United States Department of Agriculture
Natural Resources Conservation Service

In cooperation with
University of Alaska Fairbanks Agricultural and Forestry Experiment Station, and
State of Alaska Department of Natural Resources

Soil Survey of Matanuska-Susitna Valley Area, Alaska

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and State and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1992. Soil names and descriptions were approved in 1995. Unless otherwise indicated, statements in this publication refer to conditions in the Survey Area in l995. This survey was made cooperatively by the Natural Resources Conservation Service, the University of Alaska Fairbanks Agricultural and Forestry Experiment Station, and State of Alaska Department of Natural Resources. It is part of the technical assistance furnished to the Palmer, Wasilla, and Upper Susitna Soil and Water Conservation Districts.

Soil Maps in this survey may be copied without permission. However, enlargements of these maps could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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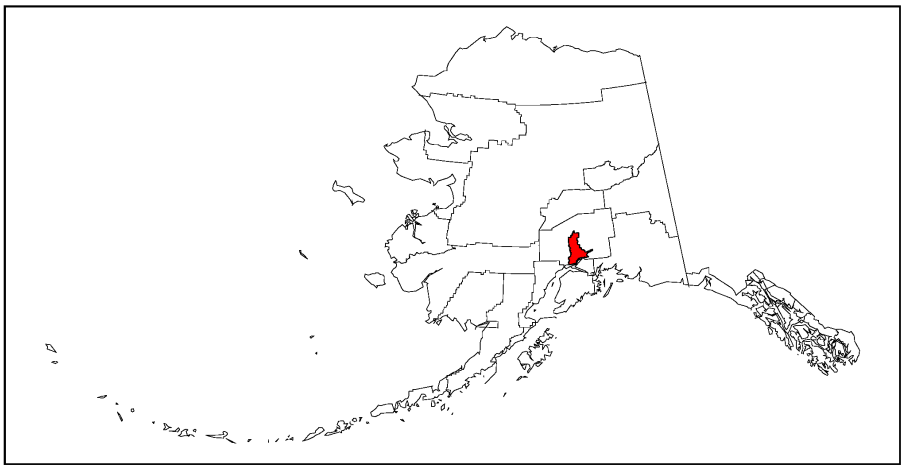
Cover: The sparsely vegetated floodplain of the Matanuska River, in the foreground, consists of gravelly riverwash and Niklavar soils. The steep slopes of the Talkeetna Mountains, illustrated in the background, have Cryods and Cryumbrepts soils.



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Foreword

This soil survey contains information that can be used in land-planning programs in the Matanuska-Susitna Valley Area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, wildlife managers, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations. These and many other soil properties that affect land use are described in this soil survey.

Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the Survey Area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Alaska Cooperative Extension.

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Soil Survey of
Matanuska-Susitna Valley Area, Alaska

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Introduction

The Soil Survey of Matanuska-Susitna Valley Area, Alaska is an update of "Soil Survey of the Matanuska Valley Area, Alaska" (*Schoephorster 1968*) and "Soil Survey of the Susitna Valley Area, Alaska" (*Schoephorster and Hinton 1973*). A number of unpublished soils investigations and areas previously not surveyed have been incorporated into this updated survey.

The primary purpose of the original surveys was to provide soils information for agricultural land uses. Soil material differences below 30 inches (below 76 cm), which normally do not influence agronomic interpretations, were not clearly separated. Since publication of those surveys, the Matanuska-Susitna Valley Area has experienced significant population growth and localized urbanization. As a result, the need for additional soils information and non-agricultural interpretations has increased proportionately.

A major purpose of the updated survey is to provide interpretations for urban land uses that take into account characteristics and properties of subsoil materials. Soils were examined to a depth of 60 inches (152 cm) and separated based on subsoil differences. Each soil was correlated to an ecological site to provide data and interpretations on vegetation succession, forestry, livestock grazing, and wildlife habitat. Updated soil maps at a scale of 1:24,000, map unit descriptions, and interpretation tables are provided for the entire Area.

The Matanuska-Susitna Valley Area includes approximately 1.5 million acres (607,300 hectares) of lowlands, hills, and mountains in the Cook Inlet-Susitna Lowlands and Talkeetna Mountains in Southcentral Alaska (Figure 1). The Area is bounded on the east

by the Talkeetna and Chugach Mountains, on the south by waters of the Knik River and Knik Arm of Cook Inlet, and on the west by the Susitna River and Kroto Creek. Elevation ranges from sea level along the southern border with the Knik Arm to 5600 feet (1707 m) in the Talkeetna Mountains.

The Area lies entirely within the Matanuska-Susitna Borough and the Palmer, Wasilla, and Upper Susitna Soil and Water Conservation Districts. Principal centers of population include Palmer, Wasilla, Talkeetna, Willow, and Sutton. Major transportation routes are the Glenn and Parks Highways and the Alaska Railroad. The Glenn Highway traverses the Matanuska Valley and serves as the principal connecting route from Anchorage to the Alaska Highway, Canada, and the lower 48 states. The Parks Highway and Alaska Railroad cross the eastern Susitna Valley providing access to Fairbanks and Interior Alaska.

How This Survey Was Made

The Soil Survey of Matanuska-Susitna Valley Area, Alaska is a compilation and update of soil surveys and investigations done in the 1960s and 70s, remapping of portions of the older surveys, and mapping of previously unmapped areas. The published soil surveys and unpublished soil investigations were evaluated to determine if mapping and interpretations were adequate for current and projected land uses and soils information needs. Areas where deficiencies existed were then targeted for remapping and additional data collection. Relevant references and other information on climate, geology, geomorphology, hydrology, and vegetation of the Area were researched.

Aerial photography covering the entire Survey Area was acquired and prepared for field use and mapping. Recent 1979-84 color, infrared photography at a nominal scale of 1:60,000 was enlarged to a scale of approximately 1:24,000 and printed in black-and-white. The existing soil surveys, reference information, and new photography were studied in detail to determine general soil-landform and soil-vegetation relationships. Potential users of the survey provided input that helped define survey objectives, procedures, and interpretative needs.

Mapping Intensity. The level of mapping intensity and amount of new fieldwork were determined to a large degree by the anticipated intensity of land use and accessibility. During this survey, the majority of time and resources was spent in areas of existing and potential urban and agricultural development, primarily accessible lands within two miles of the present primary and secondary road system. Approximately 360,000 acres (145,800 hectares), or 24 percent of the Area, along the Parks and Glenn Highways and other local roads were completely remapped. Soil map unit boundaries were determined in the field, and considerable new data on soils and associated resources were collected.

The remaining 1.14 million acres (461,700 hectares) of the Area, which were remote from the existing road system and accessible only by helicopter and boat, were mapped at a lower level of intensity. In these areas, existing mapping was checked for accuracy and map unit boundary line placement, and deficiencies were corrected. Mapping was also extended across previously unmapped areas. Whenever possible, soil map unit boundaries were determined in the field; elsewhere, boundaries were interpreted from the aerial photography and known soil-landform and soil-vegetation relations. New data were collected on forest, understory, and range composition and productivity.

Field Data Collection. Field mapping and data collection were accomplished by traversing the landscape and running detailed transects in representative delineations of soil map units. A traverse is a field procedure used by soil scientists to determine the kinds of soils in an area and to assign a particular soil body to a specific map unit. During the traverse, soil pits were dug on representative segments of the landscape, profile characteristics were described, and geographic variation of the soils and preliminary map unit boundaries were noted and adjusted. The traverse also provided a permanent record of specific delineations for future reference. Approximately one-half of all map unit

delineations in the intensively mapped portion of the Area were traversed. In the remaining areas, preliminary mapping was accomplished using stereoscopic interpretations of the aerial photographs and reviewing the previous soil survey maps.

Following preliminary mapping, detailed soil-vegetation transects were run across selected delineations of each map unit. A transect is a field procedure used to determine the properties and range in characteristics of the soils and other resources of a map unit. Composition and location of the soil components are also determined.

Each transect consisted of one to ten or more data collection stops, depending on the size of the delineation and complexity of the map unit. Stops were spaced at predetermined, paced intervals or by sampling representative landform positions. General detailed data on soils and vegetation were collected at each stop. Corresponding data and notes were linked using common transect and stop numbers. All transect locations were plotted on overlays to the aerial photographs and on USGS 1:63,360 topographic maps for permanent record and later reference during map preparation and data analysis.

The number of transects in each map unit was determined by the intensity of mapping and data needs and accessibility. At least three representative delineations of each map unit were transected in the intensively mapped portion of the Area. In the remaining areas, as many transects as time and access allowed were completed. Most map units were transected at least twice.

Soils Methods. During traverses and transects, data on landscape characteristics and soil properties were collected and field observations were recorded. Landscape characteristics included slope, depth to water table, and landform; soil properties included soil horizons, texture, rock fragments, and reaction. Soil slope was measured using a clinometer, and length was estimated. Soil properties, such as horizon depth and color, roots, and coarse fragments, were described and recorded. Texture was estimated by the "feel" or hand texturing method, and reaction was measured with soil pH indicator solutions. Soil descriptions were completed using standard guidelines, codes, and terminology provided in the "National Soil Survey Handbook" (*Soil Survey Staff 1996b*) and "Soil Survey Manual" (*Soil Survey Division Staff 1993*).

After describing the soils in the Survey Area and determining their properties, the soils were assigned to taxonomic classes (units). "Soil Taxonomy" (*Soil Survey Staff 1975*) and "Keys to Soil Taxonomy" (*Soil Survey Staff 1996c*) provide the system of taxonomic classification used in the United States and many other countries. This system is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After classifying and naming the soils in the Survey Area, they can be compared with similar soils in the same taxonomic class in other areas to confirm properties and standardize technical nomenclature, thereby providing a basis for the transfer of soils information.

Taxonomic classes are concepts, with each taxonomic class having a set of soil characteristics with precisely defined limits. However, these limits are artificial and often do not correspond with the natural range of soil properties as they occur in the field. In the detailed map unit descriptions in this report, the ranges are reported for both the taxonomic class and for the soil component as observed on the landscape.

While the soil survey was in progress, samples of some of the soils in the area were collected for laboratory analyses and engineering tests. These data, together with the observed soil characteristics and properties, were used to predict the expected behavior of the soils under different land uses. Some interpretations were modified to meet local needs.

Vegetation Methods. Detailed vegetation data were only collected on the soil-vegetation transects. Types of data included vegetation type; stand structure and species cover; age, diameter, and height of site trees; and current annual production of vascular plants. On most transects, data were collected in at least one stand in each major vegetation type. Not all types of data were collected in each stand.

A plotless reconnaissance technique was used to record the horizontal layering of the stand and the canopy cover of all plant species. Data were collected within an area of the stand approximately centered on the soil pit. The size of the sample area was variable but

encompassed an area large enough to encounter all species in the stand and adequately represent the variability within the stand. Canopy cover by species of vascular plants and total moss, total lichen, and other ground cover was ocularly estimated to the nearest 5 percent (nearest 1 percent when cover was less than 7 percent). Total basal area of trees was measured using angle gauges.

Site trees were selected from dominant and codominant trees that were free of major defects and disease. Age and diameter were measured at breast height, approximately 4.5 feet (0.4 m) above the base. Age was determined from cores extracted with an increment borer. Total height was measured using horizontal distance and percent scale techniques. Between two and six trees of a particular species were measured in each stand.

Current annual production data were collected in typical or representative areas of the stand using a modified double sampling technique. Production data were collected in most unforested vegetation types and in forest vegetation types suitable for livestock grazing.

General Nature of the Area

Climate

The climate of the Matanuska and Susitna Valleys is transitional maritime-continental, characterized by long cool winters and short warm summers. Long term climatic data for two stations in the area, Palmer and Talkeetna, are provided in Tables 1, 2, 3, and 4. At Palmer, which is near the Knik Arm of the Cook Inlet, maritime influences are more evident and winter temperatures are relatively moderate. At Talkeetna, approximately 100 miles (160 km) inland, continental influences are stronger, and temperatures are more extreme in both winter and summer.

The Chugach Mountains and Cook Inlet have substantial influence on the climate of the Matanuska-Susitna Valley Area. The Chugach Mountains form a partial barrier against moist oceanic air moving in from the Gulf of Alaska and Prince William Sound. Most of the precipitation carried by weather systems originating in the Gulf falls on the windward slopes of the Chugach Mountains. The Matanuska Valley lies in the rain shadow created by the Chugach Mountains. However, the Susitna Valley is directly exposed to moist oceanic air moving up Cook Inlet from the southwest. This air backs up against the Talkeetna Mountains, producing higher precipitation in the Susitna Valley and Talkeetna Mountains compared to the Matanuska Valley.

Long term temperature and precipitation data have been recorded at the Agricultural and Forestry Experiment Station in Palmer (NOAA recording station Palmer AAES, 6870) and at the airport in Talkeetna (Talkeetna WSCMO AP, 8976).

Temperature. Average monthly temperatures during summer are similar for Palmer and Talkeetna (Tables 1 and 2). For July, the average is 57.4 °F (14.1 °C) at Palmer and 58.2 °F (14.6 °C) at Talkeetna. Daily high temperatures in summer occasionally exceed 80 °F (26.7 °C). Daily minimum temperatures in summer are generally between 44 and 47 °F (6.7 and 8.3 °C) at both locations. Freezing temperatures have been recorded as late as June 5 and as early as August 22 at Palmer (Table 3). The frost-free period is usually greater at Talkeetna (Table 4).

Average monthly temperatures during winter are significantly higher at Palmer compared to Talkeetna. For January, the average is 12.8 °F (-10.7 °C) at Palmer and 9.7 °F (-12.4 °C) at Talkeetna. Persistent high pressure may dominate the region for several days or weeks during winter, bringing relatively cold temperatures to the Area. Persistent low temperatures of -20 °F (-28.9 °C) or less at Palmer and -30 °F (-34.4 °C) or less at Talkeetna occur during most winters. In the Susitna Valley, high pressure coupled with the lack of significant air circulation allows heat to radiate to space, further lowering winter

temperatures. In the Matanuska Valley, high pressure gradients between the coastal lowlands and Copper River Basin to the east generate strong winter winds along the Matanuska River, which moderate the temperature but escalate the wind chill factor.

Data for the last date in spring and the first date in fall when air temperature drops below certain threshold temperatures are given in Table 3 for Palmer and Table 4 for Talkeetna. The number of continuous days during which the temperature does not drop below the threshold is given in Tables 5 and 6. The threshold temperatures are 32 °F (0 °C), 28 °F (-2.2 °C), and 24 °F (-4.4 °C). The data in these tables are based on records from 1950 through 1993 for both the Palmer and Talkeetna recording stations.

The probability of certain last and first dates, and the number of days, is expressed as the number of years in ten. For example, at Palmer one can expect that the temperature will not drop below 32 °F (0 °C) after May 15 or before September 14 in five years out of ten (Table 3), or for a period of 119 days (Table 5). On the other hand, a frost-free season, above 32 °F (0 °C), of 142 days can be expected in one year out of ten (Table 5).

Precipitation. Average annual precipitation is about 15 inches (38 cm) at Palmer and about 28 inches (71 cm) at Talkeetna (Tables 1 and 2). Precipitation is usually light in spring; average precipitation during May and June is 0.68 and 1.35 inches (1.7 and 3.4 cm) at Palmer and 1.47 and 2.37 inches (3.7 and 6.0 cm) at Talkeetna. Precipitation increases in summer and early autumn to a maximum of 2.47 inches (6.3 cm) during September at Palmer and to 4.6 inches (11.7 cm) during August at Talkeetna. Average annual snowfall is about 45 inches (114 cm) at Palmer and about 115 inches (292 cm) at Talkeetna.

Soil moisture balance, and to a degree ground water recharge and surface water storage, are determined in part by evapotranspiration. Patric and Black (*1968*) compared annual precipitation and potential evapotranspiration for the Area to determine regional soil water deficits or surpluses. Potential evapotranspiration, which is defined as water losses (to the atmosphere) from fully vegetated land surfaces abundantly supplied with water, was calculated from available temperature and precipitation data from various weather reporting stations. Data indicated that, on the average, an annual moisture deficit exists for the Matanuska and southern Susitna Valleys and a moisture surplus exists for the northern Susitna Valley.

Wind. The proximity of the Gulf of Alaska to the south, and the effects of the rugged terrain surrounding the Matanuska Valley, contribute to strong seasonal winds in the Matanuska-Susitna Valley Area, particularly in the vicinity of Palmer. The "Matanuska" winds blowing down the Matanuska River canyon in winter and "Knik" winds down the Knik River floodplain in spring and summer (and occasionally winter) are well known to local residents and pilots. In spring, when the "Knik" winds, and sometimes "Matanuska" winds, are strong, blowing dust up to 3000 feet (914 m) or higher (Plate 1) darkens the air. The best agricultural soils in the Matanuska Valley are formed in this wind blown dust called loess. The blowing snow and extreme chill factors associated with winter winds impact recreational activities, transportation, and other land use activities throughout the Area.

Landforms and Geologic Deposits

A complex of floodplains and stream terraces are found along most of the length of the Matanuska and Susitna Rivers. The broad, braided floodplains, characteristic of high gradient glacial rivers, are occasionally one mile (1.6 km) or more in width. Floodplain features include point bars, cutoff meanders, and back swamps. Stream terraces are generally discontinuous and often narrow in width. Short, steep escarpments between floodplains and different terrace levels are found in many places. Soil parent materials on floodplains and stream terraces include stratified sandy and silty alluvium of varying thickness over gravelly and sandy alluvium. Seasonal depth to water table in floodplain soils fluctuates in response to periodic changes in river discharge and water level.

A variety of glacial landforms and associated features, formed during Quaternary

Glaciation (Plate 2) (*Péwé 1975*), are found above the floodplains and stream terraces at elevations ranging from about 150 to 500 feet (46 to 152 m). Glacial landforms include nearly level and undulating outwash and till plains, pitted outwash plains, steep hills, and, in a few places, wind deposited sand sheets and dunes. Soil parent materials include loose sandy and gravelly glacial outwash, friable to firm loamy and gravelly glacial drift, and firm gravelly glacial till. On hills and lower mountain slopes, bedrock is often present within 60 inches (152 cm) of the surface. Poorly drained bogs and fens occupy broad depressions and comprise a large portion of the landscape in the upper Susitna Valley. The tidal plains along the Knik Arm of Cook Inlet consist of silty and clayey sediments.

Steep hills and mountain slopes and broad to narrow valleys characterize much of the landscape at higher elevations in the Talkeetna and Chugach Mountains. In the valleys and on hills and lower mountain slopes, thick deposits of glacial drift often mask the underlying bedrock topography (Plate 3). A variety of rock types are exposed along the upper Matanuska River canyon and the Talkeetna and Chugach Mountains. Igneous intrusive rocks of Jurassic through Tertiary age comprise most of the core of the Talkeetna Mountains, with Mid-Jurassic to Late Cretaceous sedimentary and metamorphic rocks exposed along the Matanuska River canyon and eastern Talkeetna Mountains. Tertiary sedimentary rocks are the most commonly exposed rocks along the Chugach Mountains.

Eolian Deposits. Most uplands throughout the Area are covered with a layer of silty airborne or eolian deposits. Eolian deposits include loess derived primarily from floodplains of braided glacial rivers, and volcanic ash originating from volcanoes in the Alaska and Aleutian Ranges.

In the Matanuska Valley, the surface mantle consists primarily of loess. Loess continues to accumulate today as the Matanuska and Knik winds and the nearly barren floodplains of the Matanuska and Knik Rivers combine to produce significant amounts of airborne dust (Plate 1).

In the Susitna Valley and on the western slopes of the Talkeetna Mountains, which are closer to the volcanoes of the Alaska and Aleutian ranges, the surface mantle is composed of mixed loess and volcanic ash. The loess component was probably derived from the Susitna River floodplain and adjacent outwash areas during and immediately after Pleistocene Glaciation when vegetation was sparse and strong winds were more common. Dense vegetation and general lack of winds today minimize continuing loess depositions. However, periodic volcanic eruptions continue to add volcanic ash to area soils.

The thickness of eolian deposits varies throughout the Area. Loess deposits are thickest in the Palmer vicinity. Cliff-head dunes, with loess as much as 50 feet (15 m) thick, can be found on escarpments adjacent to the Matanuska River. Cliff-head dunes are immediately adjacent to floodplain source areas and often have a fairly high composition of sand. Within a mile or two to the north and west, the loess mantle thins to about 30 inches (76 cm) thick and is dominated by silt size particles. Near Big Lake, about 20 miles (32 km) west of Palmer, the loess mantle thins to about 4 inches (10 cm). Towards the Susitna River and upper Susitna Valley and western Talkeetna Mountains, the surface mantle gradually changes to one of mixed loess and volcanic ash and increases to about 18 inches (46 cm) thick.

Geological deposits of commercial value. Large deposits of gravel and sand, suitable for road construction and concrete, occur throughout most of the Area. Several trainloads of gravel are exported daily from the Palmer area to Anchorage during the busy summer construction season. Bituminous coal is mined near Sutton, and deposits of marl near Wasilla are used on a small scale for agricultural purposes. Large peat deposits are common in bogs and fens (Plate 12), but thus far these have not been utilized on a commercial scale. One hardrock gold mine and several placer gold mines are located in the Talkeetna Mountains, but at present most mines are inactive.

Water Resources

Water resources of the Matanuska-Susitna Valley Area include an intricate and extensive network of glacial rivers and non-glacial streams; numerous lakes, ponds, and other wetlands; and underground aquifers. The Matanuska and Susitna Rivers are the principal rivers in the region, draining a total area of about 21,500 square miles (55,685 km^2) (*Lamke 1979*). These rivers originate from large glaciers in the Talkeetna Mountains, Alaska Range, and Chugach Mountains. Many non-glacial streams, such as Willow, Moose, Montana, Kroto, and Goose Creeks, flow from the surrounding mountains into the Matanuska River or Susitna River drainages. Lakes are numerous throughout the project area and are locally abundant in the Kepler-Bradley Lake complex near Palmer, the Big Lake-Meadow Lakes area near Houston, and Nancy Lakes near Willow. Extensive bogs, fens, and other wetlands are found throughout the Area, particularly in the Susitna Valley.

Groundwater resources have been evaluated for the Matanuska Valley based on well log data (*Montgomery 1990*). Regional water table slope in the central Matanuska Valley is generally toward the Matanuska River. Well logs indicate regional water table depths of about 60 to 80 feet (18.3 to 24.4 m) on the Palmer Terrace and about 120 to 150 feet (36.6 to 45.7 m) along the Palmer-Wasilla Highway and Knik Road to Goose Bay. Depth to water table in the Meadow Lakes and Big Lake area is generally less than 60 feet (less than 18.3 m).

In addition to the regional water table, several water table mounds have been mapped in the Area. Water table mounds, which mostly straddle watershed boundaries, indicate that recharge to the shallow groundwater system from precipitation and snowmelt probably occurs widely throughout the area.

Native Vegetation

The majority of the Matanuska-Susitna Valley Area is forested. Forest cover types on floodplains and low stream terraces include balsam poplar, balsam poplar-white spruce, paper birch, and paper birch-white spruce1. On stream terraces and across much of the uplands, the predominant forest cover types include paper birch and paper birch-white spruce. Upland paper birch stands often contain a high percentage of quaking aspen. Many upland areas in the Susitna valley, which reportedly burned in the early part of this century (*Hegg 1970*), support black spruce and mixed black spruce-paper birch-quaking aspen forest. Extensive stands of quaking aspen are found in the Matanuska River canyon. These stands are also believed to be the result of old burns (*Hegg 1970*).

Intermixed throughout much of the forested zone, particularly in the Susitna Valley, are extensive lowland bogs dominated by stunted black spruce, ericaceous shrubs, and sphagnum moss. Fens and other gently sloping drainages dominated by willow, alder, and a variety of sedges and other hydrophytes are also common in the Susitna valley. Halophytic wet sedge meadows and marsh occupy the upper tidal zone along the Knik Arm of Cook Inlet.

Treeline occurs between 2000 to 2500 feet (610 to 762 m) elevation in most places. However, in some places in the northern portions of the Susitna valley, treeline is as low as 1000 feet (305 m) elevation. The transition between the forested zone and the alpine zone above is characterized by a mosaic of open stands of white spruce and mixed paper birch-white spruce, alder shrub, bluejoint reedgrass grassland, and occasional pockets of cottonwood (Plate 5). Alder shrub, willow shrub, and bluejoint reedgrass grassland in the subalpine zone are rapidly replaced, with increasing elevation, by a variety of dwarf shrub and herbaceous plant communities characteristic of the true alpine.

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1 Scientific names of plants mentioned in the text are given in Table 10.

The forested portion of the area is included in Major Land Resource Area 170, Cook Inlet-Susitna Lowland (*Soil Conservation Service 1981*), and the Northern Forest Formation, Susitna-Matanuska Valley Zone (*Packee 1994*). The portion of the area near and above treeline is included in Major Land Resource Area 169, Southcentral Alaska Mountains (*Soil Conservation Service 1981*).

Population

According to the 1990 U.S. Census, the population of the Matanuska-Susitna Borough was 39,683. A large portion of the population is employed in the greater Anchorage area and commutes daily from the Valley. In recent years, the growing population in the Anchorage area and preference of many people to reside in the Valley has contributed to the accelerated conversion of forest and agricultural land to residential and urban uses. Approximately 250,000 acres (101,200 hectares) of land have been converted since the mid-1960s (author's estimate from aerial photography).

Outside the major cities and towns, the population of the Matanuska-Susitna Valley Area is small and widely distributed. Most rural residents live on or near the road system. Several large tracts of land in the Susitna Valley and Talkeetna Mountains have few, if any, roads and are very sparsely settled. A substantial number of homesteads, lodges, and recreational cabins are scattered throughout these remote areas, with concentrations on navigable rivers and float plane accessible lakes. Many remote homesteads are occupied year-round. Residents pursue subsistence and semi-subsistence lifestyles.

History and Settlement

"Soil Survey of the Matanuska Valley Area, Alaska" (*Schoephorster 1968*) and "Soil Survey of the Susitna Valley Area, Alaska" (*Schoephorster and Hinton 1973*) summarized the early history and settlement of the Matanuska-Susitna Valley Area. Between 1741 and 1867, most of coastal Alaska was occupied by Russian explorers and traders seeking sea otters and other fur bearing animals, which where found in abundance in the region. Russian explorers and settlers, however, seldom ventured far from coastal areas and apparently explored little of the Matanuska-Susitna Valley Area during this period.

After the United States purchased Alaska in 1867, non-native occupation and exploration of the area remained limited until the discovery of gold in the upper Cook Inlet Region in 1896. Thereafter, non-native exploration and settlement began in earnest, albeit slowly at first.

The first major center of population was located at Knik, a long established native settlement, where a trading post was set up about 1900 and a post office in 1905. This village was a center of trading and contact with Alaska natives as well as a major point of departure for prospectors and miners. Many trails, several of them still evident, radiated from Knik to places in the interior. The best known of these was the Iditarod Trail, a 365-mile route through Rainy Pass in the Alaska Range, to Flat which became the hub of mining activities in the Kuskokwim Mountains. Knik continued as the transportation and trading center of the Area and reached a peak population of about 700 in 1915. During this early period of settlement, a number of homesteads were established around Knik and along the radiating trails.

As mining expanded and the non-native population increased, the demand for farm products increased. While early prospectors and settlers had little interest or experience in agriculture, small-scale farming in the form of gardening by villagers and roadhouse operators began about 1900. Surplus vegetables were sold to miners and prospectors. Some native hay was also harvested for horses, which were used in hauling freight. By 1914, about 300 acres of land had been cleared, and a number of settlers interested primarily in farming were establishing homesteads. Potatoes and other vegetables were

the major crops, and some oats were raised for horse feed.

A Matanuska Farmers' Association was organized in 1915. Farming activities expanded following the construction of the Alaska Railroad and the establishment of the Alaska Agricultural Experiment Station's experimental farm. Dairy cattle and machinery were brought in, leading to greater diversification and a more stable farm income. During the 1920s, most homesteaders in the Area relied on other employment to supplement farm income, but a few of them eventually became successful, self-sufficient farmers.

When the Alaska Railroad was constructed in 1916, it by-passed Knik, and the population shifted to the new villages of Wasilla and Matanuska along the railroad right-of-way. That same year, a railroad spur was constructed at the present site of Palmer on a branch line to the Chickaloon coalfields. Soon afterward, a post office was established there. Mining camps and trading centers were also established at Chickaloon, Sutton, Eska, Houston, Pittman, and Willow.

The greatest single impact on settlement in the Matanuska-Susitna Valley Area came in 1935 with the development of the federally sponsored Matanuska Colony. In the spring of that year, 202 families numbering about 900 persons, mostly from the north central states, were moved to the Area and began intensive farm development near Palmer. A few of these original colonists expanded their operations and formed the nucleus of a relatively productive agricultural area (Plate 6).

Much of the Area now has access to electric power, telephones, and transportation. Modern schools are located in all communities. Roads serve most of the rural communities, and major highways connect the Area with Anchorage, Fairbanks, and other cities in the state. Urban development expanded in the 1970s with the discovery and development of oil fields on Alaska's North Slope. Limited available private land, and relatively high land prices in the Anchorage area, encouraged the conversion of forest and agricultural land in the Area to residential and urban uses.

Enterprises in the Matanuska-Susitna Valley Area today include farming, tourism, and small businesses that support the local population. Mining activity in the area includes surface and subsurface coal mining near Sutton and placer and hardrock gold mines in the Talkeetna Mountains. Forestry in the Area consists chiefly of small logging operations and sawmills that supply house logs, fuel wood, and rough cut lumber to local markets.

Agriculture

Since the early part of the century, farming has been a significant land use and industry in the Matanuska-Susitna Valley Area (Plate 6). In 1963, the farm income of the Matanuska-Susitna Area was nearly 70 percent of the total farm income for Alaska. Dairies and truck farming were the most important farm enterprises. More than 60 percent of the farm income was from milk, and potatoes were the most valuable cash crop. Poultry products, beef, veal, and some pork provided income for a few farmers. By 1995, however, competitive shipping from the lower 48 states lowered the percentage of farm products produced locally, and the farm income of the Area dropped significantly to only 52 percent of the state's total farm economy (*USDA National Agricultural Statistics Service 1997*).

The total cropland harvested in 1993 was about 10,000 acres (4050 hectares) (*USDA National Agricultural Statistics Service 1997*). Primary crops and acreage of each were approximately as follows: grasses for hay and silage—8,500 acres; oats, barley, and mixtures of small grains for hay and feed—700 acres; and commercial vegetables including potatoes, lettuce, cabbage, and carrots—810 acres.

In 1982, the State of Alaska initiated development of the Point MacKenzie farm project. Agricultural rights were sold to private individuals, with parcels totaling approximately 20,000 acres (8,100 hectares) of nearly level forestland in the southwestern part of the Area. Land was designated for dairy farms, pasture, and cropland. Land clearing on most parcels was completed by 1986 and many dairies became operational,

with several producing milk for a number of years. By 1994, only about one third of the original farm tracts continued to operate in the project area. Others were abandoned, and much of the cleared land is growing back to native scrub and forest vegetation.

General Soil Map Units

The general soils map shows broad land areas that have a distinctive pattern of landforms, soils, relief, drainage, and vegetation. Each map unit on the general soils map represents a natural landscape that consists of one or more major landforms and associated soils or miscellaneous areas. Some minor landforms, soils, or miscellaneous areas are also included in each unit. The landforms and soils making up one unit can occur in other units but in a different pattern and composition. A general soil map unit is named for the major soils within the unit as well as physiographic and geographic features of the unit.

Each general soil map unit description includes information about the physiography and landforms, soils, vegetation, and land use. The general soils map and map unit descriptions can be used to compare the suitability of large areas for general land uses. Because of the small scale of the map and the aggregate properties of the map units, the general soils map and map units are not suitable for intensive or detailed planning applications for specific land uses.

Map Unit Descriptions

1—Bodenburg-Yensus-Eska Association (Palmer Loess Plains and Hills)

Physiography. The geographic extent of this unit corresponds roughly to the area of maximum wind blown dust associated with the Knik River and Matanuska River corridors. Strong seasonal winds blowing across the broad, sparsely vegetated floodplains of these braided, glacial rivers annually deposit thin layers of silt size, wind blown material called loess on nearby surfaces. Landforms include nearly level stream terraces, undulating glacial outwash and till plains, and steep hills of the Naptowne Glaciation (47.5 to 10 thousand Years Before Present [YBP]). Slopes range from nearly level to steep. Elevation ranges from 50 to 1400 feet (15 to 427 m).

Soils. The most extensive soils in this unit are the Bodenburg, Yensus, and Eska silt loams. Approximately 35 percent of the unit consists of Bodenburg soils, 35 percent Yensus, and 20 percent Eska. Minor components in this unit are soils on hills with bedrock at less than 60 inches (less than 152 cm), poorly drained soils in depressions, flooded soils on floodplains, and soils on sand dunes along river escarpment summits.

The Bodenburg, Yensus, and Eska silt loams are very deep, well drained soils formed in thick silty loess deposits over gravelly glacial drift. Slopes range from nearly level to steep. The soil surface is typically covered with a thin layer of partially decomposed litter. The surface and subsurface "A", "Bw", and "Bg" horizons are typically silt loam 24 to over 60 inches (61 to over 152 cm) thick. The substratum "2C" horizons, when present, are extremely gravelly coarse sand, very gravelly loam, or very gravelly sandy loam. Subsoil materials are mottled with red and gray colors throughout. Reaction is slightly acid and available water capacities, soil base saturation levels, and organic matter contents are high.

In winter, strong winds blow the soil surface free of insulating snow cover and these soils tend to freeze to considerable depths. Frozen soils result in ponding in depressional areas for short periods during the spring of most years.

Vegetation. The majority of this unit is forested. Common forest types include paper birch and paper birch-white spruce forest1. Balsam poplar is a common component in many stands. Many acres have been cleared for agriculture and planted to hay and pasture grasses.

Land Use. The soils in this unit are mainly used for agriculture, urban development, wildlife habitat, gravel source areas, and occasionally forestry. The thickness of the loess cap, neutral pH levels, high base status, and high organic matter content of the Bodenburg and Yensus soils make them well suited for agricultural use. Limitations for hayland, pastureland, and cropland include slope and wind and water erosion hazard. Major soil limitations for urban development include frost action and restricted permeability. Stream terrace positions adjacent to rivers have a stream bank erosion hazard. Limitations for forestry include plant competition. Excessive slopes, where present, limit all land uses.

2—Knik-Kalambach Association (Eastern Matanuska Valley Glacial Uplands)

Physiography. The geographic extent of this unit includes the central Matanuska Valley between Palmer and Wasilla and approximates the western and northern margin of the Knik and Matanuska wind corridors. Wind blown loess, derived from the sparsely vegetated floodplains of the Knik and Matanuska Rivers, is deposited on surfaces within this unit, similar to Unit 1. However, the total accumulation of the fine textured loess material is relatively thin compared to Unit 1 due to greater distance from the source areas and lower frequency and duration of winds. Landforms include nearly level to undulating glacial outwash and till plains and steep hills of the Naptowne Glaciation (47.5 to 10 thousand YBP). Slopes range from nearly level to steep. Elevation ranges from 50 to 1400 feet (15 to 427 m).

Soils. The most extensive soils in this unit include the Knik and Kalambach silt loams. Approximately 60 percent of the unit consists of Knik soils and 30 percent Kalambach. Minor components in this unit include poorly drained soils in depressions and soils on escarpments.

The Knik and Kalambach silt loams are very deep, well drained soils formed in silty loess over gravelly glacial drift. Slopes range from nearly level to steep. The surface layer of both the Knik and Kalambach soils is typically silt loam 12 to over 24 inches (30 to over 61 cm) thick. The substratum of Knik soils is extremely gravelly coarse sand. Kalambach soil is very gravelly loam or very gravelly sandy loam in the substratum. A thin layer of fibrous and partially decomposed litter covers the soil surface. Although silty loess is deposited on the soil surface on a regular basis, the Knik and Kalambach soils are sufficiently stable for the development of brown “Bw” subsurface horizons. Enrichment of the soil by annual additions of loess favors slightly or moderately acid soil pH levels, moderately high base saturation levels, and high organic matter content.

In winter, strong winds blow the soil surface free of insulating snow cover and these soils tend to freeze to considerable depths. Frozen soils result in ponding in depressional areas for a short period of time during spring of most years.

Vegetation. The majority of this unit is forested. Common forest types include paper birch and paper birch-white spruce forest. Balsam poplar and quaking aspen are common components in many stands. Many acres have been cleared for agriculture and planted to hay and pasture grasses.

Land Use. The soils in this unit are mainly used for urban development, hayland and cropland, wildlife habitat, gravel source areas, and occasionally forestry. Major soil

1Scientific names of plants mentioned in the text are given in Table 10.

limitations for urban development include frost action and restricted permeability. Stream terrace positions adjacent to rivers have a stream bank erosion hazard. Limitations for hayland and cropland include wind and water erosion hazard. Limitations for forestry include plant competition. Excessive slopes, where present, limit all land uses.

3—Kichatna-Deception-Kashwitna Association (Western Matanuska Valley Glacial Uplands)

Physiography. This unit extends from north of Wasilla to about Houston, and south to the Point MacKenzie farm project. Landforms include nearly level to undulating glacial outwash and till plains and steep hills of the Naptowne Glaciation (47.5 to 10 thousand YBP). Relatively shallow deposits of wind blown loess material and volcanic ash over the glacial drift material characterize this unit. Slopes range from nearly level to steep. Elevation ranges from 50 to 400 feet (15 to 122 m).

Soils. The most extensive soils in this unit are the Kichatna, Deception, and Kashwitna silt loams. Approximately 35 percent of the unit consists of Kichatna soils, 30 percent Deception, and 25 percent Kashwitna. Minor components in this unit include poorly drained mineral and organic soils in depressions.

The Kichatna, Deception, and Kashwitna silt loams are very deep, well drained soils formed in loess over gravelly glacial drift. The loess mantle in these soils is an admixture of wind deposits from local braided floodplains, and volcanic ash from the southern Alaska Range and the Aleutian Range. Slopes range from nearly level to steep. The soil surface is typically covered with a thin layer of fibrous and partially decomposed moss and litter, and is typically silt loam 4 to 16 inches (10 to 41 cm) thick. The substratum of Kashwitna and Kichatna soils is extremely gravelly coarse sand. Deception has very gravelly loam or very gravelly sandy loam in the substratum. The relatively minor periodic additions of loess provide stable surface conditions and favor soil development. Soils have silt loam surface "E" horizons over "Bs" subsurface horizons, over substratum "2C" horizons consisting of very gravelly loam or very cobbly sandy loam textures. Silty surface layers are acid in the upper part, available water capacities are low or medium, and organic matter content is relatively low.

Continuous snow cover during most winters insulates these soils from low temperatures, resulting in shallow annual frost penetration.

Vegetation. The majority of this unit is forested. Major forest types include paper birch, paper birch-spruce, and quaking aspen-spruce. Quaking aspen is a common component of many paper birch stands. The spruce component of many mixed stands consists of both white and black spruce. Apparently, many stands in this area developed following extensive forest fires in the early part of the century. In the early 1980s, thousands of acres within this unit were cleared as part of the Point MacKenzie agriculture project. Many of these acres currently support brush and forest regeneration.

Land Use. The soils in this unit are mainly used for urban development, hayland and cropland, wildlife habitat, gravel source areas, and occasionally forestry. Major soil limitations for urban development include slope, frost action, and restricted permeability on Deception soils; and excessive permeability and cutbank instability on Kichatna and Kashwitna soils. Limitations for hayland and cropland include depth to gravelly material and wind and water erosion hazard. Limitations for forestry include shallow depth to contrasting layers and plant competition on some soils. Excessive slopes, where present, limit all land uses.

4—Estelle-Disappoint Association (Northwestern Matanuska Valley Glacial Uplands)

Physiography. This unit includes the southern toeslopes of the Talkeetna Mountains,

the Nancy Lakes area, and eastern Point MacKenzie. Landforms include nearly level to undulating glacial till plains and mountain toeslopes and steep hills of the Naptowne Glaciation (47.5 to 10 thousand YBP). Slopes range from nearly level to steep. Elevation ranges from 100 to 1000 feet (30 to 305 m).

Soils. The most extensive soils in this unit are the Estelle silt loam and Disappoint very cobbly mucky silt loam. Approximately 65 percent of the unit consists of Estelle soils and 25 percent Disappoint. Minor components in this unit include poorly drained, stratified sandy and silty soils on floodplains, soils on steep escarpment slopes, and very poorly drained organic soils in depressions. Soils and drainage conditions in this unit vary considerably over short distances in response to micro-relief.

The Estelle silt loam is a very deep, well drained soil formed in windblown silts and volcanic ash over gravelly glacial till. The soil surface is typically covered with a thin layer of fibrous and partially decomposed moss and litter. Minor and infrequent additions of loess provide relatively stable surface conditions that favor soil development. These soils have gray surface "E" horizons over reddish brown "Bs" subsurface horizons. Estelle silt loam occurs on hillslopes and mountain toeslopes. Slopes range from nearly level to steep. Reaction is strongly acid or moderately acid in the upper parts, and available water capacity is moderate or high.

Disappoint very cobbly mucky silt loam soils also are formed in windblown silts and volcanic ash over gravelly glacial till. Disappoint soils occur in depressions and toeslopes and are very poorly drained. These soils exhibit little soil development and horizonation other than thick, dark, organic rich surface mineral "A" horizons, formed by the accumulation of organic materials under periodically saturated conditions. Slopes are nearly level to sloping with plain or concave microrelief. Disappoint soils are strongly acid or moderately acid in the upper parts with moderate or high available water capacities.

Continuous snow cover during most winters insulates these soils from low temperatures, resulting in shallow annual frost penetration.

Vegetation. The majority of this unit is forested. Common forest types include paper birch and paper birch-white spruce on well drained soils, and mixed paper birch, white spruce, and black spruce on poorly drained soils. Quaking aspen is a common component in many stands on well drained soils. Similar to the transition between soil types, changes in vegetation are gradual and subtle between well drained and poorly drained soils. Vegetation can be an uncertain indicator of soil drainage conditions.

Land Use. The soils in this unit are mainly used for wildlife habitat, gravel source areas, remote homesites, and occasionally forestry. The main limitations for agricultural land use are depth to gravelly material on Estelle soils, and depth to water table and surface cobbles on Disappoint soils. Limitations for urban development include restricted permeability and frost action on Estelle soils, and frost action and depth to water table on Disappoint soils. Limitations for forestry include plant competition on Estelle soils, and depth to water table and plant competition on Disappoint soils. Excessive slopes, where present, limit all land uses.

5—Nancy-Benka Association (Central Susitna Valley Glacial Outwash Plains and Hills)

Physiography. This unit is limited to a narrow strip of terrain approximately 3 to 10 miles (4.8 to 16 km) wide adjacent to the Susitna River floodplain between Willow and Chase. Landforms are dominantly nearly level glacial outwash plains and hills of the Naptowne Glaciation (47.5 to 10 thousand YBP). Soil parent materials include a mantle of loess and volcanic ash 14 to 26 inches (36 to 66 cm) thick overlying very gravelly and sandy glacial outwash material. Slopes are typically nearly level to very steep. Elevation ranges from 100 to 600 feet (30 to 183 m).

Soils. The most extensive soils in this unit include the Nancy and Benka silt loams. Approximately 50 percent of the unit is Nancy soils and 40 percent Benka. Minor

components include very poorly and poorly drained mineral and organic soils in depressions and well drained soils with stratified sandy and silty substratums. Nancy and Benka soils consist of 14 to 26 inches (36 to 66 cm) of loess and volcanic ash over sandy and very gravelly material, respectively.

The silty mantle in these soils is an admixture of loess from distant floodplain source areas and volcanic ash from the southern Alaska Range and the Aleutian Range. Relatively low additions of loess provide stable surface conditions which favor soil development. Soils have silt loam texture surface "E" and subsurface "Bs" horizons, and substratum "2C" horizons. Slopes are nearly level to steep. Soils are strongly acid in the upper parts and have medium available water capacities.

Continuous snow cover during most winters insulates these soils from low temperatures, resulting in shallow annual frost penetration.

Vegetation. The majority of this unit is forested. Common forest types include paper birch and paper birch-white spruce. Quaking aspen is a common component in many stands of paper birch. Some areas, which apparently burned in the early part of the century, currently support black spruce and black spruce-hardwood forests.

Land Use. The soils in this unit are mainly used for wildlife habitat, rural homesites, gravel source areas, and occasionally forestry and hayland and cropland. Major soil limitations for hayland and cropland include acid soil conditions, wind erosion, depth to gravelly or sandy material, and excessive late summer precipitation. Limitations for urban development include frost action and cutbank instability on Benka soils and frost action, cutbank instability, and excessive permeability on Nancy soils. Plant competition and moose browsing are significant limitations for forest management. Excessive slopes, where present, limit all land uses.

6—Benka-Delyndia-Liten Association (Southern Susitna Valley Glacial Outwash Plains and Hills)

Physiography. The geographic extent of this unit includes uplands along the lower reaches of the Susitna River. Landforms are dominantly nearly level glacial outwash plains and stable sand dunes of the Naptowne Glaciation (47.5 to 10 thousand YBP). Parent materials include a mantle of loess and volcanic ash 4 to 26 inches (10 to 66 cm) thick overlying very sandy outwash and windblown materials. Slopes typically are nearly level to steep. Elevation ranges from 50 to 200 feet (15 to 61 m).

Soils. The most extensive soils in this unit include the Benka, Delyndia, and Liten silt loams. Approximately 40 percent of the unit is Benka soils, 25 percent Delyndia, and 20 percent Liten. Minor components include very poorly and poorly drained organic and mineral soils in depressions, soils on escarpment slopes, very poorly and poorly drained soils on floodplains, and well drained soils with stratified silty and sandy substratums. Benka and Delyndia soils consist of 14 to 26 inches (36 to 66 cm) of mixed loess and 4 to 10 inches (10 to 25 cm) of volcanic ash over sandy glacial outwash. Liten soils consist of 4 to 10 inches (10 to 25 cm) of loess and volcanic ash over windblown sand.

The silty mantle in these soils is an admixture of loess from distant floodplain source areas and volcanic ash from the southern Alaska Range and the Aleutian Range. Relatively low additions of loess provide stable surface conditions favorable to soil development. These soils have silt loam surface "E" horizons over subsurface "Bs" horizons, are strongly acid in the upper parts, and have low to medium available water capacities.

Continuous snow cover during most winters insulates these soils from low temperatures, resulting in shallow annual frost penetration.

Vegetation. The majority of this unit is forested. Major forest types include paper birch-white spruce and paper birch. Some areas, which apparently burned during the early part of the century, currently support black spruce and black spruce-quaking aspen forest.

Land Use. The soils in this unit are mainly used for wildlife habitat, rural homesites,

and occasionally forestry and hayland and cropland. Major soil limitations for hayland and cropland include acid soil conditions, wind erosion, depth to sandy material, and excessive late summer precipitation. Limitations for urban development include frost action and cutbank instability. Plant competition is a significant limitation for forest management. Excessive slopes, where present, limit all land uses.

7—Tokositna-Chunilna-Histosols Association (Susitna Valley Glacial Till Plains and Hills)

Physiography. The geographic extent of this unit is along the western toeslopes of the Talkeetna Mountains and the northern Susitna Valley. Landforms are dominantly undulating glacial till plains and hills with intervening bogs in depressions of the Knik Glaciation (75 to 50 thousand YBP). Parent materials include an admixture of loess and volcanic ash over gravelly glacial till in uplands and organic materials in bogs. Slopes range from nearly level to moderately steep. Elevation ranges from 400 to 2000 feet (122 to 610 m).

Soils. The most extensive soils in this unit include Tokositna silt loam, Chunilna mucky silt loam, and Histosols. Approximately 50 percent of the unit consists of Tokositna soils, 20 percent Chunilna, and 20 percent Histosols. Minor components include very poorly and poorly drained mineral soils consisting of stratified sandy, silty, and gravelly materials on floodplains; well drained soils with stratified sandy and silty substratums; and soils on steep escarpment slopes.

The Tokositna silt loam is a very deep, well drained soil formed in windblown silts and volcanic ash over gravelly glacial till on till plains and hillslopes. Slopes range from nearly level to moderately steep. The soil surface is typically covered with a thin layer of fibrous and partially decomposed moss and litter. Minor and infrequent additions of loess provide relatively stable surface conditions that favor soil development. These soils have silt loam surface "E" over subsoil "Bhs" and "Bs" horizons, over very gravelly loam and very cobbly loam "2BC" and "2C" substratum horizons. Reaction is very strongly or strongly acid in the upper part with moderate available water capacities.

Chunilna mucky silt loam soils are also formed in windblown silts and volcanic ash over gravelly glacial till. They occur in depressions and toeslopes and are very poorly drained. These soils have thick mucky silt loam surface "A" horizons over silt loam subsurface "Bg" horizons. These layers formed under periodically saturated conditions and are underlain by "2C" substratum horizons. Slopes are nearly level to sloping with plain or concave microrelief. Reaction is strongly acid in the upper parts with medium or high available water capacities.

The nearly level Histosols soils are very deep and very poorly drained. The surface "Oi" horizon consists of a thin mat of undecomposed moss and organic material. The upper "Oe" and "Oa" layers are organic materials of varying degrees of decomposition. Total thickness of the organic layers range from 16 to over 60 inches (41 to over 152 cm) thick. Below this are organic "Oa" and "Oe" horizons consisting of organic materials of varying degrees of decomposition or mineral "Bg" horizons of variable texture. Slopes are nearly level. Reaction is very strongly acid to slightly acid in the upper parts and available water capacities are high.

Continuous snow cover during most winters insulates these soils from low temperatures, resulting in shallow annual frost penetration.

Vegetation. The majority of this unit is forested. Common forest types include white spruce-paper birch and paper birch. Poorly drained Chunilna soils often support black spruce and black spruce-paper birch forest types and alder scrub. Histosols are generally unforested or support only stunted black spruce woodland. Non-forest types include ericaceous shrub scrub and sedge wet meadow.

Land Use. The soils in this unit are mainly used for wildlife habitat, gravel source areas, remote homesites, and occasionally forestry and hayland and cropland. Major soil

limitations for urban development include restricted permeability and depth to water table on Chunilna soils, and depth to water table and low soil strength on Histosols soils. Major soil limitations for hayland and cropland include depth to water table on Chunilna and Histosols soils, and occasional surface boulders on Tokositna soils. Major soil limitations for forestry include plant competition on Tokositna soils, depth to water table and plant competition on Chunilna soils, and depth to water table on Histosols soils. Excessive slopes, where present, limit all land uses.

8—Histosols (Peatlands)

Physiography. This unit is found throughout the Susitna Valley. Peatlands include a wide variety of bogs and fens in depressions and other low landscape positions on till plains, outwash plains, stream terraces, and hills. Soil parent materials include organic materials greater than 16 inches (greater than 41 cm) thick over varied organic or mineral materials. Slopes are nearly level. Elevation ranges from 50 to 400 feet (15 to 122 m).

Soils. The most extensive soils in this unit are the Histosols. They comprise about 85 percent of this unit. Minor components include well drained mineral soils on convex positions and water.

Histosols soils are very deep, very poorly drained soils formed in organic "Oi", "Oa", and "Oe" horizons, with thickness ranging from 16 to over 60 inches (41 to over 152 cm). The subsurface layers are organic "Oe" and "Oa" horizons or mineral "Bg" horizons of variable texture. Slopes are nearly level. Reaction is very strongly acid to slightly acid in the upper parts, and available water capacities are high.

Continuous snow cover during most winters insulates these soils from low temperatures, resulting in shallow annual frost penetration.

Vegetation. Native vegetation on Peatlands consists of stunted black spruce woodland, ericaceous shrub scrub, and sedge wet meadows and bog meadows.

Land Use. The soils in this unit are mainly used for wildlife habitat. The main limitations for all uses are wetness associated with the apparent water table and low soil strength associated with organic soil materials.

9—Typic Cryaquents-Histosols-Tidal Flats Association (Tidal Marshes)

Physiography. The geographic extent of this unit includes the tidal flats areas along the Knik Arm of the Cook Inlet. These areas are inundated during high tides, especially during spring. The landform is a nearly level tidal flat. Elevation ranges from 0 to 30 feet (0 to 9 m).

Soils. The most extensive soils in this unit include Cryaquents and Histosols soils. Approximately 70 percent of the unit consists of Cryaquents and 20 percent Histosols. Minor components include tidal channels, water, and nonvegetated tidal flats.

Cryaquents are very deep and very poorly drained soils. The surface "A" and subsurface "Bg" horizons are stratified silt, silty clay loam, and silty clay, to over 60 inches (over 152 cm). Reaction is very strongly or strongly acid in the upper part and available water capacity is variable.

Histosols soils are very deep and very poorly drained. These soils occur in elevated positions and are rarely inundated by tides. The surface and subsurface "Oi", "Oe", and "Oa" horizons consist of organic materials of varying degrees of decomposition 16 to over 40 inches (41 to over 102 cm) thick. The lower subsoil "Bg" horizons are stratified silt, silty clay loam, and silty clay. Reaction is neutral to slightly acid in the upper parts, and available water capacity is high.

High water tables from tidal inundation prevent deep annual frost penetration.

Vegetation. Most places in this unit are vegetated with halophytic sedge wet meadow

and sedge-grass wet meadow. Salt-tolerant grasses and sedges dominate these communities. Willow, alder, and other shrubs occur along the edges of channels and on elevated micro-sites.

Land Use. The soils in this unit are mainly used for wildlife habitat. The main limitations for all uses include tidal flooding, shallow water table, and low soil strength.

10—Susivar-Niklavar Association (Susitna Valley Floodplains)

Physiography. This unit includes the floodplains of the Susitna, Chulitna, and Talkeetna Rivers. Floodplains include both frequently flooded low positions and less frequently flooded higher positions. Slopes are nearly level. Elevation ranges from 30 to 400 feet (9 to 122 m).

Soils. The most extensive soils in this unit include the nearly level Susivar and Niklavar fine sandy loam. Approximately 60 percent of the unit consists of Susivar soils and 30 percent Niklavar. Minor components include soils with less than 10 inches (less than 25 cm) of stratified sand and silt over gravel, very poorly drained soils in sloughs and cutoff meanders, active stream channels, water, and nonvegetated gravel and sand bars.

Susivar soils are very deep and somewhat poorly drained. The surface and subsurface "AC", "C", and "Bg" horizons consist of stratified sand and silt 40 to over 60 inches (102 to over 152 cm) thick. The substratum "2C" horizons, when present, are very gravelly coarse sand. Reaction is strongly or moderately acid in the upper parts and available water capacity is high. Water table depths within these soils fluctuate widely in response to changing river levels from spring through fall.

Niklavar soils are very deep and poorly drained. The surface is intermittently covered with a thin mat of undecomposed organic material. The surface and subsurface "A" and "Bg" horizons are stratified sand and silt 14 to 40 inches (36 to 102 cm) thick. The substratum "2C" horizons are very gravelly coarse sand. Reaction is strongly or moderately acid in the upper parts and available water capacity is moderate. Water table depths within these soils fluctuate widely in response to changing river levels from spring through fall.

Continuous snow cover during most winters insulates these soils from low temperatures, resulting in shallow annual frost penetration.

Vegetation. The majority of this unit is forested. Common forest types include balsam poplar forest and balsam poplar-white spruce forest on frequently flooded landscapes, and paper birch and paper birch-white spruce forest on higher positions. Abandoned channels and sloughs often support alder scrub and sedge wet meadows. Recently deposited alluvium is sparsely vegetated with willow and alder shrubs, cottonwood and spruce regeneration, and a variety of seral herbs.

Land Use. The soils in this unit are mainly used for wildlife habitat and forestry. The main limitations for all uses include occasional flooding, stream bank erosion, depth to water table, and frost action.

11—Kidazqeni-Susitna Association (Matanuska Valley Floodplains)

Physiography. This unit includes high floodplains and stream terraces along the Matanuska and Knik Rivers. Slopes are nearly level and range from 0 to 2 percent. Elevation ranges from 30 to 200 feet (9 to 61 m).

Soils. The most extensive soils in this unit include the nearly level Kidazqeni fine sand and Susitna silt loam. Approximately 60 percent of the unit consists of Kidazqeni soils and 30 percent Susitna. Minor components include nonvegetated gravel and sand bars, very poorly drained soils in sloughs and cutoff meanders, and water.

The rarely flooded Kidazqeni soils are very deep and moderately well to excessively drained. The surface "A" horizons and upper part of the substratum "C" horizons consist

of stratified sand and silt 1 to 10 inches (3 to 25 cm) thick. The lower substratum "2C" horizons are very gravelly coarse sand. Minimal soil horizon development is attributed to repeated deposition and erosion by flooding. Slopes are nearly level. Reaction is moderately acid or slightly acid in the upper part, and available water capacity is low or very low.

The rarely flooded Susitna soils are very deep and well drained. The surface "A" horizons and subsurface "C" horizons are stratified sand and silt 40 to 60 inches (102 to 152 cm) thick. The substratum "2C" horizons are very gravelly coarse sand. Minimal soil horizon development is attributed to repeated deposition and erosion by flooding. Slopes are nearly level. Reaction is moderately acid or slightly acid in the upper part, and available water capacity is high.

In winter, strong winds blow the soil surface free of insulating snow cover and these soils tend to freeze to considerable depths.

Vegetation. The majority of this unit is forested. Common forest types include balsam poplar, balsam poplar-white spruce, and paper birch-white spruce.

Land Use. The soils in this unit are mainly used for cropland, urban development, gravel source areas, wildlife habitat, and occasionally forestry. Major limitations for cropland include low available water capacity, depth to gravel, and rare flooding for Kidazqeni and Susitna soils. Limitations for urban development include rare flooding, stream bank erosion, and excessive permeability for the Kidazqeni soils; and rare flooding, stream bank erosion, and frost action for the Susitna soils. Limitations for forestry include depth to gravelly material and seedling mortality for the Kidazqeni soils, and seedling mortality and plant competition for the Susitna soils.

12—Talkeetna-Deneka-Chunilna Association (Lower Mountainslopes)

Physiography. The geographic extent of this unit is the Talkeetna Mountains in the northern Matanuska and eastern Susitna Valleys. Landforms are dominantly mountain backslopes and footslopes of the Knik Glaciation (75 to 50 thousand YBP). Parent materials include an admixture of loess and volcanic ash over gravelly glacial till and bedrock. Slopes range from nearly level to steep. Elevation ranges from 400 to 2000 feet (122 to 610 m).

Soils. The most extensive soils in this unit include Talkeetna and Deneka silt loams and Chunilna mucky silt loam. Approximately 50 percent of the unit consists of Talkeetna soils, 20 percent Deneka, and 20 percent Chunilna. Minor components include very poorly drained organic soils in depressions, rock outcrops, soils in earth hummocks, and soils with stratified sandy and silty substratums.

The Talkeetna soils are very deep, well drained soils formed in an admixture of loess and volcanic ash over gravelly glacial till in uplands. The mineral surface "E", "Bhs", and "Bs" horizons are silt loam ranging from 15 to 24 inches (38 to 61 cm) thick. The substratum "2BC" and "2C" horizons are very cobbly and very gravelly sandy loam and loam. Slopes range from nearly level to steep. Reaction is extremely acid to moderately acid in the upper part, and available water capacity is moderate or high.

The Deneka soils are moderately deep over bedrock and are well drained. The mineral surface "E", "Bhs", and "Bs" horizons are silt loam ranging from 15 to 24 inches (38 to 61 cm) thick over substratum "2BC" or "2C" horizons, and underlain by bedrock at from 20 to 40 inches (51 to 102 cm). Slopes range from nearly level to very steep. Reaction is extremely acid or strongly acid in the upper part, and available water capacity is moderate.

The Chunilna soils are very deep and very poorly or poorly drained. The mineral surface "A" horizons are typically mucky silt loam over "Bg" horizons consisting of silt loam 14 to 33 inches (36 to 84 cm) thick. The subsurface "2Bg" and "2C" horizons are gravelly silt loam, sandy loam, and very gravelly sandy loam. Reaction is strongly acid or moderately acid in the upper part, and available water capacity is moderate or high.

Continuous snow cover during most winters insulates these soils from low temperatures, resulting in shallow annual frost penetration.

Vegetation. The majority of this unit is forested. Major forest types include paper birch-white spruce and white spruce forest and woodland near treeline. Minor inclusions of balsam poplar are found at higher elevations.

Land Use. The soils in this unit are mainly used for wildlife habitat. Major limitations for all uses include excessive slopes (where present), depth to bedrock for Deneka soils, and depth to water table for Chunilna soils.

13—Cryumbrepts-Talkeetna-Cryaquepts Association (Upper Mountain Slopes)

Physiography. The geographic extent of this unit is the Talkeetna Mountains in the northern Matanuska and eastern Susitna Valleys. Landforms are dominantly upper mountain backslopes and crests of the Knik and occasionally the Eklutna Glaciations (200 to 50 thousand YBP). Parent materials include an admixture of loess and volcanic ash, glacial drift, and bedrock. Slope ranges from nearly level to extremely steep. Elevation ranges from 2000 to 5000 feet (610 to 1524 m).

Soils. The most extensive soils and land cover types in this unit include Cryumbrepts; Talkeetna, cool soils; and Cryaquepts soils. Approximately 35 percent of the unit consists of Cryumbrepts soils; 25 percent Talkeetna, cool soils; 20 percent Cryaquepts; and 15 percent rock outcrops. Minor components include very poorly drained organic soils in depressions and well drained soils in heath hummocks.

The Cryumbrepts soils are shallow to very deep, well drained soils formed in an admixture of loess and colluvium over consolidated bedrock. The mineral surface "A" horizons and subsoil "B" horizons, when present, are typically very cobbly sandy loam ranging from 8 to 20 inches (20 to 51 cm) thick. Below this are "C" horizons consisting of very cobbly or very stony sandy loam or bedrock. Slopes range from steep to very steep. Reaction is very strongly acid to moderately acid in the upper part, and available water capacity is low or moderate.

The Talkeetna, cool soils are very deep, well drained soils formed in an admixture of loess and volcanic ash over gravelly glacial till on uplands. The mineral "A", "E", "Bhs", and "Bs" surface and subsoil horizons are silt loam ranging from 15 to 24 inches (38 to 61 cm) thick. The substratum "2BC" and "2C" horizons are very cobbly and very gravelly sandy loam and loam. Slopes range from nearly level to very steep. Reaction is extremely acid to strongly acid in the upper part, and available water capacity is moderate or high.

The Cryaquepts soils are very deep and very poorly or poorly drained. The mineral surface "A" horizons are typically cobbly mucky silt loam, silt loam, or sandy loam 4 to 22 inches (10 to 56 cm) thick. The subsurface "Bg" horizons have variable texture that includes gravelly silt loam, very cobbly sandy loam, very gravelly sandy loam, or very gravelly sand. Slopes range from nearly level to moderately steep. Reaction is strongly acid or moderately acid in the upper part, and available water capacity is moderate or high.

Rock outcrops consist of steep cliffs and frost shattered talus fields.

In winter, strong winds blow the soil surface free of insulating snow cover, and these soils tend to freeze to considerable depths.

Vegetation. This unit includes the subalpine and alpine zones and is non-forested. In the subalpine, native vegetation consists of a mosaic of bluejoint reedgrass grassland, alder scrub and willow scrub. In the true alpine, common vegetation types include a variety of ericaceous and willow dwarf shrub communities, low willow scrub, graminoid and forb herbaceous communities, and dwarf shrub-lichen tundra.

Land Use. The soils in this unit are mainly used for wildlife habitat. Major limitations for all uses include slope and depth to bedrock for Cryumbrepts soils, depth to water table

for Cryaquepts soils, and slope for Talkeetna soils.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the Survey Area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils".

A map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class, there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and, therefore, they do not affect use and management. These are called non-contrasting or similar inclusions. They may or may not be mentioned in the map unit description. However, other included soils and miscellaneous areas have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed. Consequently, they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans; but if intensive use of small areas is planned, on-site investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or the underlying layers. They also can differ in slope, stoniness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of

a soil phase commonly indicates a feature that affects use or management. For example, Bodenburg silty substratum is a phase of the Bodenburg series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern, or in such small areas, that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Map Unit 194—Talkeetna, cool-Snowdance complex, 5 to 25 percent slopes is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the Survey Area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Map unit 184—Siwash-Talkeetna, cool-Snowdance association, 0 to 30 percent slopes is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Map unit 187—Susivar and Niklavar fine sandy loams is an example of an undifferentiated group in this Survey Area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Map unit 179—Pits, gravel is an example.

Table 7 gives the acreage and proportionate extent of each map unit. Other tables ("Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. Scientific names of plants mentioned in the descriptions are given in Table 10. The glossary defines many of the terms used in describing the soils or miscellaneous areas.

Map Unit Descriptions

101—Benka silt loam, 0 to 3 percent slopes

Composition

Benka soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Benka and similar soils

Landform: glacial outwash plains
Position on the landscape: all positions
Slope range: 0 to 3 percent
Slope features: shape—plain
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed spruce-broadleaf forest and mixed broadleaf forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—dark gray silt loam
*****2 to 27 inches (5 to 69 cm)—reddish brown, strong brown, brown, and dark yellowish brown silt loam

*27 to 60 inches (69 to 152 cm)—grayish brown and olive brown stratified coarse sand, sand, and fine sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the stratified sandy substratum—moderately rapid
Available water capacity: moderate or high
Depth to contrasting stratified sandy material: 10 to 30 inches (25 to 76 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with less than 10 inches (less than 25 cm) to stratified sand or very gravelly sand material
*soils with slopes greater than 3 percent
*poorly drained soils in depressions

Major Uses

Current uses: homesites, cropland, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 400 feet (30 to 122 m)
Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—80 to 100 days
*growing degree days—1300 to 1500
Soil related factors: wind erosion, low fertility, depth to sand, cutbank instability, excess surface fines, excess sand in substratum, corrosivity, and frost action
Ecological sites:
*Benka soil—glaciofluvial deposits, 20-35 inch pz.

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to low fertility, depth to sand, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing sandy underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil

displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high sand content.
*The substratum material from this unit is a probable source of sand.

Suitable management practices:
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: white spruce, paper birch, black spruce, and quaking aspen
Mean site index:
*white spruce—74 (100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—27.7 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*black spruce—not estimated
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest and mixed broadleaf forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*black spruce forest and mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and

feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest and mixed broadleaf forest—not estimated
*black spruce forest and mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

102—Benka silt loam, sloping and moderately steep

Composition

Benka, sloping soil and similar inclusions: 60 percent
Benka, moderately steep soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Benka, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—plain or convex; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark gray silt loam
*2 to 27 inches (5 to 69 cm)—reddish brown, strong brown, brown, and dark yellowish brown silt loam
*27 to 60 inches (69 to 152 cm)—grayish brown and olive brown stratified coarse sand, sand, and fine sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sandy material—moderately rapid
Available water capacity: moderate or high
Depth to contrasting stratified sandy material: 10 to 30 inches (25 to 76 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Benka, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes
Slope range: 12 to 35 percent
Slope features: shape—convex or plain; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark gray silt loam
*2 to 27 inches (5 to 69 cm)—reddish brown, strong brown, brown, and dark yellowish brown silt loam
*27 to 60 inches (69 to 152 cm)—grayish brown and olive brown stratified coarse sand, sand, and fine sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand—moderately rapid
Available water capacity: low
Depth to contrasting stratified sandy material: 10 to 30 inches (25 to 76 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with less than 10 inches (less than 25 cm) of silty material over sand or stratified sand and silt
*soils with slopes greater than 35 percent
*poorly drained soils in depressions

Major Uses

Current uses: wildlife habitat
Potential uses: hayland and pastureland, homesites, forestry, and livestock grazing

Major Management Factors

Elevation: 100 to 400 feet (30 to 122 m)
Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—80 to 100 days
*growing degree days—1300 to 1500
Soil related factors: slope, water erosion, wind erosion, depth to sand, low fertility, frost heaving, cutbank instability, excess surface fines, excess sand in substratum, and corrosivity
Ecological sites:
*Benka, sloping soil—glaciofluvial deposits, 20-35 inch pz.
*Benka, moderately steep soil—glaciofluvial deposits, 20-35 inch pz.

Cropland (Benka, sloping soil)

General management considerations:
*This unit has moderate limitations for cropland and hayland due to slope, depth to sand, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, and oats and barley as forage.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to

improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing sandy underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Benka, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Benka, sloping soil)

General management considerations:
*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high sand content of the substratum.
*The substratum material from this portion of the unit is a probable source of sand.

Suitable management practices:
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Benka, moderately sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this portion of the unit is a probable source of sand.

Suitable management practices:
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Design and construct buildings and access roads to compensate for steep slopes.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Benka, sloping soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—74 (100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—27.7 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Forestry (Benka, moderately steep soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce
Mean site index:
*white spruce—74 (100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—27.7 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—slope, silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Benka, sloping soil)

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, frost action, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

Livestock Grazing (Benka, moderately steep soil)

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest—not estimated
Soil limitation(s) for fencing: severe—slope, too sandy, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

103—Benka silt loam, undulating

Composition

Benka soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Benka and similar soils

Landform: glacial outwash plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed spruce-broadleaf forest and mixed broadleaf forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark gray silt loam
*2 to 27 inches (5 to 69 cm)—reddish brown, strong brown, brown, and dark yellowish

brown silt loam
*27 to 60 inches (69 to 152 cm)—grayish brown and olive brown stratified coarse sand, sand, and fine sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the stratified sand material—moderately rapid
Available water capacity: moderate or high
Depth to contrasting stratified sandy material: 10 to 30 inches (25 to 76 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with stratified sandy or very gravelly material at less than 10 inches (less than 25 cm)
*poorly drained soils in depressions
*soils with slopes greater than 10 percent

Major Uses

Current uses: homesites and cropland
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 400 feet (30 to 122 m)
Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—80 to 100 days
*growing degree days—1300 to 1500
Soil related factors: wind erosion, water erosion, slope, depth to sand, low fertility, cutbank instability, excess surface fines, excess sand in substratum, corrosivity, and frost action
Ecological sites:
*Benka soil—glaciofluvial deposits, 20-35 inch pz.

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to slope, depth to sand, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.

*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing sandy underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high sand content.
*The substratum material from this portion of the unit is a probable source of sand.

Suitable management practices:
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: white spruce, paper birch, black spruce, and quaking aspen
Mean site index:
*white spruce—74 (100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—27.7 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*black spruce—not estimated
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest and mixed broadleaf forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American

twinflower, and moss
*black spruce forest and mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest and mixed broadleaf forest—not estimated
*black spruce forest and mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

104—Benka-Liten complex, nearly level and moderately steep

Composition

Benka soil and similar inclusions: 65 percent
Liten soil and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Benka and similar soils

Landform: outwash plains (Figure 2)
Position on the landscape: all positions
Slope range: 0 to 7 percent
Slope features: shape—plain; length—100 to 300 feet (30 to 91 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce forest
Minor vegetation type(s): black spruce forest and mixed spruce-broadleaf forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark gray silt loam
*2 to 27 inches (5 to 69 cm)—reddish brown, strong brown, brown, and dark yellowish brown silt loam
*27 to 60 inches (69 to 152 cm)—grayish brown and olive brown stratified coarse sand, sand, and fine sand

Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the sandy substratum—moderately rapid
Available water capacity: moderate to high
Depth to contrasting stratified sandy material: 10 to 30 inches (25 to 76 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Liten and similar soils

Landform: hills and stabilized sand dunes (Figure 2)
Position on the landscape: all positions
Slope range: 2 to 35 percent

Slope features: shape—plain or convex; length—10 to 40 feet (3 to 12 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch/American twinflower forest and paper birch-white spruce/American twinflower forest
Minor vegetation type(s): paper birch-quaking aspen/American twinflower forest

Typical profile:
*****0 to 4 inches (0 to 10 cm)—dark gray silt loam
*****4 to 6 inches (10 to 15 cm)—yellowish red and brown fine sandy loam
*****6 to 60 inches (15 to 152 cm)—dark yellowish brown and brown sand

Drainage class: somewhat excessively drained
Permeability: in the silty loess mantle—moderate; in the sandy substratum—moderately rapid
Available water capacity: low
Depth to contrasting sandy material: 1 to 10 inches (3 to 25 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****poorly drained soils in depressions
*****similar soils with slopes greater than 35 percent

Major Uses

Current uses: homesites, sand source areas, and wildlife habitat
Potential uses: forestry, cropland, and hayland and pastureland

Major Management Factors

Elevation: 50 to 250 feet (15 to 76 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: depth to sand, slope, wind erosion, water erosion, low fertility, excess surface fines, excess sand in substratum, corrosivity, cutbank instability, and frost action
Ecological sites:
*****Benka soil—glaciofluvial deposits, 20-35 inch pz.
*****Liten soil—sand dunes

Cropland (Benka soil)

General management considerations:
*****This portion of the unit has moderate limitations for cropland due to low fertility and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*****Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:

*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing sandy underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Liten soil)

General management considerations:

*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Suitable crops for planting are timothy grass and other locally adapted grasses
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:

*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing sandy underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development (Benka soil)

General management considerations:

*This unit has severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Only the silty surface material is suitable for revegetation due to the sandy nature of the substratum.
*The substratum material from this portion of the unit is a probable source of sand.

Suitable management practices:

*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.

Building Site Development (Liten soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a low potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Only the silty surface material is suitable for revegetation due to the sandy nature of the substratum.
*This portion of the unit is a probable source of sand.

Suitable management practices:
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.

Forestry (Benka soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—74 (100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—27.7 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Forestry (Liten soil)

Major tree species: paper birch, white spruce, and quaking aspen
Minor tree species: black spruce
Mean site index:
*white spruce—73 (estimated, 100 year, *Farr 1967*)
*paper birch—57 (estimated, 50 year, *Gregory and Haack 1965*)
*quaking aspen—52 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—26.9 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—34.7 cubic feet per acre (2.7 cubic m per hectare) per year at age 80
*quaking aspen—42.0 cubic feet per acre (3.0 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—texture, slope
Seedling mortality: moderate—shallow, sand
Windthrow hazard: severe—shallow, sand
Plant competition: slight
General management considerations:
*This soil is well suited for forestry.

Livestock Grazing (Benka soil)

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*black spruce forest and mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*black spruce forest and mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of forage plants in most vegetation types.

Livestock Grazing (Liten soil)

Major understory species:
*paper birch/American twinflower forest, paper birch-white spruce/American twinflower forest, and paper birch-quaking aspen/American twinflower forest—Bebb's willow, highbush cranberry, common fireweed, American twinflower, bunchberry dogwood, bluejoint reedgrass, Labrador tea ledum, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch/American twinflower forest, paper birch-white spruce/American twinflower forest, and paper birch-quaking aspen/American twinflower forest—not estimated
Soil limitation(s) for fencing: severe—slope, too sandy
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

105—Bodenburg silt loam, 0 to 3 percent slopes

Composition

Bodenburg soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Bodenburg and similar soils

Landform: glacial outwash plains (Plates 6 and 12)
Position on the landscape: all positions
Slope range: 0 to 3 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—dark brown silt loam
*3 to 50 inches (8 to 127 cm)—dark brown, dark grayish brown, and dark yellowish brown

silt loam
*50 to 60 inches (127 to 152 cm)—brown very gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the sand and gravel—rapid
Available water capacity: high
Depth to contrasting sandy and gravelly material: 41 to 56 inches (104 to 142 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with sand and gravel at depths less than 40 inches (less than 102 cm)
*depressions that are temporarily ponded during spring
*similar soils with slopes greater than 3 percent

Major Uses

Current uses: homesites, cropland, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 400 feet (30 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: wind erosion, excessive permeability, frost action, excess surface fines, corrosivity, and cutbank instability
Ecological sites:
*Bodenburg soil—silty slopes

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to the relatively high late summer precipitation.
*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.
*Suitable crops for planting are brome-grass, timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use permanent grass cover or native vegetation in depressions that pond water during spring.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*white spruce—69 (100 year, *Farr 1967*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is well suited for livestock grazing.
*Frozen soils result in a shallow, perched water table and surface ponding in many areas in spring.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

106—Bodenburg silt loam, sloping and moderately steep

Composition

Bodenburg, sloping soil and similar inclusions: 60 percent
Bodenburg, moderately steep soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Bodenburg, sloping and similar soils

Landform: hills, ridges, and outwash plains (Figure 2)
Position on the landscape: toeslopes, ridge crests, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—dark brown silt loam
*3 to 53 inches (8 to 135 cm)—dark brown, dark grayish brown, and dark yellowish brown silt loam
*53 to 60 inches (135 to 152 cm)—brown very gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: high
Depth to contrasting very gravelly material: 40 to 60 inches (102 to 152 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is

removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Bodenburg, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: shoulders, backslopes, and footslopes
Slope range: 12 to 35 percent
Slope features: shape—plain to convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—dark brown silt loam
*3 to 53 inches (8 to 135 cm)—dark brown, dark grayish brown, and dark yellowish brown silt loam
*53 to 60 inches (135 to 152 cm)—brown very gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: high
Depth to contrasting very gravelly material: 40 to 60 inches (102 to 152 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 35 percent
*depressions that are temporarily ponded during spring
*soils with sand and gravel at depths less than 40 inches (less than 102 cm)

Major Uses

Current uses: homesites, wildlife habitat, and cropland
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 400 feet (30 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, water erosion, wind erosion, excessive permeability, frost action, cutbank instability, excess surface fines, and corrosivity
Ecological sites:
*Bodenburg, sloping soil—silty slopes
*Bodenburg, moderately steep soil—silty slopes

Cropland (Bodenburg, sloping soil)

General management considerations:

*This portion of the unit has moderate limitations for cropland and hayland due to slope and relatively high late summer precipitation.
*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.
*Suitable crops for planting are brome-grass, timothy grass, and oats and barley as forage.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:

*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Use permanent grass cover or native vegetation in depressions that pond water during spring.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Bodenburg, moderately steep soil)

General management considerations:

*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.

Suitable management practices:

*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Use permanent grass cover or native vegetation in depressions that pond water during spring.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.

Building Site Development (Bodenburg, sloping soil)

General management considerations:

*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.

*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Bodenburg, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Design and construct buildings and access roads to compensate for steep slopes.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Bodenburg, sloping soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*white spruce—69 (100 year, *Farr 1967*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110

*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Bodenburg, moderately steep soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*white spruce—69 (100 year, *Farr 1967*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Bodenburg, sloping soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Bodenburg, moderately steep soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower

Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

107—Bodenburg silt loam, steep and sloping

Composition

Bodenburg, steep soil and similar inclusions: 65 percent
Bodenburg, sloping soil and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Bodenburg, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes, footslopes, and shoulders
Slope range: 20 to 60 percent
Slope features: shape—plain to convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—dark brown silt loam
*3 to 53 inches (8 to 135 cm)—dark brown, dark grayish brown, and dark yellowish brown silt loam
*53 to 60 inches (135 to 152 cm)—brown very gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: high
Depth to contrasting very gravelly material: 40 to 60 inches (102 to 152 cm)
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Bodenburg, sloping and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: crests and toeslopes
Slope range: 2 to 20 percent
Slope features: shape—plain to convex; length—50 to 250 feet (15 to 76 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest

Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—dark brown silt loam
*3 to 53 inches (8 to 135 cm)—dark brown, dark grayish brown, and dark yellowish brown silt loam
*53 to 60 inches (135 to 152 cm)—brown very gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: high
Depth to contrasting very gravelly material: 40 to 60 inches (102 to 152 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with sand and gravel at depths less than 40 inches (less than 102 cm)
*soils with slopes greater than 60 percent
*depressions that are temporarily ponded during spring

Major Uses

Current uses: homesites and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 500 feet (30 to 152 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, excessive permeability, cutbank instability, water erosion, wind erosion, frost action, excess surface fines, and corrosivity
Ecological sites:
*Bodenburg, steep soil—silty slopes
*Bodenburg, sloping soil—silty slopes

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development (Bodenburg, steep soil)

General management considerations:
*This portion of the unit has severe limitations for homesites due to the steepness and length of slopes, and severe limitations for shallow excavations due to cutbank instability and slope.

*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Building Site Development (Bodenburg, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*In steeper areas, design and construct roads and drainage systems to minimize the risk of caving.
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Install a sand filter below septic absorption lines to reduce permeability.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Bodenburg, steep soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*white spruce—68 (100 year, *Farr 1967*)
*paper birch—47 (50 year, *Gregory and Haack 1965*)
*balsam poplar—65 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*white spruce—23.3 cubic feet per acre (1.6 cubic m per hectare) per year at age 111
*paper birch—21.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
Hazard of water erosion from a non-compacted, bare soil surface: severe—texture, slope
Soil limitation(s) for equipment use: moderate—texture, slope
Soil limitation(s) for unsurfaced roads and skid trails: severe—excess fines, slope
Condition of unsurfaced roads and skid trails when wet: slippery
Windthrow hazard: moderate—shallow rooted trees
Seedling mortality: slight

Plant competition: severe—competitive species
General management considerations:
*This soil has high potential for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Bodenburg, sloping soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*white spruce—68 (100 year, *Farr 1967*)
*paper birch—47 (50 year, *Gregory and Haack 1965*)
*balsam poplar—65 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*white spruce—23.3 cubic feet per acre (1.6 cubic m per hectare) per year at age 111
*paper birch—21.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
Hazard of water erosion from a non-compacted, bare soil surface: moderate—slope
Soil limitation(s) for equipment use: moderate—texture, slope
Soil limitation(s) for unsurfaced roads and skid trails: moderate—excess fines
Condition of unsurfaced roads and skid trails when wet: slippery
Windthrow hazard: moderate—shallow rooted trees
Seedling mortality: slight
Plant competition: severe—competitive species
General management considerations:
*This soil has high potential for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Bodenburg, steep soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Bodenburg, sloping soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower

Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: moderate—slope, frost action
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

108—Bodenburg silt loam, undulating

Composition

Bodenburg soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Bodenburg and similar soils

Landform: glacial outwash plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—dark brown silt loam
*3 to 53 inches (8 to 135 cm)—dark brown, dark grayish brown, and dark yellowish brown silt loam
*53 to 60 inches (135 to 152 cm)—brown very gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: high
Depth to contrasting very gravelly material: 40 to 60 inches (102 to 152 cm) for the Bodenburg soil and map unit
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 10 percent
*depressions that are temporarily ponded during spring
*soils with sand and gravel at depths less than 40 inches (less than 102 cm)

Major Uses

Current uses: cropland and homesites
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 400 feet (30 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: water erosion, wind erosion, frost action and excessive permeability, excess surface fines, cutbank instability, and corrosivity
Ecological sites:
*****Bodenburg soil—silty slopes

Cropland

General management considerations:
*****This unit has moderate limitations for cropland and hayland due to slope and relatively high late summer precipitation.
*****Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.
*****Suitable crops for planting are brome-grass, timothy grass, oats and barley as forage, and potatoes and cole crops.
*****Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*****Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*****Use permanent grass cover or native vegetation in depressions that pond water during spring.
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*****This unit has severe limitations for shallow excavations due to cutbank instability.
*****This unit has a high potential for frost action and a moderate risk of corrosion.
*****Temporary ponding over annual frost occurs in depressional areas during spring.
*****Excavation can expose soil material that is highly susceptible to wind and water erosion.
*****The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*****The quality of roadbeds and road surfaces can be adversely affected by frost action.
*****Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*****This unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*white spruce—69 (100 year, *Farr 1967*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action
Limitations to uniform distribution of livestock: moderate—short, steep slopes
General management considerations:
*This soil is well suited for livestock grazing.
*Frozen soils result in a shallow, perched water table and surface ponding in many areas in spring.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

109—Bodenburg silt loam, silty substratum, 0 to 3 percent slopes

Composition

Bodenburg, silty substratum soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Bodenburg, silty substratum and similar soils

Landform: glacial outwash plains and stream terraces
Position on the landscape: all positions
Slope range: 0 to 3 percent
Slope features: shape—plain
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 5 inches (0 to 13 cm)—dark brown very fine sandy loam
*****5 to 60 inches (13 to 152 cm)—dark brown, dark grayish brown, and brown silt loam

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with sand and gravel at depths less than 40 inches (less than 102 cm)
*****soils with slopes greater than 3 percent
*****depressions that are temporarily ponded during spring

Major Uses

Current uses: homesites, cropland, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 400 feet (30 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: wind erosion, frost action, restricted permeability, excess surface fines, and corrosivity
Ecological sites:
*****Bodenburg, silty substratum soil—silty slopes

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to relatively high late summer precipitation.
*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.
*Suitable crops for planting are brome-grass, timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.
*Use permanent grass cover or native vegetation in depressions that pond water during spring.

Building Site Development

General management considerations:
*This unit has slight limitations for homesites and shallow excavations.
*This unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*This portion of the unit is a probable source of topsoil.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Install footings below the frostline to overcome the risk of frost action.
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Underlay local roads with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*white spruce—69 (100 year, *Farr 1967*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*paper birch—19.8 cubic feet per acre (1.45 cubic m per hectare) per year at age 95
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*balsam poplar—not estimated

Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is well suited for livestock grazing.
*Frozen soils result in a shallow, perched water table and surface ponding in many areas in spring.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

110—Bodenburg silt loam, silty substratum, sloping and moderately steep

Composition

Bodenburg, sloping soil and similar inclusions: 60 percent
Bodenburg, moderately steep soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Bodenburg, sloping and similar soils

Landform: hills, ridges, and glacial outwash plains (Figure 2)
Position on the landscape: toeslopes, ridgetops, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 5 inches (0 to 13 cm)—dark brown very fine sandy loam
*5 to 60 inches (13 to 152 cm)—dark brown, dark grayish brown, and brown silt loam

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Bodenburg, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: shoulders, backslopes, and footslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 5 inches (0 to 13 cm)—dark brown very fine sandy loam
*****5 to 60 inches (13 to 152 cm)—dark brown, dark grayish brown, and brown silt loam

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 35 percent
*****soils with sand and gravel at depths less than 40 inches (less than 102 cm)
*****depressions that are temporarily ponded during spring

Major Uses

Current uses: homesites, cropland, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 400 feet (30 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500

Soil related factors: slope, restricted permeability, frost action, wind erosion, water erosion, excess surface fines, and corrosivity

Ecological sites:

*Bodenburg, sloping soil—silty slopes

*Bodenburg, moderately steep soil—silty slopes

Cropland (Bodenburg, sloping soil)

General management considerations:

*This portion of the unit has moderate limitations for cropland and hayland due to slope and relatively high late summer precipitation.

*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.

*Suitable crops for planting are brome-grass, timothy grass, and oats and barley as forage.

*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:

*Use permanent grass cover or native vegetation in depressions that pond water during spring.

*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.

*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Bodenburg, moderately steep soil)

General management considerations:

*This portion of the unit has severe limitations for cropland due to steep slopes.

*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.

Suitable management practices:

*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.

*Use permanent grass cover or native vegetation in depressions that pond water during spring.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.

Building Site Development (Bodenburg, sloping soil)

General management considerations:

*This portion of the unit has slight limitations for homesites and shallow excavations.

*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.

*Temporary ponding over annual frost occurs in depressional areas during spring.

*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.

*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*This portion of the unit is a probable source of topsoil.

Suitable management practices:
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage.

Building Site Development (Bodenburg, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites and shallow excavations due to slope.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*This portion of the unit is a probable source of topsoil.

Suitable management practices:
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Design and construct buildings and access roads to compensate for steep slopes.
*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage.

Forestry (Bodenburg, sloping soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*paper birch—44 (50 year, *Gregory and Haack 1965*)
*white spruce—69 (100 year, *Farr 1967*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species

General management considerations:
*This soil has high potential for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Bodenburg, moderately steep soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*paper birch—44 (50 year, *Gregory and Haack 1965*)
*white spruce—69 (100 year, *Farr 1967*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Bodenburg, sloping soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Bodenburg, moderately steep soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, frost action

Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

111—Bodenburg silt loam, silty substratum, undulating

Composition

Bodenburg, silty substratum soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Bodenburg, silty substratum and similar soils

Landform: glacial outwash plain (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 5 inches (0 to 13 cm)—dark brown very fine sandy loam
*5 to 60 inches (13 to 152 cm)—dark brown, dark grayish brown, and brown silt loam

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 10 percent
*depressions that are temporarily ponded during spring
*soils with sand and gravel at depths less than 40 inches (less than 102 cm)

Major Uses

Current uses: cropland and homesites
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 400 feet (30 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)

*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: restricted permeability, frost action, wind erosion, water erosion, excess surface fines, and corrosivity
Ecological sites:
*Bodenburg, silty substratum soil—silty slopes

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to slope and relatively high late summer precipitation.
*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.
*Suitable crops for planting are brome-grass, timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use permanent grass cover or native vegetation in depressions that pond water during spring.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has slight limitations for homesites and shallow excavations.
*This unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*This unit is a probable source of topsoil.

Suitable management practices:
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen

Mean site index:
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*white spruce—69 (100 year, *Farr 1967*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action
Limitations to uniform distribution of livestock: moderate—short, steep slopes
General management considerations:
*This soil is well suited for livestock grazing.
*Frozen soils result in a shallow, perched water table and surface ponding in many areas in spring.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

112—Bodenburg-Jim complex, steep and sloping

Composition

Bodenburg, steep soil and similar inclusions: 50 percent
Bodenburg, sloping soil and similar inclusions: 20 percent
Jim, steep soil and similar inclusions: 20 percent
Contrasting inclusions: 10 percent

Characteristics of Bodenburg, steep and similar soils

Landform: hills and low mountains (Figure 4)
Position on the landscape: backslopes
Slope range: 20 to 60 percent
Slope features: shape—plain or convex; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest

Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 3 inches (0 to 8 cm)—dark brown silt loam
*****3 to 60 inches (8 to 152 cm)—dark gray, dark grayish brown, dark yellowish brown, and dark brown silt loam

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Bodenburg, sloping and similar soils

Landform: hills and low mountains (Figure 4)
Position on the landscape: crests and toeslopes
Slope range: 6 to 15 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 3 inches (0 to 8 cm)—dark brown silt loam
*****3 to 60 inches (8 to 152 cm)—dark gray, dark grayish brown, dark yellowish brown, and dark brown silt loam

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Jim, steep and similar soils

Landform: hills (Figure 4)
Position on the landscape: backslopes and crests
Slope range: 15 to 60 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): bluejoint reedgrass grassland

Typical profile:
*****0 to 5 inches (0 to 13 cm)—dark grayish brown silt loam

*5 to 26 inches (13 to 66 cm)—olive gray and olive brown silt loam
*26 inches (66 cm)—consolidated bedrock

Drainage class: well drained
Permeability: in the silty material—moderate; in the bedrock—impermeable
Available water capacity: moderate or high
Depth to consolidated bedrock: 5 to 40 inches (13 to 102 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 60 percent
*poorly drained soils in depressions
*soils with less than 5 inches (less than 13 cm) of silty material over bedrock
*soils with very gravelly substratums at 24 to 40 inches (61 to 102 cm)
*rock outcrops

Major Uses

Current uses: wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, water erosion, wind erosion, restricted permeability, depth to bedrock, excess surface fines, corrosivity, and frost action
Ecological sites:
*Bodenburg, sloping soil—silty slopes
*Bodenburg, moderately steep soil—silty slopes
*Jim, moderately steep soil—bedrock hills, 15-25 inch pz.

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development (Bodenburg, steep soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.

Building Site Development (Bodenburg, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites and shallow excavations due to slope.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*This portion of the unit is a probable source of topsoil.

Suitable management practices:
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Design and construct buildings and access roads to compensate for steep slopes.
*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage.

Building Site Development (Jim, steep soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to slope and the depth to bedrock.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.

Forestry (Bodenburg, steep soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*balsam poplar—not estimated
Soil limitation(s) for equipment use: severe—slope, texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Bodenburg, sloping soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Jim, steep soil)

Major tree species: paper birch, white spruce, and quaking aspen
Minor tree species: balsam poplar
Mean site index:
*white spruce—63 (100 year, *Farr 1967*)
*paper birch—not estimated
*balsam poplar—65 (estimated, 50 year)
*paper birch—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—19.9 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*balsam poplar—not estimated
Soil limitation(s) for equipment use: severe—texture, slope, shallow bedrock
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.
*South slopes are often vegetated with bluejoint reedgrass grassland with only occasional, stunted trees.

Livestock Grazing (Bodenburg, steep soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, frost action

Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Bodenburg, sloping soil)

Major understory species:
*****paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*****This soil is well suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Jim, steep soil)

Major understory species:
*****paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
*****bluejoint reedgrass grassland—bluejoint reedgrass, horsetail, common fireweed, tall bluebells, twisted stalk, cowparsnip, arctic starflower, and prickly rose
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest—2700 pounds per acre (3025 kilograms per hectare), estimated
*****bluejoint reedgrass grassland—3000 pounds per acre (3360 kilograms per hectare), estimated
Soil limitation(s) for fencing: severe—slope, frost action, shallow bedrock
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

113—Chilligan, hilly-Cryaquepts complex

Composition

Chilligan soil and similar inclusions: 65 percent
Cryaquepts soil and similar inclusions: 30 percent
Contrasting inclusions: 5 percent

Characteristics of Chilligan and similar soils

Landform: hills (Figure 2)
Position on the landscape: crests, shoulders, and backslopes
Slope range: 8 to 35 percent
Slope features: shape—hilly; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*0 to 1 inch (0 to 3 cm)—gray silt loam
*1 to 24 inches (3 to 61 cm)—dark reddish brown, grayish brown, and yellowish brown silt loam and very fine sandy loam
*24 to 60 inches (61 to 152 cm)—grayish brown and dark yellowish brown stratified fine sand through silty clay loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the stratified substratum—moderately slow
Available water capacity: high
Depth to contrasting stratified sandy and silty material: 4 to 26 inches (10 to 66 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Cryaquepts and similar soils

Landform: hills (Figure 2)
Position on the landscape: toeslopes and depressions
Slope range: 0 to 7 percent
Slope features: shape—plain or concave; length—50 to 200 feet (15 to 61 m)
Organic mat on surface: 3 to 8 inches (8 to 20 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Sample profile:
*0 to 4 inches (0 to 10 cm)—black mucky silt loam
*4 to 12 inches (10 to 30 cm)—dark brown silt loam
*12 to 60 inches (30 to 152 cm)—olive gray and dark grayish brown stratified fine sand, silt, and silty clay loam

Drainage class: very poorly or poorly drained
Permeability: in the silty material—moderate; in the stratified substratum—variable
Available water capacity: high
Runoff: ponded
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Included Areas

*well drained soils on hills with very gravelly or very cobbly loam substratums
*soils with slopes greater than 35 percent

*very poorly drained soils in depressions with organic horizons greater than 16 inches (greater than 41 cm) thick

Major Uses

Current uses: wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 300 feet (15 to 91 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: restricted permeability, slope, frost action, wind erosion, water erosion, depth to seasonally high water table, corrosivity, and excess surface fines
Ecological sites:
*Chilligan soil—glaciofluvial deposits, 15-25 inch pz.
*Cryaquepts soil—drift deposits, very poorly drained

Cropland (Chilligan soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.

Cropland (Cryaquepts soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to wetness.

Building Site Development (Chilligan soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites and shallow excavations due to slope.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*This portion of the unit is a probable source of topsoil.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Design and construct buildings and access roads to compensate for steep slopes.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage.

Building Site Development (Cryaquepts soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to wetness.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Forestry (Chilligan soil)

Major tree species: paper birch and white spruce
Minor tree species: quaking aspen and balsam poplar
Mean site index:
*white spruce—69 (estimated, 100 year)
*paper birch—50 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—slope, silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Cryaquepts soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce
Mean site index:
*white spruce—61 (estimated, 100 year)
*paper birch—49 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—18.6 cubic feet per acre (1.3 cubic m per hectare) per year at age 125
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—wetness, mucky silt
Seedling mortality: severe—wetness, shallow, rock *fragments*
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is poorly suited for forestry due to severe soil limitations.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.
*The water table may rise if trees are removed.

Livestock Grazing (Chilligan soil)

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: severe—slope, too sandy
Limitations to uniform distribution of livestock: severe—slope, wet soils

General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Cryaquepts Soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—alder, devil's club, rusty menziesia, bluejoint reedgrass, horsetail, oakfern and other ferns, and bunchberry dogwood
*black spruce forest—Labrador tea ledum, lingonberry, horsetail, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—not estimated
*black spruce forest—not estimated
Soil limitation(s) for fencing: severe—wetness, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—slope, wet soils
General management considerations:
*This soil is poorly suited for livestock grazing due to wetness and other soil limitations.

114—Chilligan, undulating-Cryaquepts complex

Composition

Chilligan soil and similar inclusions: 55 percent
Cryaquepts soil and similar inclusions: 35 percent
Contrasting inclusions: 10 percent

Characteristics of Chilligan and similar soils

Landform: glaciolacustrine plains (Figure 3)
Position on the landscape: plain or convex positions
Slope range: 0 to 10 percent
Slope features: shape—plain or convex; length—100 to 300 feet (30 to 91 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*0 to 1 inch (0 to 3 cm)—gray silt loam
*1 to 24 inches (3 to 61 cm)—dark reddish brown, grayish brown, and yellowish brown silt loam and very fine sandy loam
*24 to 60 inches (61 to 152 cm)—grayish brown and dark yellowish brown stratified fine sand through silty clay loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the stratified substratum—moderately slow
Available water capacity: high
Depth to contrasting stratified sandy and silty material: 4 to 26 inches (10 to 66 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed

Hazard of flooding: none

Characteristics of Cryaquepts and similar soils

Landform: glaciolacustrine plain (Figure 3)
Position on the landscape: depressions
Slope range: 0 to 7 percent
Slope features: shape—plain or concave; length—50 to 100 feet (15 to 30 m)
Organic mat on surface: 3 to 8 inches (8 to 20 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Sample profile:
*0 to 2 inches (0 to 5 cm)—black mucky silt loam
*2 to 14 inches (5 to 36 cm)—dark brown and dark grayish brown silt loam, loam, and gravelly loam
*14 to 60 inches (36 to 152 cm)—olive gray and dark grayish brown cobbly sandy loam and very gravelly sandy loam

Drainage class: poorly or very poorly drained
Permeability: in the silty surface material—moderate; below this—variable
Available water capacity: variable
Runoff: slow or ponded
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Included Areas

*well drained soils with very gravelly or very cobbly substratums
*soils with slopes greater than 10 percent
*very poorly drained soils in depressions with organic mats greater than 16 inches (greater than 41 cm) thick

Major Uses

Current uses: wildlife habitat
Potential uses: cropland, homesites, forestry, and livestock grazing

Major Management Factors

Elevation: 50 to 300 feet (15 to 91 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: restricted permeability, wind erosion, water erosion, frost action, low fertility, depth to seasonally high water table, excess surface fines, and corrosivity
Ecological sites:
*Chilligan soil—glaciofluvial deposits, 15-25 inch pz.
*Cryaquepts soil—drift deposits, very poorly drained

Cropland (Chilligan soil)

General management considerations:

*This portion of the unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:

*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Cryaquepts soil)

General management considerations:

*This portion of the unit has severe limitations for cropland and hayland due to wetness.

Building Site Development (Chilligan soil)

General management considerations:

*This portion of the unit has slight limitations for homesites and shallow excavations.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*This portion of the unit is a probable source of topsoil.

Suitable management practices:

*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Cryaquepts soil)

General management considerations:

*This portion of the unit has severe limitations for homesites and shallow excavations due to wetness.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Forestry (Chilligan soil)

Major tree species: paper birch and white spruce
Minor tree species: quaking aspen and balsam poplar
Mean site index:
*****white spruce—69 (estimated, 100 year)
*****paper birch—50 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*****white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*****paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—competitive species
General management considerations:
*****This soil is well suited for forestry.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Cryaquepts soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce
Mean site index:
*****white spruce—61 (estimated, 100 year)
*****paper birch—49 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*****white spruce—18.6 cubic feet per acre (1.3 cubic m per hectare) per year at age 125
*****paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—wetness, mucky silt, cobbles
Seedling mortality: severe—wetness, shallow, rock fragments
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture, competitive species
General management considerations:
*****This soil is poorly suited for forestry due to severe soil limitations.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.
*****The water table may rise if trees are removed.

Livestock Grazing (Chilligan soil)

Major understory species:
*****paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch forest and paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy
Limitations to uniform distribution of livestock: moderate—wet soils
General management considerations:
*****The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Cryaquepts soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—alder, devil's club, rusty menziesia, bluejoint reedgrass, horsetail, oakfern and other ferns, and bunchberry dogwood
*black spruce forest—Labrador tea ledum, lingonberry, horsetail, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—not estimated
*black spruce forest—not estimated
Soil limitation(s) for fencing: severe—wetness, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—wet soils
General management considerations:
*This soil is poorly suited for livestock grazing due to wetness and other soil limitations.

115—Chunilna mucky silt loam, cool, 5 to 20 percent slopes

Composition

Chunilna, cool soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Chunilna, cool and similar soil

Landform: mountains
Position on the landscape: backslopes
Slope range: 5 to 20 percent
Slope features: shape—plain; length—1000 to 2000 feet (305 to 610 m)
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): tall Sitka alder shrub

Typical profile:
*0 to 4 inches (0 to 10 cm)—very dark brown mucky silt loam
*4 to 14 inches (10 to 36 cm)—dark brown silt loam mottled with dark grayish brown
*14 to 22 inches (36 to 56 cm)—dark grayish brown gravelly loam with strong brown mottles
*22 to 60 inches (56 to 152 cm)—dark grayish brown and olive gray very gravelly sandy loam

Drainage class: very poorly or poorly drained
Permeability: in the surface layers—moderate; in the gravelly and cobbly substratum—moderately slow
Available water capacity: high
Depth to contrasting very gravelly or very cobbly material: 12 to 29 inches (30 to 74 cm)
Runoff: medium
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Included Areas

*soils in similar positions with bedrock at less than 40 inches (less than 102 cm)
*soils with slopes greater than 20 percent

*soils in similar positions with bedrock at less than 14 inches (less than 36 cm)
*similar soils with mixed spruce and birch forest

Major Uses

Current uses: wildlife habitat
Potential uses: livestock grazing

Major Management Factors

Elevation: 800 to 1800 feet (244 to 549 m)
Climatic factors (average annual):
*precipitation—25 to 35 inches (64 to 89 cm)
*air temperature—32 to 34 °F (0 to 1 °C)
*frost free season—60 to 80 days
*growing degree days—1000 to 1200
Soil related factors: slope, wind erosion, water erosion, frost action, depth to seasonally high water table, excess surface fines, corrosivity, and substratum cobbles
Ecological sites:
*Chunilna, cool soil—mountain slopes, wet

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to the shallow depth to a seasonally high water table and slope.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to wetness.
*This unit has a high potential for frost action and a high risk of corrosion.

Livestock Grazing

Major species:
*tall Sitka alder shrub—Sitka alder, devil's club, spinulose shield fern, ladyfern, oakfern, bluejoint reedgrass, horsetail, and fiveleaf bramble
Mean annual production (vascular plants, air-dry weight):
*tall Sitka alder shrub—4500 pounds per acre (5040 kilograms per hectare)
Soil limitation(s) for fencing: severe—wetness, coarse fragments, frost action, slope
Limitations to uniform distribution of livestock: moderate—slope, dense brush, wet soils
General management considerations:
*This soil is poorly suited for livestock grazing.
*In spring and during periods of intense summer rain, runoff and drainage from adjacent slopes result in a shallow water table in many areas.

116—Cryaquepts, depressional, 0 to 7 percent slopes

Composition

Cryaquepts, depressional soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Cryaquepts, depressional and similar soil

Landform: hills, till plains, and outwash plains (Plate 2)
Position on the landscape: depressions, flats, and toeslopes
Slope range: 0 to 7 percent
Slope features: shape—plain or concave
Organic mat on surface: 2 to 16 inches (5 to 41 cm) thick
Major vegetation type(s): black spruce forest
Minor vegetation type(s): paper birch-spruce forest and paper birch forest

Sample profile:
*0 to 2 inches (0 to 5 cm)—black mucky silt loam
*2 to 14 inches (5 to 36 cm)—dark brown and dark grayish brown silt loam, loam, and gravelly loam
*14 to 60 inches (36 to 152 cm)—olive gray and dark grayish brown cobbly sandy loam and very gravelly sandy loam

Drainage class: very poorly or poorly drained
Permeability: in the upper part—moderate; below this—variable
Available water capacity: variable
Runoff: ponded or slow
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Included Areas

*well drained soils
*soils with slopes greater than 7 percent

Major Uses

Current uses: wildlife habitat

Major Management Factors

Elevation: 50 to 1000 feet (15 to 305 m)
Climatic factors (average annual):
*precipitation—15 to 30 inches (38 to 76 cm)
*air temperature—33 to 36 °F (1 to 2 °C)
*frost free season—70 to 110 days
*growing degree days—1100 to 1500
Soil related factors: depth to seasonally high water table
Ecological sites:
*Cryaquepts, depressional soil—depressions

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to wetness.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to wetness.

*This unit has a high potential for frost action and a high risk of corrosion.

Forestry

Major tree species: black spruce
Minor tree species: paper birch, white spruce, and quaking aspen
Mean site index:
*black spruce—not estimated
General management considerations:
*This soil is poorly suited for forestry due to low productivity and severe soil limitations.

Livestock Grazing

Major understory species:
*black spruce forest and paper birch-spruce forest—Labrador tea ledum, bog blueberry, bog birch, Beauverd's spiraea, lingonberry, black crowberry, willow, horsetail, cloudberry, sphagnum, and feathermoss
*paper birch forest—alder, devil's club, bluejoint reedgrass, horsetail, Labrador tea ledum, lingonberry, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*black spruce forest, paper birch-spruce forest, and paper birch forest—not estimated
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants and severe soil limitations.

117—Cryods, 35 to 90 percent slopes

Composition

Cryods soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Cryods and similar soils

Landform: mountains
Position on the landscape: steep backslopes
Slope range: 35 to 90 percent
Slope features: shape—plain; length—500 to 2000 feet (152 to 610 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): low willow shrub, tall alder shrub, and bluejoint reedgrass-Altai's fescue grassland

Sample profile:
*0 to 3 inches (0 to 8 cm)—very dark brown and brown silt loam
*3 to 7 inches (8 to 18 cm)—dark reddish brown gravelly loam
*7 to 60 inches (18 to 152 cm)—dark brown over olive brown very stony loam

Drainage class: well to somewhat excessively drained
Permeability: in the silty loess mantle—moderate; in the substratum material—variable
Available water capacity: low to moderate
Runoff: rapid
Depth to bedrock: 20 to more than 60 inches (51 to more than 152 cm)
Depth to seasonally high water table: greater than 60 inches (greater than 152 cm)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed

Hazard of flooding: none

Included Areas

*****soils in similar positions with bedrock at less than 20 inches (less than 51 cm)
*****soils with slopes greater than 90 percent
*****rock outcrops

Major Uses

Current uses: wildlife habitat
Potential uses: livestock grazing

Major Management Factors

Elevation: 1400 to 3700 feet (427 to 1128 m)
Climatic factors (average annual):
*****precipitation—30 to 45 inches (76 to 114 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: wind erosion, water erosion, frost action, restricted permeability, slope, depth to gravelly and cobbly material, and corrosivity
Ecological sites:
*****Cryods soil—variable (mountain slopes, cool; mountain slopes; and loamy slopes, cool)

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites and shallow excavations due to steep slopes and the depth to bedrock.
*****This unit has a high potential for frost action and a high risk of corrosion.

Livestock Grazing

Major species:
*****low willow shrub—Barclay's, diamondleaf, and other low willows; bluejoint reedgrass; Altai's fescue; false hellebore; common fireweed; Beauverd's spiraea; oakfern; Canadian burnet; black crowberry; bunchberry dogwood; and northern geranium
*****tall alder shrub—Sitka alder, bluejoint reedgrass, Beauverd's spiraea, various ferns, common fireweed, and currant
*****bluejoint reedgrass-Altai's fescue grassland—bluejoint reedgrass, Altai's fescue, Beauverd's spiraea, various ferns, common fireweed, northern geranium, Canadian burnet, false hellebore, black crowberry, and bunchberry dogwood
Mean annual production (vascular plants, air-dry weight):
*****low willow shrub—1900 pounds per acre (2130 kilograms per hectare), estimated
*****tall alder shrub—3700 pounds per acre (4150 kilograms per hectare), estimated
*****bluejoint reedgrass-Altai's fescue grassland—2500 pounds per acre (2800 kilograms per hectare), estimated
Soil limitation(s) for fencing: severe—slope, too stony, frost action
Limitations to uniform distribution of livestock: very severe—slope, rock outcrops,

drainages
General management considerations:
*****This soil is poorly suited for livestock grazing due to steep slopes.

118—Cryods, cool-Niklason, moderately wet-Qeni complex, 0 to 15 percent slopes

Composition

Cryods, cool soil and similar inclusions: 50 percent
Niklason, moderately wet soil and similar inclusions: 20 percent
Qeni soil and similar inclusions: 20 percent
Contrasting inclusions: 10 percent

Characteristics of Cryods, cool and similar soils

Landform: alluvial fans and stream terraces
Position on the landscape: all positions
Slope range: 0 to 15 percent
Slope features: shape—plain or convex; length—50 to 200 feet (15 to 61 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): spruce/ericaceous shrub-bog birch forest

Sample profile:
*****0 to 10 inches (0 to 25 cm)—very dark grayish brown, very dusky red, and dark brown silt loam
*****10 to 14 inches (25 to 36 cm)—very dusky red gravelly sandy loam
*****14 to 60 inches (36 to 152 cm)—variegated very cobbly coarse sand

Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the cobbly or gravelly substratum—variable
Available water capacity: low to moderate
Depth to contrasting gravelly or cobbly material: 3 to 10 inches (8 to 25 cm)
Runoff: slow or medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Niklason, moderately wet and similar soils

Landform: floodplains and stream terraces
Position on the landscape: all positions on floodplains and low positions on stream terraces
Slope range: 0 to 5 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): white spruce/willow/ bluejoint reedgrass woodland

Typical profile:
*****0 to 4 inches (0 to 10 cm)—fine sandy loam
*****4 to 25 inches (10 to 64 cm)—variegated stratified very fine sand and sand
*****25 to 60 inches (64 to 152 cm)—variegated very cobbly sand

Drainage class: moderately well drained
Permeability: in the surface horizon—moderate; in the stratified sandy through silty material—moderately rapid; in the gravelly substrata—rapid
Available water capacity: moderate
Depth to contrasting very gravelly or very cobbly material: 12 to 35 inches (30 to 89 cm)
Runoff: slow
Depth to seasonally high water table: 3.5 to 5.0 feet (1 to 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: occasional

Characteristics of Qeni and similar soils

Landform: stream terraces
Position on the landscape: all positions
Slope range: 0 to 5 percent
Slope features: shape—plain
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): white spruce/willow/ bluejoint reedgrass woodland

Typical profile:
*****0 to 3 inches (0 to 8 cm)—dark brown silt loam
*****3 to 8 inches (8 to 20 cm)—strong brown fine sandy loam
*****8 to 60 inches (20 to 152 cm)—variegated extremely cobbly sand

Drainage class: somewhat poorly drained
Permeability: in the surface layer—moderate; in the fine sandy loam material—moderately rapid; in the cobbly or gravelly substratum—rapid
Available water capacity: very low or low
Depth to contrasting very gravelly or very cobbly material: 3 to 14 inches (8 to 36 cm)
Runoff: slow
Depth to seasonally high water table: 1 to 3 feet (0.3 to 0.9 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: rare

Included Areas

*****soils in depressions that have thick organic mats and very poorly drained conditions
*****soils with slopes greater than 15 percent
*****soils in similar positions that are frequently flooded

Major Uses

Current uses: wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 1000 to 2300 feet (305 to 701 m)
Climatic factors (average annual):
*****precipitation—25 to 30 inches (64 to 76 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days

*growing degree days—1000 to 1200
Soil related factors: wind erosion, water erosion, depth to seasonally high water table, frost action, flooding, depth to gravelly and cobbly material, corrosivity, and excess surface fines
Ecological sites:
*Cryods, cool soil—stream terraces, cool
*Niklason, moderately wet soil—stream terraces
*Qeni soil—stream terraces

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to slope, depth to a seasonally high water table, depth to gravelly material, and flooding.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to flooding, wetness, and cutbank instability on Niklason and Qeni soils.
*The Cryods portion of this unit has a high potential for frost action and a high risk of corrosion.
*The Niklason, moderately wet portion of this unit has a moderate potential for frost action and a moderate risk of corrosion.
*The Qeni portion of this unit has a low potential for frost action and a moderate risk of corrosion.
*This unit is a probable source of sand and gravel.

Forestry (Cryods, cool soil)

Major tree species: white spruce and black spruce
Minor tree species: balsam poplar
Mean site index: not estimated
Soil limitation(s) for equipment use: slight
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—high available moisture
General management considerations:
*This soil is poorly suited for forestry.

Forestry (Niklason, moderately wet soil)

Major tree species: white spruce
Mean site index:
*white spruce—58 (estimated, 100 year)
Estimated growth at culmination of mean annual increment:
*white spruce—16.7 cubic feet per acre (1.2 cubic m per hectare) per year at age 135
Soil limitation(s) for equipment use: slight
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: slight
General management considerations:
*This soil is suited for forestry.
*This soil occurs near the upper elevational limit of tree growth and stands tend to be slow growing and uneven-aged, with marginal quality trees.

Forestry (Qeni soil)

Major tree species: white spruce
Mean site index:
*white spruce—58 (100 year, *Farr 1967*)
Estimated growth at culmination of mean annual increment:
*white spruce—16.7 cubic feet per acre (1.2 cubic m per hectare) per year at age 135
Soil limitation(s) for equipment use: moderate—wetness
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow rooted trees
Plant competition: slight
General management considerations:
*This soil is suited for forestry.
*This soil occurs near the upper elevational limit of tree growth and stands tend to be slow growing and uneven-aged, with marginal quality trees.

Livestock Grazing (Cryods, cool soil)

Major understory species:
*spruce/ericaceous shrub-bog birch forest—bog blueberry, willow, bog birch, Beauverd's spiraea, black crowberry, lingonberry, oakfern, bunchberry dogwood, bluejoint reedgrass, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*spruce/ericaceous shrub-bog birch forest—not estimated
Soil limitation(s) for fencing: moderate—coarse fragments, slope
Limitations to uniform distribution of livestock: moderate—slope, wet soils, brush thickets
General management considerations:
*This soil is poorly suited for livestock grazing.

Livestock Grazing (Niklason, moderately wet soil)

Major understory species:
*white spruce/willow/bluejoint reedgrass woodland—Barclay's, diamondleaf, and/or littletree willow; bluejoint reedgrass; Canadian burnet; common fireweed; Altai's fescue; black crowberry; Beauverd's spiraea; and sedge
Mean annual understory production (vascular plants, air-dry weight):
*white spruce/willow/bluejoint reedgrass woodland—2200 pounds per acre (2465 kilograms per hectare)
Soil limitation(s) for fencing: severe—too sandy and cobbly
Limitations to uniform distribution of livestock: moderate—slope, wet soils, brush thickets
General management considerations:
*This soil is well suited for livestock grazing.
*In spring and during periods of intense summer rain, runoff and drainage from adjacent slopes result in a shallow water table in many areas.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*The willow browse on this soil is used extensively by moose in winter and spring.

Livestock Grazing (Qeni soil)

Major understory species:
*white spruce/willow/bluejoint reedgrass woodland—Barclay's, diamondleaf, and/or littletree willow; bluejoint reedgrass; Canadian burnet; common fireweed; Altai's fescue; black crowberry; Beauverd's spiraea; and sedge
Mean annual understory production (vascular plants, air-dry weight):
*white spruce/willow/bluejoint reedgrass woodland—2200 pounds per acre (2465

kilograms per hectare)
Soil limitation(s) for fencing: severe—too sandy and cobbly, wetness
Limitations to uniform distribution of livestock: moderate—slope, wet soils, brush thickets
General management considerations:
*****This soil is well suited for livestock grazing.
*****In spring and during periods of intense summer rain, runoff and drainage from adjacent slopes result in a shallow water table in many areas.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*****The willow browse on this soil is used extensively by moose in winter and spring.

119—Cryods and Cryaquepts, cool, 0 to 35 percent slopes

Composition

Cryods and Cryaquepts, cool soils and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Cryods and similar soils

Landform: mountains
Position on the landscape: hummocks on shoulders and summits
Slope range: 10 to 35 percent
Slope features: shape—plain or convex; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 3 to 6 inches (8 to 15 cm) thick
Major vegetation type(s): black crowberry-bog blueberry dwarf shrub
Minor vegetation type(s): low willow shrub

Sample profile:
*****0 to 2 inches (0 to 5 cm)—very dark grayish brown silt loam
*****2 to 23 inches (5 to 58 cm)—reddish black and dark reddish brown silt loam
*****23 to 60 inches (58 to 152 cm)—variegated very gravelly sandy loam

Drainage class: somewhat poorly to well drained
Permeability: in the silty loess mantle—moderate; in the substratum material—variable
Available water capacity: moderate to high
Depth to very gravelly and very cobbly material: 5 to 20 inches (13 to 51 cm)
Depth to bedrock: 20 to more than 60 inches (51 to more than 152 cm)
Runoff: medium
Depth to seasonally high water table: 2 to over 6 feet (0.6 to over 1.8 m)
Hazard of erosion: by water—slight if the organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Cryaquepts, cool and similar soils

Landform: mountains
Position on the landscape: depressions and drainages on shoulders and summits
Slope range: 0 to 15 percent
Slope features: shape—plain or concave; length— 100 to 500 feet (30 to 152 m)
Organic mat on surface: 3 to 10 inches (8 to 25 cm) thick
Major vegetation type(s): low willow shrub

Sample profile:
*****0 to 4 inches (0 to 10 cm)—black mucky silt loam

*4 to 24 inches (10 to 61 cm)—dark yellowish brown silt loam
*24 to 60 inches (61 to 152 cm)—dark yellowish brown very gravelly loam

Drainage class: very poorly or poorly drained
Permeability: variable
Available water capacity: moderate or high
Runoff: slow
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Included Areas

*soils in depressional areas with thick organic mats, ponded drainage, and sedge wet meadow
*soils with slopes greater than 35 percent
*soils with bedrock at shallow or very shallow depths
*similar soils with bluejoint reedgrass grassland

Major Uses

Current uses: wildlife habitat
Potential uses: wildlife habitat

Major Management Factors

Elevation: 2100 to 3500 feet (640 to 1067 m)
Climatic factors (average annual):
*precipitation—30 to 45 inches (76 to 114 cm)
*air temperature—32 to 34 °F (0 to 1 °C)
*frost free season—60 to 80 days
*growing degree days—1000 to 1200
Soil related factors: wind erosion, water erosion, slope, frost action, depth to seasonally high water table, and corrosivity
Ecological sites:
*Cryods soil—variable (alpine hummocks; mountain slopes, cool)
*Cryaquepts, cool soil—mountain slopes, drainages

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to slope, depth to a seasonally high water table, and a short growing season.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes, depth to bedrock, and wetness.
*This unit has a high potential for frost action and a high risk of corrosion.

Livestock Grazing (Cryods, soil)

Major species:
*black crowberry-bog blueberry dwarf shrub—black crowberry, bog blueberry, lingonberry,

Altai's fescue, bunchberry dogwood, Beauverd's spiraea, dwarf arctic birch, bluejoint reedgrass, and feathermoss
*low willow shrub—Barclay's, diamondleaf, and other low willows; bluejoint reedgrass; Altai's fescue; false hellebore; common fireweed; Beauverd's spiraea; oakfern; Canadian burnet; black crowberry; bunchberry dogwood; and northern geranium
Mean annual production (vascular plants, air-dry weight):
*black crowberry-bog blueberry dwarf shrub—300 pounds per acre (335 kilograms per hectare)
*low willow shrub—2300 pounds per acre (2575 kilograms per hectare), estimated
Soil limitation(s) for fencing: severe—slope, frost action, variable soil materials
Limitations to uniform distribution of livestock: moderate—slope, wet soils, dense brush
General management considerations:
*This soil is poorly suited for livestock grazing.
*The willow browse on this soil is used extensively by moose in late winter and spring.

Livestock Grazing (Cryaquepts, cool soil)

Major species:
*low willow shrub—Barclay's, diamondleaf, and other low willows; common ladyfern; bluejoint reedgrass; horsetail; Canadian burnet; sedge; oakfern; twisted stalk; and Sitka alder
Mean annual production (vascular plants, air-dry weight):
*low willow shrub—2300 pounds per acre (2575 kilograms per hectare)
Soil limitation(s) for fencing: severe—wetness, variable soil materials, frost action, slope
Limitations to uniform distribution of livestock: moderate—slope, wet soils, dense brush
General management considerations:
*This soil has moderate potential for livestock grazing.
*In spring and during periods of intense summer rain, runoff and drainage from adjacent slopes result in a shallow water table in many areas.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*The willow browse on this soil is used extensively by moose in late winter and spring.

120—Cryods, low elevation and Cryochrepts, 30 to 70 percent slopes

Composition

Cryods, low elevation soils, Cryochrepts soils and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Cryods, low elevation and similar soils

Landform: escarpments
Position on the landscape: all positions
Slope range: 30 to 70 percent
Slope features: shape—plain to convex; length—100 to 500 feet (30 to 152 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): mixed broadleaf forest and paper birch-white spruce forest
Minor vegetation type(s): tall Sitka alder shrub

Sample profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 5 inches (5 to 13 cm)—yellowish red, strong brown, and brown silt loam
*5 to 60 inches (13 to 152 cm)—dark grayish brown very gravelly sand

Drainage class: well to somewhat excessively drained
Permeability: in the silty surface material—moderate; below this—variable
Available water capacity: variable
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Cryochrepts and similar soils

Landform: escarpments
Position on the landscape: all positions
Slope range: 30 to 70 percent
Slope features: shape—plain to convex; length—100 to 500 feet (30 to 152 m)
Organic mat on surface: 0 to 3 inches (0 to 8 cm) thick
Major vegetation type(s): mixed broadleaf forest and paper birch-white spruce forest
Minor vegetation type(s): tall Sitka alder shrub

Sample profile:
*****0 to 4 inches (0 to 10 cm)—dark brown and brown silt loam
*****4 to 60 inches (10 to 152 cm)—dark grayish brown and olive brown very gravelly loam and very cobbly loam

Drainage class: well to somewhat excessively drained
Permeability: in the silty surface material—moderate; below this—variable
Available water capacity: variable
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils on toeslopes that are poorly drained
*****rock outcrops
*****slumps and nonvegetated ground

Major Uses

Current uses: wildlife habitat
Potential uses: forestry

Major Management Factors

Elevation: 50 to 2200 feet (15 to 671 m)
Climatic factors (average annual):
*****precipitation—15 to 35 inches (38 to 89 cm)
*****air temperature—33 to 36 °F (1 to 2 °C)
*****frost free season—60 to 110 days
*****growing degree days—1000 to 1500
Soil related factors: slope, wind erosion, and water erosion
Ecological sites:
*****Cryods, low elevation soil—escarpments
*****Typic Cryochrepts soil—escarpments

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to the steepness and length of slopes.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*The Cryods portion of this unit has a high potential for frost action and a high risk of corrosion.
*The Cryochrepts portion of this unit has a high potential for frost action and a moderate risk of corrosion.

Forestry

Major tree species: paper birch, quaking aspen, and white spruce
Minor tree species: balsam poplar
Mean site index:
*white spruce—not estimated
*paper birch—not estimated
*quaking aspen—not estimated
Major understory species:
*mixed broadleaf forest and paper birch-white spruce forest—prickly rose, highbush cranberry, Sitka alder, fireweed, horsetail, tall bluebells, bunchberry dogwood, bluejoint reedgrass, and russet buffaloberry
*tall Sitka alder shrub—bluejoint reedgrass, spinulose shield fern, common fireweed, oakfern, Beauverd's spiraea, and currant
Mean annual understory production (vascular plants, air-dry weight):
*mixed broadleaf forest, paper birch-white spruce forest, and tall Sitka alder shrub—not estimated
Soil limitation(s) for equipment use: severe—slope
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: slight
General management considerations:
*This soil is poorly suited for forestry due to steep slopes.

Livestock Grazing

General management considerations:
*This soil has low potential for livestock grazing due to the variable abundance of suitable forage plants and steep slopes.

121—Cryods, shallow, 35 to 90 percent slopes

Composition

Cryods, shallow soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Cryods, shallow and similar soils

Landform: mountains
Position on the landscape: backslopes
Slope range: 35 to 90 percent
Slope features: shape—plain; length—500 to 2000 feet (152 to 610 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce forest
Minor vegetation type(s): balsam poplar forest, tall Sitka alder shrub, and bluejoint reedgrass-forb grassland

Sample profile:
*****0 to 3 inches (0 to 8 cm)—very dark brown and brown silt loam
*****3 to 7 inches (8 to 18 cm)—dark reddish brown gravelly loam
*****7 to 60 inches (18 to 152 cm)—dark brown over olive brown very stony loam

Drainage class: well to somewhat excessively drained
Permeability: in the silty loess mantle—moderate; in the substratum material—variable
Available water capacity: low to high
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Depth to contrasting very cobbly or very gravelly material: 4 to 26 inches (10 to 66 cm)
Depth to bedrock: 20 to more than 60 inches (51 to more than 152 cm)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils in similar positions with bedrock at very shallow depths
*****soils with slopes less than 35 or more than 90 percent
*****rock outcrops

Major Uses

Current uses: wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 1400 to 3700 feet (427 to 1128 m)
Climatic factors (average annual):
*****precipitation—30 to 45 inches (76 to 114 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: wind erosion; water erosion; depth to gravelly, cobbly, or stony material; depth to bedrock; excess surface fines; corrosivity; and slope
Ecological sites:
*****Cryods, shallow soil—variable (till deposits, high elevation; mountain slopes; loamy slopes)

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes and depth to bedrock.
*This unit has a high potential for frost action and a high risk of corrosion.

Forestry

Major tree species: white spruce and paper birch
Minor tree species: balsam poplar and quaking aspen
Mean site index:
*white spruce—not estimated
*paper birch—not estimated
Soil limitation(s) for equipment use: severe—slope
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—competitive species
General management considerations:
*This soil is poorly suited for forestry.
*This soil occurs near the upper elevational limit of tree growth and stands tend to be slow growing and uneven-aged, with marginal quality trees.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce forest and balsam poplar forest—Sitka alder, bluejoint reedgrass, spinulose shield fern and other ferns, common fireweed, bunchberry dogwood, prickly rose, highbush cranberry, and fiveleaf bramble
*tall Sitka alder shrub—Sitka alder, bluejoint reedgrass, Beauverd's spiraea, various ferns, common fireweed, and currant
*bluejoint reedgrass-forb grassland—bluejoint reedgrass, common fireweed, spinulose shield fern, northern false-hellebore, northern geranium, oakfern, cowparsnip, and Canadian burnet
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and balsam poplar forest—2800 pounds per acre (3140 kilograms per hectare)
*tall Sitka alder shrub—3700 pounds per acre (4245 kilograms per hectare)
*bluejoint reedgrass-forb grassland—4300 pounds per acre (4800 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: very severe—slope, rock outcrops
General management considerations:
*This soil is poorly suited for livestock grazing due to steep slopes.

122—Deception silt loam, rolling

Composition

Deception silt loam soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Deception and similar soils

Landform: till plains
Position on the landscape: all positions
Slope range: 0 to 15 percent
Slope features: shape—rolling; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 7 inches (3 to 18 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*0 to 1 inch (0 to 3 cm)—dark grayish brown silt loam
*1 to 5 inches (3 to 13 cm)—brown silt loam
*5 to 60 inches (13 to 152 cm)—dark yellowish brown and dark grayish brown very cobbly sandy loam and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate
Depth to contrasting very cobbly and very gravelly material: 4 to 16 inches (10 to 41 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 15 percent
*soils in similar positions with sand and gravel at depths less than 10 inches (less than 25 cm)
*poorly drained soils in depressions

Major Uses

Current uses: hayland and pastureland, homesites, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: low fertility, restricted permeability, slope, wind erosion, water erosion, excess surface fines, corrosivity, frost action, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Deception soil—till deposits, thin surface

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to slope, depth to very gravelly material, low fertility, and relatively high late summer precipitation.
*This portion of the unit is best suited to permanent hayland and pastureland due to the shallow depth to gravel.
*Land clearing and tillage operations increase wind and water erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has moderate limitations for homesites and shallow excavations due to cobbles and the dense nature of the substratum.
*This unit has a moderate potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—56 (estimated, 100 year, *Farr 1967*)
*paper birch—46 (estimated, 50 year)
*black spruce—not estimated

Estimated growth at culmination of mean annual increment:
*white spruce—15.6 cubic feet per acre (1.1 cubic m per hectare) per year at age 140
*paper birch—20.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*black spruce—not estimated
Soil limitation(s) for equipment use: moderate—silt, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Livestock Grazing

Major understory species:
*paper birch-spruce forest, paper birch forest, and black spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, and black spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too cobbly, slope
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

123—Deception silt loam, sloping and moderately steep

Composition

Deception, sloping soil and similar inclusions: 60 percent
Deception, steep soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Deception, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*0 to 1 inch (0 to 3 cm)—dark grayish brown silt loam
*1 to 5 inches (3 to 13 cm)—brown silt loam
*5 to 60 inches (13 to 152 cm)—dark yellowish brown and dark grayish brown very cobbly sandy loam and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the substratum—moderate or moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate

Depth to contrasting very cobbly and very gravelly material: 4 to 16 inches (10 to 41 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Deception, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes and footslopes
Slope range: 12 to 30 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*****0 to 1 inch (0 to 3 cm)—dark grayish brown silt loam
*****1 to 5 inches (3 to 13 cm)—brown silt loam
*****5 to 60 inches (13 to 152 cm)—dark yellowish brown and dark grayish brown very cobbly sandy loam and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate
Depth to contrasting very cobbly and very gravelly material: 4 to 16 inches (10 to 41 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 30 percent
*****soils in similar positions with sand and gravel at depths less than 10 inches (less than 25 cm)
*****poorly drained soils in depressions
*****occasional surface stones

Major Uses

Current uses: homesites and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500

Soil related factors: wind erosion, water erosion, frost action, excess surface fines, corrosivity, low fertility, restricted permeability, depth to gravelly and cobbly material, and dense substratum

Ecological sites:

*Deception, sloping soil—till deposits, thin surface

*Deception, moderately steep soil—till deposits, thin surface

Cropland (Deception, sloping soil)

General management considerations:

*This portion of the unit has moderate limitations for cropland and hayland due to slope, the depth to very gravelly material, low fertility, and relatively high late summer precipitation.

*This portion of the unit is best suited to permanent hayland and pastureland due to the shallow depth to gravel.

*Occasional surface stones limit some fieldwork.

*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:

*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.

*Add lime to improve soil fertility.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.

*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.

*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Deception, moderately steep soil)

General management considerations:

*This portion of the unit has severe limitations for cropland due to steep slopes.

*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

*Occasional surface stones limit some fieldwork.

Suitable management practices:

*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.

*Add lime to improve soil fertility.

Building Site Development (Deception, sloping soil)

General management considerations:

*This portion of the unit has moderate limitations for homesites and shallow excavations due to cobbles and the dense nature of the substratum.

*This portion of the unit has a moderate potential for frost action and a high risk of corrosion.

*Untreated effluent can move along the surface of the restrictive layer and seep in

downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Deception, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites and shallow excavations due to slope, cobbles, and the dense nature of the substratum.
*This portion of the unit has a moderate potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Design and construct buildings and access roads to compensate for steep slopes.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Deception, sloping soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—56 (estimated, 100 year, *Farr 1967*)
*paper birch—46 (estimated, 50 year)
*black spruce—not estimated

Estimated growth at culmination of mean annual increment:
*white spruce—15.6 cubic feet per acre (1.1 cubic m per hectare) per year at age 140
*paper birch—20.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*black spruce—not estimated
Soil limitation(s) for equipment use: moderate—silt, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Forestry (Deception, moderately steep soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—56 (estimated, 100 year, *Farr 1967*)
*paper birch—46 (estimated, 50 year)
*black spruce—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—15.6 cubic feet per acre (1.1 cubic m per hectare) per year at age 140
*paper birch—20.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*black spruce—not estimated
Soil limitation(s) for equipment use: moderate—slope, silt, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Livestock Grazing (Deception, sloping soil)

Major understory species:
*paper birch-spruce forest, paper birch forest, and black spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, and black spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too cobbly, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

Livestock Grazing (Deception, moderately steep soil)

Major understory species:
*paper birch-spruce forest, paper birch forest, and black spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, and black spruce forest—not estimated
Soil limitation(s) for fencing: severe—slope, too cobbly
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage

plants.

124—Deception silt loam, steep and sloping

Composition

Deception, steep soil and similar inclusions: 70 percent
Deception, sloping soil and similar inclusions: 20 percent
Contrasting inclusions: 10 percent

Characteristics of Deception, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes
Slope range: 20 to 60 percent
Slope features: shape—convex or plain; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 6 inches (3 to 15 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*****0 to 1 inch (0 to 3 cm)—dark grayish brown silt loam
*****1 to 5 inches (3 to 13 cm)—brown silt loam
*****5 to 60 inches (13 to 152 cm)—dark yellowish brown and dark grayish brown very cobbly sandy loam and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate
Depth to contrasting very cobbly and very gravelly material: 4 to 16 inches (10 to 41 cm)
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Deception, sloping and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: crests and toeslopes
Slope range: 10 to 20 percent
Slope features: shape—convex or concave; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*****0 to 1 inch (0 to 3 cm)—dark grayish brown silt loam
*****1 to 5 inches (3 to 13 cm)—brown silt loam
*****5 to 60 inches (13 to 152 cm)—dark yellowish brown and dark grayish brown very cobbly sandy loam and very gravelly loam

Drainage class: well drained

Permeability: in the silt loam surface—moderate; in the substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate
Depth to contrasting very cobbly and very gravelly material: 4 to 16 inches (10 to 41 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 60 percent
*****soils in similar positions with sand and gravel at depths less than 10 inches (less than 25 cm)
*****poorly drained soils in depressions

Major Uses

Current uses: homesites, wildlife habitat, and roadfill
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: slope, water erosion, wind erosion, frost action, excess surface fines, corrosivity, restricted permeability, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*****Deception, steep soil—till deposits, thin surface
*****Deception, sloping soil—till deposits, thin surface

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development (Deception, steep soil)

General management considerations:
*****This portion of the unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*****This portion of the unit has a moderate potential for frost action and a high risk of corrosion.

Suitable management practices:
*****Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Building Site Development (Deception, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites and shallow excavations due to slope, cobbles, and the dense nature of the substratum.
*This portion of the unit has a moderate potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for reclamation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Design and construct buildings and access roads to compensate for steep slopes.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Deception, steep soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—56 (estimated, 100 year, *Farr 1967*)
*paper birch—46 (estimated, 50 year)
*black spruce—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—15.6 cubic feet per acre (1.1 cubic m per hectare) per year at age 140
*paper birch—20.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*black spruce—not estimated
Soil limitation(s) for equipment use: severe—slope, silt, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Forestry (Deception, sloping soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—56 (estimated, 100 year, *Farr 1967*)
*paper birch—46 (estimated, 50 year)
*black spruce—not estimated

Estimated growth at culmination of mean annual increment:
*white spruce—15.6 cubic feet per acre (1.1 cubic m per hectare) per year at age 140
*paper birch—20.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*black spruce—not estimated
Soil limitation(s) for equipment use: moderate—silt, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Livestock Grazing (Deception, steep soil)

Major understory species:
*paper birch-spruce forest, paper birch forest, and black spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, and black spruce forest—not estimated
Soil limitation(s) for fencing: severe—slope, too cobbly
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

Livestock Grazing (Deception, sloping soil)

Major understory species:
*paper birch-spruce forest, paper birch forest, and black spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, and black spruce forest—not estimated
Soil limitation(s) for fencing: severe—too cobbly, slope
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

125—Deception silt loam, undulating

Composition

Deception soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Deception and similar soils

Landform: till plains (Figure 3 and Plate 7)
Position on the landscape: all positions
Slope range: 0 to 7 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*0 to 1 inch (0 to 3 cm)—dark grayish brown silt loam
*1 to 5 inches (3 to 13 cm)—brown silt loam
*5 to 60 inches (13 to 152 cm)—dark yellowish brown and dark grayish brown very cobbly sandy loam and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate
Depth to contrasting very gravelly and very cobbly material: 4 to 16 inches (10 to 41 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 7 percent
*soils with sand and gravel at depths less than 10 inches (less than 25 cm)
*poorly drained soils in depressions

Major Uses

Current uses: hayland and pastureland, homesites, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 300 to 650 feet (91 to 198 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: restricted permeability, wind erosion, water erosion, frost action, corrosivity, excess surface fines, low fertility, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Deception soil—till deposits, thin surface

Cropland

General management considerations:
*This unit has severe limitations for cropland due to the shallow depth to very gravelly and cobbly glacial till material.
*This portion of the unit is best suited to permanent hayland and pastureland due to the shallow depth to gravel and cobbles.
*Land clearing and tillage operations increase wind and water erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.

*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has moderate limitations for homesites and shallow excavations due to cobbles and the dense nature of the substratum.
*This unit has a moderate potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the low fertility and dense nature of the substratum.
*The substratum material from this unit is a probable source of roadfill.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—56 (estimated, 100 year, *Farr 1967*)
*paper birch—46 (estimated, 50 year)
*black spruce—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—15.6 cubic feet per acre (1.1 cubic m per hectare) per year at age 140
*paper birch—20.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*black spruce—not estimated
Soil limitation(s) for equipment use: moderate—silt, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is poorly suited for forestry.

Livestock Grazing

Major understory species:
*****paper birch-spruce forest, paper birch forest, and black spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, and black spruce forest—not estimated
Soil limitation(s) for fencing: severe—too cobbly
Limitations to uniform distribution of livestock: slight
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

126—Delyndia silt loam, 0 to 5 percent slopes

Composition

Delyndia soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Delyndia and similar soils

Landform: outwash plains
Position on the landscape: all positions
Slope range: 0 to 5 percent
Slope features: shape—plain
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed broadleaf forest

Typical profile:
*****0 to 4 inches (0 to 10 cm)—grayish brown, strong brown, and yellowish brown silt loam
*****4 to 60 inches (10 to 152 cm)—strong brown and dark yellowish brown stratified loamy sand, sand, and gravelly coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the sandy substrata—moderately rapid
Available water capacity: low
Depth to contrasting sandy material: 3 to 12 inches (8 to 30 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 10 percent
*****poorly drained soils in depressions
*****soils in similar positions with sand and gravel at depths less than 10 inches (less than 25 cm)

Major Uses

Current uses: homesites, wildlife habitat, and sand source
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: depth to sand, wind erosion, cutbank instability, excess surface fines, excess sand in substratum, and corrosivity
Ecological sites:
*Delyndia soil—glaciofluvial deposits, 15-25 inch pz.

Cropland

General management considerations:
*This unit has severe limitations for cropland due to the shallow depth to sand.
*This portion of the unit is best suited to permanent hayland and pastureland due to the shallow depth to sand.
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing sandy underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a low potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*Only the silty surface material is suitable for revegetation due to the high sand content.
*The substratum material from this unit is a probable source of sand.

Suitable management practices:
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.

Forestry

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen

Mean site index:
*white spruce—69 (estimated, 100 year, *Farr 1967*)
*paper birch—50 (estimated, 50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*black spruce—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is well suited for forestry.

Livestock Grazing

Major understory species:
*paper birch-spruce forest, paper birch forest, black spruce forest, and mixed broadleaf forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, black spruce forest, and mixed broadleaf forest —not estimated
Soil limitation(s) for fencing: severe—too sandy
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

127—Delyndia-Histosols complex, 0 to 3 percent slopes

Composition

Delyndia silt loam soil and similar inclusions: 50 percent
Histosols soil and similar inclusions: 40 percent
Contrasting inclusions: 10 percent

Characteristics of Delyndia and similar soils

Landform: outwash plains
Position on the landscape: convex or plain areas between bogs and fens
Slope range: 0 to 3 percent
Slope features: shape—plain or convex
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed broadleaf forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—grayish brown silt loam
*2 to 4 inches (5 to 10 cm)—strong brown and yellowish brown silt loam
*4 to 60 inches (10 to 152 cm)—strong brown and dark yellowish brown stratified loamy

sand, sand, and gravelly coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the sandy substrata—moderately rapid
Available water capacity: low to moderate
Depth to contrasting sandy material: 3 to 12 inches (8 to 30 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Histosols and similar soils

Landform: outwash plains
Position on the landscape: bogs and fens in depressions
Slope range: 0 to 2 percent
Slope features: shape—plain or concave
Organic mat on surface: 16 to over 60 inches (41 to over 152 cm) thick
Major vegetation type(s): ericaceous shrub scrub, sedge-shrub bog meadow and fen meadow, and sedge wet meadow and bog meadow
Minor vegetation type(s): black spruce/ericaceous shrub woodland

Sample profile:
*****0 to 5 inches (0 to 13 cm)—dark reddish brown peat
*****5 to 60 inches (13 to 152 cm)—dark reddish brown mucky peat with lenses of black muck

Drainage class: very poorly drained
Permeability: in the organic horizons—moderately rapid; below this—variable
Available water capacity: high
Runoff: ponded
Depth to seasonally high water table: 0.5 feet above the surface to 1 foot (0.2 m above the surface to 0.3 m)
Hazard of erosion: by water—slight; by wind—slight
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 10 percent
*****poorly drained soils in depressions
*****soils in similar positions with sand and gravel at depths less than10 inches (less than 25 cm)

Major Uses

Current uses: wildlife habitat and sand source
Potential uses: forestry

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500

Soil related factors: depth to sand, low soil strength, frost action, depth to seasonally high water table, cutbank instability, low fertility, excess surface fines, excess sand in substratum, cutbank instability, and wind erosion

Ecological sites:

*****Delyndia soil—glaciofluvial deposits, 15-25 inch pz.

*****Histosols—organic terrain

Cropland (Delyndia soil)

General management considerations:

*****This portion of the unit has moderate limitations for cropland and hayland due to low fertility, the depth to sandy material, and relatively high late summer precipitation.

*****This portion of the unit is best suited to permanent hayland and pastureland due to the shallow depth to sand.

*****Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:

*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.

*****Add lime to improve soil fertility.

*****Use shallow cuts during land smoothing to avoid exposing sandy underlying material.

*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*****Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Histosols soil)

General management considerations:

*****This portion of the unit has severe limitations for cropland and hayland due to depth to a seasonally high water table and low soil strength.

Building Site Development (Delyndia soil)

General management considerations:

*****This portion of the unit has severe limitations for shallow excavations due to cutbank instability.

*****This portion of the unit has a low potential for frost action and a high risk of corrosion.

*****Excavation can expose soil material that is highly susceptible to wind erosion.

*****Only the silty surface material is suitable for revegetation due to the high sand content.

*****The substratum material from this portion of the unit is a probable source of sand.

Suitable management practices:

*****Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.

*****Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.

*****Stockpile topsoil and use it to reclaim areas disturbed during construction.

Building Site Development (Histosols soil)

General management considerations:

*****This portion of the unit has severe limitations for homesites due to ponding and low soil strength, and severe limitations for shallow excavations due to excess humus and ponding.

*****This portion of the unit has a high potential for frost action and a high risk of corrosion.

Forestry (Delyndia soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*****paper birch—50 (estimated, 50 year, *Gregory and Haack 1965*)
*****black spruce—not estimated
*****white spruce—69 (estimated, 100 year, *Farr 1967*)
Estimated growth at culmination of mean annual increment:
*****paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*****black spruce—not estimated
*****white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*****This soil is well suited for forestry.

Forestry (Histosols soil)

Minor tree species: black spruce
Soil limitation(s) for equipment use: severe—texture, wetness
General management considerations:
*****This soil is usually not forested and is unsuited for forestry. Crossing this soil with winter roads may be required to access forested stands on the Delyndia soil.

Livestock Grazing (Delyndia soil)

Major understory species:
*****paper birch-spruce forest, paper birch forest, black spruce forest, and mixed broadleaf forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, black spruce forest, and mixed broadleaf forest—not estimated
Soil limitation(s) for fencing: severe—too sandy
Limitations to uniform distribution of livestock: very severe—wet soils, organic soils
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

Livestock Grazing (Histosols soil)

Major species:
*****ericaceous shrub bog—Labrador tea ledum, bog birch, bog blueberry, Beauverd's spiraea, cottongrass, cloudberry, marsh cinquefoil, sedge, sphagnum moss, and roundleaf sundew
*****sedge-shrub bog meadow and fen meadow—various sedges, cottongrass, bluejoint reedgrass, willow, sweetgale, shrubby cinquefoil, marsh cinquefoil, water horsetail, bog blueberry, bog rosemary, sphagnum moss, and various aquatic mosses
*****black spruce/ericaceous shrub bog—stunted black spruce, Labrador tea ledum, bog blueberry, lingonberry, black crowberry, bog birch, crowberry, and sphagnum moss
Mean annual production (vascular plants, air-dry weight):
*****ericaceous shrub bog, sedge-shrub bog meadow and fen meadow, and black spruce/ericaceous shrub bog—not estimated

Soil limitation(s) for fencing: severe—wetness, organic soils
Limitations to uniform distribution of livestock: very severe—wet soils, organic soils
General management considerations:
*This soil is unsuited for livestock grazing due to wetness.

128—Disappoint very cobbly mucky silt loam, 0 to 12 percent slopes

Composition

Disappoint soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Disappoint and similar soils

Landform: mountains
Position on the landscape: toeslopes and depressions
Slope range: 0 to 12 percent
Slope features: shape—undulating or concave; length—150 to 500 feet (46 to 152 m)
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*0 to 4 inches (0 to 10 cm)—black very cobbly mucky silt loam
*4 to 13 inches (10 to 33 cm)—very dark grayish brown very cobbly silt loam and cobbly silt loam
*13 to 41 inches (33 to 104 cm)—very dark grayish brown gravelly silt loam, loam, and sandy loam
*41 to 60 inches (104 to 152 cm)—olive very gravelly sandy loam

Drainage class: poorly or very poorly drained
Permeability: in the surface layers—moderate; in the very gravelly sandy loam material—moderately slow
Available water capacity: high
Runoff: slow
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Included Areas

*very poorly drained organic soils in depressions
*occasional surface boulders
*soils with slopes greater than 12 percent
*well drained soils

Major Uses

Current uses: wildlife habitat and homesites
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 400 to 1000 feet (122 to 305 m)

Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—80 to 100 days
*growing degree days—1200 to 1400
Soil related factors: depth to seasonally high water table, water erosion, excess surface fines, frost action, corrosivity, and substratum cobbles
Ecological sites:
*Disappoint soil—till deposits, very poorly drained

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to wetness.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to wetness.
*This unit has a high potential for frost action and a high risk of corrosion.

Forestry

Major tree species: white spruce and paper birch
Minor tree species: black spruce
Mean site index:
*white spruce—61 (estimated, 100 year)
*paper birch —49 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—18.6 cubic feet per acre (1.3 cubic m per hectare) per year at age 125
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—wetness, mucky silt, cobbles
Seedling mortality: severe—wetness, shallow, rock fragments
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is poorly suited for forestry due to severe soil limitations.
*The water table may rise if trees are removed.

Livestock Grazing

Major understory species:
*paper birch-white spruce forest and paper birch forest—alder, devil's club, rusty menziesia, bluejoint reedgrass, horsetail, oakfern and other ferns, and bunchberry dogwood
*black spruce forest—Labrador tea ledum, lingonberry, horsetail, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—not estimated
*black spruce forest—not estimated
Soil limitation(s) for fencing: severe—wetness, too cobbly, slope, frost action
Limitations to uniform distribution of livestock: moderate—wet soils
General management considerations:
*This soil is poorly suited for livestock grazing due to wetness and other soil limitations.

129—Eska silt loam, sloping and moderately steep

Composition

Eska, sloping soil and similar inclusions: 65 percent
Eska, moderately steep and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Eska, sloping and similar soils

Landform: till plains, hills, and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating till plain areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 6 inches (0 to 15 cm)—dark grayish brown and dark brown silt loam
*****6 to 36 inches (15 to 91 cm)—dark yellowish brown, dark grayish brown, and dark brown silt loam
*****36 to 60 inches (91 to 152 cm)—dark grayish brown very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly till material—moderately slow
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 22 to 40 inches (56 to 102 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Eska, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes
Slope range: 12 to 25 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 6 inches (0 to 15 cm)—dark grayish brown and dark brown silt loam
*****6 to 36 inches (15 to 91 cm)—dark yellowish brown, dark grayish brown, and dark brown silt loam
*****36 to 60 inches (91 to 152 cm)—dark grayish brown very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly till material—moderately slow
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 22 to 40 inches (56 to 102 cm)
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 25 percent
*soils in similar positions with very gravelly material at less than 22 inches (less than 56 cm)
*poorly drained soils in depressions

Major Uses

Current uses: hayland and pastureland, homesites, wildlife habitat, and roadfill source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 1000 to 1500 feet (305 to 457 m)
Climatic factors (average annual):
*precipitation—18 inches (46 cm)
*air temperature—35 °F (2 °C)
*frost free season—80 to 100 days
*growing degree days—1200 to 1400
Soil related factors: wind erosion, water erosion, slope, frost action, restricted permeability, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Eska, sloping soil—silty slopes, cool
*Eska, moderately steep soil—silty slopes, cool

Cropland (Eska, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland and hayland due to slope and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Occasional surface stones limit some fieldwork.
*Land clearing and tillage operations increase wind and water erosion hazard.
*Crops respond well to fertilizer if precipitation is adequate.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Eska, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Hay crops respond well to fertilizer if precipitation is adequate.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development (Eska, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to cobbles, and moderate limitations for shallow excavations due to the dense nature of the substratum.
*This unit has a high potential for frost action and a moderate risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Eska, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to the dense nature of the substratum.
*This unit has a high potential for frost action and a moderate risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Design and construct buildings and access roads to compensate for steep slopes.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of slumping.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Eska, sloping soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Eska, moderately steep soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)

*paper birch—49 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Eska, sloping soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest—2600 pounds per acre (2910 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Eska, moderately steep soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest—2600 pounds per acre (2910 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

130—Eska-Jim complex, sloping and moderately steep

Composition

Eska, sloping soil and similar inclusions: 40 percent
Eska, moderately steep and similar inclusions: 25 percent
Jim, moderately steep and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Eska, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 6 inches (0 to 15 cm)—dark grayish brown and dark brown silt loam
*****6 to 36 inches (15 to 91 cm)—dark yellowish brown, dark grayish brown, and dark brown silt loam
*****36 to 60 inches (91 to 152 cm)—dark grayish brown very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly till material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 22 to 40 inches (56 to 102 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Eska, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes
Slope range: 12 to 25 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 6 inches (0 to 15 cm)—dark grayish brown and dark brown silt loam
*****6 to 36 inches (15 to 91 cm)—dark yellowish brown, dark grayish brown, and dark brown silt loam

*36 to 60 inches (91 to 152 cm)—dark grayish brown very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly till material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 22 to 40 inches (56 to 102 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Jim and similar soils

Landform: hills (Figure 2)
Position on the landscape: shoulders and backslopes
Slope range: 2 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 5 inches (0 to 13 cm)—dark grayish brown silt loam
*5 to 26 inches (13 to 66 cm)—olive gray and olive brown silt loam
*26 inches (66 cm)—consolidated bedrock

Drainage class: well drained
Permeability: in the silty material—moderate; in the bedrock—impermeable
Available water capacity: high
Depth to consolidated bedrock for the Jim soil: 20 to 40 inches (51 to 102 cm)
Depth to consolidated bedrock for the map unit component: 5 to 40 inches (13 to 102 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 30 percent
*rock outcrops
*soils in similar positions with very gravelly material at less than 10 inches (less than 25 cm)
*poorly drained soils in depressions

Major Uses

Current uses: homesites, hayland and pastureland, wildlife habitat, and roadfill source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 600 to 1500 feet (183 to 457 m)
Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—80 to 100 days
*growing degree days—1200 to 1400
Soil related factors: wind erosion, water erosion, slope, depth to bedrock, excess surface fines, corrosivity, frost action, restricted permeability, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Eska, sloping soil—silty slopes, cool
*Eska, moderately steep soil—silty slopes, cool
*Jim soil—bedrock hills, 15-25 inch pz.

Cropland (Eska, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland and hayland due to slope and relatively high late summer precipitation.
*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Occasional surface stones limit some fieldwork.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Use permanent grass cover or native vegetation in depressions that pond water during spring.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Eska, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion

hazard.
*Use permanent grass cover or native vegetation in depressions that pond water during spring.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Jim soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development (Eska, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to cobbles, and moderate limitations for shallow excavations due to cobbles and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Install footings below the frostline to overcome the risk of frost action.

*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Eska, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this portion of the unit is a probable source of roadfill.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Design and construct buildings and access roads to compensate for steep slopes.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Jim soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to the depth to bedrock and steepness and length of slopes.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.

Forestry (Eska, sloping soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*balsam poplar—not estimated

Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*****This soil is well suited for forestry.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Eska, moderately steep soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*****white spruce—69 (100 year, *Farr 1967*)
*****paper birch—49 (50 year, *Gregory and Haack 1965*)
*****balsam poplar—not estimated
Estimated growth at culmination of mean annual increment:
*****white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*****paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*****balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*****This soil is well suited for forestry.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Jim soil)

Major tree species: paper birch, white spruce, and quaking aspen
Minor tree species: balsam poplar
Mean site index:
*****white spruce—63 (100 year, *Farr 1967*)
*****paper birch—not estimated
*****quaking aspen—not estimated
*****balsam poplar—65 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*****white spruce—19.9 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*****balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture, slope, shallow bedrock
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*****This soil is suited for forestry.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Eska, sloping soil)

Major understory species:
*****paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass,

horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower

Mean annual understory production (vascular plants, air-dry weight):

*****paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest—2600 pounds per acre (2910 kilograms per hectare)

Soil limitation(s) for fencing: moderate—frost action, slope

Limitations to uniform distribution of livestock: moderate—slope, rock outcrops

General management considerations:

*****This soil is well suited for livestock grazing.

*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Eska, moderately steep soil)

Major understory species:

*****paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower

Mean annual understory production (vascular plants, air-dry weight):

*****paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch-white spruce-balsam poplar/bluejoint reedgrass-horsetail forest—2600 pounds per acre (2910 kilograms per hectare)

Soil limitation(s) for fencing: severe—slope, frost action

Limitations to uniform distribution of livestock: moderate—slope, rock outcrops

General management considerations:

*****This soil is well suited for livestock grazing.

*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Jim soil)

Major understory species:

*****paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower

Mean annual understory production (vascular plants, air-dry weight):

*****paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest—not estimated

Soil limitation(s) for fencing: severe—shallow bedrock, slope, frost action

Limitations to uniform distribution of livestock: moderate—slope

General management considerations:

*****This soil is well suited for livestock grazing.

*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

131—Estelle silt loam, rolling

Composition

Estelle soil and similar inclusions: 90 percent

Contrasting inclusions: 10 percent

Characteristics of Estelle and similar soils

Landform: till plains
Position on the landscape: all positions
Slope range: 2 to 16 percent
Slope features: shape—rolling; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 6 inches (3 to 15 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 16 inches (5 to 41 cm)—yellowish red, dark yellowish brown, and strong brown silt loam and very fine sandy loam
*16 to 60 inches (41 to 152 cm)—dark grayish brown and brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam and very fine sandy loam surface—moderate; in the substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 16 percent
*soils in similar positions with very gravelly material at less than 10 inches (less than 25 cm)
*poorly drained soils in depressions and on toeslopes
*occasional surface boulders

Major Uses

Current uses: hayland and pastureland, homesites, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 600 feet (15 to 183 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, water erosion, wind erosion, restricted permeability, frost action, excess surface fines, corrosivity, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Estelle soil—till deposits, 15-25 inch pz.

Cropland

General management considerations:

*This unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:

*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:

*This unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:

*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch and white spruce
Minor tree species: quaking aspen and black spruce

Mean site index:
*white spruce—75 (100 year, *Farr 1967*)
*paper birch—57 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—28.5 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—34.7 cubic feet per acre (2.4 cubic m per hectare) per year at age 80
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too cobbly, slope, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

132—Estelle silt loam, sloping and moderately steep

Composition

Estelle, sloping soil and similar inclusions: 60 percent
Estelle, moderately steep soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Estelle, sloping and similar soils

Landform: glacial till plains and hills (Figure 2)
Position on the landscape: crests and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 16 inches (5 to 41 cm)—yellowish red, dark yellowish brown, and strong brown silt loam and very fine sandy loam
*16 to 60 inches (41 to 152 cm)—dark grayish brown and brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Estelle, moderately steep and similar soils

Landform: hills (Figure 2)
Position on the landscape: backslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*****2 to 16 inches (5 to 41 cm)—yellowish red, dark yellowish brown, and strong brown silt loam and very fine sandy loam
*****16 to 60 inches (41 to 152 cm)—dark grayish brown and brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****poorly drained soils in depressions
*****soils with slopes greater than 25 percent
*****soils with very gravelly material at less than 10 inches (less than 25 cm)
*****occasional surface boulders

Major Uses

Current uses: homesites and wildlife habitat
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 100 to 600 feet (30 to 183 m)

Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, wind erosion, low fertility, water erosion, frost action, excess surface fines, corrosivity, restricted permeability, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Estelle, sloping soil—till deposits, 15-25 inch pz.
*Estelle, moderately steep soil—till deposits, 15-25 inch pz.

Cropland (Estelle, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland due to steep slopes, the depth to gravelly material, low fertility, and excessive late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Estelle, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Estelle, sloping soil)

General management considerations:

*This portion of the unit has moderate limitations for homesites due to cobbles, and moderate limitations for shallow excavations due the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:

*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Estelle, moderately steep soil)

General management considerations:

*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:

*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Design and construct buildings and access roads to compensate for steep slopes.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Estelle, sloping soil)

Major tree species: paper birch and white spruce
Minor tree species: quaking aspen and black spruce

Mean site index:
*white spruce—75 (100 year, *Farr 1967*)
*paper birch—57 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—28.5 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—34.7 cubic feet per acre (2.4 cubic m per hectare) per year at age 80
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Estelle, moderately steep soil)

Major tree species: paper birch and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—75 (100 year, *Farr 1967*)
*paper birch—57 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—28.5 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—34.7 cubic feet per acre (2.4 cubic m per hectare) per year at age 80
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Estelle, sloping soil)

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2699 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too cobbly, slope, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Estelle, moderately steep soil)

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood

Mean annual understory production (vascular plants, air-dry weight):
*****paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

133—Estelle silt loam, steep and sloping

Composition

Estelle, steep soil and similar inclusions: 65 percent
Estelle, sloping soil and similar inclusions: 25 percent
Contrasting inclusions: 15 percent

Characteristics of Estelle, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes
Slope range: 20 to 65 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*****2 to 16 inches (5 to 41 cm)—yellowish red, dark yellowish brown, and strong brown silt loam and very fine sandy loam
*****16 to 60 inches (41 to 152 cm)—dark grayish brown and brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam and very fine sandy loam surface—moderate; in the gravelly and cobbly substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Estelle, sloping and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: crests and toeslopes
Slope range: 6 to 20 percent
Slope features: shape—convex or concave; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 16 inches (5 to 41 cm)—yellowish red, dark yellowish brown, and strong brown silt loam and very fine sandy loam
*16 to 60 inches (41 to 152 cm)—dark grayish brown and brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam and very fine sandy loam surface—moderate; in the gravelly and cobbly substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: medium
Depth to seasonally high water table: greater than 60 inches (greater than 152 cm)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils in similar positions with very gravelly material at less than 10 inches (less than 25 cm)
*poorly drained soils in depressions and on toeslopes
*soils with slopes greater than 65 percent
*occasional surface boulders

Major Uses

Current uses: wildlife habitat
Potential uses: homesites, forestry, and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, restricted permeability, water erosion, wind erosion, excess surface fines, corrosivity, frost action, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Estelle, steep soil—till deposits, 15-25 inch pz.
*Estelle, sloping soil—till deposits, 15-25 inch pz.

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development (Estelle, steep soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due

to the steepness and length of slopes.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Suitable management practices:
*Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Building Site Development (Estelle, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for reclamation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Design and construct buildings and access roads to compensate for steep slopes.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Estelle, steep soil)

Major tree species: paper birch and white spruce
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—75 (100 year, *Farr 1967*)
*paper birch—57 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—28.5 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—34.7 cubic feet per acre (2.4 cubic m per hectare) per year at age 80
Soil limitation(s) for equipment use: severe—slope, silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Estelle, sloping soil)

Major tree species: paper birch and white spruce

Minor tree species: quaking aspen
Mean site index:
*white spruce—75 (100 year, *Farr 1967*)
*paper birch—57 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—28.5 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—34.7 cubic feet per acre (2.4 cubic m per hectare) per year at age 80
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Estelle, steep soil)

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too cobbly, frost action
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Estelle, sloping soil)

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too cobbly, slope, frost action
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

134—Estelle silt loam, undulating

Composition

Estelle soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Estelle and similar soils

Landform: till plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 5 percent
Slope features: shape—undulating
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 16 inches (5 to 41 cm)—yellowish red, dark yellowish brown, and strong brown silt loam and very fine sandy loam
*16 to 60 inches (41 to 152 cm)—dark grayish brown and brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam and very fine sandy loam surface—moderate; in the substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 10 to 26 inches (25 to 66 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 5 percent
*soils in similar positions with very gravelly material at less than 10 inches (less than 25 cm)
*poorly drained soils in depressions and on toeslopes
*occasional surface boulders

Major Uses

Current uses: hayland and pastureland, homesites, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: wind erosion, restricted permeability, excess surface fines, corrosivity, low fertility, frost action, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Estelle soil—till deposits, 15-25 inch pz.

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to low fertility and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This portion of the unit has moderate limitations for homesites due to cobbles, and moderate limitations for shallow excavations due to cobbles and the dense nature of the substratum.
*This unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch and white spruce
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—75 (100 year, *Farr 1967*)
*paper birch—57 (50 year, *Gregory and Haack 1965*)

Estimated growth at culmination of mean annual increment:
*white spruce—28.5 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—34.7 cubic feet per acre (2.4 cubic m per hectare) per year at age 80
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too cobbly, frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

135—Estelle, hilly-Disappoint complex

Composition

Estelle soil and similar inclusions: 65 percent
Disappoint soil and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Estelle and similar soils

Landform: hills (Figure 2)
Position on the landscape: crests, backslopes, and footslopes
Slope range: 2 to 30 percent
Slope features: shape—hilly; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 16 inches (5 to 41 cm)—yellowish red, dark yellowish brown, and strong brown silt loam and very fine sandy loam
*16 to 60 inches (41 to 152 cm)—dark grayish brown and brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over

short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Disappoint and similar soils

Landform: hills (Figure 2)
Position on the landscape: depressions
Slope range: 0 to 7 percent
Slope features: shape—concave or plain; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*****0 to 4 inches (0 to 10 cm)—black very cobbly mucky silt loam
*****4 to 13 inches (10 to 33 cm)—very dark grayish brown very cobbly silt loam and cobbly silt loam
*****13 to 41 inches (33 to 104 cm)—very dark grayish brown gravelly silt loam with pockets of loam and sandy loam
*****41 to 60 inches (104 to 152 cm)—olive very gravelly sandy loam

Drainage class: very poorly or poorly drained
Permeability: in the loamy surface layers—moderate; in the very gravelly loam substratum—moderately slow
Available water capacity: high
Runoff: slow
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Included Areas

*****very poorly drained soils in depressions with organic mats greater than 16 inches (greater than 41 cm)
*****soils with slopes greater than 30 percent
*****soils with very gravelly material at less than 10 inches (less than 25 cm)
*****occasional surface boulders

Major Uses

Current uses: wildlife habitat and homesites
Potential uses: hayland and pastureland, forestry, and livestock grazing

Major Management Factors

Elevation: 100 to 600 feet (30 to 183 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)

*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, water erosion, low fertility, wind erosion, depth to seasonally high water table, frost action, restricted permeability, excess surface fines, corrosivity, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Estelle, moderately steep soil—till deposits, 15-25 inch pz.
*Disappoint soil—drift deposits, very poorly drained

Cropland (Estelle soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Cropland (Disappoint soil)

General management considerations:
*This portion of the unit has severe limitations for cropland and hayland due to wetness.

Building Site Development (Estelle soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles; and moderate limitations for shallow excavations due to slope, cobbles, and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Design and construct buildings and access roads to compensate for steep slopes.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.

*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Disappoint soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to wetness.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Forestry (Estelle soil)

Major tree species: paper birch and white spruce
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—75 (100 year, *Farr 1967*)
*paper birch—57 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—28.5 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—34.7 cubic feet per acre (2.4 cubic m per hectare) per year at age 80
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Disappoint soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce
Mean site index:
*white spruce—61 (estimated, 100 year)
*paper birch—49 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—18.6 cubic feet per acre (1.3 cubic m per hectare) per year at age 125
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—wetness, mucky silt, cobbles
Seedling mortality: severe—wetness, shallow, rock fragments
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is poorly suited for forestry due to severe soil limitations.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.
*The water table may rise if trees are removed.

Livestock Grazing (Estelle soil)

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood

Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—slope, wet soils
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Disappoint soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—alder, devil's club, rusty menziesia, bluejoint reedgrass, horsetail, oakfern and other ferns, and bunchberry dogwood
*black spruce forest—Labrador tea ledum, lingonberry, horsetail, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—not estimated
*black spruce forest—not estimated
Soil limitation(s) for fencing: severe—wetness, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—slope, wet soils
General management considerations:
*This soil is poorly suited for livestock grazing due to wetness and other soil limitations.

136—Estelle, undulating-Disappoint complex

Composition

Estelle soil and similar inclusions: 60 percent
Disappoint soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Estelle and similar soils

Landform: glacial till plains (Figure 3)
Position on the landscape: convex and plain positions
Slope range: 2 to 16 percent
Slope features: shape—rolling; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 16 inches (5 to 41 cm)—yellowish red, dark yellowish brown, and strong brown silt loam and very fine sandy loam
*16 to 60 inches (41 to 152 cm)—dark grayish brown and brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly loam substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high

Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Disappoint and similar soils

Landform: glacial till plains (Figure 3)
Position on the landscape: depressions
Slope range: 0 to 7 percent
Slope features: shape—plain or concave; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*****0 to 4 inches (0 to 10 cm)—black very cobbly mucky silt loam
*****4 to 13 inches (10 to 33 cm)—very dark grayish brown very cobbly silt loam and cobbly silt loam
*****13 to 41 inches (33 to 104 cm)—very dark grayish brown gravelly silt loam with pockets and lenses of sandy loam and loam
*****41 to 60 inches (104 to 152 cm)—olive very gravelly sandy loam

Drainage class: very poorly or poorly drained
Permeability: in the upper part—moderate; in the underlying very gravelly substratum material—moderately slow
Available water capacity: high
Runoff: very slow
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 16 percent
*****well drained soils with very gravelly material at less than 10 inches (less than 25 cm)
*****very poorly drained soils in depressions with organic mats thicker than 16 inches (41 cm)
*****occasional surface boulders

Major Uses

Current uses: wildlife habitat and homesites
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 600 feet (30 to 183 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: depth to seasonally high water table, slope, restricted permeability,

water erosion, wind erosion, excess surface fines, corrosivity, frost action, depth to gravelly and cobbly material, and dense substratum

Ecological sites:

*Estelle soil—till deposits, 15-25 inch pz.

*Disappoint soil—drift deposits, very poorly drained

Cropland (Estelle soil)

General management considerations:

*This portion of the unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.

*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.

*Occasional surface stones limit some fieldwork.

*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:

*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.

*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.

*Add lime to improve soil fertility.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.

*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.

*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Disappoint soil)

General management considerations:

*This portion of the unit has severe limitations for cropland and hayland due to wetness.

Building Site Development (Estelle soil)

General management considerations:

*This portion of the unit has moderate limitations for homesites due to slope and cobbles; and moderate limitations for shallow excavations due to slope, cobbles, and the dense nature of the substratum.

*This portion of the unit has a high potential for frost action and a high risk of corrosion.

*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.

*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.

*Excavation can expose soil material that is highly susceptible to wind and water erosion.

*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.

*The quality of roadbeds and road surfaces can be adversely affected by frost action.

*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:

*Increase the size of the absorption area to compensate for the restricted permeability.

*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Disappoint soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to wetness.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Forestry (Estelle soil)

Major tree species: paper birch and white spruce
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—75 (100 year, *Farr 1967*)
*paper birch—57 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—28.5 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—34.7 cubic feet per acre (2.4 cubic m per hectare) per year at age 80
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Disappoint soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce
Mean site index:
*white spruce—61 (estimated, 100 year)
*paper birch —49 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—18.6 cubic feet per acre (1.3 cubic m per hectare) per year at age 125
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—wetness, mucky silt, cobbles
Seedling mortality: severe—wetness, shallow, rock fragments
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is poorly suited for forestry due to severe soil limitations.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.
*The water table may rise if trees are removed.

Livestock Grazing (Estelle soil)

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too cobbly, slope, frost action
Limitations to uniform distribution of livestock: moderate—slope, wet soils
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Disappoint soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—alder, devil's club, rusty menziesia, bluejoint reedgrass, horsetail, oakfern and other ferns, and bunchberry dogwood
*black spruce forest—Labrador tea ledum, lingonberry, horsetail, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—not estimated
*black spruce forest—not estimated
Soil limitation(s) for fencing: severe—wetness, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—slope, wet soils
General management considerations:
*This soil is poorly suited for livestock grazing due to wetness and other soil limitations.

137—Flat Horn silt loam, 0 to 5 percent slopes

Composition

Flat Horn silt loam soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Flat Horn and similar soils

Landform: outwash plains
Position on the landscape: all positions
Slope range: 0 to 5 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 9 inches (5 to 23 cm)—reddish brown, brown, and strong brown silt loam
*9 to 15 inches (23 to 38 cm)—grayish brown and dark yellowish brown fine sandy loam
*15 to 60 inches (38 to 152 cm)—stratified olive brown and olive silt through fine sand

Drainage class: well drained
Permeability: in the silt loam and very fine sandy loam surface—moderate; in the stratified substrata—moderate
Available water capacity: moderate
Depth to contrasting stratified sandy and silty material: 3 to 14 inches (8 to 36 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 25 percent
*****soils with very gravelly material at less than 40 inches (less than 102 cm)
*****poorly drained soils in depressions

Major Uses

Current uses: homesites and wildlife habitat
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: restricted permeability, low fertility, frost action, wind erosion, excess surface fines, and corrosivity
Ecological sites:
*****Flat Horn soil—glaciofluvial deposits, 15-25 inch pz.

Cropland

General management considerations:
*****This unit has moderate limitations for cropland and hayland due to low fertility and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*****Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Add lime to improve soil fertility.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has slight limitations for homesites and shallow excavations.
*This unit has a moderate potential for frost action and a high risk of corrosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch and white spruce
Minor tree species: black spruce, quaking aspen, and balsam poplar
Mean site index:
*white spruce—69 (estimated, 100 year)
*paper birch—50 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
*paper birch-spruce forest—Labrador tea ledum, lingonberry, bog blueberry, bunchberry dogwood, black crowberry, American twinflower, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest, paper birch-white spruce forest, and paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy
Limitations to uniform distribution of livestock: slight
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

138—Flat Horn silt loam, rolling

Composition

Flat Horn soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Flat Horn and similar soils

Landform: hills and outwash plains
Position on the landscape: all positions
Slope range: 2 to 16 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—gray silt loam
*****2 to 9 inches (5 to 23 cm)—reddish brown, brown, and strong brown silt loam
*****9 to 60 inches (23 to 152 cm)—stratified olive brown and olive silt through fine sand

Drainage class: well drained
Permeability: in the silt loam and very fine sandy loam surface—moderate; in the stratified substrata—moderate
Available water capacity: moderate
Depth to contrasting stratified sandy and silty material: 3 to 14 inches (8 to 36 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 16 percent
*****soils in similar positions with very gravelly material at less than 40 inches (less than 102 cm)
*****poorly drained soils in depressions

Major Uses

Current uses: homesites and wildlife habitat
Potential uses: hayland and pastureland, forestry, and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: wind erosion, water erosion, slope, frost action, restricted permeability, low fertility, excess surface fines, and corrosivity

Ecological sites:
*Flat Horn soil—glaciofluvial deposits, 15-25 inch pz.

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass and oats and barley as forage.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Avoid the cultivation of grain crops on slopes in excess of 12 percent to reduce water erosion hazard.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has moderate limitations for homesites due to slope and slight limitations for shallow excavations.
*This unit has a moderate potential for frost action and a high risk of corrosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch and white spruce
Minor tree species: black spruce, quaking aspen, and balsam poplar
Mean site index:
*white spruce—69 (estimated, 100 year)
*paper birch—50 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt

Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
*paper birch-spruce forest—Labrador tea ledum, lingonberry, bog blueberry, bunchberry dogwood, black crowberry, American twinflower, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest, paper birch-white spruce forest, and paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

139—Flat Horn silt loam, sloping and moderately steep

Composition

Flat Horn silt loam, sloping soil and similar inclusions: 60 percent
Flat Horn silt loam, moderately steep soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Flat Horn, sloping and similar soils

Landform: hills (Figure 2)
Position on the landscape: crests and toeslopes
Slope range: 2 to 12 percent
Slope features: shape—convex or undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 9 inches (5 to 23 cm)—reddish brown, brown, and strong brown silt loam
*9 to 60 inches (23 to 152 cm)—stratified olive brown and olive silt through fine sand

Drainage class: well drained
Permeability: in the silt loam and very fine sandy loam surface—moderate; in the stratified substrata—moderate
Available water capacity: moderate
Depth to contrasting stratified sandy and silty material: 3 to 14 inches (8 to 36 cm)
Runoff: slow

Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Flat Horn, moderately steep and similar soils

Landform: hills (Figure 2)
Position on the landscape: backslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 9 inches (5 to 23 cm)—reddish brown, brown, and strong brown silt loam
*9 to 60 inches (23 to 152 cm)—stratified olive brown and olive silt through fine sand

Drainage class: well drained
Permeability: in the silt loam and very fine sandy loam surface—moderate; in the stratified substrata—moderate
Available water capacity: moderate
Depth to contrasting stratified sandy and silty material: 3 to 14 inches (8 to 36 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 35 percent
*soils in similar positions with very gravelly material at less than 40 inches (less than 102 cm)
*poorly drained soils in depressions

Major Uses

Current uses: wildlife habitat
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, water erosion, wind erosion, restricted permeability, frost action, corrosivity, and excess surface fines
Ecological sites:
*Flat Horn, sloping soil—glaciofluvial deposits, 15-25 inch pz.
*Flat Horn, moderately steep soil—glaciofluvial deposits, 15-25 inch pz.

Cropland (Flat Horn, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland due to slope, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass and oats and barley as forage.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Leave windbreaks of natural vegetation in place when clearing to reduce the hazard of wind and water erosion.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Cropland (Flat Horn, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to slope.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Flat Horn, sloping soil)

General management considerations:
*This portion of the unit has slight limitations for homesites and shallow excavations.
*This portion of the unit has a moderate potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage.

Building Site Development (Flat Horn, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites and shallow excavations due to slope.
*This portion of the unit has a moderate potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage.

Forestry (Flat Horn, sloping soil)

Major tree species: paper birch and white spruce
Minor tree species: quaking aspen and balsam poplar
Mean site index:
*white spruce—69 (estimated, 100 year)
*paper birch—50 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Flat Horn, moderately steep soil)

Major tree species: paper birch and white spruce
Minor tree species: quaking aspen and balsam poplar
Mean site index:
*white spruce—69 (estimated, 100 year)
*paper birch—50 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—competitive species

General management considerations:
*****This soil is well suited for forestry.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Flat Horn, sloping soil)

Major understory species:
*****paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch forest and paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Flat Horn, moderately steep soil)

Major understory species:
*****paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch forest and paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: severe—slope, too sandy
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

140—Goldcord-Tsadaka complex, 0 to 30 percent slopes

Composition

Goldcord soil and similar inclusions: 50 percent
Tsadaka soil and similar inclusions: 40 percent
Contrasting inclusions: 10 percent

Characteristics of Goldcord and similar soils

Landform: mountains
Position on the landscape: crests and steep backslopes
Slope range: 0 to 30 percent
Slope features: shape—plain or convex; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): bearberry-lichen dwarf shrub

Typical profile:
*0 to 8 inches (0 to 20 cm)—dark brown very cobbly sandy loam
*8 to 19 inches (20 to 48 cm)—dark brown very cobbly sandy loam
*19 inches (48 cm)—consolidated bedrock

Drainage class: well drained
Permeability: in the surface material—moderate; in the bedrock—impermeable
Available water capacity: low
Depth to consolidated bedrock: 8 to 20 inches (20 to 51 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: none

Characteristics of Tsadaka and similar soils

Landform: mountains
Position on the landscape: hummocks on shoulderslopes and backslopes
Slope range: 10 to 25 percent
Slope features: shape—plain or convex; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 4 to 10 inches (10 to 25 cm) thick
Major vegetation type(s): black crowberry-bog blueberry dwarf shrub

Typical profile:
*0 to 5 inches (0 to 13 cm)—very dark brown and dark grayish brown silt loam
*5 to 13 inches (13 to 33 cm)—very dusky red and yellowish red silt loam
*13 to 26 inches (33 to 66 cm)—dusky red very cobbly sandy loam that is weakly cemented
*26 to 60 inches (66 to 152 cm)—dark brown very cobbly sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the cemented very gravelly sandy loam material—slow; in the underlying very gravelly sandy loam material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: low to moderate
Depth to contrasting very gravelly and very cobbly material: 14 to 18 inches (36 to 46 cm)
Depth to gravelly till material for the map unit component: 10 to 18 inches (25 to 46 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 30 percent
*soils on backslopes with alder and bluejoint reedgrass vegetation
*very poorly drained soils in depressions
*occasional surface boulders
*rock outcrops

Major Uses

Current uses: wildlife habitat

Major Management Factors

Elevation: 1700 to 3500 feet (518 to 1067 m)
Climatic factors (average annual):
*****precipitation—30 to 45 inches (76 to 114 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: slope, water erosion, wind erosion, restricted permeability, frost action, depth to bedrock, corrosivity, depth to gravelly and cobbly material, dense substratum, and cemented layer
Ecological sites:
*****Goldcord soil—alpine ridges
*****Tsadaka soil—alpine hummocks

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to steep slopes, the depth to gravelly and cobbly material, depth to bedrock, depth to cemented layer, and a short growing season.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites and shallow excavations due to steep slopes, the depth to cemented layer, and depth to bedrock.
*****The Goldcord portion of this unit has a moderate potential for frost action and a high risk of corrosion.
*****The Tsadaka portion of this unit has a high potential for frost action and a high risk of corrosion.

Livestock Grazing (Goldcord soil)

Major species:
*****bearberry-lichen dwarf shrub—alpine bearberry, black crowberry, Labrador tea ledum, pincushion-plant, bog blueberry, lingonberry, alpine azalea, alpine sweet grass, sedge, and lichen
Mean annual production (vascular plants, air-dry weight):
*****bearberry-lichen dwarf shrub—250 pounds per acre (280 kilograms per hectare)
Soil limitation(s) for fencing: severe—shallow bedrock, too cobbly, slope
Limitations to uniform distribution of livestock: moderate—slope, rock outcrops, poorly drained areas
General management considerations:
*****This soil is poorly suited for livestock grazing.

Livestock Grazing (Tsadaka soil)

Major species:
*****black crowberry-bog blueberry dwarf shrub—black crowberry, bog blueberry, lingonberry, Altai's fescue, bunchberry dogwood, Beauverd's spiraea, dwarf arctic birch, bluejoint reedgrass, and feathermoss

Mean annual production (vascular plants, air-dry weight):
*black crowberry-bog blueberry dwarf shrub—300 pounds per acre (335 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—slope, rock outcrops, poorly drained areas
General management considerations:
*This soil is poorly suited for livestock grazing.

141—Histosols

Composition

Histosols and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Histosols and similar soils

Landform: glacial plains, hills, and mountains (Plate 2)
Position on the landscape: bogs and fens
Slope range: 0 to 7 percent
Slope features: shape—plain or concave
Organic mat on surface: 16 to over 60 inches (41 to over 152 cm) thick
Major vegetation type(s): black spruce/ericaceous shrub woodland, ericaceous shrub scrub, and sedge-shrub bog meadow and fen meadow

Sample profile:
*0 to 5 inches (0 to 13 cm)—dark reddish brown peat
*5 to 60 inches (13 to 152 cm)—dark reddish brown mucky peat with lenses of black muck

Drainage class: very poorly drained
Permeability: in the surface organic horizons—moderately rapid; below this—variable
Available water capacity: high
Runoff: ponded
Depth to seasonally high water table: 0 to 1 foot (0 to 0.3 m)
Hazard of erosion: by water—slight; by wind—slight
Hazard of flooding: none

Included Areas

*well drained mineral soils on convex positions

Major Uses

Current uses: wildlife habitat
Potential uses: wildlife habitat

Major Management Factors

Elevation: 30 to 1700 feet (9 to 518 m)
Climatic factors (average annual):
*precipitation—15 to 35 inches (38 to 89 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—80 to 110 days
*growing degree days—1300 to 1500

Soil related factors: depth to seasonally high water table, low soil strength, and corrosivity
Ecological sites:
*****Histosols—organic terrain

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to wetness.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites due to ponding and low soil strength, and severe limitations for shallow excavations due to excess humus and ponding.
*****This unit has a high potential for frost action and a high risk of corrosion.

Livestock Grazing

Major species:
*****black spruce/ericaceous shrub bog—stunted black spruce, Labrador tea ledum, bog blueberry, lingonberry, black crowberry, bog birch, crowberry, and sphagnum moss
*****ericaceous shrub bog—Labrador tea ledum, bog birch, bog blueberry, Beauverd's spiraea, cottongrass, cloudberry, marsh cinquefoil, sedge, sphagnum moss, and roundleaf sundew
*****sedge-shrub bog meadow—various sedges, cottongrass, bluejoint reedgrass, willow, sweetgale, shrubby cinquefoil, marsh cinquefoil, water horsetail, bog blueberry, bog rosemary, sphagnum moss, and various aquatic mosses
Mean annual production (vascular plants, air-dry weight):
*****black spruce/ericaceous shrub bog, ericaceous shrub bog, and sedge-shrub bog meadow—not estimated
Soil limitation(s) for fencing: severe—wetness, organic soils
Limitations to uniform distribution of livestock: very severe—wet soils, organic soils
General management considerations:
*****This soil is poorly suited for livestock grazing due to wetness and low abundance of suitable forage plants in most vegetation types.

142—Histosols, high elevation

Composition

Histosols, high elevation and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Histosols, high elevation and similar soils

Landform: mountains
Position on the landscape: bogs and fens on crests and shoulders
Slope range: 0 to 7 percent
Slope features: shape—plain or concave
Organic mat on surface: 16 to over 60 inches (41 to over 152 cm) thick
Major vegetation type(s): sedge-shrub bog meadow and fen meadow

Sample profile:
*****0 to 5 inches (0 to 13 cm)—dark reddish brown peat
*****5 to 60 inches (13 to 152 cm)—dark reddish brown mucky peat with lenses of black muck

Drainage class: very poorly drained
Permeability: in the surface organic horizons—moderately rapid; below this—variable
Available water capacity: high
Runoff: very slow
Depth to seasonally high water table: 0.5 feet above the surface to 1 foot (0.2 m above the surface to 0.3 m)
Hazard of erosion: by water—slight; by wind—slight
Hazard of flooding: none

Included Areas

*****well drained mineral soils on convex positions

Major Uses

Current uses: wildlife habitat
Potential uses: wildlife habitat

Major Management Factors

Elevation: 1700 to 3200 feet (518 to 975 m)
Climatic factors (average annual):
*****precipitation—35 to 45 inches (86 to 114 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: depth to seasonally high water table, low soil strength, and corrosivity
Ecological sites:
*****Histosols, high elevation—organic terrain, high elevation

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to wetness.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites due to ponding and low soil strength, and severe limitations for shallow excavations due to excess humus and ponding.

Livestock Grazing

Major species:
*****sedge-shrub bog meadow and fen meadow—various sedges, cottongrass, bluejoint reedgrass, willow, sweetgale, shrubby cinquefoil, marsh cinquefoil, water horsetail, bog blueberry, bog rosemary, sphagnum moss, and various aquatic mosses
Mean annual production (vascular plants, air-dry weight):
*****sedge-shrub bog meadow and fen meadow—not estimated
Soil limitation(s) for fencing: severe—wetness, organic soils, frost action
Limitations to uniform distribution of livestock: severe—wet soils, organic soils
General management considerations:
*****This soil is poorly suited for livestock grazing due to wetness.

143—Kalambach silt loam, sloping and moderately steep

Composition

Kalambach, sloping soil and similar inclusions: 65 percent
Kalambach, moderately steep soil and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Kalambach, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 10 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 6 inches (0 to 15 cm)—dark grayish brown and dark brown silt loam
*****6 to 21 inches (15 to 53 cm)—dark yellowish brown and dark brown silt loam
*****21 to 60 inches (53 to 152 cm)—dark grayish brown very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly till material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 10 to 31 inches (25 to 79 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Kalambach, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes
Slope range: 10 to 30 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 6 inches (0 to 15 cm)—dark brown and brown silt loam
*****6 to 16 inches (15 to 41 cm)—strong brown silt loam
*****16 to 60 inches (41 to 152 cm)—dark grayish brown very gravelly sandy loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly till material—moderate to moderately slow; permeability rates in substratum materials vary

considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 10 to 31 inches (25 to 79 cm)
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 30 percent
*****soils in similar positions with very gravelly material at less than 10 inches (less than 25 cm)
*****poorly drained soils in depressions

Major Uses

Current uses: homesites, hayland and pastureland, wildlife habitat, and roadfill source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—18 inches (46 cm); range—15 to 25 inches (38 to 64 cm)
*****air temperature—35 °F (2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: wind erosion, water erosion, restricted permeability, excess surface fines, low fertility, corrosivity, frost action, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*****Kalambach, gently sloping soil—till deposits, 15-25 inch pz.
*****Kalambach, moderately steep soil—till deposits, 15-25 inch pz.

Cropland (Kalambach, sloping soil)

General management considerations:
*****This portion of the unit has moderate limitations for cropland and hayland due to slope, the depth to gravelly and cobbly material, low fertility, and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass and oats and barley as forage.
*****Occasional surface stones limit some fieldwork.
*****Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Add lime to improve soil fertility.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Use cross slope or contour tillage during planting operations to reduce water erosion

hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Kalambach, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Kalambach, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to cobbles, and moderate limitations for shallow excavations due to the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Kalambach, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of

the substratum.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Design and construct buildings and access roads to compensate for steep slopes.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Kalambach, sloping soil)

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—63 (100 year, *Farr 1967*)
*paper birch—47 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—19.9 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—21.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Kalambach, moderately steep soil)

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—63 (100 year, *Farr 1967*)
*paper birch—47 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—19.9 cubic feet per acre (1.4 cubic m per hectare) per year at age 120

*paper birch—21.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Kalambach, sloping soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too gravelly, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Kalambach, moderately steep soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

144—Kalambach silt loam, steep and sloping

Composition

Kalambach, steep soil and similar inclusions: 60 percent
Kalambach, sloping soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Kalambach, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes and footslopes
Slope range: 20 to 60 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 6 inches (0 to 15 cm)—dark grayish brown and dark brown silt loam
*****6 to 21 inches (15 to 53 cm)—dark yellowish brown and dark brown silt loam
*****21 to 60 inches (53 to 152 cm)—dark grayish brown very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly till material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 10 to 31 inches (25 to 79 cm)
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Kalambach, sloping and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: crests and toeslopes
Slope range: 5 to 20 percent
Slope features: shape—convex or concave; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 6 inches (0 to 15 cm)—dark grayish brown and dark brown silt loam
*****6 to 21 inches (15 to 53 cm)—dark yellowish brown and dark brown silt loam
*****21 to 60 inches (53 to 152 cm)—dark grayish brown very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly till material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 10 to 31 inches (25 to 79 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with very gravelly material at less than 10 inches (less than 25 cm)
*soils with slopes greater than 60 percent
*poorly drained soils in depressions
*occasional surface boulders

Major Uses

Current uses: wildlife habitat
Potential uses: homesites, forestry, and livestock grazing

Major Management Factors

Elevation: 300 to 1000 feet (91 to 305 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, water erosion, wind erosion, restricted permeability, excess surface fines, corrosivity, frost action, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Kalambach, steep soil—till deposits, 15-25 inch pz.
*Kalambach, sloping soil—till deposits, 15-25 inch pz.

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development (Kalambach, steep soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.

Suitable management practices:
*Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Building Site Development (Kalambach, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to cobbles and slope, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.

*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for reclamation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Design and construct buildings and access roads to compensate for steep slopes.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Kalambach, steep soil)

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—63 (100 year, *Farr 1967*)
*paper birch—47 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—19.9 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—21.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: severe—slope, texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Kalambach, sloping soil)

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—63 (100 year, *Farr 1967*)
*paper birch—47 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—19.9 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—21.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species

General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Kalambach, steep soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Kalambach, sloping soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too gravelly, slope, frost action
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

145—Kalambach silt loam, undulating

Composition

Kalambach, undulating soil and similar inclusions: 85 percent
Contrasting inclusions: 10 percent

Characteristics of Kalambach and similar soils

Landform: till plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick

Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 6 inches (0 to 15 cm)—dark grayish brown and dark brown silt loam
*6 to 21 inches (15 to 53 cm)—dark yellowish brown and dark brown silt loam
*21 to 60 inches (53 to 152 cm)—dark grayish brown very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly till material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 10 to 31 inches (25 to 79 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils on hills with slopes greater than 30 percent
*soils in similar positions with very gravelly material at less than 10 inches (less than 25 cm)
*poorly drained soils in depressions
*occasional surface boulders

Major Uses

Current uses: hayland and pastureland, homesites, wildlife habitat, and roadfill source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 600 feet (15 to 183 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, wind erosion, water erosion, restricted permeability, low fertility, excess surface fines, corrosivity, frost action, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Kalambach soil—till deposits, 15-25 inch pz.

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to slope, depth to gravelly and cobbly material, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.

*Occasional surface stones limit some fieldwork.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This portion of the unit has moderate limitations for homesites due to cobbles, and moderate limitations for shallow excavations due to the dense nature of the substratum.
*This unit has a high potential for frost action and a moderate risk of corrosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—63 (100 year, *Farr 1967*)
*paper birch—47 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—19.9 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—21.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 90

*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too gravelly, frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

146—Kalambach-Disappoint complex, 0 to 10 percent slopes

Composition

Kalambach soil and similar inclusions: 65 percent
Disappoint soil and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Kalambach and similar soils

Landform: glacial till plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 6 inches (0 to 15 cm)—dark grayish brown and dark brown silt loam
*6 to 21 inches (15 to 53 cm)—dark yellowish brown and dark brown silt loam
*21 to 60 inches (53 to 152 cm)—dark grayish brown very gravelly loam

Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the gravelly substratum—moderate or

moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate
Depth to contrasting very gravelly and very cobbly material: 10 to 31 inches (25 to 79 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Disappoint and similar soils

Landform: glacial till plains (Figure 3)
Position on the landscape: depressions
Slope range: 0 to 7 percent
Slope features: shape—plain or concave
Organic mat on surface: 2 to 6 inches (5 to 15 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*****0 to 4 inches (0 to 10 cm)—black very cobbly mucky silt loam
*****4 to 13 inches (10 to 33 cm)—very dark grayish brown very cobbly silt loam and cobbly silt loam
*****13 to 41 inches (33 to 104 cm)—stratified very dark grayish brown gravelly silt loam through sandy loam
*****41 to 60 inches (104 to 152 cm)—olive very gravelly sandy loam

Drainage class: poorly or very poorly drained
Permeability: in the very cobbly surface layers—moderate; in the stratified material—moderate; in the very gravelly sandy loam material—moderately slow
Available water capacity: high
Runoff: slow
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 10 percent
*****occasional surface stones

Major Uses

Current uses: wildlife and homesites
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 150 to 450 feet (46 to 137 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500

Soil related factors: water table, restricted permeability, frost action, wind erosion, water erosion, excess surface fines, corrosivity, depth to gravelly and cobbly material, and dense substratum

Ecological sites:

*Kalambach soil—till deposits, 15-25 inch pz.

*Disappoint soil—drift deposits, very poorly drained

Cropland (Kalambach soil)

General management considerations:

*This portion of the unit has moderate limitations for cropland and hayland due to wind erosion, water erosion, and relatively high late summer precipitation.

*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.

*Occasional surface stones limit some fieldwork.

*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:

*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.

*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.

*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.

*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Disappoint soil)

General management considerations:

*This portion of the unit has severe limitations for cropland and hayland due to wetness.

Building Site Development (Kalambach soil)

General management considerations:

*This portion of the unit has moderate limitations for homesites due to cobbles, and moderate limitations for shallow excavations due to the dense nature of the substratum.

*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.

*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.

*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.

*Excavation can expose soil material that is highly susceptible to wind and water erosion.

*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.

*The quality of roadbeds and road surfaces can be adversely affected by frost action.

*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Disappoint soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to wetness.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Forestry (Kalambach soil)

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*paper birch—47 (50 year, *Gregory and Haack 1965*)
*white spruce—63 (100 year, *Farr 1967*)
*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*paper birch—21.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 90
*white spruce—19.6 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Disappoint soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce
Mean site index:
*white spruce—61 (estimated, 100 year)
*paper birch —49 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—18.6 cubic feet per acre (1.3 cubic m per hectare) per year at age 125
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—wetness, mucky silt, cobbles
Seedling mortality: severe—wetness, shallow, rock fragments
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is poorly suited for forestry due to severe soil limitations.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

*The water table may rise if trees are removed.

Livestock Grazing (Kalambach soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2400 pounds per acre (2690 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too gravelly, frost action
Limitations to uniform distribution of livestock: moderate—wet soils
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Disappoint soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—alder, devil's club, rusty menziesia, bluejoint reedgrass, horsetail, oakfern and other ferns, and bunchberry dogwood
*black spruce forest—Labrador tea ledum, lingonberry, horsetail, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—not estimated
*black spruce forest—not estimated
Soil limitation(s) for fencing: severe—wetness, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—wet soils
General management considerations:
*This soil is poorly suited for livestock grazing due to wetness and other soil limitations.

147—Kashwitna silt loam, 0 to 3 percent slopes

Composition

Kashwitna soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Kashwitna and similar soils

Landform: outwash plains
Position on the landscape: all positions
Slope range: 0 to 3 percent
Slope features: shape—plain
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest, paper birch forest, and quaking aspen-spruce forest
Minor vegetation type(s): black spruce forest and mixed broadleaf forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 18 inches (5 to 46 cm)—strong brown and dark brown silt loam
*18 to 60 inches (46 to 152 cm)—olive brown very gravelly sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: moderate
Depth to contrasting very gravelly material: 8 to 27 inches (20 to 69 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 10 percent
*soils in similar positions with very gravelly material at less than 8 inches (less than 20 cm)
*poorly drained soils in depressions

Major Uses

Current uses: cropland, hayland and pastureland, homesites, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: depth to sand and gravel, cutbank instability, excessive permeability, wind erosion, low fertility, frost action, excess surface fines, and corrosivity
Ecological sites:
*Kashwitna soil—glaciofluvial deposits, 15-25 inch pz.

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to low fertility, depth to gravel, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, black spruce, white spruce, and quaking aspen
Mean site index:
*white spruce—69 (estimated, 100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—52 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*black spruce—not estimated
*quaking aspen—42.0 cubic feet per acre (3.0 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is well suited for forestry.

Livestock Grazing

Major understory species:
*paper birch-spruce forest, paper birch forest, quaking aspen-spruce forest, black spruce forest, and mixed broadleaf forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, quaking aspen-spruce forest, black spruce forest, and mixed broadleaf forest—not estimated

Soil limitation(s) for fencing: moderate—too gravelly, frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*****The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.

148—Kashwitna silt loam, sloping and moderately steep

Composition

Kashwitna, sloping soil and similar inclusions: 60 percent
Kashwitna, moderately steep soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Kashwitna, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation types: mixed paper birch-white spruce forest, mixed paper birch-aspen-white spruce forest, and black spruce forest
Minor vegetation type(s): paper birch-spruce forest and paper birch forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—gray silt loam
*****2 to 18 inches (5 to 46 cm)—strong brown and dark brown silt loam
*****18 to 60 inches (46 to 152 cm)—olive brown very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: moderate
Depth to contrasting very gravelly and very cobbly material: 8 to 27 inches (20 to 69 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Kashwitna, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes and footslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—gray silt loam
*****2 to 18 inches (5 to 46 cm)—strong brown and dark brown silt loam
*****18 to 60 inches (46 to 152 cm)—olive brown very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: moderate
Depth to contrasting very gravelly and very cobbly material: 8 to 27 inches (20 to 69 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 35 percent
*****poorly drained soils in depressions
*****soils with less than 8 inches (less than 20 cm) of silty material over sand and gravel

Major Uses

Current uses: homesites, wildlife habitat, and cropland
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 300 feet (15 to 91 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: slope, depth to gravel and cobbles, water erosion, wind erosion, excessive permeability, cutbank instability, low fertility, frost action, excess surface fines, and corrosivity
Ecological sites:
*****Kashwitna, sloping soil—glaciofluvial deposits, 15-25 inch pz.
*****Kashwitna, moderately steep soil—glaciofluvial deposits, 15-25 inch pz.

Cropland (Kashwitna, sloping soil)

General management considerations:
*****This portion of the unit has moderate limitations for cropland and hayland due to slope, low fertility, the depth to gravel, and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass, oats and barley as forage, and cole crops.
*****Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Add lime to improve soil fertility.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*****Use shallow cuts during land smoothing to avoid exposing gravelly outwash underlying material.

*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Kashwitna, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Kashwitna, sloping soil)

General management considerations:
*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this portion of the unit is a probable source of gravel, sand, and roadfill.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Kashwitna, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Cutbanks are not stable and, therefore, are subject to caving.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this portion of the unit is a probable source of gravel and

sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Design and construct buildings and access roads to compensate for steep slopes.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Kashwitna, sloping soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (estimated, 100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—52 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*black spruce—not estimated
*quaking aspen—42.0 cubic feet per acre (3.0 cubic m per hectare) per year at age 95
Hazard of water erosion from a non-compacted, bare soil surface: moderate—slope
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is well suited for forestry.

Forestry (Kashwitna, moderately steep soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (estimated, 100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—52 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*black spruce—not estimated
*quaking aspen—42.0 cubic feet per acre (3.0 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—slope, texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture

General management considerations:
*****This soil is well suited for forestry.

Livestock Grazing (Kashwitna, sloping soil)

Major understory species:
*****paper birch-spruce forest and paper birch forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest and paper birch forest—not estimated
Soil limitation(s) for fencing: moderate—too gravelly, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.

Livestock Grazing (Kashwitna, moderately steep soil)

Major understory species:
*****paper birch-spruce forest and paper birch forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest and paper birch forest—not estimated
Soil limitation(s) for fencing: severe—too gravelly, slope, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.

149—Kashwitna silt loam, undulating

Composition

Kashwitna soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Kashwitna and similar soils

Landform: outwash plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 8 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest and quaking aspen-spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—gray silt loam
*****2 to 18 inches (5 to 46 cm)—strong brown and dark brown silt loam
*****18 to 60 inches (46 to 152 cm)—olive brown very gravelly sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid

Available water capacity: moderate
Depth to gravelly material for the Kashwitna soil: 10 to 20 inches (25 to 51 cm)
Depth to gravelly material for the map unit: 8 to 27 inches (20 to 69 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 8 percent
*****soils in similar positions with very gravelly material at less than 10 inches (less than 25 cm)
*****poorly drained soils in depressions

Major Uses

Current uses: cropland, hayland and pastureland, homesites, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: depth to sand and gravel, excessive permeability, wind erosion, water erosion, cutbank instability, frost action, excess surface fines, low fertility, and corrosivity
Ecological sites:
*****Kashwitna soil—glaciofluvial deposits, 15-25 inch pz.

Cropland

General management considerations:
*****This unit has moderate limitations for cropland and hayland due to slope, low fertility, depth to gravel, and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*****Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*****Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Add lime to improve soil fertility.
*****Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Leave planned strips of trees and other existing vegetation perpendicular to the prevailing

wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (estimated, 100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—52 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*black spruce—not estimated
*quaking aspen—42.0 cubic feet per acre (3.0 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is well suited for forestry.

Livestock Grazing

Major understory species:
*paper birch-spruce forest, paper birch forest, black spruce forest, and quaking aspen-spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, black spruce forest, and quaking aspen-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too gravelly, frost action
Limitations to uniform distribution of livestock: slight

General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.

150—Keba silt loam, undulating

Composition

Keba silt loam soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Keba and similar soils

Landform: glaciolacustrine plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 6 inches (5 to 15 cm)—reddish brown, brown, and dark yellowish brown silt loam
*6 to 60 inches (15 to 152 cm)—dark grayish brown and dark yellowish brown gravelly silty clay loam and loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the substratum—moderately slow
Available water capacity: high
Depth to contrasting loamy material for the map unit: 2 to 16 inches (5 to 41 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils on hills with slopes greater than 15 percent
*soils in similar positions with very gravelly material at less than 10 inches (less than 25 cm)
*poorly drained soils in depressions

Major Uses

Current uses: homesites and wildlife habitat
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 100 to 300 feet (30 to 91 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)

*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: restricted permeability, slope, wind erosion, water erosion, frost action, excess surface fines, low fertility, and corrosivity
Ecological sites:
*Keba soil—till deposits, 15-25 inch pz.

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass and oats and barley as forage.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has slight limitations for homesites and shallow excavations.
*This unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch and white spruce
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—74 (estimated, 100 year)
*paper birch—55 (estimated, 50 year)

Estimated growth at culmination of mean annual increment:
*white spruce—27.7 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—31.8 cubic feet per acre (2.2 cubic m per hectare) per year at age 85
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
*paper birch-spruce forest—Labrador tea ledum, lingonberry, bog blueberry, bunchberry dogwood, black crowberry, American twinflower, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
*paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy
Limitations to uniform distribution of livestock: slight
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

151—Kichatna silt loam, 0 to 3 percent slopes

Composition

Kichatna soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Kichatna and similar soils

Landform: outwash plains
Position on the landscape: all positions
Slope range: 0 to 3 percent
Slope features: shape—plain
Organic mat on surface: 1 to 6 inches (3 to 15 cm) thick
Major vegetation type(s): paper birch-spruce forest, paper birch forest, quaking aspen-spruce forest, and black spruce forest
Minor vegetation type(s): mixed broadleaf forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 9 inches (5 to 23 cm)—yellowish red, strong brown, and brown silt loam
*9 to 60 inches (23 to 152 cm)—dark yellowish brown very gravelly and extremely gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: very low or low
Depth to contrasting very gravelly material: 2 to 16 inches (5 to 41 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 10 percent
*****poorly drained soils in depressions

Major Uses

Current uses: cropland, hayland and pastureland, homesites, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: excessive permeability, depth to gravel and cobbles, wind erosion, excess surface fines, cutbank instability, low fertility, and corrosivity
Ecological sites:
*****Kichatna soil—glaciofluvial deposits, thin surface

Cropland

General management considerations:
*****This unit has severe limitations for cropland due to the shallow depth to gravel.
*****This unit is best suited to permanent hayland and pastureland due to the shallow depth to gravel.
*****Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Add lime to improve soil fertility.
*****Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*****This unit has severe limitations for shallow excavations due to cutbank instability.
*****This unit has a low potential for frost action and a high risk of corrosion.

*Excavation can expose soil material that is highly susceptible to wind erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.

Forestry

Major tree species: paper birch, black spruce, white spruce, and quaking aspen
Mean site index:
*white spruce—64 (estimated, 100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—45 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*black spruce—not estimated
*quaking aspen—28.6 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Livestock Grazing

Major understory species:
*paper birch-spruce forest, paper birch forest, quaking aspen-spruce forest, black spruce forest, and mixed broadleaf forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, quaking aspen-spruce forest, black spruce forest, and mixed broadleaf forest—not estimated
Soil limitation(s) for fencing: severe—too gravelly
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

152—Kichatna silt loam, sloping and moderately steep

Composition

Kichatna, sloping and similar soils: 60 percent
Kichatna, steep and similar soils: 30 percent

Contrasting inclusions: 19 percent

Characteristics of Kichatna, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between ridges and hills
Slope range: 0 to 12 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-spruce forest, paper birch forest, black spruce forest, and quaking aspen-spruce forest
Minor vegetation type(s): quaking aspen forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*****2 to 9 inches (5 to 23 cm)—yellowish red, strong brown, and brown silt loam
*****9 to 60 inches (23 to 152 cm)—dark yellowish brown very gravelly and extremely gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: very low or low
Depth to contrasting very gravelly material: 4 to 10 inches (10 to 25 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Kichatna, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes and footslopes
Slope range: 12 to 25 percent
Slope features: shape—plain to convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-spruce forest, paper birch forest, black spruce forest, and quaking aspen-spruce forest
Minor vegetation type(s): quaking aspen forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*****2 to 9 inches (5 to 23 cm)—yellowish red, strong brown, and brown silt loam
*****9 to 60 inches (23 to 152 cm)—dark yellowish brown very gravelly loamy coarse sand and extremely gravelly loamy coarse sand.

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: very low or low
Depth to contrasting very gravelly material: 3 to 13 inches (8 to 33 cm)
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 25 percent
*poorly drained soils in depressions

Major Uses

Current uses: homesites and wildlife habitat
Potential uses: hayland and pastureland, forestry, and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: depth to gravel, wind erosion, cutbank instability, slope, water erosion, excessive permeability, excess surface fines, corrosivity, and low fertility
Ecological sites:
*Kichatna, sloping soil—glaciofluvial deposits, thin surface
*Kichatna, moderately steep soil—glaciofluvial deposits, thin surface

Cropland

General management considerations:
*This unit has severe limitations for cropland due to steep slopes and the depth to very gravelly material.
*This unit is best suited to permanent hayland and pastureland due to steep slopes and the shallow depth to gravelly material.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Kichatna, sloping soil)

General management considerations:
*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a low potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.

Building Site Development (Kichatna, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Design and construct buildings and access roads to compensate for steep slopes.

Forestry (Kichatna, sloping soil)

Major tree species: paper birch, black spruce, white spruce, and quaking aspen
Mean site index:
*white spruce—64 (estimated, 100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—45 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*black spruce—not estimated
*quaking aspen—28.6 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Forestry (Kichatna, moderately steep soil)

Major tree species: paper birch, black spruce, white spruce, and quaking aspen
Mean site index:
*white spruce—64 (estimated, 100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—45 (estimated, 50 year, *Gregory and Haack 1965*)

Estimated growth at culmination of mean annual increment:
*****white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*****paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*****black spruce—not estimated
*****quaking aspen—28.6 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—texture, slope
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*****This soil is suited for forestry.

Livestock Grazing (Kichatna, sloping soil)

Major understory species:
*****paper birch-spruce forest, paper birch forest, black spruce forest, quaking aspen-spruce forest, and quaking aspen forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, black spruce forest, quaking aspen-spruce forest, and quaking aspen forest—not estimated
Soil limitation(s) for fencing: moderate—too gravelly, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

Livestock Grazing (Kichatna, moderately steep soil)

Major understory species:
*****paper birch-spruce forest, paper birch forest, black spruce forest, quaking aspen-spruce forest, and quaking aspen forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, black spruce forest, quaking aspen-spruce forest, and quaking aspen forest—not estimated
Soil limitation(s) for fencing: severe—slope, too gravelly
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

153—Kichatna silt loam, steep and sloping

Composition

Kichatna, steep soil and similar inclusions: 70 percent
Kichatna, sloping soil and similar inclusions: 20 percent
Contrasting inclusions: 10 percent

Characteristics of Kichatna, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes
Slope range: 20 to 60 percent

Slope features: shape—plain to convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 2 to 6 inches (5 to 15 cm) thick
Major vegetation type(s): paper birch-spruce forest, paper birch forest, and quaking aspen forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 9 inches (5 to 23 cm)—yellowish red, strong brown, and brown silt loam
*9 to 60 inches (23 to 152 cm)—dark yellowish brown very gravelly and extremely gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: very low or low
Depth to contrasting very gravelly material: 4 to 19 inches (10 to 48 cm)
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Kichatna, sloping and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: crests and toeslopes
Slope range: 10 to 20 percent
Slope features: shape—convex to concave
Organic mat on surface: 2 to 6 inches (5 to 15 cm) thick
Major vegetation type(s): paper birch-spruce forest, paper birch forest, and quaking aspen forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 9 inches (5 to 23 cm)—yellowish red, strong brown, and brown silt loam
*9 to 60 inches (23 to 152 cm)—dark yellowish brown very gravelly loamy coarse sand and extremely gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: very low or low
Depth to contrasting very gravelly material: 4 to 19 inches (10 to 48 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 60 percent
*poorly drained soils in depressions

Major Uses

Current uses: homesites, wildlife habitat, and gravel source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, water erosion, wind erosion, cutbank instability, excess surface fines, depth to gravelly material, corrosivity, and excessive permeability
Ecological sites:
*Kichatna, steep soil—glaciofluvial deposits, thin surface
*Kichatna, sloping soil—glaciofluvial deposits, thin surface

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to the steepness and length of slopes.

Building Site Development (Kichatna, steep soil)

General management considerations:
*This portion of the unit has severe limitations for homesites due to the steepness and length of slopes, and severe limitations for shallow excavations due to cutbank instability and slope.
*This portion of the unit has a low potential for frost action and a high risk of corrosion.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Building Site Development (Kichatna, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to steep slopes, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a low potential for frost action and a high risk of corrosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Design and construct buildings and access roads to compensate for steep slopes.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.

Forestry (Kichatna, steep soil)

Major tree species: paper birch, white spruce, and quaking aspen

Minor tree species: black spruce
Mean site index:
*white spruce—64 (estimated, 100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*quaking aspen—45 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*quaking aspen—28.6 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: severe—texture, slope
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is poorly suited for forestry.

Forestry (Kichatna, sloping soil)

Major tree species: paper birch, white spruce, and quaking aspen
Minor tree species: black spruce
Mean site index:
*white spruce—64 (estimated, 100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*quaking aspen—45 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*quaking aspen—28.6 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Livestock Grazing (Kichatna, steep soil)

Major understory species:
*paper birch-spruce forest, paper birch forest, and quaking aspen forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, and quaking aspen forest—not estimated
Soil limitation(s) for fencing: severe—slope, too gravelly
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

Livestock Grazing (Kichatna, sloping soil)

Major understory species:
*paper birch-spruce forest, paper birch forest, and quaking aspen forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss

Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, and quaking aspen forest—not estimated
Soil limitation(s) for fencing: moderate—too gravelly, slope
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

154—Kichatna silt loam, undulating

Composition

Kichatna silt loam soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Kichatna and similar soils

Landform: outwash plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): quaking aspen-spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*****2 to 9 inches (5 to 23 cm)—yellowish red, strong brown, and brown silt loam
*****9 to 60 inches (23 to 152 cm)—dark yellowish brown very gravelly and extremely gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: very low or low
Depth to contrasting very gravelly material: 4 to 14 inches (10 to 36 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 10 percent
*****poorly drained soils in depressions

Major Uses

Current uses: cropland, hayland and pastureland, homesites, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)

Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: wind erosion, depth to gravel, excessive permeability, excess surface fines, cutbank instability, corrosivity, and low fertility
Ecological sites:
*Kichatna soil—glaciofluvial deposits, thin surface

Cropland

General management considerations:
*This unit has severe limitations for cropland due to the shallow depth to gravel.
*This unit is best suited to permanent hayland and pastureland due to the shallow depth to gravel.
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a low potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.

Forestry

Major tree species: paper birch, black spruce, white spruce, and quaking aspen
Minor tree species: quaking aspen
Mean site index:
*white spruce—64 (estimated, 100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)

*black spruce—not estimated
*quaking aspen—45 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*black spruce—not estimated
*quaking aspen—28.6 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Livestock Grazing

Major understory species:
*paper birch-spruce forest, paper birch forest, black spruce forest, and quaking aspen-spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, black spruce forest, and quaking aspen-spruce forest—not estimated
Soil limitation(s) for fencing: severe—too gravelly
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

155—Kichatna-Deception complex, sloping and moderately steep

Composition

Kichatna soil and similar inclusions: 60 percent
Deception soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Kichatna and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 25 percent
Slope features: shape—convex or undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-spruce forest, paper birch forest, and quaking aspen forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 9 inches (5 to 23 cm)—yellowish red, strong brown, and brown silt loam
*9 to 60 inches (23 to 152 cm)—dark yellowish brown very gravelly and extremely gravelly loamy coarse sand

Drainage class: well drained

Permeability: in the silt loam surface—moderate; in the substratum—rapid
Available water capacity: very low or low
Depth to contrasting very gravelly material: 5 to 17 inches (13 to 43 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Deception and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes and footslopes
Slope range: 12 to 25 percent
Slope features: shape—convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*****0 to 1 inch (0 to 3 cm)—dark grayish brown silt loam
*****1 to 5 inches (3 to 13 cm)—brown silt loam
*****5 to 60 inches (13 to 152 cm)—dark yellowish brown and dark grayish brown very cobbly sandy loam and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate
Depth to contrasting very gravelly material: 5 to 17 inches (13 to 43 cm)
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils on hillslopes with slopes greater than 25 percent
*****poorly drained soils in depressions

Major Uses

Current uses: homesites, wildlife habitat, and gravel and roadfill source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: slope, wind erosion, water erosion, cutbank instability, restricted

permeability, excess fines, corrosivity, low fertility, frost action, depth to gravelly and cobbly material, and dense substratum

Ecological sites:

*Kichatna soil—glaciofluvial deposits, thin surface

*Deception soil—till deposits, thin surface

Cropland

General management considerations:

*This unit has severe limitations for cropland due to steep slopes and the shallow depth to gravel.

*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:

*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.

*Add lime to improve soil fertility.

Building Site Development (Kichatna soil)

General management considerations:

*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.

*This portion of the unit has a low potential for frost action and a high risk of corrosion.

*Excavation can expose soil material that is highly susceptible to wind and water erosion.

*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.

*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:

*Install a sand filter below septic absorption lines to reduce permeability.

*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.

*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.

*Stockpile topsoil and use it to reclaim areas disturbed during construction.

*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.

*Design and construct buildings and access roads to compensate for steep slopes.

Building Site Development (Deception soil)

General management considerations:

*This portion of the unit has moderate limitations for homesites due to slope and cobbles; and moderate limitations for shallow excavations due to slope, cobbles, and the dense nature of the substratum.

*This portion of the unit has a moderate potential for frost action and a high risk of corrosion.

*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.

*Excavation can expose soil material that is highly susceptible to wind and water erosion.

*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Design and construct buildings and access roads to compensate for steep slopes.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Kichatna soil)

Major tree species: paper birch, white spruce, and quaking aspen
Minor tree species: black spruce
Mean site index:
*white spruce—64 (estimated, 100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*quaking aspen—45 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—18.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*quaking aspen—28.6 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Forestry (Deception soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—56 (estimated, 100 year, *Farr 1967*)
*paper birch—46 (estimated, 50 year)
*black spruce—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—15.6 cubic feet per acre (1.1 cubic m per hectare) per year at age 140
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*black spruce—not estimated
Soil limitation(s) for equipment use: moderate—slope, silt, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Livestock Grazing (Kichatna soil)

Major understory species:
*paper birch-spruce forest, paper birch forest, and quaking aspen forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, and quaking aspen forest—not estimated
Soil limitation(s) for fencing: severe—slope, too gravelly
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

Livestock Grazing (Deception soil)

Major understory species:
*paper birch-spruce forest, paper birch forest, and black spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, and black spruce forest—not estimated
Soil limitation(s) for fencing: severe—slope, too cobbly
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

156—Kichatna-Deception complex, steep and sloping

Composition

Kichatna, steep soil and similar inclusions: 45 percent
Deception, sloping soil and similar inclusions: 25 percent
Deception, steep soil and similar inclusions: 20 percent
Contrasting inclusions: 10 percent

Characteristics of Kichatna, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes
Slope range: 20 to 60 percent
Slope features: shape—convex or plain; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest, paper birch forest, and quaking aspen forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 9 inches (5 to 23 cm)—yellowish red, strong brown, and brown silt loam
*9 to 60 inches (23 to 152 cm)—dark yellowish brown very gravelly and extremely gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the substratum—rapid

Available water capacity: very low or low
Depth to contrasting very gravelly material: 2 to 16 inches (5 to 41 cm)
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Deception, sloping and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: crests and toeslopes
Slope range: 4 to 20 percent
Slope features: shape—convex or plain; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*****0 to 1 inch (0 to 3 cm)—dark grayish brown silt loam
*****1 to 5 inches (3 to 13 cm)—brown silt loam
*****5 to 60 inches (13 to 152 cm)—dark yellowish brown and dark grayish brown very cobbly sandy loam and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the substratum—moderate or moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate
Depth to contrasting very gravelly and very cobbly material: 4 to 16 inches (10 to 41 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Deception, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes
Slope range: 20 to 60 percent
Slope features: shape—convex or plain; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*****0 to 1 inch (0 to 3 cm)—dark grayish brown silt loam
*****1 to 5 inches (3 to 13 cm)—brown silt loam
*****5 to 60 inches (13 to 152 cm)—dark yellowish brown and dark grayish brown very cobbly sandy loam and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the substratum—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances

Available water capacity: moderate
Depth to contrasting very gravelly and very cobbly material: 4 to 16 inches (10 to 41 cm)
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils on hillslopes with slopes greater than 60 percent
*****poorly drained soils in depressions
*****soils in similar positions with sandy substratum textures

Major Uses

Current uses: homesites, wildlife habitat, and gravel and roadfill source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: slope, restricted and excessive permeability, cutbank instability, wind erosion, water erosion, excess surface fines, corrosivity, frost action, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*****Kichatna, steep soil—glaciofluvial deposits, thin surface
*****Deception, sloping soil—till deposits, thin surface
*****Deception, steep soil—till deposits, thin surface

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to the steepness and length of slopes.

Building Site Development (Kichatna, steep soil)

General management considerations:
*****This portion of the unit has severe limitations for homesites due to the steepness and length of slopes, and severe limitations for shallow excavations due to the steepness and length of slopes and cutbank instability.
*****This portion of the unit has a low potential for frost action and a high risk of corrosion.
*****The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*****Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Building Site Development (Deception, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles; and moderate limitations for shallow excavations due to slope, cobbles, and the dense nature of the substratum.
*This portion of the unit has a moderate potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for reclamation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Design and construct buildings and access roads to compensate for steep slopes.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Deception, steep soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*This portion of the unit has a moderate potential for frost action and a high risk of corrosion.

Suitable management practices:
*Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Forestry (Kichatna, steep soil)

Major tree species: paper birch, white spruce, and quaking aspen
Minor tree species: black spruce
Mean site index:
*white spruce—64 (estimated, 100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*quaking aspen—45 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*quaking aspen—28.6 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: severe—texture, slope
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture

General management considerations:
*****This soil is suited for forestry.

Forestry (Deception, sloping soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*****white spruce—56 (estimated, 100 year, *Farr 1967*)
*****paper birch—46 (estimated, 50 year)
*****black spruce—not estimated
Estimated growth at culmination of mean annual increment:
*****white spruce—15.6 cubic feet per acre (1.1 cubic m per hectare) per year at age 140
*****paper birch—20.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*****black spruce—not estimated
Soil limitation(s) for equipment use: moderate—silt, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*****This soil is suited for forestry.

Forestry (Deception, steep soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*****white spruce—56 (estimated, 100 year, *Farr 1967*)
*****paper birch—46 (estimated, 50 year)
*****black spruce—not estimated
Estimated growth at culmination of mean annual increment:
*****white spruce—15.6 cubic feet per acre (1.1 cubic m per hectare) per year at age 140
*****paper birch—20.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*****black spruce—not estimated
Soil limitation(s) for equipment use: severe—slope, silt, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*****This soil is suited for forestry.

Livestock Grazing (Kichatna, steep soil)

Major understory species:
*****paper birch-spruce forest, paper birch forest, and quaking aspen forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, and quaking aspen forest—not estimated
Soil limitation(s) for fencing: severe—too gravelly
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

Livestock Grazing (Deception, sloping soil)

Major understory species:
*****paper birch-spruce forest, paper birch forest, and black spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, and black spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too cobbly, slope
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

Livestock Grazing (Deception, steep soil)

Major understory species:
*****paper birch-spruce forest, paper birch forest, and black spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, and black spruce forest—not estimated
Soil limitation(s) for fencing: severe—slope, too cobbly
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

157—Kichatna-Delyndia complex, moderately steep and gently sloping

Composition

Kichatna, moderately steep soil and similar inclusions: 65 percent
Delyndia, gently sloping soil and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Kichatna, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes
Slope range: 10 to 25 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest, paper birch forest, black spruce forest, and quaking aspen-spruce forest
Minor vegetation type(s): quaking aspen forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*****2 to 9 inches (5 to 23 cm)—yellowish red, strong brown, and brown silt loam
*****9 to 60 inches (23 to 152 cm)—dark yellowish brown very gravelly and extremely gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: very low or low
Depth to contrasting very gravelly material: 2 to 16 inches (5 to 41 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Delyndia, gently sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: undulating areas between hills and ridges
Slope range: 3 to 10 percent
Slope features: shape—plain to undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed broadleaf forest

Typical profile:
*0 to 4 inches (0 to 10 cm)—grayish brown, strong brown, and yellowish brown silt loam
*4 to 60 inches (10 to 152 cm)—strong brown and dark yellowish brown stratified loamy sand, sand, and gravelly coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the sandy substrata—moderately rapid
Available water capacity: low
Depth to contrasting very gravelly material: 2 to 16 inches (5 to 41 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 25 percent
*poorly drained soils in depressions

Major Uses

Current uses: homesites, wildlife habitat, and gravel and sand source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: wind erosion, water erosion, slope, cutbank instability, excess surface fines, excess sand in substratum, corrosivity, low fertility, and excessive permeability

Ecological sites:
*Kichatna soil—glaciofluvial deposits, thin surface
*Delyndia soil—glaciofluvial deposits, 15-25 inch pz.

Cropland (Kichatna soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Cropland (Delyndia soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland and hayland due to slope, the shallow depth to sand, low fertility, and relatively high late summer precipitation.
*This unit is best suited to permanent hayland and pastureland due to the shallow depth to sand.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing sandy underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development (Kichatna soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a low potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.

*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Design and construct buildings and access roads to compensate for steep slopes.
*Install footings below the frostline to overcome the risk of frost action.

Building Site Development (Delyndia soil)

General management considerations:
*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a low potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The substratum material from this portion of the unit is a probable source of sand.

Suitable management practices:
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.

Forestry (Kichatna soil)

Major tree species: paper birch, black spruce, white spruce, and quaking aspen
Mean site index:
*white spruce—64 (estimated, 100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—45 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—19.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*black spruce—not estimated
*quaking aspen—28.6 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—texture, slope
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Forestry (Delyndia soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (estimated, 100 year, *Farr 1967*)
*paper birch—50 (estimated, 50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*black spruce—not estimated
Soil limitation(s) for equipment use: moderate—texture

Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*****This soil is well suited for forestry.

Livestock Grazing (Kichatna soil)

Major understory species:
*****paper birch-spruce forest, paper birch forest, black spruce forest, quaking aspen-spruce forest, and quaking aspen forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, black spruce forest, quaking aspen-spruce forest, and quaking aspen forest—not estimated
Soil limitation(s) for fencing: severe—slope, too gravelly
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

Livestock Grazing (Delyndia soil)

Major understory species:
*****paper birch-spruce forest, paper birch forest, black spruce forest, and mixed broadleaf forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, black spruce forest, and mixed broadleaf forest—not estimated
Soil limitation(s) for fencing: severe—too sandy
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

158—Kichatna-Delyndia silt loams, 0 to 4 percent slopes

Composition

Kichatna soil and similar inclusions: 45 percent
Delyndia soil and similar inclusions: 45 percent
Contrasting inclusions: 10 percent

Characteristics of Kichatna and similar soils

Landform: outwash plains
Position on the landscape: all positions
Slope range: 0 to 4 percent
Slope features: shape—plain
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest, paper birch forest, quaking aspen-spruce forest, and black spruce forest
Minor vegetation type(s): mixed broadleaf forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 9 inches (5 to 23 cm)—yellowish red, strong brown, and brown silt loam
*9 to 60 inches (23 to 152 cm)—dark yellowish brown very gravelly and extremely gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: very low or low
Depth to contrasting very gravelly material: 2 to 13 inches (5 to 33 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Delyndia and similar soils

Landform: outwash plains
Position on the landscape: all positions
Slope range: 0 to 4 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed broadleaf forest

Typical profile:
*0 to 4 inches (0 to 10 cm)—grayish brown, strong brown, and yellowish brown silt loam
*4 to 60 inches (10 to 152 cm)—strong brown and dark yellowish brown stratified loamy sand, sand, and gravelly coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the sandy substrata—moderately rapid
Available water capacity: low
Depth to contrasting sandy material: 2 to 13 inches (5 to 33 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 10 percent
*poorly drained soils in depressions

Major Uses

Current uses: homesites, wildlife habitat, and gravel and sand source
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)

Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: excessive permeability, depth to sand and gravel, excess surface fines, corrosivity, cutbank instability, low fertility, and wind erosion
Ecological sites:
*Kichatna soil—glaciofluvial deposits, thin surface
*Delyndia soil—glaciofluvial deposits, 15-25 inch pz.

Cropland

General management considerations:
*This unit has severe limitations for cropland due to the shallow depth to sand or gravel.
*This portion of the unit is best suited to permanent hayland and pastureland due to the shallow depth to sand or gravel.
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing sandy or gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development (Kichatna soil)

General management considerations:
*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a low potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this portion of unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.

Building Site Development (Delyndia soil)

General management considerations:
*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a low potential for frost action and a high risk of corrosion.

*Excavation can expose soil material that is highly susceptible to wind erosion.
*Only the silty surface material is suitable for revegetation due to the high sand content.
*The substratum material from this portion of the unit is a probable source of sand.

Suitable management practices:
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.

Forestry (Kichatna soil)

Major tree species: paper birch, black spruce, white spruce, and quaking aspen
Mean site index:
*white spruce—64 (estimated, 100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—45 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*black spruce—not estimated
*quaking aspen—28.6 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is suited for forestry.

Forestry (Delyndia soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (estimated, 100 year, *Farr 1967*)
*paper birch—50 (estimated, 50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*black spruce—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is well suited for forestry.

Livestock Grazing (Kichatna soil)

Major understory species:
*paper birch-spruce forest, paper birch forest, quaking aspen-spruce forest, black spruce forest, and mixed broadleaf forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss

Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, quaking aspen-spruce forest, black spruce forest, and mixed broadleaf forest—not estimated
Soil limitation(s) for fencing: severe—too gravelly
Limitations to uniform distribution of livestock: slight
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

Livestock Grazing (Delyndia soil)

Major understory species:
*****paper birch-spruce forest, paper birch forest, black spruce forest, and mixed broadleaf forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, black spruce forest, and mixed broadleaf forest—not estimated
Soil limitation(s) for fencing: severe—too sandy
Limitations to uniform distribution of livestock: slight
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

159—Kidazqeni, cool and Niklason, cool soils, 4 to 12 percent slopes

Composition

Kidazqeni, cool soil and similar inclusions: variable
Niklason, cool soil and similar inclusions: variable
Contrasting inclusions: 10 percent

Characteristics of Kidazqeni, cool and similar soils

Landform: alluvial fans
Position on the landscape: all positions
Slope range: 4 to 12 percent
Slope features: shape—plain
Organic mat on surface: 0 to 2 inches (0 to 5 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass forest
Minor vegetation type(s): paper birch-white spruce/Sitka alder/bluejoint reedgrass forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—very dark grayish brown very fine sandy loam
*****2 to 8 inches (5 to 20 cm)—dark brown and dark grayish brown stratified fine sand through silt
*****8 to 60 inches (20 to 152 cm)—variegated extremely gravelly coarse sand

Drainage class: somewhat excessively drained
Permeability: in the surface horizon—moderate; in the stratified sandy through silty material—moderately rapid; in the gravelly substrata—rapid
Available water capacity: low to very low
Depth to contrasting very gravelly material: 2 to 10 inches (5 to 25 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)

Hazard of erosion: by water—slight if the organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: occasional

Characteristics of Niklason, cool and similar soils

Landform: alluvial fans
Position on the landscape: all positions
Slope range: 4 to 12 percent
Slope features: shape—plain
Organic mat on surface: 0 to 2 inches (0 to 5 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass forest
Minor vegetation type(s): paper birch-white spruce/Sitka alder/bluejoint reedgrass forest and balsam poplar/Sitka alder forest

Typical profile:
*****0 to 4 inches (0 to 10 cm)—dark brown silt loam
*****4 to 25 inches (10 to 64 cm)—brown and light gray stratified fine sand through silt
*****25 to 60 inches (64 to 152 cm)—variegated extremely gravelly sand

Drainage class: well drained
Permeability: in the surface horizon—moderate; in the stratified sandy through silty material—moderately rapid; in the gravelly substrata—rapid
Available water capacity: moderate
Depth to contrasting very gravelly material: 10 to 40 inches (25 to 102 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: occasional

Included Areas

*****frequently flooded soils in channels
*****soil with slopes greater than 12 percent

Major Uses

Current uses: wildlife habitat
Potential uses: forestry

Major Management Factors

Elevation: 600 to 1500 feet (183 to 457 m)
Climatic factors (average annual):
*****precipitation—25 to 30 inches (64 to 76 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—70 to 90 days
*****growing degree days—1100 to 1400
Soil related factors: depth to sand and gravel, frost action, excess surface fines, corrosivity, and occasional flooding
Ecological sites:
*****Kidazqeni, cool soil—fans
*****Niklason, cool soil—fans

Cropland

General management considerations:
*This unit has severe limitations for cropland due to the shallow depth to gravel and occasional flooding hazard.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites due to the flooding hazard, and severe limitations for shallow excavations due to cutbank instability.
*The Kidazqeni portion of this unit has a low potential for frost action and a moderated risk of corrosion.
*The Niklason portion of this unit has a moderate potential for frost action and a moderate risk of corrosion.
*The substratum material from this unit is a probable source of gravel and sand.

Forestry (Kidazqeni, cool soil)

Major tree species: white spruce and paper birch
Mean site index:
*white spruce—64 (estimated, 100 year)
*paper birch—42 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—17.2 cubic feet per acre (1.2 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: slight
Seedling mortality: severe—shallow
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Niklason, cool soil)

Major tree species: white spruce and paper birch
Minor tree species: balsam poplar
Mean site index:
*white spruce—64 (estimated, 100 year)
*paper birch—42 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—17.2 cubic feet per acre (1.2 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: slight
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Kidazqeni, cool soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass forest—bluejoint reedgrass, spinulose shield fern, oakfern, common fireweed, Beauverd's spiraea, bunchberry dogwood, and fiveleaf bramble
*paper birch-white spruce/Sitka alder/bluejoint reedgrass forest—Sitka alder, bluejoint reedgrass, spinulose shield fern and other ferns, common fireweed, bunchberry dogwood, and fiveleaf bramble
Mean annual understory production (vascular plants, air-dry weight): not estimated
Soil limitation(s) for fencing: severe—too gravelly, slope, flooding
Limitations to uniform distribution of livestock: moderate—short, steep slopes; flooding
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Niklason, cool soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass forest—bluejoint reedgrass, spinulose shield fern, oakfern, common fireweed, Beauverd's spiraea, bunchberry dogwood, and fiveleaf bramble
*paper birch-white spruce/Sitka alder/bluejoint reedgrass forest—Sitka alder, bluejoint reedgrass, spinulose shield fern and other ferns, common fireweed, bunchberry dogwood, and fiveleaf bramble
*balsam poplar/Sitka alder forest—Sitka alder, bluejoint reedgrass, spinulose shield fern, oakfern, common fireweed, highbush cranberry, and Beauverd's spiraea
Mean annual understory production (vascular plants, air-dry weight): not estimated
Soil limitation(s) for fencing: moderate—too sandy and gravelly, slope, flooding
Limitations to uniform distribution of livestock: moderate—short, steep slopes; flooding
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

160—Kidazqeni silt loam, rarely flooded, 0 to 2 percent slopes

Composition

Kidazqeni soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Kidazqeni and similar soils

Landform: stream terraces
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 1 to 2 inches (3 to 5 cm) thick
Major vegetation type(s): balsam poplar forest and paper birch-white spruce forest

Typical profile:
*0 to 1 inch (0 to 3 cm)—very dark grayish brown silt loam
*1 to 5 inches (3 to 13 cm)—very dark grayish brown and dark brown stratified fine sand

through silt
*5 to 60 inches (13 to 152 cm)—variegated extremely gravelly coarse sand

Drainage class: somewhat excessively drained
Permeability: in the surface horizon—moderate; in the stratified sandy through silty material—moderately rapid; in the gravelly substrata—rapid
Available water capacity: very low
Depth to contrasting very gravelly material: 2 to 10 inches (5 to 25 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: rare

Included Areas

*soils in lower positions that are occasionally flooded
*soils with greater than 10 inches (greater than 25 cm) of stratified material over sand and gravel
*soils with slopes greater than 2 percent

Major Uses

Current uses: wildlife habitat, homesites, and gravel source area
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 0 to 500 feet (0 to 152 m)
Climatic factors (average annual):
*precipitation—15 to 25 inches (38 to 64 cm)
*air temperature—33 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: rare flooding frequency, depth to gravelly and cobbly material, excess surface fines, and corrosivity
Ecological sites:
*Kidazqeni soil—floodplain deposits

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to the shallow depth to gravel.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites due to flooding, and severe limitations for shallow excavations due to cutbank instability.
*This unit has a low potential for frost action and a moderate risk of corrosion.
*This unit is a probable source of gravel and sand.

Forestry

Major tree species: balsam poplar, paper birch, and white spruce

Mean site index:
*****balsam poplar—68 (estimated, 50 year)
*****paper birch—46 (estimated, 50 year)
*****white spruce—70 (estimated, 100 year)
Estimated growth at culmination of mean annual increment:
*****balsam poplar—not estimated
*****paper birch—20.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*****white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105
Soil limitation(s) for equipment use: moderate—cobbles
Seedling mortality: severe—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*****This soil is well suited for forestry.

Livestock Grazing

Major understory species:
*****balsam poplar forest—Sitka alder, highbush cranberry, prickly rose, devil's club, bluejoint reedgrass, ostrich fern, and horsetail
*****paper birch-white spruce forest—Sitka alder, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, horsetail, bunchberry dogwood, and red currant
Mean annual understory production (vascular plants, air-dry weight):
*****balsam poplar forest and paper birch-white spruce forest—1000 pounds per acre (1120 kilograms per hectare), estimated
Soil limitation(s) for fencing: severe—too gravelly, flooding
Limitations to uniform distribution of livestock: moderate—dense brush; flooding; short, steep slopes
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

161—Kidazqeni soils, 0 to 2 percent slopes

Composition

Kidazqeni, moderately wet soil and similar inclusions: variable
Kidazqeni soil and similar inclusions: variable
Contrasting inclusions: 15 percent

Characteristics of Kidazqeni, moderately wet and similar soils

Landform: floodplains
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): balsam poplar forest and paper birch-white spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—very dark grayish brown very fine sandy loam
*****2 to 8 inches (5 to 20 cm)—dark brown and dark grayish brown stratified fine sand through silt
*****8 to 60 inches (20 to 152 cm)—variegated extremely gravelly coarse sand

Drainage class: moderately well drained
Permeability: in the surface horizon—moderate; in the stratified sandy through silty material—moderately rapid; in the gravelly substrata—rapid
Available water capacity: very low
Depth to contrasting very gravelly material: 2 to 8 inches (5 to 20 cm)
Runoff: slow
Depth to seasonally high water table: 3.5 to 5 feet (1.0 to 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: occasional

Characteristics of Kidazqeni and similar soils

Landform: floodplains
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): balsam poplar forest and paper birch-white spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—very dark grayish brown very fine sandy loam
*****2 to 8 inches (5 to 20 cm)—dark brown and dark grayish brown stratified fine sand through silt
*****8 to 60 inches (20 to 152 cm)—variegated extremely gravelly coarse sand

Drainage class: somewhat excessively drained
Permeability: in the surface horizon—moderate; in the stratified sandy through silty material—moderately rapid; in the gravelly substrata—rapid
Available water capacity: very low
Depth to contrasting very gravelly material: 2 to 8 inches (5 to 20 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: occasional

Included Areas

*****soils with more than 10 inches (more than 25 cm) of stratified material over sand and gravel
*****frequently flooded soils
*****riverwash

Major Uses

Current uses: wildlife habitat and homesites
Potential uses: forestry

Major Management Factors

Elevation: 0 to 1600 feet (0 to 488 m)
Climatic factors (average annual):
*****precipitation—15 to 25 inches (38 to 64 cm)

*air temperature—33 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: flooding, depth to gravelly and cobbly material, depth to seasonally high water table, excess surface fines, and corrosivity
Ecological sites:
*Kidazqeni, moderately wet soil—floodplain deposits, moderately wet
*Kidazqeni soil—floodplain deposits

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to the shallow depth to gravel and occasional flooding hazard.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites due to flooding, and severe limitations for shallow excavations due to cutbank instability.
*This unit is a probable source of gravel and sand.
*This unit has a low potential for frost action and a moderate risk of corrosion.

Forestry (Kidazqeni, moderately wet soil)

Major tree species: balsam poplar, paper birch, and white spruce
Mean site index:
*balsam poplar—68 (estimated, 50 year)
*paper birch—42 (estimated, 50 year)
*white spruce—67 (estimated, 100 year)
Estimated growth at culmination of mean annual increment:
*balsam poplar—not estimated
*paper birch—17.2 cubic feet per acre (1.2 cubic m per hectare) per year at age 100
*white spruce—22.6 cubic feet per acre (1.6 cubic m per hectare) per year at age 110
Soil limitation(s) for equipment use: moderate—flooding, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture
General management considerations:
*This soil is well suited for forestry.

Forestry (Kidazqeni soil)

Major tree species: balsam poplar, paper birch, and white spruce
Mean site index:
*balsam poplar—68 (estimated, 50 year)
*paper birch—46 (estimated, 50 year)
*white spruce—70 (estimated, 100 year)
Estimated growth at culmination of mean annual increment:
*balsam poplar—not estimated
*paper birch—20.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105
Soil limitation(s) for equipment use: moderate—flooding, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—high available moisture

General management considerations:
*****This soil is well suited for forestry.

Livestock Grazing

Major understory species:
*****balsam poplar forest—Sitka alder, highbush cranberry, prickly rose, devil's club, bluejoint reedgrass, ostrich fern, and horsetail
*****paper birch-white spruce forest—Sitka alder, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, horsetail, bunchberry dogwood, and red currant
Mean annual understory production (vascular plants, air-dry weight):
*****balsam poplar forest and paper birch-white spruce forest—1000 pounds per acre (1120 kilograms per hectare), estimated
Soil limitation(s) for fencing: severe—too gravelly, flooding
Limitations to uniform distribution of livestock: moderate—dense brush, flooding
General management considerations:
*****This map unit is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

162—Kidazqeni-Niklason complex, 0 to 2 percent slopes

Composition

Kidazqeni soil and similar inclusions: 50 percent
Niklason soil and similar inclusions: 40 percent
Contrasting inclusions: 10 percent

Characteristics of Kidazqeni and similar soils

Landform: floodplains
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): balsam poplar forest
Minor vegetation type(s): paper birch forest, paper birch-white spruce forest, and tall alder scrub

Typical profile:
*****0 to 2 inches (0 to 5 cm)—very dark grayish brown very fine sandy loam
*****2 to 8 inches (5 to 20 cm)—dark brown and dark grayish brown stratified fine sand through silt
*****8 to 60 inches (20 to 152 cm)—variegated extremely gravelly coarse sand

Drainage class: somewhat excessively drained
Permeability: in the surface horizon—moderate; in the stratified sandy through silty material—moderately rapid; in the gravelly substrata—rapid
Available water capacity: very low
Depth to contrasting very gravelly material: 2 to 10 inches (5 to 25 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is

removed
Hazard of flooding: occasional

Characteristics of Niklason and similar soils

Landform: floodplains
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): balsam poplar forest
Minor vegetation type(s): paper birch forest, paper birch-white spruce forest, and tall alder scrub

Typical profile:
*0 to 4 inches (0 to 10 cm)—dark brown silt loam
*4 to 25 inches (10 to 64 cm)—brown and light gray stratified fine sand through silt
*25 to 60 inches (64 to 152 cm)—variegated extremely gravelly sand

Drainage class: well drained
Permeability: in the surface horizon—moderate; in the stratified sandy through silty material—moderately rapid; in the gravelly substrata—rapid
Available water capacity: low to moderate
Depth to contrasting very gravelly material: 10 to 40 inches (25 to 102 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: occasional

Included Areas

*poorly drained soils in channels and depressions
*soils that are frequently flooded
*soils with slopes greater than 2 percent

Major Uses

Current uses: wildlife habitat and gravel source area
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 0 to 1000 feet (0 to 305 m)
Climatic factors (average annual):
*precipitation—15 to 25 inches (38 to 64 cm)
*air temperature—33 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: depth to gravelly and cobbly material, excess surface fines, excess sand in substratum, corrosivity, and flooding
Ecological sites:
*Kidazqeni soil—floodplain deposits
*Niklason soil—floodplain deposits

Cropland

General management considerations:
*****This unit has severe limitations for cropland due to the shallow depth to gravel and occasional flooding frequency.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites due to flooding, and severe limitations for shallow excavations due to cutbank instability.
*****The Kidazqeni portion of this unit has a low potential for frost action and a moderate risk of corrosion.
*****The Niklason portion of this unit has a moderate potential for frost action and a moderate risk of corrosion.
*****This unit is a probable source of gravel and sand.

Forestry (Kidazqeni soil)

Major tree species: balsam poplar
Minor tree species: paper birch and white spruce
Mean site index:
*****white spruce—70 (estimated, 100 year)
*****paper birch—46 (estimated, 50 year)
*****balsam poplar—68 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*****white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105
*****paper birch—20.8 cubic feet per acre (1.5 cubic m per hectare) per year at age 95
*****balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—cobbles
Seedling mortality: severe—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—competitive species
General management considerations:
*****This soil is well suited for forestry.

Forestry (Niklason soil)

Major tree species: balsam poplar and paper birch
Minor tree species: white spruce
Mean site index:
*****white spruce—72 (estimated, 100 year)
*****paper birch—47 (estimated, 50 year)
*****balsam poplar—72 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*****white spruce—26.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 105
*****paper birch—21.1 cubic feet per acre (1.5 cubic m per hectare) per year at age 90
*****balsam poplar—not estimated
Soil limitation(s) for equipment use: slight
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—competitive species
General management considerations:
*****This soil is well suited for forestry.

Livestock Grazing (Kidazqeni soil)

Major understory species:
*balsam poplar forest—Sitka alder, highbush cranberry, prickly rose, bluejoint reedgrass, various ferns, and horsetail
*paper birch forest and paper birch-white spruce forest—Sitka alder, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, horsetail, bunchberry dogwood, and red currant
*tall alder shrub—Sitka alder, bluejoint reedgrass, willow, currant, red raspberry, horsetail, and sweetscented bedstraw
Mean annual understory production (vascular plants, air-dry weight):
*balsam poplar forest—1000 pounds per acre (1120 kilograms per hectare), estimated
*paper birch forest and paper birch-white spruce forest—900 pounds per acre (1010 kilograms per hectare), estimated
*tall alder shrub—not estimated
Soil limitation(s) for fencing: severe—too gravelly, flooding
Limitations to uniform distribution of livestock: moderate—wet soils; dense brush; short, steep slopes; flooding
General management considerations:
*This soil is poorly suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Niklason soil)

Major understory species:
*balsam poplar forest—Sitka alder, highbush cranberry, prickly rose, bluejoint reedgrass, various ferns, and horsetail
*paper birch forest and paper birch-white spruce forest—Sitka alder, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, horsetail, bunchberry dogwood, and red currant
*tall alder shrub—Sitka alder, bluejoint reedgrass, willow, currant, red raspberry, horsetail, and sweetscented bedstraw
Mean annual understory production (vascular plants, air-dry weight):
*balsam poplar forest—1000 pounds per acre (1120 kilograms per hectare), estimated
*paper birch forest and paper birch-white spruce forest—900 pounds per acre (1010 kilograms per hectare), estimated
*tall alder shrub—not estimated
Soil limitation(s) for fencing: moderate—too sandy and gravelly, flooding
Limitations to uniform distribution of livestock: moderate—wet soils; dense brush; short, steep slopes; flooding
General management considerations:
*This soil is poorly suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

163—Killey and Moose River soils, 0 to 2 percent slopes

Composition

Killey soils, Moose River soils and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Killey and similar soils

Landform: floodplains of small streams
Position on the landscape: flats
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and tall alder shrub
Minor vegetation type(s): tall alder-willow shrub and balsam poplar woodland

Typical profile:
*0 to 3 inches (0 to 8 cm)—dark brown silt loam
*3 to 36 inches (8 to 91 cm)—olive brown and dark grayish brown stratified silt loam
*36 to 60 inches (91 to 152 cm)—olive gray very gravelly coarse sand

Drainage class: very poorly drained
Permeability: in the stratified surface layers—moderate; in the sand and gravel—rapid
Available water capacity: moderate
Depth to contrasting very gravelly material: 20 to 40 inches (51 to 102 cm)
Runoff: very slow
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: occasional

Characteristics of Moose River and similar soils

Landform: floodplains of small streams
Position on the landscape: flats and depressions
Slope range: 0 to 2 percent
Slope features: shape—plain or concave
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): tall thinleaf alder-willow shrub, low willow shrub, and sedge-grass wet meadow

Typical profile:
*0 to 29 inches (0 to 74 cm)—dark grayish brown stratified fine sand through silt loam
*29 to 60 inches (74 to 152 cm)—olive gray and dark greenish gray stratified gravelly fine sand through silt loam

Drainage class: very poorly drained
Permeability: moderate
Available water capacity: high
Runoff: very slow
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: occasional

Included Areas

*well drained soils on terraces
*soils with less than 10 inches (less than 25 cm) of stratified material over sand and gravel
*frequently flooded soils in channels
*soils with slopes greater than 2 percent

Major Uses

Current uses: wildlife habitat
Potential uses: forestry

Major Management Factors

Elevation: 0 to 700 feet (0 to 213 m)
Climatic factors (average annual):
*****precipitation—20 to 25 inches (51 to 64 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—80 to 100 days
*****growing degree days—1300 to 1500
Soil related factors: occasional flooding, frost action, depth to seasonally high water table, excess sand in substratum, and corrosivity
Ecological sites:
*****Killey soil—alluvial bottoms, wet
*****Moose River soil—alluvial bottoms, very wet

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to wetness and occasional flooding frequency.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites due to wetness and flooding, and severe limitations for shallow excavations due to cutbank instability and wetness.
*****The Killey part of this unit has a high potential for frost action and a high risk of corrosion.
*****The Moose River part of this unit has a high potential for frost action and a moderate risk of corrosion.
*****This unit is a probable source of gravel and sand.

Forestry (Killey soil)

Major tree species: paper birch and white spruce
Minor tree species: balsam poplar and black spruce
Mean site index:
*****white spruce—60 (100 year, *Farr 1967*)
*****paper birch—42 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*****white spruce—18.0 cubic feet per acre (1.3 cubic m per hectare) per year at age 130
*****paper birch—17.2 cubic feet per acre (1.2 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: severe—wetness
Seedling mortality: severe—wetness
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture
General management considerations:
*****This soil is poorly suited for forestry.
*****The water table may rise if trees are removed.

Forestry (Moose River soil)

Soil limitation(s) for equipment use: severe—wetness

General management considerations:
*****This soil is usually non-forested and is unsuited for forestry. It may have to be crossed with roads and trails to access stands on the Killey soil.

Livestock Grazing (Killey soil)

Major understory species:
*****paper birch-white spruce forest, paper birch forest, and balsam poplar woodland—Sitka and thinleaf alder, prickly rose, highbush cranberry, spinulose shield fern, horsetail, and bluejoint reedgrass
*****tall alder shrub and tall alder-willow shrub—thinleaf and Sitka alder, diamondleaf willow and other willows, bluejoint reedgrass, various sedges, marsh cinquefoil, horsetail, and sweetgale
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest, paper birch forest, balsam poplar woodland, tall alder shrub, and tall alder-willow shrub—not estimated
Soil limitation(s) for fencing: severe—wetness, flooding, frost action
Limitations to uniform distribution of livestock: severe—wet soils
General management considerations:
*****This soil is poorly suited for livestock grazing due to wet soils, occasional flooding, and low abundance of suitable forage plants.

Livestock Grazing (Moose River soil)

Major species:
*****tall thinleaf alder-willow shrub and low willow shrub—thinleaf alder, diamondleaf willow and other willows, sweetgale, bog birch, horsetail, various sedges, bluejoint reedgrass, and marsh cinquefoil
*****sedge-grass wet meadow—various sedges, bluejoint reedgrass, marsh cinquefoil, willow, and alder
Mean annual production (vascular plants, air-dry weight):
*****tall thinleaf alder-willow shrub, low willow shrub, and sedge-grass wet meadow—not estimated
Soil limitation(s) for fencing: severe—wetness, flooding, frost action
Limitations to uniform distribution of livestock: severe—wet soils
General management considerations:
*****This soil is poorly suited for livestock grazing due to wetness, occasional flooding, and other severe soil limitations.

164—Knik silt loam, 0 to 3 percent slopes

Composition

Knik silt loam soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Knik and similar soils

Landform: outwash plains (Plates 8 and 9)
Position on the landscape: all positions
Slope range: 0 to 3 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest

Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 12 inches (0 to 30 cm)—dark brown and dark grayish brown silt loam
*12 to 18 inches (30 to 46 cm)—strong brown silt loam
*18 to 60 inches (46 to 152 cm)—dark yellowish brown extremely gravelly coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: moderate
Depth to contrasting very gravelly material: 9 to 28 inches (23 to 71 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 10 percent
*soils with very gravelly material at less than 10 inches (less than 25 cm)
*poorly drained soils in depressions

Major Uses

Current uses: cropland, hayland and pastureland, homesites, wildlife habitat, and gravel source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 600 feet (15 to 183 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: excessive permeability, depth to gravel, wind erosion, excess surface fines, cutbank instability, low fertility, corrosivity, and frost action
Ecological sites:
*Knik soil—silty slopes, thin surface

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to low fertility and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, brome-grass, oats and barley as forage, and potatoes and cole crops (Plate 9).
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.

*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a high potential for frost action and a moderate risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—70 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint

reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower

Mean annual understory production (vascular plants, air-dry weight):

*****paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2100 pounds per acre (2350 kilograms per hectare)

Soil limitation(s) for fencing: moderate—too gravelly, frost action

Limitations to uniform distribution of livestock: slight

General management considerations:

*****This soil is well suited for livestock grazing.

*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

165—Knik silt loam, gently sloping and moderately steep

Composition

Knik, gently sloping soil and similar inclusions: 55 percent
Knik, moderately steep soil and similar inclusions: 35 percent
Contrasting inclusions: 10 percent

Characteristics of Knik, gently sloping and similar soils

Landform: hills and ridges (Figure 2)

Position on the landscape: crests, toeslopes, and undulating areas between ridges and hills

Slope range: 2 to 12 percent

Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)

Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick

Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest

Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:

*****0 to 12 inches (0 to 30 cm)—dark brown and dark grayish brown silt loam

*****12 to 18 inches (30 to 46 cm)—strong brown silt loam

*****18 to 60 inches (46 to 152 cm)—dark yellowish brown very gravelly loamy coarse sand

Drainage class: well drained

Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid

Available water capacity: moderate

Depth to contrasting very gravelly material: 10 to 28 inches (25 to 71 cm)

Runoff: slow

Depth to seasonally high water table: more than 5 feet (more than 1.5 m)

Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed

Hazard of flooding: none

Characteristics of Knik, moderately steep and similar soils

Landform: hills and ridges (Figure 2)

Position on the landscape: backslopes

Slope range: 12 to 30 percent

Slope features: shape—plain to convex; length—20 to 100 feet (6 to 30 m)

Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 12 inches (0 to 30 cm)—dark brown and dark grayish brown silt loam
*****12 to 18 inches (30 to 46 cm)—strong brown silt loam
*****18 to 60 inches (46 to 152 cm)—dark yellowish brown very gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: moderate
Depth to contrasting very gravelly material: 9 to 32 inches (23 to 81 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 30 percent
*****soils with very gravelly material at less than 5 inches (less than 13 cm)
*****poorly drained soils in depressions

Major Uses

Current uses: homesites, hayland and pastureland, wildlife habitat, and gravel source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 600 feet (15 to 183 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: wind erosion, water erosion, slope, cutbank instability, depth to gravel, low fertility, frost action, excess surface fines, corrosivity, and excessive permeability
Ecological sites:
*****Knik, sloping soil—silty slopes, thin surface
*****Knik, moderately steep soil—silty slopes, thin surface

Cropland (Knik, gently sloping soil)

General management considerations:
*****This portion of the unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*****Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:

*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly outwash underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Knik, moderately steep soil)

General management considerations:

*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:

*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Knik, gently sloping soil)

General management considerations:

*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:

*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Knik, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Design and construct buildings and access roads to compensate for steep slopes.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Knik, gently sloping soil)

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—70 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Knik, moderately steep soil)

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—70 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
*quaking aspen—not estimated

Estimated growth at culmination of mean annual increment:
*white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: moderate—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Knik, gently sloping soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2100 pounds per acre (2350 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too gravelly, slope, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Knik, moderately steep soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2100 pounds per acre (2350 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

166—Knik silt loam, steep and sloping

Composition

Knik, steep soil and similar inclusions: 65 percent

Knik, sloping and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Knik, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes
Slope range: 15 to 65 percent
Slope features: shape—plain to convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 12 inches (0 to 30 cm)—dark brown and dark grayish brown silt loam
*****12 to 18 inches (30 to 46 cm)—strong brown silt loam
*****18 to 60 inches (46 to 152 cm)—dark yellowish brown extremely gravelly coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: moderate
Depth to contrasting very gravelly material: 10 to 30 inches (25 to 76 cm)
Runoff: high
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Knik, sloping and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: crests and toeslopes
Slope range: 2 to 15 percent
Slope features: shape—concave or convex; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 12 inches (0 to 30 cm)—dark brown and dark grayish brown silt loam
*****12 to 18 inches (30 to 46cm)—strong brown silt loam
*****18 to 60 inches (46 to 152 cm)—dark yellowish brown very gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: moderate
Depth to contrasting very gravelly material: 10 to 40 inches (25 to 102 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 65 percent
*soils in similar positions with very gravelly material at less than 5 inches (less than 13 cm)
*poorly drained soils in depressions

Major Uses

Current uses: homesites, wildlife habitat, and gravel source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, depth to gravelly and cobbly material, wind erosion, water erosion, frost action, cutbank instability, excess surface fines, corrosivity, and excessive permeability
Ecological sites:
*Knik, steep soil—silty slopes, thin surface
*Knik, sloping soil—silty slopes, thin surface

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development (Knik, steep soil)

General management considerations:
*This portion of the unit has severe limitations for homesites due to the steepness and length of slopes, and severe limitations for shallow excavations due to cutbank instability and slope.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Building Site Development (Knik, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.

*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*In steeper areas, design and construct roads and drainage systems to minimize the risk of caving.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Install a sand filter below septic absorption lines to reduce permeability.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Knik, steep soil)

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—70 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: severe—slope, texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Knik, sloping soil)

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—70 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow

Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Knik, steep soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2100 pounds per acre (2350 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Knik, sloping soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2100 pounds per acre (2350 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too gravelly, slope, frost action
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

167—Knik silt loam, undulating

Composition

Knik soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Knik and similar soils

Landform: outwash plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 7 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)

Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest; paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*****0 to 12 inches (0 to 30 cm)—dark brown and dark grayish brown silt loam
*****12 to 18 inches (30 to 46 cm)—strong brown silt loam
*****18 to 60 inches (46 to 152 cm)—dark yellowish brown extremely gravelly coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: moderate
Depth to contrasting very gravelly material: 9 to 28 inches (23 to 71 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 10 percent
*****soils with very gravelly material at less than 9 inches (less than 23 cm)
*****poorly drained soils in depressions

Major Uses

Current uses: cropland, hayland and pastureland, homesites, wildlife habitat, and gravel source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 600 feet (15 to 183 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: depth to gravelly material, slope, wind erosion, water erosion, excessive permeability, cutbank instability, excess surface fines, corrosivity, low fertility, and frost action
Ecological sites:
*****Knik soil—silty slopes, thin surface

Cropland

General management considerations:
*****This unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass, brome-grass, oats and barley as forage, and potatoes and cole crops.
*****Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a high potential for frost action and a moderate risk of corrosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this unit is a probable source of gravel and sand.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—70 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.

*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2100 pounds per acre (2350 kilograms per hectare)
Soil limitation(s) for fencing: moderate—too gravelly, frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

168—Knik-Cryaquepts complex, 0 to 25 percent slopes

Composition

Knik soil and similar inclusions: 65 percent
Cryaquepts soil and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Knik and similar soils

Landform: hills (Figure 2)
Position on the landscape: crests, backslopes, and footslopes
Slope range: 2 to 25 percent
Slope features: length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): mixed broadleaf/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 12 inches (0 to 30 cm)—dark brown and dark grayish brown silt loam
*12 to 18 inches (30 to 46 cm)—strong brown silt loam
*18 to 60 inches (46 to 152 cm)—dark yellowish brown extremely gravelly coarse sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the extremely gravelly substratum—rapid
Available water capacity: moderate
Depth to contrasting very gravelly material: 12 to 24 inches (30 to 61 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Characteristics of Cryaquepts and similar soils

Landform: hills (Figure 2)
Position on the landscape: toeslopes and depressions
Slope range: 0 to 7 percent
Slope features: shape—plain or concave
Organic mat on surface: 2 to 16 inches (5 to 41 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Sample profile:
*0 to 2 inches (0 to 5 cm)—black mucky silt loam
*2 to 14 inches (5 to 36 cm)—dark brown and dark grayish brown silt loam, loam, and gravelly loam
*14 to 60 inches (36 to 152 cm)—olive gray and dark grayish brown cobbly sandy loam and very gravelly sandy loam

Drainage class: very poorly or poorly drained
Permeability: in the upper part—moderate; below this—variable
Available water capacity: variable
Runoff: slow or ponded
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 25 percent
*very poorly drained soils with organic mats greater than 16 inches (greater than 41 cm)

Major Uses

Current uses: wildlife habitat and homesites
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 50 to 250 feet (15 to 76 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: depth to seasonally high water table, low fertility, slope, wind erosion, frost action, cutbank instability, water erosion, depth to gravelly material, excessive surface fines, and corrosivity
Ecological sites:
*Knik soil—silty slopes, thin surface
*Cryaquepts soil—drift deposits, very poorly drained

Cropland (Knik soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.

*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Cropland (Cryaquepts soil)

General management considerations:
*This portion of the unit has severe limitations for cropland and hayland due to wetness.

Building Site Development (Knik soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*This portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Design and construct buildings and access roads to compensate for steep slopes.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Cryaquepts soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to wetness.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Forestry (Knik soil)

Major tree species: paper birch, white spruce, balsam poplar, and quaking aspen
Mean site index:
*white spruce—70 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)

*balsam poplar—not estimated
*quaking aspen—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
*quaking aspen—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Cryaquepts soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce
Mean site index:
*white spruce—61 (estimated, 100 year)
*paper birch—49 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—18.6 cubic feet per acre (1.3 cubic m per hectare) per year at age 125
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—wetness, mucky silt, cobbles
Seedling mortality: severe—wetness, shallow, rock fragments
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is poorly suited for forestry due to severe soil limitations.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.
*The water table may rise if trees are removed.

Livestock Grazing (Knik soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and mixed broadleaf/bluejoint reedgrass-horsetail forest—2100 pounds per acre (2350 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: moderate—slope, wet soils
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Cryaquepts soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—alder, devil's club, rusty menziesia, bluejoint reedgrass, horsetail, oakfern and other ferns, and bunchberry dogwood
*black spruce forest—Labrador tea ledum, lingonberry, horsetail, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—not estimated
*black spruce forest—not estimated
Soil limitation(s) for fencing: severe—wetness, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—slope, wet soils
General management considerations:
*This soil is poorly suited for livestock grazing due to wetness and other soil limitations.

169—Liten silt loam, hilly

Composition

Liten soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Liten and similar soils

Landform: hills (Figure 2)
Position on the landscape: all positions
Slope range: 2 to 35 percent
Slope features: shape—plain or convex; length—10 to 100 feet (3 to 30 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch/American twinflower forest and paper birch-white spruce/American twinflower forest
Minor vegetation type(s): paper birch-quaking aspen/American twinflower forest

Typical profile:
*0 to 4 inches (0 to 10 cm)—dark gray silt loam
*4 to 6 inches (10 to 15 cm)—yellowish red and brown fine sandy loam
*6 to 60 inches (15 to 152 cm)—dark yellowish brown and brown sand

Drainage class: somewhat excessively drained
Permeability: in the silty loess mantle—moderate; in the sandy substratum—moderately rapid
Available water capacity: very low or low
Depth to contrasting sandy material: 1 to 10 inches (3 to 25 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with more than 10 inches (more than 25 cm) of silty material over sand
*soils with slopes greater than 35 percent

Major Uses

Current uses: homesites, sand source areas, and wildlife habitat
Potential uses: forestry and hayland and pastureland

Major Management Factors

Elevation: 50 to 250 feet (15 to 76 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: depth to sand, slope, low fertility, wind erosion, water erosion, cutbank instability, excess surface fines, and corrosivity
Ecological sites:
*Liten soil—sand dunes

Cropland

General management considerations:
*This unit has severe limitations for cropland due to steep slopes.
*This unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing sandy underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This unit has a low potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Only the silty surface material is suitable for revegetation due to the sandy nature of the substratum.
*The substratum material from this unit is a probable source of sand.

Suitable management practices:
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Design and construct buildings and access roads to compensate for steep slopes.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.

Forestry

Major tree species: paper birch, white spruce, and quaking aspen
Minor tree species: black spruce
Mean site index:
*****white spruce—73 (estimated, 100 year, *Farr 1967*)
*****paper birch—57 (estimated, 50 year, *Gregory and Haack 1965*)
*****quaking aspen—52 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*****white spruce—26.9 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*****paper birch—34.7 cubic feet per acre (2.4 cubic m per hectare) per year at age 80
*****quaking aspen—42.0 cubic feet per acre (3.0 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—texture, slope
Seedling mortality: moderate—shallow, sand
Windthrow hazard: severe—shallow
Plant competition: slight
General management considerations:
*****This soil is well suited for forestry.

Livestock Grazing

Major understory species:
*****paper birch/American twinflower forest, paper birch-white spruce/American twinflower forest, and paper birch-quaking aspen/American twinflower forest—Bebb's willow, highbush cranberry, common fireweed, American twinflower, bunchberry dogwood, bluejoint reedgrass, Labrador tea ledum, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch/American twinflower forest, paper birch-white spruce/American twinflower forest, and paper birch-quaking aspen/American twinflower forest—not estimated
Soil limitation(s) for fencing: severe—slope, too sandy
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

170—Mine spoils

Composition

Mine spoils: 95 percent
Contrasting inclusions: 5 percent

Characteristics of Mine spoils

Landform: hills and mountains
Position on landscape: all positions
Slope range: 0 to 150 percent
Native vegetation: scattered herbs, shrubs, and tree regeneration
Material: loess, glacial drift, and sedimentary bedrock

Included Areas

*****poorly drained soils in depressions

171—Nancy silt loam, 0 to 3 percent slopes

Composition

Nancy soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Nancy and similar soils

Landform: outwash plains
Position on the landscape: all positions
Slope range: 0 to 3 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed spruce-broadleaf forest and mixed broadleaf forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—grayish brown silt loam
*3 to 24 inches (8 to 61 cm)—dark reddish brown and dark grayish brown silt loam
*24 to 60 inches (61 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel material—rapid
Available water capacity: moderate or high
Depth to contrasting very gravelly material: 10 to 30 inches (25 to 76 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with sand and gravel at less than 10 inches (less than 25 cm)
*soils with sand at less than 10 inches (less than 25 cm)
*soils with slopes greater than 3 percent
*poorly drained soils in depressions

Major Uses

Current uses: homesites, cropland, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 400 feet (30 to 122 m)
Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—80 to 100 days
*growing degree days—1300 to 1500
Soil related factors: wind erosion, frost action, depth to gravelly and cobbly material, cutbank instability, low fertility, excess surface fines, and excessive permeability

Ecological sites:
*Nancy soil—glaciofluvial deposits, 20-35 inch pz.

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to depth to gravel, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has slight limitations for homesites and severe limitations for shallow excavations due to cutbank instability.
*This unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this unit is a probable source of sand and gravel.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: white spruce, paper birch, black spruce, and quaking aspen
Mean site index:
*white spruce—76 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)

Estimated growth at culmination of mean annual increment:
*white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*black spruce—not estimated
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest and mixed broadleaf forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*black spruce forest and mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest and mixed broadleaf forest—not estimated
*black spruce forest and mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

172—Nancy silt loam, sloping and moderately steep

Composition

Nancy, sloping soil and similar inclusions: 60 percent
Nancy, moderately steep soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Nancy, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—plain or convex; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): mixed spruce-broadleaf forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—grayish brown silt loam
*3 to 24 inches (8 to 61 cm)—dark reddish brown and dark grayish brown silt loam
*24 to 60 inches (61 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel material—rapid
Available water capacity: moderate or high
Depth to contrasting very gravelly material: 10 to 26 inches (25 to 66 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Nancy, moderately steep and similar soils

Landform: hills (Figure 2)
Position on the landscape: backslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): mixed spruce-broadleaf forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—grayish brown silt loam
*3 to 24 inches (8 to 61 cm)—dark reddish brown and dark grayish brown silt loam
*24 to 60 inches (61 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: moderate or high
Depth to contrasting very gravelly material: 10 to 26 inches (25 to 66 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with sand and gravel at less than 10 inches (less than 25 cm)
*soils with sand at less than 10 inches (less than 25 cm)
*poorly drained soil in depressions
*soils with slopes greater than 35 percent

Major Uses

Current uses: homesites, cropland, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 600 feet (30 to 183 m)

Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—80 to 100 days
*growing degree days—1300 to 1500
Soil related factors: slope, wind erosion, water erosion, depth to gravelly and cobbly material, frost action, cutbank instability, low fertility, excess surface fines, corrosivity, and excessive permeability
Ecological sites:
*Nancy, sloping soil—glaciofluvial deposits, 20-35 inch pz.
*Nancy, moderately steep soil—glaciofluvial deposits, 20-35 inch pz.

Cropland (Nancy, sloping soil)

General management considerations:
*This unit has moderate limitations for cropland and hayland due to slope, depth to gravel, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass and oats and barley as forage.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly outwash underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Nancy, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Nancy, sloping soil)

General management considerations:
*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.

*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this portion of the unit is a probable source of sand and gravel.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Nancy, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this portion of the unit is a probable source of sand and gravel.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Design and construct buildings and access roads to compensate for steep slopes.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Nancy, sloping soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—76 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100

*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Forestry (Nancy, moderately steep soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—76 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Nancy, sloping soil)

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest—not estimated
*mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, slope, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

Livestock Grazing (Nancy, moderately steep soil)

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia,

bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest—not estimated
*mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: severe—slope, too sandy, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

173—Nancy silt loam, steep and sloping

Composition

Nancy, steep and similar inclusions: 60 percent
Nancy, sloping and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Nancy, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes
Slope range: 20 to 60 percent
Slope features: shape—plain to convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 2 to 6 inches (5 to 15 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): mixed spruce-broadleaf forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 9 inches (5 to 23 cm)—yellowish red, strong brown, and brown silt loam
*9 to 60 inches (23 to 152 cm)—dark yellowish brown very gravelly and extremely gravelly loamy coarse sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: medium or high
Depth to contrasting very gravelly material: 10 to 26 inches (25 to 66 cm)
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Nancy, sloping and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: toeslopes and crests
Slope range: 2 to 20 percent

Slope features: shape—plane to convex; length—50 to 200 feet (15 to 61 m)
Organic mat on surface: 2 to 6 inches (5 to 15 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): mixed spruce-broadleaf forest

Typical profile:
*****0 to 3 inches (0 to 8 cm)—grayish brown silt loam
*****3 to 24 inches (8 to 61 cm)—dark reddish brown and dark grayish brown silt loam
*****24 to 60 inches (61 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—rapid
Available water capacity: moderate or high
Depth to contrasting very gravelly material: 10 to 26 inches (25 to 66 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 60 percent
*****soils with sand and gravel at less than 5 inches (less than 13 cm)
*****poorly drained soils in depressions

Major Uses

Current uses: homesites, wildlife habitat, and gravel source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—20 to 25 inches (51 to 64 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—80 to 100 days
*****growing degree days—1300 to 1500
Soil related factors: steepness and length of slopes, depth to gravel, wind erosion, water erosion, excessive permeability, cutbank instability, frost action, excess surface fines, excess sand in substratum, and corrosivity
Ecological sites:
*****Nancy, steep soil—glaciofluvial deposits, 20-35 inch pz.
*****Nancy, sloping soil—glaciofluvial deposits, 20-35 inch pz.

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development (Nancy, steep soil)

General management considerations:
*****This portion of the unit has severe limitations for homesites due to the steepness and length of slopes, and severe limitations for shallow excavations due to cutbank

instability and the steepness and length of slopes.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*This portion of the unit is a probable source of sand, gravel, and roadfill.

Suitable management practices:
*Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Building Site Development (Nancy, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to steep slopes, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*This portion of the unit is a probable source of sand and gravel.

Suitable management practices:
*Design and construct buildings and access roads to compensate for steep slopes.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Install a sand filter below septic absorption lines to reduce permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Nancy, steep soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—76 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: severe—slope, silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Forestry (Nancy, sloping soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen

Mean site index:
*white spruce—76 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Nancy, steep soil)

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest—not estimated
*mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: severe—slope, too sandy, frost action
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

Livestock Grazing (Nancy, sloping soil)

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest—not estimated
*mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, slope, frost action
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

174—Nancy silt loam, undulating

Composition

Nancy soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Nancy and similar soils

Landform: glacial outwash plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (4 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed spruce-broadleaf forest and mixed broadleaf forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—grayish brown silt loam
*3 to 24 inches (8 to 61 cm)—dark reddish brown and dark grayish brown silt loam
*24 to 60 inches (61 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel material—rapid
Available water capacity: moderate or high
Depth to contrasting very gravelly material: 10 to 30 inches (25 to 76 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with less than 10 inches (less than 25 cm) of silty material over sand and gravel or sand
*soils with slopes greater than 10 percent
*poorly drained soils in depressions

Major Uses

Current uses: homesites, cropland, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 100 to 600 feet (30 to 183 m)
Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—80 to 100 days
*growing degree days—1300 to 1500
Soil related factors: wind erosion, water erosion, frost action, low fertility, depth to gravel and cobbles, cutbank instability, excess surface fines, corrosivity, and excessive permeability

Ecological sites:
*Nancy soil—glaciofluvial deposits, 20-35 inch pz.

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to slope, depth to gravel, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this unit is a probable source of sand and gravel.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: white spruce, paper birch, black spruce, and quaking aspen
Mean site index:
*white spruce—76 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated

*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*black spruce—not estimated
*quaking aspen—42.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest and mixed broadleaf forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*black spruce forest and mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest and mixed broadleaf forest—not estimated
*black spruce forest and mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

175—Nancy-Cryaquepts complex, 0 to 5 percent slopes

Composition

Nancy soil and similar inclusions: 60 percent
Cryaquepts soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Nancy and similar soils

Landform: glacial outwash plains
Position on the landscape: all positions
Slope range: 0 to 5 percent
Slope features: shape—undulating; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): mixed spruce-broadleaf forest, paper birch-white spruce forest, and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—grayish brown silt loam
*3 to 24 inches (8 to 61 cm)—dark reddish brown and dark grayish brown silt loam
*24 to 60 inches (61 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the gravelly substratum—rapid
Available water capacity: moderate or high
Depth to contrasting very gravelly material: 10 to 30 inches (25 to 76 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Cryaquepts and similar soils

Landform: glacial outwash plains
Position on the landscape: depressions
Slope range: 0 to 5 percent
Slope features: shape—concave or plain; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 2 to 16 inches (5 to 41 cm) thick
Major vegetation type(s): paper birch-spruce forest

Sample profile:
*0 to 4 inches (0 to 10 cm)—dark brown silt loam
*4 to 16 inches (10 to 41 cm)—dark brown, dark gray, and strong brown silt loam
*16 to 60 inches (41 to 152 cm)—variegated extremely gravelly sand

Drainage class: very poorly or poorly drained
Permeability: in the upper part—moderate; below this—variable
Available water capacity: moderate or high
Runoff: ponded
Depth to seasonally high water table: 0 to 2 feet (0 to 0.6 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 5 percent
*soils with sand and gravel at less than 10 inches (less than 25 cm)
*very poorly drained soils in depressions with organic mats greater than 16 inches (greater than 41 cm) thick

Major Uses

Current uses: homesites and wildlife habitat
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 300 to 600 feet (91 to 183 m)
Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)

*frost free season—80 to 100 days
*growing degree days—1300 to 1500
Soil related factors: depth to seasonally high water table, wind erosion, water erosion, depth to gravelly and cobbly material, cutbank instability, frost action, low fertility, excessive permeability, excess surface fines, and corrosivity
Ecological sites:
*Nancy soil—glaciofluvial deposits, 20-35 inch pz.
*Cryaquepts soil—drift deposits, very poorly drained

Cropland (Nancy soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland and hayland due to the depth to gravel, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use shallow cuts during land smoothing to avoid exposing gravelly outwash underlying material.
*Add lime to improve soil fertility.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Cryaquepts soil)

General management considerations:
*This portion of the unit has severe limitations for cropland and hayland due to wetness.

Building Site Development (Nancy soil)

General management considerations:
*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this portion of the unit is a probable source of sand and gravel.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.

*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Cryaquepts soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to wetness.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Forestry (Nancy soil)

Major tree species: white spruce, paper birch, and quaking aspen
Minor tree species: black spruce
Mean site index:
*white spruce—76 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Forestry (Cryaquepts soil)

Major tree species: paper birch and white spruce
Minor tree species: black spruce
Mean site index:
*white spruce—61 (estimated, 100 year, *Farr 1967*)
*paper birch—49 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—18.6 cubic feet per acre (1.3 cubic m per hectare) per year at age 125
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—wetness
Seedling mortality: severe—wetness, shallow
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is poorly suited for forestry due to severe soil limitations.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.
*The water table may rise if trees are removed.

Livestock Grazing (Nancy soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*black spruce forest and mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—not estimated
*black spruce forest and mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, frost action
Limitations to uniform distribution of livestock: moderate—wet soils
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

Livestock Grazing (Cryaquepts soil)

Major understory species:
*paper birch-spruce forest—alder, devil's club, rusty menziesia, early blueberry, bog blueberry, Beauverd's spiraea, bluejoint reedgrass, horsetail, and spinulose shield fern
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: severe—wetness, frost action
Limitations to uniform distribution of livestock: moderate—wet soils
General management considerations:
*This soil is poorly suited for livestock grazing due to wetness and other soil limitations.

176—Nancy-Tokositna complex, sloping and moderately steep

Composition

Nancy, sloping soil and similar inclusions: 50 percent
Nancy, moderately steep soil and similar inclusions: 20 percent
Tokositna, moderately steep soil and similar inclusions: 20 percent
Contrasting inclusions: 10 percent

Characteristics of Nancy, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—plain or convex; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed spruce-broadleaf forest and mixed broadleaf forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—grayish brown silt loam
*3 to 24 inches (8 to 61 cm)—dark reddish brown and dark grayish brown silt loam
*24 to 60 inches (61 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: moderate or high
Depth to contrasting very gravelly material: 12 to 26 inches (30 to 66 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Nancy, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed spruce-broadleaf forest and mixed broadleaf forest

Typical profile:
*****0 to 3 inches (0 to 8 cm)—grayish brown silt loam
*****3 to 24 inches (8 to 61 cm)—dark reddish brown and dark grayish brown silt loam
*****24 to 60 inches (61 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: moderate or high
Depth to contrasting very gravelly material: 12 to 26 inches (30 to 66 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Tokositna, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—grayish brown silt loam
*****2 to 28 inches (5 to 71 cm)—dark reddish brown, strong brown, and brown silt loam
*****28 to 60 inches (71 to 152 cm)—very dark grayish brown and dark grayish brown very cobbly loam and sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very cobbly loam and sandy loam—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high

Depth to contrasting very gravelly and very cobbly material: 10 to 36 inches (25 to 91 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with gravelly material at less than 10 inches (less than 25 cm)
*****poorly drained soils in depressions
*****soils with slopes greater than 35 percent
*****occasional surface boulders

Major Uses

Current uses: wildlife habitat
Potential uses: cropland, homesites, forestry, and livestock grazing

Major Management Factors

Elevation: 400 to 1000 feet (122 to 305 m)
Climatic factors (average annual):
*****precipitation—25 to 30 inches (64 to 76 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—70 to 90 days
*****growing degree days—1100 to 1400
Soil related factors: slope, depth to gravelly and cobbly material, restricted and excessive permeability, water erosion, wind erosion, cutbank instability, low fertility, frost action, excess surface fines, and corrosivity
Ecological sites:
*****Nancy, sloping soil—glaciofluvial deposits, 20-35 inch pz.
*****Nancy, moderately steep soil—glaciofluvial deposits, 20-35 inch pz.
*****Tokositna, moderately steep soil—till deposits, 20-35 inch pz.

Cropland (Nancy, sloping soil)

General management considerations:
*****This portion of the unit has moderate limitations for cropland and hayland due to slope, the depth to gravel, low soil pH levels, and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*****Land clearing and tillage operations increase wind and water erosion hazard.
*****Crops respond well to fertilizer if precipitation is adequate.

Suitable management practices:
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Add lime to improve soil fertility.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*****Use shallow cuts during land smoothing to avoid exposing gravelly outwash underlying

material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Nancy and Tokositna, moderately steep soils)

General management considerations:
*These portions of the unit have severe limitations for cropland due to steep slopes.
*These portions of the unit are best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Nancy, sloping soil)

General management considerations:
*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Nancy, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this portion of the unit is a probable source of sand and

gravel.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Design and construct buildings and access roads to compensate for steep slopes.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Tokositna, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Design and construct buildings and access roads to compensate for steep slopes.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Nancy, sloping soil)

Major tree species: white spruce, paper birch, black spruce, and quaking aspen
Mean site index:
*white spruce—76 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*black spruce—not estimated
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95

Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Forestry (Nancy, moderately steep soil)

Major tree species: white spruce, paper birch, black spruce, and quaking aspen
Mean site index:
*white spruce—76 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*black spruce—not estimated
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—slope, silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Forestry (Tokositna, moderately steep soil)

Major tree species: white spruce and paper birch
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—72 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—26.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Nancy, sloping soil)

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss

*paper birch forest and mixed broadleaf forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*black spruce forest and mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss

Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest and mixed broadleaf forest—not estimated
*black spruce forest and mixed spruce-broadleaf forest—not estimated

Soil limitation(s) for fencing: moderate—too sandy, slope, frost action

Limitations to uniform distribution of livestock: moderate—slope, dense brush

General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

Livestock Grazing (Nancy, moderately steep soil)

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest and mixed broadleaf forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*black spruce forest and mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss

Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest and mixed broadleaf forest—not estimated
*black spruce forest and mixed spruce-broadleaf forest—not estimated

Soil limitation(s) for fencing: severe—slope, too sandy, frost action

Limitations to uniform distribution of livestock: moderate—slope, dense brush

General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

Livestock Grazing (Tokositna, moderately steep soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss

Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—1800 pounds per acre (2010 kilograms per hectare)

Soil limitation(s) for fencing: severe—slope, frost action

Limitations to uniform distribution of livestock: moderate—slope, dense brush

General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

177—Nancy-Tokositna complex, steep and sloping

Composition

Nancy, steep soil and similar inclusions: 30 percent
Tokositna, steep soil and similar inclusions: 30 percent
Nancy, sloping soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Nancy, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes and footslopes
Slope range: 20 to 60 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): mixed spruce-broadleaf forest

Typical profile:
*****0 to 3 inches (0 to 8 cm)—grayish brown silt loam
*****3 to 24 inches (8 to 61 cm)—dark reddish brown and dark grayish brown silt loam
*****24 to 60 inches (61 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: moderate or high
Depth to contrasting very gravelly material: 10 to 26 inches (25 to 66 cm)
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Tokositna, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes and footslopes
Slope range: 20 to 60 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—grayish brown silt loam
*****2 to 28 inches (5 to 71 cm)—dark reddish brown, strong brown, and brown silt loam
*****28 to 60 inches (71 to 152 cm)—very dark grayish brown and dark grayish brown very cobbly loam and sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very cobbly loam and sandy loam material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 34 inches (28 to 86 cm)
Runoff: rapid

Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Nancy, sloping and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: crests and toeslopes
Slope range: 8 to 20 percent
Slope features: shape—concave or convex; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): mixed spruce-broadleaf forest

Typical profile:
*****0 to 3 inches (0 to 8 cm)—grayish brown silt loam
*****3 to 24 inches (8 to 61 cm)—dark reddish brown and dark grayish brown silt loam
*****24 to 60 inches (61 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: moderate or high
Depth to contrasting very gravelly material: 10 to 26 inches (25 to 66 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 60 percent
*****poorly drained soils in depressions
*****soils with less than 10 inches (less than 25 cm) of silty material over very gravelly and very cobbly material
*****occasional surface boulders

Major Uses

Current uses: wildlife habitat
Potential uses: homesites, forestry, and livestock grazing

Major Management Factors

Elevation: 300 to 1000 feet (91 to 305 m)
Climatic factors (average annual):
*****precipitation—20 to 30 inches (51 to 76 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—70 to 90 days
*****growing degree days—1100 to 1400
Soil related factors: slope, water erosion, wind erosion, depth to gravelly and cobbly material, restricted and excessive permeability, cutbank instability, frost action, excess surface fines, corrosivity, and dense substratum
Ecological sites:
*****Nancy, steep soil—glaciofluvial deposits, 20-35 inch pz.

*Tokositna, steep soil—till deposits, 20-35 inch pz.
*Nancy, sloping soil—glaciofluvial deposits, 20-35 inch pz.

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development (Nancy, steep soils)

General management considerations:
*This portion of the unit has severe limitations for homesites due to the steepness and length of slopes, and severe limitations for shallow excavations due to cutbank instability and the steepness and length of slopes.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Building Site Development (Tokositna, steep soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Suitable management practices:
*Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Building Site Development (Nancy, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to steep slopes, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this portion of the unit is a probable source of gravel and sand.
*Only the silty surface material is suitable for reclamation due to the gravelly nature of the substratum.

Suitable management practices:
*Design and construct buildings and access roads to compensate for steep slopes.
*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Nancy, steep soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*****white spruce—76 (100 year, *Farr 1967*)
*****paper birch—49 (50 year, *Gregory and Haack 1965*)
*****quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*****white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*****paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*****quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: severe—slope, silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*****This soil is suited for forestry.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Forestry (Tokositna, steep soil)

Major tree species: white spruce and paper birch
Minor tree species: quaking aspen and black spruce
Mean site index:
*****white spruce—72 (100 year, *Farr 1967*)
*****paper birch—50 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*****white spruce—26.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 105
*****paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—slope, silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*****This soil is suited for forestry.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Nancy, sloping soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*****white spruce—76 (100 year, *Farr 1967*)
*****paper birch—49 (50 year, *Gregory and Haack 1965*)
*****quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*****white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*****paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*****quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species

General management considerations:
*****This soil is well suited for forestry.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Nancy, steep soil)

Major understory species:
*****paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*****paper birch forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*****mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest—not estimated
*****paper birch forest—not estimated
*****mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: severe—slope, too sandy, frost action
Limitations to uniform distribution of livestock: severe—slope, dense brush
General management considerations:
*****This soil is poorly suited for livestock grazing.

Livestock Grazing (Tokositna, steep soil)

Major understory species:
*****paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest and paper birch forest—1800 pounds per acre (2010 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: severe—slope, dense brush
General management considerations:
*****This soil is poorly suited for livestock grazing.

Livestock Grazing (Nancy, sloping soil)

Major understory species:
*****paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*****paper birch forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*****mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest—not estimated
*****paper birch forest—not estimated
*****mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, slope, frost action
Limitations to uniform distribution of livestock: severe—slope, dense brush
General management considerations:
*****This soil is poorly suited for livestock grazing.

178—Nancy-Tokositna complex, undulating

Composition

Nancy soil and similar inclusions: 45 percent
Tokositna soil and similar inclusions: 45 percent
Contrasting inclusions: 10 percent

Characteristics of Nancy and similar soils

Landform: glacial plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed spruce-broadleaf forest and mixed broadleaf forest

Typical profile:
*****0 to 3 inches (0 to 8 cm)—grayish brown silt loam
*****3 to 24 inches (8 to 61 cm)—dark reddish brown and dark grayish brown silt loam
*****24 to 60 inches (61 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: moderate or high
Depth to contrasting very gravelly material: 10 to 26 inches (25 to 66 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Tokositna and similar soils

Landform: glacial plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—100 to 300 feet (30 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—grayish brown silt loam
*****2 to 28 inches (5 to 71 cm)—dark reddish brown, strong brown, and brown silt loam
*****28 to 60 inches (71 to 152 cm)—very dark grayish brown and dark grayish brown very cobbly loam and sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very cobbly loam—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to very cobbly and very gravelly loam material for the Tokositna soil: 14 to 30 inches (36 to 76 cm)

Depth to very cobbly and very gravelly loam material for the map unit component: 11 to 30 inches (28 to 76 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with very gravelly material at less than 10 inches (less than 25 cm)
*****soils with slopes greater than 10 percent
*****occasional surface boulders
*****poorly drained soils in depressions

Major Uses

Current uses: wildlife habitat, homesites, and cropland
Potential uses: forestland and livestock grazing

Major Management Factors

Elevation: 300 to 1000 feet (91 to 305 m)
Climatic factors (average annual):
*****precipitation—25 to 30 inches (64 to 76 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—70 to 90 days
*****growing degree days—1100 to 1400
Soil related factors: wind erosion, water erosion, frost action, depth to gravelly and cobbly material, low fertility, cutbank instability, excess surface fines, corrosivity, restricted and excessive permeability, and dense substratum
Ecological sites:
*****Nancy soil—glaciofluvial deposits, 20-35 inch pz.
*****Tokositna soil—till deposits, 20-35 inch pz.

Cropland

General management considerations:
*****This portion of the unit has moderate limitations for cropland and hayland due to slope, the depth to gravel, low fertility, and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*****Land clearing and tillage operations increase wind and water erosion hazard.
*****Occasional surface stones limit some fieldwork.

Suitable management practices:
*****Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Add lime to improve soil fertility.
*****Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development (Nancy soil)

General management considerations:

*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:

*Install a sand filter below septic absorption lines to reduce permeability.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Tokositna soil)

General management considerations:

*This portion of the unit has moderate limitations for homesites due to cobbles, and moderate limitations for shallow excavations due to the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:

*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Nancy soil)

Major tree species: white spruce, paper birch, black spruce, and quaking aspen
Mean site index:
*white spruce—76 (100 year, *Farr 1967*)
*paper birch—49 (50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
*quaking aspen—53 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—29.2 cubic feet per acre (2.0 cubic m per hectare) per year at age 100
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
*black spruce—not estimated
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass could potentially dominate this soil and inhibit successful tree regeneration.

Forestry (Tokositna soil)

Major tree species: white spruce and paper birch
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—72 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—26.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Nancy soil)

Major understory species:
*paper birch-white spruce forest—devil's club, highbush cranberry, rusty menziesia, bluejoint reedgrass, ovalleaf blueberry, prickly rose, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and clubmoss
*paper birch forest and mixed broadleaf forest—willow, highbush cranberry, common fireweed, prickly rose, lingonberry, bunchberry dogwood, clubmoss, American twinflower, and moss
*black spruce forest and mixed spruce-broadleaf forest—willow, Labrador tea ledum, bog blueberry, lingonberry, Beauverd's spiraea, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
*paper birch forest and mixed broadleaf forest—not estimated

*black spruce forest and mixed spruce-broadleaf forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, frost action
Limitations to uniform distribution of livestock: moderate—dense brush
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of forage plants in most vegetation types.

Livestock Grazing (Tokositna soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—1800 pounds per acre (2010 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action
Limitations to uniform distribution of livestock: moderate—dense brush
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

179—Pits, gravel

Composition

Pits, gravel: 95 percent

Characteristics of Pits, gravel

Landform: glacial plains, hills, and mountains
Slope range: 0 to 70 percent
Native vegetation: scattered herbs, shrubs, and tree regeneration
Material: gravelly and sandy glacial till, outwash, and alluvium

Included Areas

*well drained soils
*poorly drained soils in depressions

180—Psuyaah-Snowdance complex, 5 to 20 percent slopes

Composition

Psuyaah soil and similar inclusions: 55 percent
Snowdance soil and similar inclusions: 35 percent
Contrasting inclusions: 10 percent

Characteristics of Psuyaah and similar soils

Landform: mountains (Figure 5)
Position on the landscape: backslopes

Slope range: 5 to 20 percent
Slope features: shape—plain; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): bluejoint reedgrass-forb grassland

Typical profile:
*0 to 15 inches (0 to 38 cm)—dark brown and dark yellowish brown silt loam
*15 to 21 inches (38 to 53 cm)—dark yellowish brown loam
*21 to 60 inches (53 to 152 cm)—dark yellowish brown very cobbly loam

Drainage class: poorly drained
Permeability: in the silty loess mantle—moderate; in the very gravelly and very cobbly material—moderately slow
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 16 to 27 inches (41 to 69 cm)
Runoff: medium
Depth to seasonally high water table: 0.5 to 2.0 feet (0.2 to 0.6 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Snowdance and similar soils

Landform: mountains (Figure 5)
Position on the landscape: backslopes—depressions and drainages
Slope range: 5 to 15 percent
Slope features: shape—concave; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 3 to 6 inches (8 to 15 cm) thick
Major vegetation type(s): low willow shrub

Typical profile:
*0 to 5 inches (0 to 13 cm)—black mucky silt loam
*5 to 16 inches (13 to 41 cm)—dark brown silt loam
*16 to 31 inches (41 to 79 cm)—dark brown very gravelly sandy loam
*31 to 60 inches (79 to 152 cm)—very dark grayish brown very cobbly sandy loam

Drainage class: very poorly or poorly drained
Permeability: in the silty loess mantle—moderate; in the very gravelly and very cobbly material—moderately slow
Available water capacity: high
Depth to very gravelly and very cobbly material: 11 to 32 inches (28 to 81 cm)
Runoff: slow
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*well drained soils with very cobbly or very gravelly material at less than 10 inches (less than 25 cm)
*soils with slopes greater than 20 percent
*soils along drainages that are flooded

Major Uses

Current uses: wildlife habitat
Potential uses: livestock grazing

Major Management Factors

Elevation: 2100 to 3000 feet (640 to 914 m)
Climatic factors (average annual):
*****precipitation—30 to 45 inches (76 to 114 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: wind erosion, water erosion, slope, frost action, corrosivity, and depth to seasonally high water table
Ecological sites:
*****Psuyaah soil—loamy slopes, wet
*****Snowdance soil—mountain slopes, drainages

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to slope and depth to a seasonally high water table.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites and shallow excavations due to wetness.
*****The Psuyaah part of this unit has a high potential for frost action and a moderate risk of corrosion.
*****The Snowdance part of this unit has a high potential for frost action and a high risk of corrosion.

Livestock Grazing (Psuyaah soil)

Major species:
*****bluejoint reedgrass-forb grassland—bluejoint reedgrass, common fireweed, spinulose shield fern, oakfern, false hellebore, Beauverd's spiraea, Canadian burnet, northern geranium, bunchberry dogwood, and arctic starflower
Mean annual production (vascular plants, air-dry weight):
*****bluejoint reedgrass-forb grassland—2500 pounds per acre (2800 kilograms per hectare)
Soil limitation(s) for fencing: moderate—wetness, slope, frost action
Limitations to uniform distribution of livestock: moderate—slope, wet soils, dense brush
General management considerations:
*****This soil is well suited for livestock grazing.
*****In spring, and during periods of intense summer rain, runoff and drainage from adjacent slopes may result in a shallow water table in many areas.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*****The grasslands on this soil are used extensively by moose in summer and fall.

Livestock Grazing (Snowdance soil)

Major species:
*****low willow shrub—Barclay's, diamondleaf, and other low willows; common ladyfern;

bluejoint reedgrass; horsetail; Canadian burnet; sedge; oakfern; and twisted stalk
Mean annual production (vascular plants, air-dry weight):
*low willow shrub—2300 pounds per acre (2575 kilograms per hectare)
Soil limitation(s) for fencing: severe—wetness, slope, frost action
Limitations to uniform distribution of livestock: moderate—slope, wet soils, dense brush
General management considerations:
*This soil is suited for livestock grazing.
*In spring, and during periods of intense summer rain, runoff and drainage from adjacent slopes result in a shallow water table in many areas.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*The willow browse on this soil is used extensively by moose in winter and spring.

181—Qeni, cool-Niklavar, cool-Cryods, cold complex, 0 to 25 percent slopes

Composition

Qeni, cool soil and similar inclusions: 35 percent
Niklavar, cool soil and similar inclusions: 30 percent
Cryods, cold soil and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Qeni, cool and similar soils

Landform: stream terraces (Plate 4)
Position on the landscape: all positions
Slope range: 0 to 5 percent
Slope features: shape—plain
Organic mat on surface: 2 to 6 inches (5 to 15 cm) thick
Major vegetation type(s): low willow/bluejoint reedgrass shrub

Typical profile:
*0 to 3 inches (0 to 8 cm)—very dark grayish brown silt loam
*3 to 8 inches (8 to 20 cm)—strong brown fine sandy loam
*8 to 60 inches (20 to 152 cm)—variegated extremely gravelly coarse sand

Drainage class: somewhat poorly drained
Permeability: in the surface layer—moderate; in the fine sandy loam material—moderate; in the very gravelly and very cobbly material—rapid
Available water capacity: low or very low
Depth to contrasting very gravelly and very cobbly material: 2 to 14 inches (5 to 36 cm)
Runoff: slow
Depth to seasonally high water table: 1 to 3 feet (0.5 to 0.9 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: rare

Characteristics of Niklavar, cool and similar soils

Landform: floodplains (Plate 4)
Position on the landscape: all positions
Slope range: 0 to 5 percent

Slope features: shape—plain
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): low willow/bluejoint reedgrass shrub

Typical profile:
*0 to 4 inches (0 to 10 cm)—dark brown fine sandy loam
*4 to 30 inches (10 to 76 cm)—very dark grayish brown, dark greenish gray, dark brown, and light gray stratified fine sand through silt
*30 to 60 inches (76 to 152 cm)—variegated extremely gravelly sand

Drainage class: poorly drained
Permeability: in the stratified sandy and silty material—moderate; in the very gravelly and very cobbly material—rapid
Available water capacity: moderate
Depth to contrasting very gravelly or cobbly material: 10 to 22 inches (25 to 56 cm)
Runoff: slow
Depth to seasonally high water table: 1 to 2 feet (0.3 to 0.6 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: occasional

Characteristics of Cryods, cold and similar soils

Landform: mountains (Plate 4)
Position on the landscape: alluvial fans and toeslopes
Slope range: 10 to 25 percent
Slope features: shape—plain or convex; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): bluejoint reedgrass-forb grassland

Sample profile:
*0 to 5 inches (0 to 13 cm)—dark brown silt loam and loam
*5 to 10 inches (13 to 25 cm)—dark brown sandy loam and loam
*10 to 18 inches (25 to 46 cm)—strong brown gravelly sandy loam
*18 to 60 inches (46 to 152 cm)—strong brown extremely cobbly coarse sand

Drainage class: well drained
Permeability: in the loamy surface material—moderate; in the substratum—variable
Available water capacity: low to moderate
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*very poorly drained soils in depressions that have organic mats more than 16 inches (more than 41 cm) thick
*soils with slopes greater than 25 percent
*frequently flooded soils

Major Uses

Current uses: wildlife habitat

Potential uses: livestock grazing

Major Management Factors

Elevation: 2200 to 2800 feet (671 to 853 m)
Climatic factors (average annual):
*****precipitation—30 to 45 inches (76 to 114 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: wind erosion, water erosion, depth to seasonally high water table, corrosivity, depth to gravelly material, and flooding
Ecological sites:
*****Qeni, cool soil—stream terraces, wet
*****Niklavar, cool soil—stream terraces, wet
*****Cryods, cold soil—loamy slopes, cool

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to slope, the depth to gravel, and depth to a seasonally high water table.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites and shallow excavations due to wetness and flooding on Qeni, cool and Niklavar, cool soils, and the steepness and length of slopes on Cryods, cold soils.
*****The Qeni, cool portion of this unit has a low potential for frost action and a moderate risk of corrosion.
*****The Niklavar, cool portion of this unit has a high potential for frost action and a moderate risk of corrosion.
*****The Cryods, cold portion of this unit has a high potential for frost action and a high risk of corrosion.
*****The substratum material from Qeni and Niklavar soils provides a probable source of gravel and sand.

Livestock Grazing (Qeni, cool soil)

Major species:
*****low willow-bluejoint reedgrass shrub—Barclay's, diamondleaf, undergreen, and other low willows; bluejoint reedgrass; Altai's fescue; sedge; common fireweed; Canadian burnet; northern geranium; bunchberry dogwood; and violet
Mean annual production (vascular plants, air-dry weight):
*****low willow-bluejoint reedgrass shrub—2200 pounds per acre (2465 kilograms per hectare)
Soil limitation(s) for fencing: severe—wetness, too cobbly and sandy
Limitations to uniform distribution of livestock: moderate—slope, low escarpments, poorly drained areas, flooding, channels
General management considerations:
*****This soil is suited for livestock grazing.
*****In spring, and during periods of intense summer rain, runoff and drainage from adjacent mountain slopes result in a shallow water table in many areas.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*****The willow browse on this soil is used extensively by moose in winter, spring, and early

summer.

Livestock Grazing (Niklavar, cool soil)

Major species:
*****low willow-bluejoint reedgrass shrub—Barclay's, diamondleaf, undergreen, and other low willows; bluejoint reedgrass; Altai's fescue; sedge; common fireweed; Canadian burnet; northern geranium; bunchberry dogwood; and violet
Mean annual production (vascular plants, air-dry weight):
*****low willow-bluejoint reedgrass shrub—2200 pounds per acre (2465 kilograms per hectare)
Soil limitation(s) for fencing: severe—wetness, flooding, frost action
Limitations to uniform distribution of livestock: moderate—slope, low escarpments, poorly drained areas, flooding, channels
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*****The willow browse on this soil is used extensively by moose in winter, spring, and early summer.

Livestock Grazing (Cryods, cold soil)

Major species:
*****bluejoint reedgrass-forb grassland—bluejoint reedgrass, common fireweed, spinulose shield fern, oakfern, false hellebore, Beauverd's spiraea, Canadian burnet, northern geranium, bunchberry dogwood, and arctic starflower
Mean annual production (vascular plants, air-dry weight):
*****bluejoint reedgrass-forb grassland—2500 pounds per acre (2800 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, variable soil materials
Limitations to uniform distribution of livestock: moderate—slope, low escarpments, poorly drained areas, flooding, channels
General management considerations:
*****This soil is well suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

182—Riverwash and Niklavar soils, 0 to 2 percent slopes

Composition

Riverwash and Niklavar, frequently flooded soils: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Riverwash

Landform: floodplains (cover photo)
Position on the landscape: non-vegetated gravel bars and sandy channels
Slope range: 0 to 2 percent
Slope features: shape—plain, with many bar and channel escarpments
Major vegetation type(s): barren to sparse herbs

Sample profile:
*****0 to 60 inches (0 to 152 cm)—variegated very cobbly coarse sand

Runoff: slow

Depth to seasonally high water table: variable
Hazard of erosion: by water—slight; by wind—variable
Hazard of flooding: frequent

Characteristics of Niklavar, frequently flooded and similar soils

Landform: floodplains (cover photo)
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 0 to 2 inches (0 to 5 cm) thick
Major vegetation type(s): balsam poplar forest and tall alder-willow scrub

Typical profile:
*****0 to 1 inch (0 to 3 cm)—dark brown loamy fine sand
*****1 to 30 inches (3 to 76 cm)—dark brown, very dark grayish brown, and dark greenish gray stratified fine sand through silt
*****30 to 60 inches (76 to 152 cm)—variegated extremely gravelly sand

Drainage class: poorly drained
Permeability: in the stratified surface layers—moderate; in the sand and gravel—rapid
Available water capacity: moderate
Depth to contrasting very gravelly material: 24 to 40 inches (61 to 102 cm)
Runoff: slow
Depth to seasonally high water table: 1 to 2 feet (0.3 to 0.6 m)
Hazard of erosion: by water— slight; by wind— moderate
Hazard of flooding: frequent

Included Areas

*****river channels
*****soils on slopes greater than 2 percent
*****soils with seasonally high water table depths below 24 inches (below 61 cm)

Major Uses

Current uses: wildlife habitat
Potential uses: forestry, livestock grazing, and gravel source area

Major Management Factors

Elevation: 20 to 400 feet (6 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 30 inches (38 to 76 cm)
*****air temperature—33 to 36 °F (1 to 2 °C)
*****frost free season—70 to 110 days
*****growing degree days—1000 to 1500
Soil related factors: depth to sand and gravel, low available water capacity, depth to seasonally high water table, frequent flooding, excess surface fines, frost action, and corrosivity
Ecological sites:
*****Riverwash—none
*****Niklavar soil—floodplain deposits, moderately wet

Cropland

General management considerations:
*This unit has severe limitations for cropland due to the shallow depth to gravel and frequent flooding.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites due to frequent flooding and depth to a seasonally high water table, and severe limitations for shallow excavations due to cutbank instability and wetness.
*The Niklavar part of this unit has a high potential for frost action and a moderate risk of corrosion.
*This unit is a probable source of gravel and sand.

Forestry (Riverwash)

General management considerations:
*This soil is non-forested and is unsuited for forestry.

Forestry (Niklavar soil)

Major tree species: balsam poplar
Minor tree species: white spruce and paper birch
Mean site index:
*balsam poplar—75 (estimated, 50 year)
*white spruce—69 (estimated, 100 year)
*balsam poplar—43 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*balsam poplar—not estimated
*white spruce—24.0 cubic feet per acre (1.8 cubic m per hectare) per year at age 110
*paper birch—18.0 cubic feet per acre (1.3 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—wetness, flooding
Seedling mortality: moderate—wetness
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—high soil moisture
General management considerations:
*This soil is suited for forestry.
*The water table may rise if trees are removed.

Livestock Grazing (Riverwash)

Major understory species:
*sparse herbs—horsetail; sweet-vetch; dwarf and common fireweed; siberian aster; yarrow; wheatgrass; rough bentgrass; bluegrass; feltleaf willow, balsam poplar, and white spruce seedlings and seedlings of other woody species *Mean annual understory production (vascular plants, air-dry weight):*
*sparse herbs—not estimated
Soil limitation(s) for fencing: severe—flooding, wetness, river ice
Limitations to uniform distribution of livestock: moderate—channels, flooding, wet soils
General management considerations:
*This soil is poorly suited for livestock grazing due to low abundance and production of forage plants.

Livestock Grazing (Niklavar soil)

Major species:
*balsam poplar forest—thinleaf alder, willow, prickly rose, highbush cranberry, bluejoint reedgrass, horsetail, common fireweed, sweet-vetch, yarrow, spinulose shield fern, and devil's club
*tall alder-willow scrub—thinleaf alder, feltleaf willow, bluejoint reedgrass, wheatgrass, horsetail, dwarf and common fireweed, sweet-vetch, yarrow, and balsam poplar and white spruce seedlings
Mean annual production (vascular plants, air-dry weight):
*balsam poplar forest—1000 pounds per acre (1120 kilograms per hectare), estimated
*tall alder-willow shrub—not estimated
Soil limitation(s) for fencing: severe—wetness, flooding, frost action
Limitations to uniform distribution of livestock: moderate—channels, flooding, wet soils
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

183—Rock outcrop-Cryumbrepts association, extremely steep

Composition

Rock outcrop and similar inclusions: 45 percent
Cryumbrepts soil and similar inclusions: 40 percent
Contrasting inclusions: 15 percent

Characteristics of Rock outcrop

Landform: mountains (Plate 3)
Position on the landscape: steep cliffs and outcrops
Slope range: 25 to 150 percent
Major vegetation type(s): lichen and alpine herbs

Characteristics of Cryumbrepts and similar soils

Landform: mountains (Plate 3)
Position on the landscape: backslopes and crests
Slope range: 25 to 70 percent
Slope features: shape—plain or convex; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): mixed herbs, Cassiope dwarf shrub tundra, willow dwarf shrub tundra, and bearberry-lichen dwarf shrub tundra

Sample profile:
*0 to 6 inches (0 to 15 cm)—dark brown very cobbly sandy loam
*6 to 60 inches (15 to 152 cm)—brown extremely cobbly sandy loam

Drainage class: well drained
Permeability: in the surface material—moderate; in the underlying material—variable
Available water capacity: very low or low
Depth to consolidated bedrock: 8 to over 60 inches (20 to over 152 cm)
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is

removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes less than 25 percent
*****soils on backslopes with alder and bluejoint reedgrass vegetation
*****very poorly drained soils in depressions

Major Uses

Current uses: wildlife habitat
Potential uses: wildlife habitat

Major Management Factors

Elevation: 2000 to 5100 feet (610 to 1554 m)
Climatic factors (average annual):
*****precipitation—30 to 45 inches (76 to 114 cm)
*****air temperature—33 °F (1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: slope; water erosion; depth to gravelly, cobbly and stony materials; depth to bedrock; and corrosivity
Ecological sites:
*****Rock outcrop—none
*****Cryumbrepts soil—alpine terrain

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to steep slopes; the depth to gravelly, cobbly, and stony material; and depth to bedrock.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes, cobbles, and the depth to bedrock.
*****The Cryumbrepts part of this unit has a moderate potential for frost action and a high risk of corrosion.

Livestock Grazing (Rock outcrop)

Major species:
*****lichen—various species of crustose lichens
*****alpine herbs—sedge, alpine holygrass, anemone, bunchberry dogwood, diapensia, luetkea, various dwarf willows, and fruticose lichens
Mean annual production (vascular plants, air-dry weight):
*****lichen and alpine herbs—not estimated
Soil limitation(s) for fencing: severe—surface bedrock, slope
Limitations to uniform distribution of livestock: very severe—slope, rock outcrops
General management considerations:
*****This soil is unsuited for livestock grazing due to very low abundance of vegetation.

Livestock Grazing (Cryumbrepts soil)

Major species:
*mixed herbs—false hellebore, bluejoint reedgrass, cowparsnip, tall bluebells, Canadian burnet, tall larkspur, northern geranium, common fireweed, monkshood, and a wide variety of other subalpine and alpine herbs
*Cassiope dwarf shrub tundra—white arctic mountain heather, luetkea, black crowberry, bunchberry dogwood, and Altai's fescue
*willow-lichen dwarf shrub tundra—various dwarf willows and ericaceous shrubs, alpine holygrass, sedge, dwarf alpine herbs, and fruticose lichens
*bearberry-lichen dwarf shrub tundra—alpine bearberry, black crowberry, Labrador tea ledum, diapensia, bog blueberry, lingonberry, alpine azalea, alpine holygrass, sedge, and fruticose lichen
Mean annual production (vascular plants, air-dry weight):
*mixed herbs and dwarf shrub tundra types—not estimated
Soil limitation(s) for fencing: severe—slope, too cobbly, shallow bedrock
Limitations to uniform distribution of livestock: very severe—slope, rock outcrops
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants in the different plant communities, and steep slopes.

184—Siwash-Talkeetna, cool-Snowdance association, 0 to 30 percent slopes

Composition

Siwash soil and similar inclusions: 40 percent
Talkeetna, cool soil and similar inclusions: 30 percent
Snowdance soil and similar inclusions: 20 percent
Contrasting inclusions: 10 percent

Characteristics of Siwash and similar soils

Landform: mountains (Figure 5)
Position on the landscape: hummocks on crests and steep backslopes
Slope range: 0 to 30 percent
Slope features: shape—plain or convex; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 3 to 8 inches (8 to 20 cm) thick
Major vegetation type(s): black crowberry-bog blueberry dwarf shrub
Minor vegetation type(s): black crowberry-Altai's fescue dwarf shrub and Altai's fescue-forb herbland

Typical profile:
*0 to 1 inch (0 to 3 cm)—grayish brown silt loam
*1 to 11 inches (3 to 28 cm)—very dusky red, yellowish red, and brown silt loam and sandy loam
*11 to 17 inches (28 to 43 cm)—dark yellowish brown very gravelly loam
*17 inches (43 cm)—consolidated bedrock

Drainage class: well drained
Permeability: in the silty material—moderate; in the gravelly material—moderate or moderately slow; in the bedrock—variable; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate

Depth to consolidated bedrock: 6 to 20 inches (15 to 51 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Talkeetna, cool and similar soils

Landform: mountains (Figure 5)
Position on the landscape: backslopes
Slope range: 10 to 25 percent; aspect—easterly to southerly
Slope features: shape—plain or convex; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): bluejoint reedgrass-forb grassland

Typical profile:
*****0 to 3 inches (0 to 8 cm)—dark reddish brown silt loam
*****3 to 4 inches (8 to 10 cm)—dark gray silt loam
*****4 to 15 inches (10 to 38 cm)—very dusky red, dark reddish brown, and reddish brown silt loam
*****15 to 60 inches (38 to 152 cm)—olive gray very gravelly sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly sandy loam—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate to high
Depth to contrasting very gravelly and very cobbly material: 15 to 24 inches (38 to 61 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Snowdance and similar soils

Landform: mountains (Figure 5)
Position on the landscape: depressions
Slope range: 0 to 10 percent
Slope features: shape—plain or concave
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): low willow shrub
Minor vegetation type(s): tall Sitka alder shrub

Typical profile:
*****0 to 5 inches (0 to 13 cm)—black mucky silt loam
*****5 to 16 inches (13 to 41 cm)—dark brown silt loam
*****16 to 31 inches (41 to 79 cm)—dark brown very gravelly sandy loam
*****31 to 60 inches (79 to 152 cm)—very dark grayish brown very cobbly sandy loam

Drainage class: very poorly or poorly drained
Permeability: in the silty material—moderate; in the very gravelly sandy loam—moderately slow
Available water capacity: moderate to high
Depth to contrasting very gravelly and very cobbly material: 15 to 24 inches (38 to 61 cm)

Runoff: medium
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 30 percent
*****very poorly drained soils in depressions with organic mats greater than 16 inches (greater than 41 cm) thick
*****soils with less than 6 inches (less than 15 cm) of silty material over very gravelly and very cobbly material or bedrock
*****occasional surface boulders
*****rock outcrops

Major Uses

Current uses: wildlife habitat
Potential uses: livestock grazing

Major Management Factors

Elevation: 1700 to 2500 feet (518 to 762 m)
Climatic factors (average annual):
*****precipitation—30 to 45 inches (76 to 114 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: slope, water erosion, wind erosion, restricted permeability, depth to gravelly and cobbly material, depth to bedrock, depth to seasonally high water table, corrosivity, frost action, and dense substratum
Ecological sites:
*****Siwash soil—alpine hummocks
*****Talkeetna, cool soil—loamy slopes, cool
*****Snowdance soil—mountain slopes, drainages

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to steep slopes, the depth to bedrock, depth to a seasonally high water table, and a short growing season.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes, depth to a seasonally high water table, and depth to bedrock.
*****This unit has a high potential for frost action and a high risk of corrosion.

Livestock Grazing (Siwash soil)

Major species:
*****black crowberry-bog blueberry dwarf shrub and black crowberry-Altai's fescue dwarf shrub—black crowberry, bog blueberry, lingonberry, Altai's fescue, bunchberry

dogwood, Beauverd's spiraea, feathermoss, and lichen
*Altai's fescue-forb herbland—Altai's fescue, bunchberry dogwood, bluejoint reedgrass, Canadian burnet, northern geranium, oakfern, willow, and black crowberry
Mean annual production (vascular plants, air-dry weight):
*black crowberry-bog blueberry dwarf shrub and black crowberry-Altai's fescue dwarf shrub—300 pounds per acre (335 kilograms per hectare)
*Altai's fescue-forb herbland—not estimated
Soil limitation(s) for fencing: severe—slope, too gravelly, shallow bedrock, frost action
Limitations to uniform distribution of livestock: severe—slope, wet soils, dense brush, rock outcrops
General management considerations:
*This soil is poorly suited for livestock grazing.

Livestock Grazing (Talkeetna, cool soil)

Major species:
*bluejoint reedgrass-forb grassland—bluejoint reedgrass, common fireweed, spinulose shield fern, oakfern, false hellebore, Beauverd's spiraea, Canadian burnet, northern geranium, and arctic starflower
Mean annual production (vascular plants, air-dry weight):
*bluejoint reedgrass-forb grassland—2500 pounds per acre (2800 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: severe—slope, wet soils, dense brush, rock outcrops
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*The grasslands on this soil are used extensively by moose in summer and fall.

Livestock Grazing (Snowdance soil)

Major species:
*low willow shrub—Barclay's, diamondleaf, and other low willows; ladyfern; bluejoint reedgrass; horsetail; Canadian burnet; sedge; oakfern; twisted stalk; and Sitka alder
*tall Sitka alder shrub—Sitka alder, willow, spinulose shield fern, ladyfern, oakfern, bluejoint reedgrass, horsetail, and fiveleaf bramble
Mean annual production (vascular plants, air-dry weight):
*low willow shrub—2300 pounds per acre (2575 kilograms per hectare)
*tall Sitka alder shrub—4500 pounds per acre (5040 kilograms per hectare)
Soil limitation(s) for fencing: moderate—wetness, frost action
Limitations to uniform distribution of livestock: severe—slope, wet soils, dense brush, rock outcrops
General management considerations:
*This soil is suited for livestock grazing.
*In spring, and during periods of intense summer rain, runoff and drainage from adjacent slopes result in a shallow water table in many areas.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*The willow browse on this soil is used extensively by moose in winter and spring.

185—Susitna silt loam, 0 to 2 percent slopes

Composition

Susitna soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Susitna and similar soils

Landform: stream terraces
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce forest and balsam poplar-white spruce forest
Minor vegetation type(s): paper birch forest

Typical profile:
*****0 to 3 inches (0 to 8 cm)—very dark gray silt loam
*****3 to 45 inches (8 to 114 cm)—pale brown and dark gray stratified silt loam, fine sandy loam, and loamy fine sand
*****45 to 60 inches (114 to 152 cm)—variegated very gravelly sand

Drainage class: well drained
Permeability: in the stratified surface layers—moderate; in the sand and gravel—rapid
Available water capacity: high
Depth to contrasting very gravelly material: 40 to over 60 inches (102 to over 152 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: rare

Included Areas

*****frequently flooded soils
*****very poorly drained soils in depressions
*****soils with less than 40 inches (less than 102 cm) of stratified material over sand and gravel
*****riverwash and river channels

Major Uses

Current uses: cropland and homesites
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 20 to 400 feet (6 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 25 inches (38 to 64 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—80 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: rare flooding, stream bank erosion, frost action, wind erosion, excess

surface fines, depth to gravelly material, excess sand in substratum, and corrosivity
Ecological sites:
*Susitna soil—floodplain deposits

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to rare flooding frequency, low fertility, stream bank erosion, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Leave buffers of native vegetation along stream channels and sloughs to lessen stream bank erosion.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This portion of the unit has severe limitations for homesites due to flooding, and severe limitations for shallow excavations due to cutbank instability.
*This unit has a moderate potential for frost action and a high risk of corrosion.
*The substratum material from this unit is a probable source of gravel and sand.

Forestry

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—73 (estimated, 100 year, *Farr 1967*)
*paper birch—48 (estimated, 50 year, *Gregory and Haack 1965*)
*balsam poplar—72 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—26.9 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—22.9 cubic feet per acre (1.6 cubic m per hectare) per year at age 90
*balsam poplar—not estimated
Soil limitation(s) for equipment use: slight
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce forest and paper birch forest—alder, prickly rose, highbush cranberry, bluejoint reedgrass, spinulose shield fern, oakfern, bunchberry dogwood, horsetail, and devil's club
*balsam poplar-white spruce forest—alder, prickly rose, highbush cranberry, bluejoint reedgrass, spinulose shield fern, horsetail, devil's club, sweetscented bedstraw, and tall bluebell
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—1000 pounds per acre (1120 kilograms per hectare), estimated
*balsam poplar-white spruce forest—1100 pounds per acre (1230 kilograms per hectare), estimated
Soil limitation(s) for fencing: moderate—too sandy
Limitations to uniform distribution of livestock: moderate—channels, poorly drained areas, dense brush
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

186—Susivar-Moose River complex, 0 to 2 percent slopes

Composition

Susivar soil and similar inclusions: 70 percent
Moose River soil and similar inclusions: 20 percent
Contrasting inclusions: 10 percent

Characteristics of Susivar and similar soils

Landform: floodplains (Figure 6)
Position on the landscape: flats
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest
Minor vegetation type(s): balsam poplar-white spruce forest and tall alder shrub

Typical profile:
*0 to 3 inches (0 to 8 cm)—very dark gray fine sandy loam
*3 to 37 inches (8 to 94 cm)—very dark brown, olive gray, dark greenish gray, and reddish brown stratified silt loam, fine sandy loam, and loamy fine sand
*37 to 60 inches (94 to 152 cm)—dark brown stratified fine sand, very fine sand, and silt

Drainage class: somewhat poorly drained
Permeability: moderate
Available water capacity: high
Depth to contrasting very gravelly material: 40 to over 60 inches (102 to over 152 cm)
Runoff: slow
Depth to seasonally high water table: 1.5 to 3 feet (0.5 to 0.9 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed

Hazard of flooding: occasional

Characteristics of Moose River and similar soils

Landform: floodplains (Figure 6)
Position on the landscape: depressions and channels
Slope range: 0 to 2 percent
Slope features: shape—plain or concave
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): tall thinleaf alder-willow shrub, low willow shrub, and sedge-grass wet meadow

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark brown silt loam
*2 to 60 inches (5 to 152 cm)—dark brown, dark gray, and olive gray stratified fine sand through silt

Drainage class: poorly or very poorly drained
Permeability: moderate
Available water capacity: high
Runoff: ponded
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: occasional

Included Areas

*rarely flooded soils on stream terraces
*soils with less than 40 inches (less than 102 cm) of stratified loamy material over gravel
*soils with slopes greater than 2 percent
*riverwash

Major Uses

Current uses: cropland, homesites, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 20 to 700 feet (6 to 213 m)
Climatic factors (average annual):
*precipitation—15 to 30 inches (38 to 76 cm)
*air temperature—33 to 36 °F (1 to 2 °C)
*frost free season—80 to 110 days
*growing degree days—1300 to 1500
Soil related factors: flooding, stream bank erosion, depth to seasonally high water table, excess surface fines, excess sand in substratum, and corrosivity
Ecological sites:
*Susivar soil—floodplain deposits, moderately wet
*Moose River soil—alluvial bottoms, very wet

Cropland (Susivar soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland and hayland due to

relatively high late summer precipitation, low fertility, occasional flooding, and stream bank erosion.

*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.

*Land clearing and tillage operations increase wind erosion hazard.

*Land clearing may reduce evapotranspiration from soils resulting in shallower water table depths.

Suitable management practices:

*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.

*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.

*Add lime to improve soil fertility.

*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.

*Leave buffers of native vegetation along stream channels and sloughs to lessen stream bank erosion.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Moose River soil)

General management considerations:

*This portion of the unit has severe limitations for cropland and hayland due to wetness and flooding.

Building Site Development (Susivar soil)

General management considerations:

*This portion of the unit has severe limitations for homesites due to flooding and wetness, and severe limitations for shallow excavations due to wetness.

*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.

Building Site Development (Moose River soil)

General management considerations:

*This portion of the unit has severe limitations for homesites due to flooding and wetness, and severe limitations for shallow excavations due to wetness and cutbank instability.

*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.

*The substratum material from this portion of the unit is a probable source of gravel and sand.

Forestry (Susivar soil)

Major tree species: paper birch, white spruce, and balsam poplar

Mean site index:

*white spruce—70 (100 year, *Farr 1967*)

*paper birch—44 (50 year, *Gregory and Haack 1965*)

*balsam poplar—75 (50 year, *B. C. Forest Service 1979*)

Estimated growth at culmination of mean annual increment:

*white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105

*paper birch—18.9 cubic feet per acre (1.3 cubic m per hectare) per year at age 95

*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—wetness
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—high available moisture
General management considerations:
*This soil is well suited for forestry.
*The water table may rise if trees are removed.

Forestry (Moose River soil)

Soil limitation(s) for equipment use: severe—wetness
General management considerations:
*This soil is usually non-forested and is unsuited for forestry. It may have to be crossed with roads and trails to access stands on the Susivar soil.

Livestock Grazing (Susivar soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—alder, prickly rose, highbush cranberry, bluejoint reedgrass, spinulose shield fern, oakfern, bunchberry dogwood, horsetail, and devil's club
*balsam poplar-white spruce forest—alder, prickly rose, highbush cranberry, bluejoint reedgrass, spinulose shield fern, horsetail, devil's club, sweetscented bedstraw, and tall bluebell
*tall alder shrub—Sitka and thinleaf alder, bluejoint reedgrass, willow, currant, common red raspberry, horsetail, and sweetscented bedstraw
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—1000 pounds per acre (1120 kilograms per hectare), estimated
*balsam poplar-white spruce forest—1100 pounds per acre (1230 kilograms per hectare), estimated
*tall alder shrub—not estimated
Soil limitation(s) for fencing: severe—wetness, flooding, frost action
Limitations to uniform distribution of livestock: severe—flooding, wet soils, dense brush
General management considerations:
*This soil is poorly suited for livestock grazing.

Livestock Grazing (Moose River soil)

Major species:
*tall thinleaf alder-willow shrub and low willow shrub—thinleaf alder, diamondleaf willow and other willows, sweetgale, bog birch, horsetail, various sedges, bluejoint reedgrass, and marsh cinquefoil
*sedge-grass wet meadow—various sedges, bluejoint reedgrass, marsh cinquefoil, willow, and alder
Mean annual production (vascular plants, air-dry weight):
*tall thinleaf alder-willow shrub, low willow shrub, and sedge-grass wet meadow—not estimated
Soil limitation(s) for fencing: severe—wetness, flooding, frost action
Limitations to uniform distribution of livestock: severe—flooding, wet soils, dense brush
General management considerations:
*This soil is poorly suited for livestock grazing due to wetness and other severe soil limitations.

187—Susivar and Niklavar fine sandy loams

Composition

Susivar and Niklavar soils and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Susivar and similar soils

Landform: floodplains (Figure 7)
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 0 to 2 inches (0 to 5 cm) thick
Major vegetation type(s): balsam poplar forest
Minor vegetation type(s): balsam poplar-white spruce forest, paper birch forest, and tall alder shrub

Typical profile:
*****0 to 3 inches (0 to 8 cm)—very dark gray fine sandy loam
*****3 to 37 inches (8 to 94 cm)—very dark brown, olive gray, dark greenish gray, and reddish brown stratified silt loam, fine sandy loam, and loamy fine sand
*****37 to 60 inches (94 to 152 cm)—dark brown stratified fine sand, very fine sand, and silt

Drainage class: somewhat poorly drained
Permeability: moderate
Available water capacity: high
Depth to contrasting very gravelly material: 40 to over 60 inches (102 to over 152 cm)
Runoff: slow
Depth to seasonally high water table: 1.5 to 3 feet (0.5 to 0.9 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: occasional

Characteristics of Niklavar and similar soils

Landform: floodplains (Figure 7)
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 0 to 3 inches (0 to 8 cm) thick
Major vegetation type(s): balsam poplar forest
Minor vegetation type(s): balsam poplar-white spruce forest and tall alder shrub

Typical profile:
*****0 to 4 inches (0 to 10 cm)—dark brown fine sandy loam
*****4 to 30 inches (10 to 76 cm)—very dark grayish brown, dark greenish gray, dark brown, and light gray stratified fine sand through silt
*****30 to 60 inches (76 to 152 cm)—variegated extremely gravelly sand

Drainage class: poorly drained
Permeability: in the stratified sand and silt—moderate; in the sand and gravel—rapid
Available water capacity: moderate
Depth to contrasting very gravelly material: 24 to 40 inches (61 to 102 cm)
Runoff: slow

Depth to seasonally high water table: 1 to 2 feet (0.3 to 0.6 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, moderate if the mat is removed
Hazard of flooding: occasional

Included Areas

*soils with less than 24 inches (less than 61 cm) of stratified sediments over sand and gravel
*riverwash
*frequently flooded soils
*river channels

Major Uses

Current uses: forestry and wildlife habitat

Major Management Factors

Elevation: 10 to 650 feet (3 to 198 m)
Climatic factors (average annual):
*precipitation—15 to 30 inches (38 to 76 cm)
*air temperature—33 to 36 °F (1 to 2 °C)
*frost free season—80 to 110 days
*growing degree days—1300 to 1500
Soil related factors: occasional flooding, depth to seasonally high water table, stream bank erosion, frost action, excess surface fines, excess sand in substratum, and corrosivity
Ecological sites:
*Susivar soil—floodplain deposits, moderately wet
*Niklavar soil—floodplain deposits, moderately wet

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to relatively high late summer precipitation, depth to a seasonally high water table, low fertility, occasional flooding, and stream bank erosion.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind erosion hazard.
*Land clearing may reduce evapotranspiration from soils resulting in shallower water table depths.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Leave buffers of native vegetation along stream channels and sloughs to lessen stream bank erosion.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing

wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites due to occasional flooding hazard and wetness, and severe limitations for shallow excavations due to cutbank instability and wetness.
*This unit has a high potential for frost action and a moderate risk of corrosion.

Forestry (Susivar soil)

Major tree species: balsam poplar and white spruce
Minor tree species: paper birch
Mean site index:
*white spruce—70 (100 year, *Farr 1967*)
*balsam poplar—75 (estimated, 50 year, *B. C. Forest Service 1979*)
*paper birch—44 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.7 cubic feet per acre (1.7 cubic m per hectare) per year at age 105
*balsam poplar—not estimated
*paper birch—18.9 cubic feet per acre (1.3 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—wetness
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—high soil moisture
General management considerations:
*This soil is well suited for forestry.
*The water table may rise if trees are removed.

Forestry (Niklavar soil)

Major tree species: balsam poplar and white spruce
Minor tree species: paper birch
Mean site index:
*white spruce—69 (estimated, 100 year)
*balsam poplar—75 (estimated, 50 year)
*paper birch—43 (estimated, 50 year)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*balsam poplar—not estimated
*paper birch—18.0 cubic feet per acre (1.3 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—wetness
Seedling mortality: moderate—wetness
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—high soil moisture
General management considerations:
*This soil is well suited for forestry.
*The water table may rise if trees are removed.

Livestock Grazing (Susivar soil)

Major understory species:
*balsam poplar forest and balsam poplar-white spruce forest—alder, highbush cranberry, prickly rose, devil's club, bluejoint reedgrass, spinulose shield fern, horsetail, tall bluebell, and sweetscented bedstraw

*paper birch forest—alder, prickly rose, highbush cranberry, bluejoint reedgrass, spinulose shield fern, horsetail, devil's club, sweetscented bedstraw, and tall bluebell
*tall alder shrub—Sitka and thinleaf alder, bluejoint reedgrass, willow currant, common red raspberry, horsetail, and sweetscented bedstraw
Mean annual understory production (vascular plants, air-dry weight):
*balsam poplar forest and balsam poplar-white spruce forest—1000 pounds per acre (1120 kilograms per hectare), estimated
*paper birch forest—1100 pounds per acre (1230 kilograms per hectare), estimated
*tall alder shrub—not estimated
Soil limitation(s) for fencing: severe—wetness, flooding, frost action
Limitations to uniform distribution of livestock: moderate—poorly drained or flooded areas, dense brush
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Niklavar soil)

Major understory species:
*balsam poplar forest and balsam poplar-white spruce forest—alder, highbush cranberry, prickly rose, devil's club, bluejoint reedgrass, spinulose shield fern, horsetail, tall bluebell, and sweetscented bedstraw
*tall alder shrub—Sitka and thinleaf alder, bluejoint reedgrass, willow currant, common red raspberry, horsetail, and sweetscented bedstraw
Mean annual understory production (vascular plants, air-dry weight):
*balsam poplar forest and balsam poplar-white spruce forest—1000 pounds per acre (1230 kilograms per hectare), estimated
*tall alder shrub—not estimated
Soil limitation(s) for fencing: severe—wetness, flooding, frost action
Limitations to uniform distribution of livestock: moderate—poorly drained or flooded areas, dense brush
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

188—Talkeetna very fine sandy loam, warm, 15 to 35 percent slopes

Composition

Talkeetna, warm soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Talkeetna, warm and similar soils

Landform: mountains
Position on the landscape: footslopes and toeslopes
Slope range: 15 to 35 percent
Slope features: shape—plain; length—500 to 1500 feet (152 to 457 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass woodland and bluejoint reedgrass-common fireweed grassland
Minor vegetation type(s): paper birch/bluejoint reedgrass woodland

Typical profile:
*0 to 8 inches (0 to 20 cm)—dark grayish brown very fine sandy loam
*8 to 15 inches (20 to 38 cm)—dark reddish brown silt loam
*15 to 23 inches (38 to 58 cm)—strong brown loam
*23 to 60 inches (58 to 152 cm)—olive brown very cobbly sandy loam

Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the very gravelly and very cobbly material—moderately slow to moderate; permeability rates of substratum materials vary considerably over short distances
Available water capacity: moderate to high
Depth to contrasting very gravelly and very cobbly material: 12 to 32 inches (30 to 81 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*very poorly drained soils in depressions
*soils with slopes greater than 35 percent
*soils along drainages with alder shrub vegetation
*soils with bedrock within 40 inches (102 cm) of the surface

Major Uses

Current uses: wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 800 to 1600 feet (244 to 488 m)
Climatic factors (average annual):
*precipitation—25 to 30 inches (64 to 76 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—70 to 90 days
*growing degree days—1100 to 1400
Soil related factors: wind erosion, water erosion, frost action, restricted permeability, slope, excess surface fines, depth to gravelly and cobbly material, corrosivity, and dense substratum
Ecological sites:
*Talkeetna, warm soil—till deposits, high elevation

Cropland

General management considerations:
*This unit has severe limitations for cropland due to slope and a short growing season.
*This unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*This unit has a high potential for frost action and a high risk of corrosion.

Forestry

Major tree species: paper birch and white spruce
Minor tree species: cottonwood
Mean site index:
*white spruce—64 (100 year, *Farr 1967*)
*paper birch—45 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce/bluejoint reedgrass woodland and paper birch/bluejoint reedgrass woodland—bluejoint reedgrass, common fireweed, spinulose shield fern, oakfern, horsetail, cowparsnip, twisted stalk, and Sitka alder
*bluejoint reedgrass-common fireweed grassland—bluejoint reedgrass, common fireweed, cowparsnip, oakfern, spinulose shield fern, and twisted stalk
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass woodland and paper birch/bluejoint reedgrass woodland—2800 pounds per acre (3140 kilograms per hectare)
*bluejoint reedgrass-common fireweed grassland—6700 pounds per acre (7500 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: moderate—slope, brush thickets, poorly drained areas
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

189—Talkeetna-Talkeetna, thick surface complex, 15 to 35 percent slopes

Composition

Talkeetna soil and similar inclusions: 50 percent
Talkeetna, thick surface soil and similar inclusions: 40 percent

Contrasting inclusions: 10 percent

Characteristics of Talkeetna and similar soils

Landform: mountains (Figure 5 and Plate 4)
Position on the landscape: backslopes and footslopes
Slope range: 15 to 35 percent
Slope features: shape—plain or convex; length—500 to 1500 feet (152 to 457 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): bluejoint reedgrass-forb grassland

Typical profile:
*****0 to 15 inches (0 to 38 cm)—alternately layered black, very dark brown, very dusky red, and dark reddish brown silt loam
*****15 to 19 inches (38 to 48 cm)—brown silt loam
*****19 to 26 inches (48 to 66 cm)—olive brown very gravelly loam
*****26 to 60 inches (66 to 152 cm)—brown very cobbly loam

Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the very gravelly and very cobbly material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate to high
Depth to contrasting very gravelly or very cobbly material: 10 to 25 inches (25 to 64 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Talkeetna, thick surface and similar soils

Landform: mountains (Figure 5 and Plate 4)
Position on the landscape: backslopes and footslopes
Slope range: 15 to 35 percent
Slope features: shape—plain or convex; length—500 to 1500 feet (152 to 457 m)
Organic mat on surface: 4 to 8 inches (10 to 20 cm) thick
Major vegetation type(s): tall Sitka alder shrub

Typical profile:
*****0 to 11 inches (0 to 28 cm)—alternating dark grayish brown, dark brown, and dark reddish brown silt loam
*****11 to 21 inches (28 to 53 cm)—dark reddish brown gravelly loam
*****21 to 60 inches (53 to 152 cm)—brown and dark grayish brown very cobbly loam

Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the very gravelly and very cobbly material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate to high
Depth to contrasting very gravelly or very cobbly material: 10 to 25 inches (25 to 64 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—moderate if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 35 percent
*****rock outcrops
*****soils with bedrock within 40 inches (102 cm) of the soil surface
*****poorly drained soils in depressions and drainages

Major Uses

Current uses: wildlife habitat
Potential uses: livestock grazing

Major Management Factors

Elevation: 1400 to 2500 feet (427 to 762 m)
Climatic factors (average annual):
*****precipitation—30 to 45 inches (76 to 114 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: wind erosion, water erosion, slope, frost action, restricted permeability, corrosivity, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*****Talkeetna soil—loamy slopes
*****Talkeetna, thick surface soil—mountain slopes

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to steep slopes and a short growing season.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*****This unit has a high potential for frost action and a high risk of corrosion.

Livestock Grazing (Talkeetna soil)

Major species:
*****bluejoint reedgrass-forb grassland—bluejoint reedgrass, common fireweed, spinulose shield fern, northern false-hellebore, northern geranium, oakfern, cowparsnip, and Canadian burnet
Mean annual production (vascular plants, air-dry weight):
*****bluejoint reedgrass-forb grassland—4300 pounds per acre (4800 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: severe—slope, dense brush, poorly drained areas
General management considerations:
*****This soil is well suited for livestock grazing.

Livestock Grazing (Talkeetna, thick surface soil)

Major species:
*tall Sitka alder shrub—Sitka alder, bluejoint reedgrass, spinulose shield fern, common fireweed, oakfern, Beauverd's spirea, and currant
Mean annual production (vascular plants, air-dry weight):
*tall Sitka alder shrub—3700 pounds per acre (4245 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: severe—slope, dense brush, poorly drained areas
General management considerations:
*This soil is poorly suited for livestock grazing due to dense alder brush and low production of herbaceous plants.

190—Talkeetna, warm-Talkeetna, thick surface complex, hilly

Composition

Talkeetna, warm and similar inclusions: 50 percent
Talkeetna, thick surface and similar inclusions: 40 percent
Contrasting inclusions: 10 percent

Characteristics of Talkeetna, warm and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: all positions
Slope range: 2 to 35 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 2 inches (3 to 5 cm) thick
Major vegetation type(s): white spruce/bluejoint reedgrass woodland and white spruce/Sitka alder/bluejoint reedgrass woodland
Minor vegetation type(s): paper birch-white spruce/Sitka alder/bluejoint reedgrass forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—dark reddish brown silt loam
*3 to 4 inches (8 to 10 cm)—dark gray silt loam
*4 to 15 inches (10 to 38 cm)—very dusky red, dark reddish brown, and reddish brown silt loam
*15 to 60 inches (38 to 152 cm)—olive gray very gravelly sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly loam—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 23 inches (28 to 58 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Talkeetna, thick surface and similar soils

Landform: hills and ridges (Figure 2)

Position on the landscape: all positions
Slope range: 2 to 35 percent
Slope features: shape—plain or convex; length—40 to 200 feet (12 to 61 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): tall Sitka alder shrub

Typical profile:
*****0 to 3 inches (0 to 8 cm)—dark reddish brown silt loam
*****3 to 4 inches (8 to 10 cm)—dark gray silt loam
*****4 to 15 inches (10 to 38 cm)—very dusky red, dark reddish brown, and reddish brown silt loam
*****15 to 60 inches (38 to 152 cm)—olive gray very gravelly sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly loam material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 23 inches (28 to 58 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 35 percent
*****poorly drained soils in depressions
*****occasional surface boulders and rock outcrops

Major Uses

Current uses: wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 800 to 1800 feet (244 to 549 m)
Climatic factors (average annual):
*****precipitation—25 to 30 inches (64 to 76 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—70 to 90 days
*****growing degree days—1100 to 1400
Soil related factors: slope, restricted permeability, depth to gravelly and cobbly material, wind erosion, water erosion, excess surface fines, corrosivity, frost action, and dense substratum
Ecological sites:
*****Talkeetna, warm soil—till deposits, high elevation
*****Talkeetna, thick surface soil—mountain slopes

Cropland

General management considerations:
*****This unit has severe limitations for cropland due to steep slopes.
*****This portion of the unit is best suited to permanent hayland and pastureland due to steep

slopes and a short growing season.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*This unit has a high potential for frost action and a high risk of corrosion.

Forestry (Talkeetna, warm soil)

Major tree species: white spruce
Minor tree species: paper birch and balsam poplar
Mean site index:
*white spruce—64 (100 year, *Farr 1967*)
*paper birch—45 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*This soil occurs near the upper elevational limit of tree growth, and stands tend to be slow growing and uneven-aged with marginal quality trees.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Talkeetna, thick surface soil)

Soil limitation(s) for equipment use: moderate—silt, slope
General management considerations:
*This soil is usually non-forested and is unsuited for forestry. It may have to be crossed with roads and trails to access stands on the Talkeetna warm soil.

Livestock Grazing (Talkeetna, warm soil)

Major understory species:
*white spruce/bluejoint reedgrass woodland—bluejoint reedgrass, spinulose shield fern, oakfern, common fireweed, Beauverd's spiraea, bunchberry dogwood, and fiveleaf bramble
*white spruce/Sitka alder/bluejoint reedgrass woodland and paper birch-white spruce/Sitka alder/bluejoint reedgrass forest—Sitka alder, bluejoint reedgrass, spinulose shield fern and other ferns, common fireweed, bunchberry dogwood, and fiveleaf bramble

Mean annual understory production (vascular plants, air-dry weight):
*white spruce/bluejoint reedgrass woodland—2575 pounds per acre (3140 kilograms per hectare)
*white spruce/Sitka alder/bluejoint reedgrass woodland and paper birch-white spruce/Sitka alder/bluejoint reedgrass forest—3000 pounds per acre (3360 kilograms per hectare), estimated
Soil limitation(s) for fencing: severe—slope, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—slope, poorly drained areas, dense brush
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Talkeetna, thick surface soil)

Major species:
*tall Sitka alder shrub—Sitka alder, bluejoint reedgrass, spinulose shield fern, common fireweed, oakfern, Beauverd's spiraea, and currant
Mean annual production (vascular plants, air-dry weight):
*tall Sitka alder shrub—3700 pounds per acre (4140 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
General management considerations:
This soil is poorly suited for livestock grazing due to dense alder brush and low production of palatable forage plants.

191—Talkeetna, warm and Talkeetna, thick surface soils, 15 to 45 percent slopes

Composition

Talkeetna, warm and Talkeetna, thick surface soils and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Talkeetna, warm and similar soils

Landform: mountains
Position on the landscape: backslopes
Slope range: 15 to 45 percent
Slope features: shape—plain or convex; length—1000 to 2000 feet (305 to 610 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/Sitka alder/bluejoint reedgrass forest and white spruce/bluejoint reedgrass woodland

Typical profile:
*0 to 3 inches (0 to 8 cm)—dark reddish brown silt loam
*3 to 4 inches (8 to 10 cm)—dark gray silt loam
*4 to 15 inches (10 to 38 cm)—very dusky red, dark reddish brown, and reddish brown silt loam
*15 to 60 inches (38 to 152 cm)—olive gray very gravelly sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly sandy loam—moderate to moderately slow; permeability rates in substratum materials vary considerably over

short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 15 to 24 inches (38 to 61 cm)
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Talkeetna, thick surface and similar soils

Landform: mountains
Position on the landscape: backslopes
Slope range: 15 to 45 percent
Slope features: shape—plain to convex; length—1000 to 2000 feet (305 to 610 m)
Organic mat on surface: 2 to 6 inches (5 to 15 cm) thick
Major vegetation type(s): tall Sitka alder shrub

Typical profile:
*****0 to 1 inch (0 to 3 cm)—gray silt loam
*****1 to 15 inches (3 to 38 cm)—dark reddish brown, dark brown, and brown silt loam
*****15 to 60 inches (38 to 152 cm)—dark yellowish brown and olive brown very gravelly sandy loam

Drainage class: well drained
Permeability: in the silt loam surface—moderate; in the very gravelly substrata—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 10 to 27 inches (25 to 69 cm)
Runoff: medium to rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 45 percent
*****poorly drained soils along drainages
*****occasional surface boulders
*****soils with bedrock within 40 inches (102 cm) of the soil surface
*****rock outcrops

Major Uses

Current uses: wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 800 to 1800 feet (244 to 549 m)
Climatic factors (average annual):
*****precipitation—25 to 35 inches (64 to 89 cm)
*****air temperature—32 to 35 °F (0 to 2 °C)
*****frost free season—70 to 90 days

*growing degree days—1000 to 1400
Soil related factors: slope, water erosion, wind erosion, restricted permeability, depth to gravelly and cobbly material, excess surface fines, corrosivity, frost action, and dense substratum
Ecological sites:
*Talkeetna, warm soil—till deposits, high elevation
*Talkeetna, thick surface soil—mountain slopes

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to the steepness and length of slopes.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*This unit has a high potential for frost action and a high risk of corrosion.

Forestry (Talkeetna, warm soil)

Major tree species: white spruce and paper birch
Minor tree species: balsam poplar
Mean site index:
*white spruce—64 (100 year, *Farr 1967*)
*paper birch—45 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—slope, texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*This soil occurs near the upper elevational limit of tree growth, and stands tend to be slow growing and uneven-aged with marginal quality trees.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Talkeetna, thick surface soil)

Soil limitation(s) for unsurfaced roads and skid trails: moderate—slope, texture
General management considerations:
*This soil is normally non-forested and is poorly suited for forestry. It may have to be crossed with roads and trails to access stands on the Talkeetna, warm soil.

Livestock Grazing (Talkeetna, warm soil)

Major understory species:
*paper birch-white spruce/Sitka alder/bluejoint reedgrass forest—Sitka alder, bluejoint reedgrass, spinulose shield fern and other ferns, common fireweed, bunchberry dogwood, and fiveleaf bramble
*white spruce/bluejoint reedgrass woodland—bluejoint reedgrass, spinulose shield fern,

oakfern, common fireweed, Beauverd's spiraea, bunchberry dogwood, and fiveleaf bramble

Mean annual understory production (vascular plants, air-dry weight):

*****paper birch-white spruce/Sitka alder/bluejoint reedgrass forest—2800 pounds per acre (3140 kilograms per hectare), estimated

*****white spruce/bluejoint reedgrass woodland—2400 pounds per acre (2690 kilograms per hectare)

Soil limitation(s) for fencing: severe—slope, too gravelly, frost action

Limitations to uniform distribution of livestock: severe—slope, dense brush, poorly drained areas

General management considerations:

*****This soil is suited for livestock grazing.

*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Talkeetna, thick surface soil)

Major understory species:

*****tall Sitka alder shrub—Sitka alder, bluejoint reedgrass, spinulose shield fern, common fireweed, oakfern, Beauverd's spiraea, and currant

Mean annual understory production (vascular plants, air-dry weight):

*****tall Sitka alder shrub—3700 pounds per acre (4145 kilograms per hectare)

Soil limitation(s) for fencing: severe—slope, too gravelly, frost action

Limitations to uniform distribution of livestock: severe—slope, dense brush, poorly drained areas

General management considerations:

*****This soil is poorly suited for livestock grazing due to dense alder brush and low production of palatable forage plants.

192—Talkeetna, low elevation-Deneka, low elevation association, steep and moderately steep

Composition

Talkeetna, low elevation, steep soil and similar inclusions: 65 percent
Deneka, low elevation, moderately steep soil and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Talkeetna, low elevation, steep and similar soils

Landform: mountains
Position on the landscape: backslopes
Slope range: 20 to 70 percent
Slope features: shape—plain or convex; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:

*****0 to 3 inches (0 to 8 cm)—dark reddish brown silt loam

*****3 to 4 inches (8 to 10 cm)—dark gray silt loam

*****4 to 15 inches (10 to 38 cm)—very dusky red, dark reddish brown, and reddish brown silt loam

*****15 to 60 inches (38 to 152 cm)—olive gray very gravelly sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly sandy loam—moderate or moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 15 to 24 inches (38 to 61 cm)
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Deneka, low elevation, moderately steep soil

Landform: mountains
Position on the landscape: shoulders and crests
Slope range: 2 to 35 percent
Slope features: shape—plain or convex; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—dark reddish brown silt loam
*****2 to 4 inches (5 to 10 cm)—brownish gray silt loam
*****4 to 17 inches (10 to 43 cm)—very dusky red, brown, and dark reddish brown silt loam and fine sandy loam
*****17 to 20 inches (43 to 51 cm)—dark yellowish brown very cobbly sandy loam
*****20 inches (51 cm)—consolidated bedrock

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly and cobbly material—moderate to moderately slow; in the bedrock—variable; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate
Depth to consolidated bedrock: 6 to 20 inches (15 to 51 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 70 percent
*****poorly drained soils in depressions
*****rock outcrops

Major Uses

Current uses: wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 600 to 2400 feet (183 to 732 m)

Climatic factors (average annual):
*precipitation—25 to 35 inches (64 to 89 cm)
*air temperature—32 to 34 °F (0 to 1 °C)
*frost free season—60 to 80 days
*growing degree days—1000 to 1200
Soil related factors: slope, water erosion, wind erosion, restricted permeability, depth to gravelly and cobbly material, depth to bedrock, excess surface fines, corrosivity, frost action, and dense substratum
Ecological sites:
*Talkeetna, low elevation soil—till deposits, 20-35 inch pz.
*Deneka, low elevation soil—bedrock hills, 20-35 inch pz.

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to steep slopes and the shallow depth to bedrock.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes and shallow depth to bedrock.
*This unit has a high potential for frost action and a high risk of corrosion.

Forestry (Talkeetna, low elevation soil)

Major tree species: white spruce and paper birch
Minor tree species: balsam poplar
Mean site index:
*white spruce—65 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—21.2 cubic feet per acre (1.5 cubic m per hectare) per year at age 115
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Deneka, low elevation soil)

Major tree species: white spruce and paper birch
Mean site index:
*white spruce—73 (estimated, 100 year, *Farr 1967*)
*paper birch—44 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—26.9 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—18.9 cubic feet per acre (1.3 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow

Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Talkeetna, low elevation soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—1800 pounds per acre (2015 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: severe—slope, dense brush, rock outcrops
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Deneka, low elevation soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—2800 pounds per acre (3135 kilograms per hectare)
Soil limitation(s) for fencing: moderate—slope, shallow bedrock, frost action
Limitations to uniform distribution of livestock: severe—slope, dense brush, rock outcrops
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

193—Talkeetna, warm-Talkeetna, thick surface-Deneka complex, hilly

Composition

Talkeetna, warm soil and similar inclusions: 40 percent
Talkeetna, thick surface soil and similar inclusions: 25 percent
Deneka soil and similar inclusions: 25 percent
Contrasting inclusions: 10 percent

Characteristics of Talkeetna, warm and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: all positions
Slope range: 0 to 60 percent
Slope features: shape—plain or convex; length—100 to 500 feet (30 to 152 m)
Organic mat on surface: 1 to 2 inches (3 to 5 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass forest and paper

birch/bluejoint reedgrass forest
Minor vegetation type(s): paper birch-white spruce/Sitka alder/bluejoint reedgrass forest

Typical profile:
*0 to 3 inches (0 to 8 cm)—dark reddish brown silt loam
*3 to 4 inches (8 to 10 cm)—dark gray silt loam
*4 to 15 inches (10 to 38 cm)—very dusky red, dark reddish brown, and reddish brown silt loam
*15 to 60 inches (38 to 152 cm)—olive gray very gravelly sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly loam material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 23 inches (28 to 58 cm)
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Talkeetna, thick surface and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: all positions
Slope range: 0 to 60 percent
Slope features: shape—plain or convex; length—100 to 500 feet (30 to 152 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): tall Sitka alder shrub

Typical profile:
*0 to 3 inches (0 to 8 cm)—dark reddish brown silt loam
*3 to 4 inches (8 to 10 cm)—dark gray silt loam
*4 to 15 inches (10 to 38 cm)—very dusky red, dark reddish brown, and reddish brown silt loam
*15 to 60 inches (38 to 152 cm)—olive gray very gravelly sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly loam—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 23 inches (28 to 58 cm)
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Deneka and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: shoulders and crests
Slope range: 2 to 20 percent
Slope features: shape—plain or convex; length—150 to 400 feet (46 to 122 m)

Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass forest and paper birch/bluejoint reedgrass forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—dark reddish brown silt
*****2 to 4 inches (5 to 10 cm)—light brownish gray silt loam
*****4 to 17 inches (10 to 43 cm)—very dusky red, dark reddish brown, and brown fine sandy loam and silt loam
*****17 to 20 inches (43 to 51 cm)—dark yellowish brown very cobbly sandy loam
*****20 inches (51 cm)—consolidated bedrock

Drainage class: well drained
Permeability: in the silty material—moderate; in the gravelly and cobbly material—moderate to moderately slow; in the bedrock—variable; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate to high
Depth to gravelly and cobbly material: 12 to 19 inches (30 to 48 cm)
Depth to consolidated bedrock: 8 to 40 inches (20 to 102 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 60 percent
*****poorly drained soils in depressions
*****occasional surface boulders and rock outcroppings

Major Uses

Current uses: wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 600 to 2400 feet (183 to 732 m)
Climatic factors (average annual):
*****precipitation—25 to 30 inches (64 to 76 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—70 to 90 days
*****growing degree days—1100 to 1400
Soil related factors: slope, restricted permeability, depth to bedrock, depth to gravel, wind erosion, water erosion, excess surface fines, corrosivity, frost action, and dense substratum
Ecological sites:
*****Talkeetna, warm soil—till deposits, high elevation
*****Talkeetna, thick surface soil—mountain slopes
*****Deneka soil—bedrock hills, high elevation

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to steep slopes and the depth to bedrock.
*This unit has a high potential for frost action and a high risk of corrosion.

Forestry (Talkeetna, warm soil)

Major tree species: paper birch and white spruce
Minor tree species: balsam poplar
Mean site index:
*paper birch—45 (estimated, 50 year, *Gregory and Haack 1965*)
*white spruce—64 (100 year, *Farr 1967*)
Estimated growth at culmination of mean annual increment:
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
Soil limitation(s) for equipment use: moderate—slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*This soil occurs near the upper elevational limit of tree growth, and stands tend to be slow growing and uneven-aged with marginal quality trees.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Talkeetna, thick surface soil)

Soil limitation(s) for equipment use: moderate—slope
General management considerations:
*This soil is usually non-forested and is unsuited for forestry. It may have to be crossed with roads and trails to access stands on the Talkeetna, warm soil.

Forestry (Deneka soil)

Major tree species: paper birch and white spruce
Mean site index:
*paper birch—45 (estimated, 50 year, *Gregory and Haack 1965*)
*white spruce—64 (100 year, *Farr 1967*)
Estimated growth at culmination of mean annual increment:
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
Soil limitation(s) for equipment use: moderate—slope
Seedling mortality: moderate—shallow
Windthrow hazard: moderate—shallow
Plant competition: severe—competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Talkeetna, warm soil)

Major understory species:

*****paper birch-white spruce/bluejoint reedgrass forest and paper birch/bluejoint reedgrass forest—bluejoint reedgrass, spinulose shield fern, oakfern, common fireweed, Beauverd's spiraea, bunchberry dogwood, and fiveleaf bramble

*****paper birch-white spruce/Sitka alder/bluejoint reedgrass forest—Sitka alder, bluejoint reedgrass, spinulose shield fern and other ferns, common fireweed, bunchberry dogwood, and fiveleaf bramble

Mean annual understory production (vascular plants, air-dry weight):

*****paper birch-white spruce/bluejoint reedgrass forest and paper birch/bluejoint reedgrass forest—2800 pounds per acre (3140 kilograms per hectare)

*****paper birch-white spruce/Sitka alder/bluejoint reedgrass woodland and paper birch-white spruce/Sitka alder/bluejoint reedgrass forest —3000 pounds per acre (3360 kilograms per hectare), estimated

Soil limitation(s) for fencing: severe—slope, too gravelly, frost action

Limitations to uniform distribution of livestock: severe—slope, poorly drained areas, dense brush

General management considerations:

*****This soil is poorly suited for livestock grazing due to steep slopes.

Livestock Grazing (Talkeetna, thick surface soil)

Major species:

*****tall Sitka alder shrub—Sitka alder, bluejoint reedgrass, spinulose shield fern, common fireweed, oakfern, Beauverd's spiraea, and currant

Mean annual production (vascular plants, air-dry weight):

*****tall Sitka alder shrub—3700 pounds per acre (4140 kilograms per hectare)

Soil limitation(s) for fencing: severe—slope, too gravelly, frost action

Limitations to uniform distribution of livestock: severe—slope, poorly drained areas, dense brush

General management considerations:

*****This soil is poorly suited for livestock grazing due to dense alder brush, low production of palatable forage plants, and steep slopes.

Livestock Grazing (Deneka soil)

Major understory species:

*****paper birch-white spruce/bluejoint reedgrass forest and paper birch/bluejoint reedgrass forest—bluejoint reedgrass, spinulose shield fern, oakfern, common fireweed, Beauverd's spiraea, bunchberry dogwood, and fiveleaf bramble

Mean annual understory production (vascular plants, air-dry weight):

*****paper birch-white spruce/bluejoint reedgrass forest and paper birch/bluejoint reedgrass forest—2800 pounds per acre (3140 kilograms per hectare)

Soil limitation(s) for fencing: severe—shallow bedrock, slope, frost action

Limitations to uniform distribution of livestock: severe—slope, poorly drained areas, dense brush

General management considerations:

*****This soil is suited for livestock grazing.

*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

194—Talkeetna, cool-Snowdance complex, 5 to 25 percent slopes

Composition

Talkeetna, cool soil and similar inclusions: 70 percent
Snowdance soil and similar inclusions: 25 percent
Contrasting inclusions: 5 percent

Characteristics of Talkeetna, cool and similar soils

Landform: mountains (Plates 5 and 10)
Position on the landscape: footslopes
Slope range: 10 to 25 percent
Slope features: shape—plain or convex; length—500 to 2000 feet (152 to 610 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): bluejoint reedgrass-forb grassland

Typical profile:
*****0 to 2 inches (0 to 5 cm)—brown silt loam
*****2 to 18 inches (5 to 46 cm)—very dusky red over dark reddish brown silt loam
*****18 to 60 inches (46 to 152 cm)—olive brown very gravelly loam

Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the very gravelly and very cobbly material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate to high
Depth to contrasting very gravelly and very cobbly material: 11 to 28 inches (28 to 71 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Snowdance and similar soils

Landform: mountains (Figure 5 and Plate 5)
Position on the landscape: footslopes, drainages, and depressions
Slope range: 5 to 15 percent
Slope features: shape—plain or concave; length—100 to 300 feet (30 to 91 m)
Organic mat on surface: 3 to 6 inches (8 to 15 cm) thick
Major vegetation type(s): low willow shrub and tall Sitka alder-willow shrub

Typical profile:
*****0 to 5 inches (0 to 13 cm)—black silt loam
*****5 to 15 inches (13 to 38 cm)—dark brown silt loam
*****15 to 60 inches (38 to 152 cm)—dark brown very gravelly and very cobbly sandy loam

Drainage class: very poorly or poorly drained
Permeability: in the silty loess mantle—moderate; in the very gravelly and very cobbly material—moderately slow
Available water capacity: moderate to high
Depth to contrasting cobbly and gravelly material for the Snowdance soil: 14 to 18 inches (36 to 46 cm)
Depth to contrasting cobbly and gravelly material for the map unit component: 10 to 18 inches (25 to 46 cm)

Runoff: medium
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 25 percent
*****poorly drained soils in similar positions with bluejoint reedgrass-forb grassland

Major Uses

Current uses: wildlife habitat
Potential uses: livestock grazing

Major Management Factors

Elevation: 1700 to 2500 feet (518 to 762 m)
Climatic factors (average annual):
*****precipitation—30 to 45 inches (76 to 114 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: wind erosion, water erosion, restricted permeability, frost action, depth to seasonally high water table, corrosivity, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*****Talkeetna, cool soil—loamy slopes, cool
*****Snowdance soil—mountain slopes, drainages

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to slope, depth to a seasonally high water table, and a short growing season.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites and shallow excavations due to wetness and the steepness and length of slopes.
*****This unit has a high potential for frost action and a high risk of corrosion.

Livestock Grazing (Talkeetna, cool soil)

Major species:
*****bluejoint reedgrass-forb grassland—bluejoint reedgrass, common fireweed, spinulose shield fern, oakfern, false hellebore, Beauverd's spiraea, Canadian burnet, northern geranium, bunchberry dogwood, and arctic starflower
Mean annual production (vascular plants, air-dry weight):
*****bluejoint reedgrass-forb grassland—2500 pounds per acre (2800 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: moderate—slope, wet soils, dense brush
General management considerations:
*****This soil is well suited for livestock grazing.

*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*The grasslands on this soil are used extensively by moose in summer and fall.

Livestock Grazing (Snowdance soil)

Major species:
*low willow shrub and tall Sitka alder-willow shrub—Barclay's, diamondleaf, and other low willows; common ladyfern; bluejoint reedgrass; horsetail; Canadian burnet; sedge; oakfern; twisted stalk; and Sitka alder
Mean annual production (vascular plants, air-dry weight):
*low willow shrub and tall Sitka alder-willow shrub—2300 pounds per acre (2575 kilograms per hectare)
Soil limitation(s) for fencing: moderate—wetness, slope, frost action
Limitations to uniform distribution of livestock: severe—slope, wet soils, dense brush
General management considerations:
*This soil is suited for livestock grazing.
*In spring and during periods of intense summer rain, runoff and drainage from adjacent slopes result in a shallow water table in many areas.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*The willow browse on this soil is used extensively by moose in winter and spring.

195—Talkeetna, cool-Tsadaka-Chunilna, cool complex, 10 to 35 percent slopes

Composition

Talkeetna, cool soil and similar inclusions: 35 percent
Tsadaka soil and similar inclusions: 35 percent
Chunilna, cool soil and similar inclusions: 20 percent
Contrasting inclusions: 10 percent

Characteristics of Talkeetna, cool and similar soils

Landform: mountains (Figure 5 and Plate 3)
Position on the landscape: backslopes
Slope range: 10 to 35 percent
Slope features: shape—plain; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): bluejoint reedgrass-forb grassland

Typical profile:
*0 to 18 inches (0 to 46 cm)—alternately layered very dark brown, very dusky red, and dark reddish brown silt loam
*18 to 60 inches (46 to 152 cm)—dark brown very cobbly loam

Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the very gravelly and very cobbly material—moderately slow to moderate; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate to high
Depth to contrasting very gravelly or very cobbly material: 11 to 23 inches (28 to 58 cm)
Runoff: medium

Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Tsadaka and similar soils

Landform: mountains (Figure 5 and Plate 3)
Position on the landscape: hummocks on shoulderslopes and backslopes
Slope range: 10 to 35 percent
Slope features: shape—plain or convex; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 4 to 10 inches (10 to 25 cm) thick
Major vegetation type(s): black crowberry-bog blueberry dwarf shrub

Typical profile:
*****0 to 2 inches (0 to 5 cm)—very dark brown silt loam
*****2 to 5 inches (5 to 13 cm)—grayish brown silt loam
*****5 to 15 inches (13 to 38 cm)—very dusky red and yellowish red silt loam
*****15 to 26 inches (38 to 66 cm)—dusky red very cobbly sandy loam, cemented
*****26 to 60 inches (66 to 152 cm)—brown very cobbly sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the cemented gravelly material—slow; in the underlying gravelly substratum material—moderately slow to moderate; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate or high
Depth to contrasting very gravelly and very cobbly material: 10 to 18 inches (25 to 46 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Chunilna, cool and similar soils

Landform: mountains (Figure 5)
Position on the landscape: backslopes—depressions and drainages
Slope range: 10 to 25 percent
Slope features: shape—concave; length—200 to 1000 feet (61 to 305 m)
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): tall Sitka alder shrub

Typical profile:
*****0 to 4 inches (0 to 10 cm)—very dark brown mucky silt loam
*****4 to 14 inches (10 to 36 cm)—dark brown silt loam
*****14 to 60 inches (36 to 152 cm)—dark grayish brown and olive gray very gravelly loam and very gravelly sandy loam

Drainage class: poorly drained
Permeability: in the silty loess mantle—moderate; in the very gravelly and very cobbly material—moderately slow
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 10 to 32 inches (25 to 81 cm)
Runoff: slow
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is

removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****flooded soils in drainages
*****soils with slopes greater than 35 percent
*****poorly drained soils in similar positions with bluejoint vegetation
*****rock outcroppings

Major Uses

Current uses: wildlife habitat
Potential uses: livestock grazing

Major Management Factors

Elevation: 1500 to 3000 feet (457 to 914 m)
Climatic factors (average annual):
*****precipitation—30 to 45 inches (76 to 114 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: wind erosion, water erosion, slope, restricted permeability, frost action, depth to seasonally high water table, depth to gravelly and cobbly material, corrosivity, depth to cemented layer, and dense substratum
Ecological sites:
*****Talkeetna, cool soil—loamy slopes, cool
*****Tsadaka soil—alpine hummocks
*****Chunilna, cool soil—mountain slopes, wet

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to slope and depth to a seasonally high water table.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes, depth to cemented pan, and wetness.
*****This unit has a high potential for frost action and a high risk of corrosion.

Livestock Grazing (Talkeetna, cool soil)

Major species:
*****bluejoint reedgrass-forb grassland—bluejoint reedgrass, common fireweed, spinulose shield fern, oakfern, false hellebore, Beauverd's spiraea, Canadian burnet, northern geranium, bunchberry dogwood, and arctic starflower
Mean annual production (vascular plants, air-dry weight):
*****bluejoint reedgrass-forb grassland—2300 pounds per acre (2575 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: moderate—slope, drainages, dense brush, wet soils

General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.
*The grasslands on this soil are used extensively by moose in summer and fall.

Livestock Grazing (Tsadaka soil)

Major species:
*black crowberry-bog blueberry dwarf shrub—black crowberry, bog blueberry, lingonberry, bunchberry dogwood, dwarf arctic birch, Beauverd's spiraea, bluejoint reedgrass, sedge, Altai's fescue, and feathermoss
Mean annual production (vascular plants, air-dry weight):
*dwarf black crowberry-bog blueberry shrub—300 pounds per acre (335 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—slope, drainages, dense brush, wet soils
General management considerations:
*This soil is poorly suited for livestock grazing.

Livestock Grazing (Chunilna, cool soil)

Major species:
*tall Sitka alder shrub—Sitka alder, willow, spinulose shield fern, common ladyfern, oakfern, bluejoint reedgrass, horsetail, and fiveleaf bramble
Mean annual production (vascular plants, air-dry weight):
*tall Sitka alder shrub—4500 pounds per acre (5040 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, coarse fragments, wetness, frost action
Limitations to uniform distribution of livestock: severe—slope, drainages, dense brush, wet soils
General management considerations:
*This soil is suited for livestock grazing.
*In spring and during periods of intense summer rain, runoff and drainage from adjacent slopes result in a shallow water table in many areas.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

196—Tidal Flats

Composition

Tidal flats: 90 percent

Characteristics of Tidal flats

Landform: tidal flats
Position on landscape: all positions
Slope range: 0 to 1 percent
Slope features: shape—plain
Native vegetation: scattered halophytic herbs along upper margin.
Material: silty and clayey marine deposits

Included Areas

*ponded and very poorly drained soils
*water

197—Tokositna silt loam, sloping and moderately steep

Composition

Tokositna, sloping soil and similar inclusions: 55 percent
Tokositna, moderately steep soil and similar inclusions: 35 percent
Contrasting inclusions: 10 percent

Characteristics of Tokositna, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: toeslopes, crests, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—grayish brown silt loam
*2 to 28 inches (5 to 71 cm)—dark reddish brown, strong brown, and brown silt loam
*28 to 60 inches (71 to 152 cm)—very dark grayish brown and dark grayish brown very cobbly loam and sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly loam—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Tokositna, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—grayish brown silt loam
*2 to 28 inches (5 to 71 cm)—dark reddish brown, strong brown, and brown silt loam
*28 to 60 inches (71 to 152 cm)—very dark grayish brown and dark grayish brown very cobbly loam and sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly loam material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 35 percent
*****poorly drained soils in depressions
*****occasional surface boulders

Major Uses

Current uses: cropland, homesites, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 400 to 1000 feet (122 to 305 m)
Climatic factors (average annual):
*****precipitation—25 to 30 inches (64 to 76 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—70 to 90 days
*****growing degree days—1100 to 1400
Soil related factors: slope, depth to gravelly and cobbly material, restricted permeability, wind erosion, water erosion, low fertility, frost action, excess surface fines, corrosivity, and dense substratum
Ecological sites:
*****Tokositna, sloping soil—till deposits, 20-35 inch pz.
*****Tokositna, moderately steep soil—till deposits, 20-35 inch pz.

Cropland (Tokositna, sloping soil)

General management considerations:
*****This portion of the unit has moderate limitations for cropland and hayland due to slope, the depth to gravel, low fertility, and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass and oats and barley as forage.
*****Occasional surface stones limit some fieldwork.
*****Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Add lime to improve soil fertility.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Use cross slope or contour tillage during planting operations to reduce water erosion

hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Tokositna, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Tokositna, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to cobbles, and moderate limitations for shallow excavations due to the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Tokositna, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.

*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Design and construct buildings and access roads to compensate for steep slopes.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Tokositna, sloping soil)

Major tree species: white spruce and paper birch
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—72 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—26.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Tokositna, moderately steep soil)

Major tree species: white spruce and paper birch
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—72 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—26.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species

General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Tokositna, sloping soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—1800 pounds per acre (2010 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: moderate—slope, dense brush
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Tokositna, moderately steep soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—1800 pounds per acre (2010 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: moderate—slope, dense brush
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

198—Tokositna silt loam, steep and sloping

Composition

Tokositna, steep soil and similar inclusions: 60 percent
Tokositna, sloping soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Tokositna, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: backslopes and footslopes
Slope range: 20 to 60 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—grayish brown silt loam
*2 to 28 inches (5 to 71 cm)—dark reddish brown, strong brown, and brown silt loam
*28 to 60 inches (71 to 152 cm)—very dark grayish brown and dark grayish brown very cobbly loam and sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very cobbly loam material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Tokositna, sloping and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: crests and toeslopes
Slope range: 5 to 20 percent
Slope features: shape—convex or concave; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—grayish brown silt loam
*2 to 28 inches (5 to 71 cm)—dark reddish brown, strong brown, and brown silt loam
*28 to 60 inches (71 to 152 cm)—very dark grayish brown and dark grayish brown very cobbly loam and sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very cobbly and very gravelly substratum material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 36 inches (28 to 91 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 60 percent
*poorly drained soils in depressions
*occasional surface boulders

Major Uses

Current uses: wildlife habitat
Potential uses: homesites, forestry, and livestock grazing

Major Management Factors

Elevation: 300 to 1000 feet (91 to 305 m)
Climatic factors (average annual):
*precipitation—25 to 30 inches (64 to 76 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—70 to 90 days
*growing degree days—1100 to 1400
Soil related factors: slope, water erosion, wind erosion, depth to gravelly and cobbly material, restricted permeability, frost action, excess surface fines, corrosivity, and dense substratum
Ecological sites:
*Tokositna, steep soil—till deposits, 20-35 inch pz.
*Tokositna, sloping soil—till deposits, 20-35 inch pz.

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development (Tokositna, steep soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Suitable management practices:
*Locate roads and buildings in the more gently sloping areas of this portion of the unit.

Building Site Development (Tokositna, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this portion of the unit is a probable source of roadfill.
*Only the silty surface material is suitable for reclamation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Design and construct buildings and access roads to compensate for steep slopes.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.

*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Tokositna, steep soil)

Major tree species: white spruce and paper birch
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—72 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—26.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—slope, silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Tokositna, sloping soil)

Major tree species: white spruce and paper birch
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—72 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—26.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Tokositna, steep soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—1800 pounds per acre (2010 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: severe—slope, dense brush
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Tokositna, sloping soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—1800 pounds per acre (2010 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: severe—slope, dense brush
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

199—Tokositna silt loam, undulating

Composition

Tokositna soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Tokositna and similar soils

Landform: glacial till plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—grayish brown silt loam
*2 to 28 inches (5 to 71 cm)—dark reddish brown, strong brown, and brown silt loam
*28 to 60 inches (71 to 152 cm)—very dark grayish brown and dark grayish brown very cobbly loam and sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in the very cobbly loam and sandy loam material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 10 percent
*occasional surface boulders
*poorly drained soils in depressions

Major Uses

Current uses: homesites and cropland
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 300 to 1000 feet (91 to 305 m)
Climatic factors (average annual):
*****precipitation—25 to 30 inches (64 to 76 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—70 to 90 days
*****growing degree days—1100 to 1400
Soil related factors: wind erosion, water erosion, depth to gravelly and cobbly material, low fertility, restricted permeability, excess surface fines, frost action, and dense substratum
Ecological sites:
*****Tokositna soil—till deposits, 20-35 inch pz.

Cropland

General management considerations:
*****This unit has moderate limitations for cropland and hayland due to slope, depth to gravelly and cobbly material, low fertility, and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*****Land clearing and tillage operations increase wind and water erosion hazard.
*****Occasional surface stones limit some fieldwork.

Suitable management practices:
*****Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Add lime to improve soil fertility.
*****Use shallow cuts during land smoothing to avoid exposing gravelly and cobbly underlying material.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*****This unit has moderate limitations for homesites due to cobbles, and moderate limitations for shallow excavations due to the dense nature of the substratum.
*****This unit has a high potential for frost action and a high risk of corrosion.
*****Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*****Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*****Excavation can expose soil material that is highly susceptible to wind and water erosion.
*****Excavation is hampered by cobbles in the soil and the dense nature of the substratum

consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: white spruce and paper birch
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—72 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—26.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—1800 pounds per acre (2010 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action
Limitations to uniform distribution of livestock: moderate—dense brush
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

200—Tokositna, hilly-Chunilna complex

Composition

Tokositna soil and similar inclusions: 60 percent
Chunilna soil and similar inclusions: 30 percent

Contrasting inclusions: 10 percent

Characteristics of Tokositna and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes, crests, and footslopes
Slope range: 2 to 30 percent
Slope features: shape—plain or convex; length—20 to 150 feet (6 to 46 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—grayish brown silt loam
*****2 to 28 inches (5 to 71 cm)—dark reddish brown, strong brown, and brown silt loam
*****28 to 60 inches (71 to 152 cm)—very dark grayish brown and dark grayish brown very cobbly loam and sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in very gravelly loam material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 11 to 35 inches (28 to 89 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Chunilna and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: toeslopes and depressions
Slope range: 0 to 7 percent
Slope features: shape—plain or concave; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce forest

Typical profile:
*****0 to 4 inches (0 to 10 cm)—very dark brown mucky silt loam
*****4 to 14 inches (10 to 36 cm)—dark brown silt loam
*****14 to 60 inches (36 to 152 cm)—dark grayish brown and olive gray very gravelly loam and very gravelly sandy loam

Drainage class: very poorly or poorly drained
Permeability: in the silty material—moderate; in the very gravelly loam and sandy loam material—moderately slow
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 14 to 33 inches (36 to 84 cm)
Runoff: ponded
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*well drained soils with very gravelly material at less than 10 inches (less than 25 cm)
*soils with slopes greater than 30 percent
*very poorly drained soils in depressions with organic mats greater than 16 inches (greater than 41 cm) thick
*occasional surface boulders

Major Uses

Current uses: wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 400 to 1000 feet (122 to 305 m)
Climatic factors (average annual):
*precipitation—25 to 30 inches (64 to 76 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—70 to 90 days
*growing degree days—1100 to 1400
Soil related factors: depth to seasonally high water table, frost action, slope, wind erosion, low fertility, water erosion, restricted permeability, depth to gravelly and cobbly material, excess surface fines, corrosivity, and dense substratum
Ecological sites:
*Tokositna soil—till deposits, 20-35 inch pz.
*Chunilna soil—drift deposits, very poorly drained

Cropland (Tokositna soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Cropland (Chunilna soil)

General management considerations:
*This portion of the unit has severe limitations for cropland and hayland due to wetness.

Building Site Development (Tokositna soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.

*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.
*Design and construct buildings and access roads to compensate for steep slopes.

Building Site Development (Chunilna soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to wetness.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Forestry (Tokositna soil)

Major tree species: white spruce and paper birch
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—72 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—26.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Chunilna soil)

Major tree species: paper birch and white spruce
Minor tree species: black spruce
Mean site index:
*white spruce—61 (estimated, 100 year, *Farr 1967*)
*paper birch—49 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—18.6 cubic feet per acre (1.3 cubic m per hectare) per year at age 125
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90

Soil limitation(s) for equipment use: severe—wetness
Seedling mortality: severe—wetness, shallow
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture, competitive species
General management considerations:
*****This soil is poorly suited for forestry due to severe soil limitations.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.
*****The water table may rise if trees are removed.

Livestock Grazing (Tokositna soil)

Major understory species:
*****paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest and paper birch forest—1800 pounds per acre (2015 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: moderate—slope, dense brush, wet soils
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Chunilna soil)

Major understory species:
*****paper birch-white spruce forest—alder, devil's club, rusty menziesia, early blueberry, bog blueberry, Beauverd's spiraea, bluejoint reedgrass, horsetail, and spinulose shield fern
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: severe—wetness, frost action
Limitations to uniform distribution of livestock: moderate—dense brush, slope, wet soils
General management considerations:
*****This soil is poorly suited for livestock grazing due to wetness and other soil limitations.

201—Tokositna, undulating-Chunilna complex

Composition

Tokositna, undulating soil and similar inclusions: 60 percent
Chunilna soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Tokositna and similar soils

Landform: glacial till plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest and paper birch forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—grayish brown silt loam
*2 to 28 inches (5 to 71 cm)—dark reddish brown, strong brown, and brown silt loam
*28 to 60 inches (71 to 152 cm)—very dark grayish brown and dark grayish brown very cobbly loam and sandy loam

Drainage class: well drained
Permeability: in the silty material—moderate; in very gravelly loam material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 16 to 35 inches (41 to 89 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Chunilna and similar soils

Landform: glacial till plains (Figure 3)
Position on the landscape: depressions
Slope range: 0 to 7 percent
Slope features: shape—plain or concave; length—50 to 100 feet (15 to 30 m)
Organic mat on surface: 2 to 5 inches (5 to 13 cm) thick
Major vegetation type(s): paper birch-white spruce forest

Typical profile:
*0 to 4 inches (0 to 10 cm)—very dark brown mucky silt loam
*4 to 14 inches (10 to 36 cm)—dark brown silt loam
*14 to 60 inches (36 to 152 cm)—dark grayish brown and olive gray very gravelly loam and very gravelly sandy loam

Drainage class: very poorly or poorly drained
Permeability: in the silty material—moderate; in the very gravelly loam and sandy loam material—moderately slow
Available water capacity: high
Depth to gravelly and cobbly material: 14 to 33 inches (36 to 84 cm)
Runoff: ponded
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*well drained soils with very gravelly material at less than 10 inches (less than 25 cm)
*soils with slopes greater than 10 percent
*very poorly drained soils in depressions with organic mats greater than 16 inches (greater than 41 cm) thick
*occasional surface boulders

Major Uses

Current uses: homesites, cropland, and wildlife habitat
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 400 to 1000 feet (122 to 305 m)
Climatic factors (average annual):
*precipitation—25 to 30 inches (64 to 76 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—70 to 90 days
*growing degree days—1100 to 1400
Soil related factors: depth to seasonally high water table, frost action, wind erosion, excess surface fines, depth to gravelly and cobbly material, corrosivity, low fertility, restricted permeability, and dense substratum
Ecological sites:
*Tokositna soil—till deposits, 20-35 inch pz.
*Chunilna soil—drift deposits, very poorly drained

Cropland (Tokositna soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland and hayland due to low fertility and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Chunilna soil)

General management considerations:
*This portion of the unit has severe limitations for cropland and hayland due to wetness.

Building Site Development (Tokositna soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to cobbles, and moderate limitations for shallow excavations due to the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind erosion.

*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Chunilna soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to wetness.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Forestry (Tokositna soil)

Major tree species: white spruce and paper birch
Minor tree species: quaking aspen and black spruce
Mean site index:
*white spruce—72 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—26.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 105
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Chunilna soil)

Major tree species: paper birch and white spruce
Minor tree species: black spruce
Mean site index:
*white spruce—61 (estimated, 100 year, *Farr 1967*)
*paper birch—49 (estimated, 50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—18.6 cubic feet per acre (1.3 cubic m per hectare) per year at age 125
*paper birch—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: severe—wetness
Seedling mortality: severe—wetness, shallow
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture, competitive species

General management considerations:
*This soil is poorly suited for forestry due to severe soil limitations.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.
*The water table may rise if trees are removed.

Livestock Grazing (Tokositna soil)

Major understory species:
*paper birch-white spruce forest and paper birch forest—Sitka alder, devil's club, rusty menziesia, bluejoint reedgrass, spinulose shield fern, horsetail, oakfern, bunchberry dogwood, fiveleaf bramble, and stiff clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch forest—1800 pounds per acre (2015 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: moderate—dense brush, slope, wet soils
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Chunilna soil)

Major understory species:
*paper birch-white spruce forest—alder, devil's club, rusty menziesia, early blueberry, bog blueberry, Beauverd's spiraea, bluejoint reedgrass, horsetail, and spinulose shield fern
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: severe—wetness, frost action
Limitations to uniform distribution of livestock: moderate—dense brush, slope, wet soils
General management considerations:
*This soil is poorly suited for livestock grazing due to wetness and other soil limitations.

202—Tsadaka-Talkeetna, cool complex, 5 to 25 percent slopes

Composition

Tsadaka soil and similar inclusions: 70 percent
Talkeetna, cool soil and similar inclusions: 20 percent
Contrasting inclusions: 10 percent

Characteristics of Tsadaka and similar soils

Landform: mountains
Position on the landscape: hummocks on undulating backslopes and ridges
Slope range: 5 to 25 percent
Slope features: shape—plain or convex; length—30 to 200 feet (9 to 61 m)
Organic mat on surface: 3 to 6 inches (8 to 15 cm) thick
Major vegetation type(s): black crowberry-bog blueberry dwarf shrub
Minor vegetation type(s): black crowberry-Altai's fescue dwarf shrub

Typical profile:
*0 to 2 inches (0 to 5 cm)—very dark brown silt loam
*2 to 5 inches (5 to 13 cm)—grayish brown silt loam

*5 to 15 inches (13 to 38 cm)—very dusky red and yellowish red silt loam
*15 to 26 inches (38 to 66 cm)—dusky red very cobbly sandy loam, cemented
*26 to 60 inches (66 to 152 cm)—brown very cobbly sandy loam

Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the cemented cobbly or gravelly material—slow; in the underlying cobbly or gravelly substratum—moderately slow or moderate; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate to high
Depth to contrasting very gravelly or very cobbly material: 10 to 22 inches (25 to 56 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Talkeetna, cool and similar soils

Landform: mountains
Position on the landscape: backslopes, toeslopes, and undulating ridges
Slope range: 10 to 25 percent
Slope features: shape—plane or concave; length—30 to 200 feet (9 to 61 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): bluejoint reedgrass-forb grassland

Typical profile:
*0 to 1 inch (0 to 3 cm)—gray silt loam
*1 to 15 inches (3 to 38 cm)—dark reddish brown, dark brown, and brown silt loam
*15 to 60 inches (38 to 152 cm)—dark yellowish brown and olive brown very gravelly sandy loam

Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the gravelly substratum—moderately slow to moderate; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate or high
Depth to contrasting very gravelly or very cobbly material: 11 to 22 inches (28 to 56 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 25 percent
*poorly drained soils in depressions

Major Uses

Current uses: wildlife habitat
Potential uses: livestock grazing

Major Management Factors

Elevation: 2100 to 2700 feet (640 to 823 m)
Climatic factors (average annual):
*****precipitation—30 to 45 inches (76 to 114 cm)
*****air temperature—32 to 34 °F (0 to 1 °C)
*****frost free season—60 to 80 days
*****growing degree days—1000 to 1200
Soil related factors: wind erosion, water erosion, frost action, restricted permeability, slope, depth to cobbly and gravelly material, depth to cemented layer, corrosivity, and dense substratum
Ecological sites:
*****Tsadaka soil—alpine hummocks
*****Talkeetna, cool soil—loamy slopes, cool

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to slope and a short growing season.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites and shallow excavations due to slope and the depth to cemented horizons.
*****This unit has a high potential for frost action and a high risk of corrosion.

Livestock Grazing (Tsadaka soil)

Major species:
*****dwarf black crowberry-bog blueberry shrub and dwarf black crowberry-Altai's fescue shrub—black crowberry, bog blueberry, lingonberry, Altai's fescue, bunchberry dogwood, Beauverd's spiraea, dwarf arctic birch, bluejoint reedgrass, and feathermoss
Mean annual production (vascular plants, air-dry weight):
*****black crowberry-bog blueberry dwarf shrub and black crowberry-Altai's fescue dwarf shrub—300 pounds per acre (335 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too cobbly, frost action
Limitations to uniform distribution of livestock: moderate—slope, poorly drained areas
General management considerations:
*****This soil is poorly suited for livestock grazing.

Livestock Grazing (Talkeetna, cool soil)

Major species:
*****bluejoint reedgrass-forb grassland—bluejoint reedgrass, common fireweed, spinulose shield fern, oakfern, false hellebore, Beauverd's spiraea, Canadian burnet, northern geranium, bunchberry dogwood, and arctic starflower
Mean annual production (vascular plants, air-dry weight):
*****bluejoint reedgrass-forb grassland—2300 pounds per acre (2800 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, too gravelly, frost action
Limitations to uniform distribution of livestock: moderate—slope, poorly drained areas
General management considerations:
*****This soil is well suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

*The grasslands on this soil are used extensively by moose in summer and fall.

203—Typic Cryaquents, 0 to 2 percent slopes

Composition

Typic Cryaquents soils and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Typic Cryaquents and similar soils

Landform: floodplains along small streams
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and tall alder shrub
Minor vegetation type(s): tall alder-willow shrub, and balsam poplar woodland

Sample profile:
*0 to 8 inches (0 to 20 cm)—dark brown and dark grayish brown fine sandy loam
*8 to 60 inches (20 to 152 cm)—dark brown and dark grayish brown stratified fine sand through silt

Drainage class: very poorly or poorly drained
Permeability: variable
Available water capacity: variable
Runoff: slow
Depth to seasonally high water table: 0 to 1.5 feet (0 to 0.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: occasional

Included Areas

*well drained soils
*nonflooded soils

Major Uses

Current uses: wildlife habitat

Major Management Factors

Elevation: 50 to 1800 feet (15 to 549 m)
Climatic factors (average annual):
*precipitation—15 to 25 inches (38 to 64 cm)
*air temperature—33 to 36 °F (1 to 2 °C)
*frost free season—80 to 110 days
*growing degree days—1100 to 1500
Soil related factors: flooding, depth to seasonally high water table, frost action, corrosivity, and excess sand in substratum
Ecological sites:
*Typic Cryaquents soil—alluvial terrain, wet

Cropland

General management considerations:
*****This unit has severe limitations for cropland and hayland due to wetness and flooding.

Building Site Development

General management considerations:
*****This unit has severe limitations for homesites due to wetness and flooding, and severe limitations for shallow excavations due to wetness.
*****This unit has a high potential for frost action and a moderate risk of corrosion.

Forestry

Major tree species: paper birch and white spruce
Minor tree species: balsam poplar and black spruce
Mean site index:
*****white spruce—not estimated
*****paper birch—not estimated
Soil limitation(s) for equipment use: severe—wetness
Seedling mortality: severe—wetness
Windthrow hazard: severe—shallow
Plant competition: severe—high available moisture
General management considerations:
*****This soil is poorly suited for forestry due to wet soils.
*****The water table may rise if trees are removed.

Livestock Grazing

Major understory species:
*****paper birch-white spruce forest, paper birch forest, and balsam poplar woodland—Sitka and thinleaf alder, prickly rose, highbush cranberry, spinulose shield fern, horsetail, and bluejoint reedgrass
*****tall alder shrub and tall alder-willow shrub—thinleaf and Sitka alder, diamondleaf willow and other willows, bluejoint reedgrass, various sedges, marsh cinquefoil, horsetail, and sweetgale
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest, paper birch forest, balsam poplar woodland, tall alder shrub, and tall alder-willow shrub—not estimated
Soil limitation(s) for fencing: severe—wetness, frost action
Limitations to uniform distribution of livestock: moderate—wet soils
General management considerations:
*****This soil is poorly suited for livestock grazing due to wet soils.

204—Typic Cryaquents, coastal, 0 to 2 percent slopes

Composition

Typic Cryaquents, coastal soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Typic Cryaquents, coastal and similar soils

Landform: tidal plains
Position on the landscape: all positions

Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 2 to 6 inches (5 to 15 cm) thick
Major vegetation type(s): halophytic sedge-grass wet meadow

Sample profile:
*0 to 8 inches (0 to 20 cm)—dark gray silt loam
*8 to 60 inches (20 to 152 cm)—dark greenish gray silt loam

Drainage class: very poorly drained
Permeability: variable
Available water capacity: variable
Runoff: ponded
Depth to seasonally high water table: 0 to 1 foot (0 to 0.3 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, slight if the mat is removed
Hazard of flooding: frequent; flooding is initiated by tidal action

Included Areas

*very poorly drained soils with organic material more than 16 inches (more than 41 cm) thick
*nonvegetated tidal flats
*water

Major Uses

Current uses: wildlife habitat
Potential uses: wildlife habitat and livestock grazing

Major Management Factors

Elevation: 0 to 30 feet (0 to 9 m)
Climatic factors (average annual):
*precipitation—16 to 18 inches (41 to 46 cm)
*air temperature—35 °F (2 °C)
*frost free season—80 to 100 days
*growing degree days—1300 to 1500
Soil related factors: frequent flooding, depth to seasonally high water table, frost action, corrosivity, and excess clay in the substratum
Ecological sites:
*Typic Cryaquents, coastal soil—tidal basin

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to wetness and frequent flooding.

Building Site Development

General management considerations:
*This unit has severe limitations for homesites and shallow excavations due to wetness and flooding.
*This unit has a high potential for frost action and a moderate risk of corrosion.

Livestock Grazing

Major species:
*halophytic wet sedge-grass meadow—Lyngbye's sedge and other salt tolerant sedges, grasses, and forbs
Mean annual production (vascular plants, air-dry weight):
*halophytic wet sedge-grass meadow—4150 pounds per acre (4650 kilograms per hectare) (*Vince and Snow 1984* as reported in *Viereck et al. 1992*)
Soil limitation(s) for fencing: severe—too clayey, wetness, frost action
Limitations to uniform distribution of livestock: severe—wet soils
General management considerations:
*This soil is poorly suited for livestock grazing due to wet soils and tidal flooding.

205—Whitsol silt loam, 0 to 2 percent slopes

Composition

Whitsol soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Whitsol and similar soils

Landform: glacial outwash plains
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 34 inches (5 to 86 cm)—dark reddish brown, strong brown, grayish brown, and dark yellowish brown silt loam
*34 to 44 inches (86 to 112 cm)—olive gray fine sandy loam
*44 to 60 inches (112 to 152 cm)—olive very gravelly coarse sand

Drainage class: well drained
Permeability: in the surface layers—moderate; in the sand and gravel material—rapid
Available water capacity: high
Depth to contrasting stratified silty and sandy material: 14 to 35 inches (36 to 89 cm)
Depth to contrasting very gravelly material: 36 to 55 inches (91 to 140 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*poorly drained soils in depressions
*soils with very gravelly material at less than 40 inches (less than 102 cm)
*soils with slopes greater than 2 percent

Major Uses

Current uses: wildlife habitat, cropland, and homesites
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 200 to 400 feet (61 to 122 m)
Climatic factors (average annual):
*****precipitation—20 to 25 inches (51 to 64 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—80 to 100 days
*****growing degree days—1300 to 1500
Soil related factors: wind erosion, frost action, restricted permeability, cutbank instability, corrosivity, and excess surface fines
Ecological sites:
*****Whitsol soil—glaciofluvial deposits, 20-35 inch pz.

Cropland

General management considerations:
*****This unit has moderate limitations for cropland and hayland due to low fertility and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*****Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Add lime to improve soil fertility.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*****This unit has severe limitations for shallow excavations due to cutbank instability.
*****This unit has a high potential for frost action and a high risk of corrosion.
*****Excavation can expose soil material that is highly susceptible to wind erosion.
*****The quality of roadbeds and road surfaces can be adversely affected by frost action and limited soil strength.
*****The substratum material from this unit is a probable source of gravel and sand.

Suitable management practices:
*****Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*****Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*****Stockpile topsoil and use it to reclaim areas disturbed during construction.
*****Install footings below the frostline to overcome the risk of frost action.
*****Underlay local roads with a special base to prevent frost heave damage and provide soil strength.

Forestry

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*****white spruce—69 (100 year, *Farr 1967*)
*****paper birch—50 (50 year, *Gregory and Haack 1965*)
*****quaking aspen—53 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*****white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*****paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*****quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*****This soil is well suited for forestry.

Livestock Grazing

Major understory species:
*****paper birch-white spruce forest—devil's club, Sitka alder, prickly rose, highbush cranberry, horsetail, oakfern, and bluejoint reedgrass
*****paper birch-spruce forest—prickly rose, Beauverd's spiraea, lingonberry, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest and paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

206—Whitsol silt loam, cool, sloping and moderately steep

Composition

Whitsol, cool, sloping soil and similar inclusions: 60 percent
Whitsol, cool, moderately steep soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Whitsol, cool, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): white spruce forest
Minor vegetation type(s): paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 27 inches (5 to 69 cm)—dark reddish brown, strong brown, and yellowish brown silt loam
*27 to 60 inches (69 to 152 cm)—dark yellowish brown and dark grayish brown stratified silt loam, fine sandy loam, and sand

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Depth to contrasting stratified silty and sandy material: 11 to 35 inches (28 to 89 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Whitsol, cool, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: shoulders, backslopes, and footslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length— 20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): white spruce forest
Minor vegetation type(s): paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 27 inches (5 to 69 cm)—dark reddish brown, strong brown, and yellowish brown silt loam
*27 to 60 inches (69 to 152 cm)—dark yellowish brown and dark grayish brown stratified silt loam, fine sandy loam, and sand

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Depth to contrasting stratified silty and sandy material: 11 to 35 inches (28 to 89 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 35 percent
*soils with very gravelly materials at less than 40 inches (less than 102 cm)
*poorly drained soils in depressions

Major Uses

Current uses: wildlife habitat
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 500 to 1500 feet (152 to 457 m)
Climatic factors (average annual):
*precipitation—25 to 30 inches (64 to 76 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—70 to 90 days
*growing degree days—1100 to 1400
Soil related factors: slope, low fertility, wind erosion, water erosion, restricted permeability, frost action, excess surface fines, and corrosivity
Ecological sites:
*Whitsol, cool, sloping soil—till deposits, high elevation
*Whitsol, cool, moderately steep soil—till deposits, high elevation

Cropland (Whitsol, cool, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Whitsol, cool, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Whitsol, cool, sloping soil)

General management considerations:
*This portion of the unit has slight limitations for homesites and shallow excavations.

*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Whitsol, cool, moderately sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites and shallow excavations due to slope.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Design and construct buildings and access roads to compensate for steep slopes.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Whitsol, cool, sloping soil)

Major tree species: white spruce and paper birch
Mean site index:
*white spruce—64 (100 year, *Farr 1967*)
*paper birch—42 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—17.2 cubic feet per acre (1.2 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species

General management considerations:
*****This soil is suited for forestry.

Forestry (Whitsol, cool, moderately steep soil)

Major tree species: white spruce and paper birch
Mean site index:
*****white spruce—64 (100 year, *Farr 1967*)
*****paper birch—42 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*****white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*****paper birch—17.2 cubic feet per acre (1.2 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*****This soil is suited for forestry.

Livestock Grazing (Whitsol, cool, sloping soil)

Major understory species:
*****white spruce forest and paper birch-white spruce forest—bluejoint reedgrass, Beauverd's spiraea, bog blueberry, lingonberry, oakfern, bunchberry dogwood, and clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*****white spruce forest and paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Whitsol, cool, moderately steep soil)

Major understory species:
*****white spruce forest and paper birch-white spruce forest—bluejoint reedgrass, Beauverd's spiraea, bog blueberry, lingonberry, oakfern, bunchberry dogwood, and clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*****white spruce forest and paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

207—Whitsol silt loam, cool, steep and sloping

Composition

Whitsol, cool, steep soil and similar inclusions: 60 percent
Whitsol, cool, sloping soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Whitsol, cool, steep and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: shoulders, backslopes, and footslopes
Slope range: 20 to 60 percent
Slope features: shape—plain or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): white spruce forest
Minor vegetation type(s): paper birch-white spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—gray silt loam
*****2 to 27 inches (5 to 69 cm)—dark reddish brown, strong brown, and yellowish brown silt loam
*****27 to 60 inches (69 to 152 cm)—dark yellowish brown and dark grayish brown stratified silt loam, fine sandy loam, and fine sand

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Depth to contrasting stratified sandy and silty material: 11 to 31 inches (28 to 79 cm)
Runoff: rapid
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Whitsol, cool, sloping and similar soils

Landform: hills and ridges (Figure 4)
Position on the landscape: crests and toeslopes
Slope range: 5 to 20 percent
Slope features: shape—convex or concave; length—50 to 150 feet (15 to 46 m)
Organic mat on surface: 2 to 4 inches (5 to 10 cm) thick
Major vegetation type(s): white spruce forest
Minor vegetation type(s): paper birch-white spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—gray silt loam
*****2 to 27 inches (5 to 69 cm)—dark reddish brown, strong brown, and yellowish brown silt loam
*****27 to 60 inches (69 to 152 cm)—dark yellowish brown and dark grayish brown stratified silt loam, fine sandy loam, and fine sand

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Depth to contrasting stratified sandy and silty material: 11 to 31 inches (28 to 79 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with very gravelly material at less than 40 inches (less than 102 cm)
*soils with slopes greater than 60 percent
*poorly drained soils in depressions

Major Uses

Current uses: wildlife habitat
Potential uses: homesites, forestry, and livestock grazing

Major Management Factors

Elevation: 500 to 1500 feet (152 to 457 m)
Climatic factors (average annual):
*precipitation—25 to 30 inches (64 to 76 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—70 to 90 days
*growing degree days—1000 to 1200
Soil related factors: slope, water erosion, wind erosion, restricted permeability, frost action, excess surface fines, and corrosivity
Ecological sites:
*Whitsol, cool, steep soil—till deposits, high elevation
*Whitsol, cool, sloping soil—till deposits, high elevation

Cropland

General management considerations:
*This unit has severe limitations for cropland and hayland due to steep slopes.

Building Site Development (Whitsol, cool, steep soil)

General management considerations:
*This portion of the unit has severe limitations for homesites and shallow excavations due to the steepness and length of slopes.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.

Suitable management practices:
*Locate roads and buildings in the more gently sloping areas of the unit.

Building Site Development (Whitsol, cool, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites and shallow excavations due to steep slopes.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for reclamation due to the low fertility of the substratum.

Suitable management practices:
*Design and construct buildings and access roads to compensate for steep slopes.
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage and provide soil strength.

Forestry (Whitsol, cool, steep soil)

Major tree species: white spruce and paper birch
Mean site index:
*white spruce—64 (100 year, *Farr 1967*)
*paper birch—42 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—17.2 cubic feet per acre (1.2 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: severe—slope, silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is poorly suited for forestry.

Forestry (Whitsol, cool, sloping soil)

Major tree species: white spruce and paper birch
Mean site index:
*white spruce—64 (100 year, *Farr 1967*)
*paper birch—42 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—20.5 cubic feet per acre (1.4 cubic m per hectare) per year at age 120
*paper birch—17.2 cubic feet per acre (1.2 cubic m per hectare) per year at age 100
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is suited for forestry.

Livestock Grazing (Whitsol, cool, steep soil)

Major understory species:
*white spruce forest and paper birch-white spruce forest—bluejoint reedgrass, Beauverd's spiraea, bog blueberry, lingonberry, oakfern, bunchberry dogwood, and clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*white spruce forest and paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is poorly suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Whitsol, cool, sloping soil)

Major understory species:
*white spruce forest and paper birch-white spruce forest—bluejoint reedgrass, Beauverd's spiraea, bog blueberry, lingonberry, oakfern, bunchberry dogwood, and clubmoss
Mean annual understory production (vascular plants, air-dry weight):
*white spruce forest and paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: severe—slope
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

208—Whitsol silt loam, silty substratum, 0 to 7 percent slopes

Composition

Whitsol, silty substratum soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Whitsol, silty substratum and similar soils

Landform: glacial outwash and till plains
Position on the landscape: all positions
Slope range: 0 to 7 percent
Slope features: shape—plain
Organic mat on surface: 1 to 7 inches (3 to 18 cm) thick
Major vegetation type(s): paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 27 inches (5 to 69 cm)—dark reddish brown, strong brown, and yellowish brown silt loam
*27 to 60 inches (69 to 152 cm)—dark yellowish brown and dark grayish brown stratified silt loam, fine sandy loam, and fine sand

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Depth to contrasting stratified sandy and silty material: 10 to 28 inches (25 to 71 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*poorly drained soils in depressions
*soils with very gravelly material at less than 40 inches (less than 102 cm)
*soils with slopes greater than 7 percent

Major Uses

Current uses: cropland and homesites
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 200 to 500 feet (61 to 152 m)
Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—80 to 100 days
*growing degree days—1300 to 1500
Soil related factors: frost action, low fertility, restricted permeability, wind erosion, corrosivity, and excess surface fines
Ecological sites:
*Whitsol, silty substratum soil—glaciofluvial deposits, 20-35 inch pz.

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to low fertility and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has slight limitations for homesites and shallow excavations.
*This unit has a high potential for frost action and a high risk of corrosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Underlay local roads with a special base to prevent frost heave damage and provide soil strength.

Forestry

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*****white spruce—69 (100 year, *Farr 1967*)
*****paper birch—50 (50 year, *Gregory and Haack 1965*)
*****quaking aspen—53 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*****white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*****paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*****quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*****This soil is well suited for forestry.

Livestock Grazing

Major understory species:
*****paper birch-white spruce forest—devil's club, Sitka alder, prickly rose, highbush cranberry, horsetail, oakfern, and bluejoint reedgrass
*****paper birch-spruce forest—prickly rose, Beauverd's spiraea, lingonberry, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest and paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

209—Whitsol silt loam, silty substratum, sloping and moderately steep

Composition

Whitsol, silty substratum, sloping soil and similar inclusions: 60 percent
Whitsol, silty substratum, moderately steep soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Whitsol, silty substratum, sloping and similar soils

Landform: hills, ridges, and outwash plains (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 27 inches (5 to 69 cm)—dark reddish brown, strong brown, and yellowish brown silt loam
*27 to 60 inches (69 to 152 cm)—dark yellowish brown and dark grayish brown stratified silt loam, fine sandy loam, and fine sand

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Depth to stratified silty and sandy material for the Whitsol soil: 14 to 35 inches (36 to 89 cm)
Depth to stratified silty and sandy material for the map unit component: 11 to 35 inches (28 to 89 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Whitsol, silty substratum, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: shoulders, backslopes, and footslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 27 inches (5 to 69 cm)—dark reddish brown, strong brown, and yellowish brown silt loam
*27 to 60 inches (69 to 152 cm)—dark yellowish brown and dark grayish brown stratified silt loam, fine sandy loam, and sand

Drainage class: well drained
Permeability: moderate
Available water capacity: high
Depth to stratified silty and sandy material for the Whitsol soil: 14 to 35 inches (36 to 89 cm)
Depth to stratified silty and sandy material for the map unit component: 11 to 35 inches (28 to 89 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 35 percent
*soils with very gravelly material at less than 40 inches (less than 102 cm)
*poorly drained soils in depressions

Major Uses

Current uses: wildlife habitat
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 200 to 500 feet (61 to 152 m)
Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—80 to 100 days
*growing degree days—1300 to 1500
Soil related factors: slope, low fertility, wind erosion, water erosion, restricted permeability, frost action, excess surface fines, and corrosivity
Ecological sites:
*Whitsol, sloping soil—glaciofluvial deposits, 20-35 inch pz.
*Whitsol, moderately steep soil—glaciofluvial deposits, 20-35 inch pz.

Cropland (Whitsol, silty substratum, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland and hayland due to slope, low soil fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Whitsol, silty substratum, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion

hazard.
*Add lime to improve soil fertility.

Building Site Development (Whitsol, silty substratum, sloping soil)

General management considerations:
*This portion of the unit has slight limitations for homesites and shallow excavations.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Whitsol, silty substratum, moderately sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites and shallow excavations due to slope.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Design and construct buildings and access roads to compensate for steep slopes.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Whitsol, silty substratum, sloping soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen

Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.

Forestry (Whitsol, silty substratum, moderately steep soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is suited for forestry.

Livestock Grazing (Whitsol, silty substratum, sloping soil)

Major understory species:
*paper birch-white spruce forest—devil's club, Sitka alder, prickly rose, highbush cranberry, horsetail, oakfern, and bluejoint reedgrass
*paper birch-spruce forest—prickly rose, Beauverd's spiraea, lingonberry, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Whitsol, silty substratum, moderately steep soil)

Major understory species:
*paper birch-white spruce forest—devil's club, Sitka alder, prickly rose, highbush cranberry, horsetail, oakfern, and bluejoint reedgrass

Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

210—Whitsol silt loam, till substratum, sloping and moderately steep

Composition

Whitsol, till substratum, sloping soil and similar inclusions: 60 percent
Whitsol, till substratum, moderately steep soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Whitsol, till substratum, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—undulating or convex; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—gray silt loam
*****2 to 26 inches (5 to 66 cm)—dark reddish brown silt loam
*****26 to 55 inches (66 to 140 cm)—dark brown stratified silt loam, fine sandy loam, and fine sand
*****55 to 60 inches (140 to 152 cm)—dark grayish brown very gravelly sandy loam

Drainage class: well drained
Permeability: in the loamy surface layers—moderate; in the very gravelly loam material—moderate or moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting sandy and silty material: 11 to 23 inches (28 to 58 cm)
Depth to contrasting very gravelly and very cobbly material: 34 to 60 inches (86 to 152 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Whitsol, till substratum, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)

Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 26 inches (5 to 66 cm)—dark reddish brown silt loam
*26 to 55 inches (66 to 140 cm)—dark brown stratified silt loam, fine sandy loam, and fine sand
*55 to 60 inches (140 to 152 cm)—dark grayish brown very gravelly sandy loam

Drainage class: well drained
Permeability: in the loamy surface layers—moderate; in the very gravelly sandy loam material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting stratified sandy and silty material: 11 to 23 inches (28 to 58 cm)
Depth to contrasting very gravelly and very cobbly material: 34 to 60 inches (86 to 152 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 35 percent
*poorly drained soils in depressions
*occasional surface boulders

Major Uses

Current uses: homesites and wildlife habitat
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 200 to 500 feet (61 to 152 m)
Climatic factors (average annual):
*precipitation—20 to 25 inches (51 to 64 cm)
*air temperature—33 to 35 °F (1 to 2 °C)
*frost free season—80 to 100 days
*growing degree days—1300 to 1500
Soil related factors: slope, wind erosion, water erosion, restricted permeability, frost action, low fertility, corrosivity, excess surface fines, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Whitsol, till substratum, sloping soil—glaciofluvial deposits, 20-35 inch pz.
*Whitsol, till substratum, moderately steep soil—glaciofluvial deposits, 20-35 inch pz.

Cropland (Whitsol, till substratum, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.

*Occasional surface stones limit some fieldwork.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Whitsol, till substratum, moderately steep soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.

Building Site Development (Whitsol, till substratum, sloping soil)

General management considerations:
*This portion of the unit has slight limitations for homesites and moderate limitations for shallow excavations due to the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.

*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage and provide soil strength.

Building Site Development (Whitsol, till substratum, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Design and construct buildings and access roads to compensate for steep slopes.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage and provide soil strength.

Forestry (Whitsol, till substratum, sloping soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.

Forestry (Whitsol, till substratum, moderately steep soil)

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen

Mean site index:
*****white spruce—69 (100 year, *Farr 1967*)
*****paper birch—50 (50 year, *Gregory and Haack 1965*)
*****quaking aspen—53 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*****white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*****paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*****quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*****This soil is suited for forestry.

Livestock Grazing (Whitsol, till substratum, sloping soil)

Major understory species:
*****paper birch-white spruce forest—devil's club, Sitka alder, prickly rose, highbush cranberry, horsetail, oakfern, and bluejoint reedgrass
*****paper birch-spruce forest—prickly rose, Beauverd's spiraea, lingonberry, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest and paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Whitsol, till substratum, moderately steep soil)

Major understory species:
*****paper birch-white spruce forest—devil's club, Sitka alder, prickly rose, highbush cranberry, horsetail, oakfern, and bluejoint reedgrass
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-white spruce forest—not estimated
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is suited for livestock grazing.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

211—Whitsol silt loam, till substratum, undulating

Composition

Whitsol, till substratum soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Whitsol, till substratum and similar soils

Landform: till plains (Figure 3)

Position on the landscape: all positions
Slope range: 0 to 12 percent
Slope features: shape—undulating; length—100 to 400 feet (30 to 122 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—gray silt loam
*****2 to 26 inches (5 to 66 cm)—dark reddish brown silt loam
*****26 to 55 inches (66 to 140 cm)—dark brown stratified silt loam, fine sandy loam, and fine sand
*****55 to 60 inches (140 to 152 cm)—dark grayish brown very gravelly sandy loam

Drainage class: well drained
Permeability: in the surface layers—moderate; in the very gravelly loam material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting stratified sandy and silty material: 11 to 23 inches (28 to 58 cm)
Depth to contrasting very gravelly and very cobbly material: 34 to 60 inches (86 to 152 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****poorly drained soils in depressions
*****soils with slopes greater than 12 percent
*****occasional surface boulders

Major Uses

Current uses: homesites and cropland
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 200 to 500 feet (61 to 152 m)
Climatic factors (average annual):
*****precipitation—20 to 25 inches (51 to 64 cm)
*****air temperature—33 to 35 °F (1 to 2 °C)
*****frost free season—80 to 100 days
*****growing degree days—1300 to 1500
Soil related factors: wind erosion, water erosion, frost action, restricted permeability, excess surface fines, corrosivity, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*****Whitsol, till substratum soil—glaciofluvial deposits, 20-35 inch pz.

Cropland

General management considerations:
*****This unit has moderate limitations for cropland and hayland due to slope, low fertility, and

relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has slight limitations for homesites and moderate limitations for shallow excavations due to the dense nature of the substratum.
*This unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage and provide soil strength.

Forestry

Major tree species: white spruce and paper birch
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)
*quaking aspen—53 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110

*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*quaking aspen—43.9 cubic feet per acre (3.1 cubic m per hectare) per year at age 95
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—high available moisture, competitive species
General management considerations:
*This soil is well suited for forestry.

Livestock Grazing

Major understory species:
*paper birch-white spruce forest—devil's club, Sitka alder, prickly rose, highbush cranberry, horsetail, oakfern, and bluejoint reedgrass
*paper birch-spruce forest—prickly rose, Beauverd's spiraea, lingonberry, bunchberry dogwood, clubmoss, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce forest and paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

212—Yensus silt loam, 0 to 2 percent slopes

Composition

Yensus soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Yensus and similar soils

Landform: glacial outwash plains and stream terraces
Position on the landscape: all positions
Slope range: 0 to 2 percent
Slope features: shape—plain
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—very dark brown silt loam
*2 to 36 inches (5 to 91 cm)—dark yellowish brown, dark grayish brown, and dark brown silt loam
*36 to 60 inches (91 to 152 cm)—variegated extremely gravelly coarse sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: high
Depth to contrasting very gravelly material: 20 to 43 inches (51 to 109 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however,

saturated conditions may occur over seasonal frost for a brief period during late April or May

Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed

Hazard of flooding: none

Included Areas

*****soils with very gravelly material at less than 20 inches (less than 51 cm)
*****depressions that are temporarily ponded during spring
*****soils with slopes greater than 2 percent

Major Uses

Current uses: homesites, cropland, hayland and pastureland, and gravel source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 300 feet (15 to 91 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: wind erosion, excessive permeability, depth to gravel, frost action, ponding over seasonal frost during spring, cutbank instability, excess surface fines, and corrosivity
Ecological sites:
*****Yensus soil—silty slopes

Cropland

General management considerations:
*****This unit has moderate limitations for cropland and hayland due to relatively high late summer precipitation.
*****Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.
*****Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*****Land clearing and tillage operations increase wind erosion hazard.

Suitable management practices:
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Use permanent grass cover or native vegetation in depressions that pond water during spring.
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Excavation can expose soil material that is highly susceptible to wind erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint

reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is well suited for livestock grazing.
*Frozen soils result in a shallow, perched water table and surface ponding in many areas in spring.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

213—Yensus silt loam, sloping and moderately steep

Composition

Yensus, sloping soil and similar inclusions: 55 percent
Yensus, moderately steep soil and similar inclusions: 35 percent
Contrasting inclusions: 10 percent

Characteristics of Yensus, sloping and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: crests, toeslopes, and undulating areas between hills and ridges
Slope range: 2 to 12 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—very dark brown silt loam
*2 to 36 inches (5 to 91 cm)—dark yellowish brown, dark grayish brown, and dark brown silt loam
*36 to 60 inches (91 to 152 cm)—variegated extremely gravelly coarse sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: high
Depth to contrasting very gravelly material: 22 to 43 inches (56 to 109 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Yensus, moderately steep and similar soils

Landform: hills and ridges (Figure 2)
Position on the landscape: backslopes and footslopes
Slope range: 12 to 35 percent
Slope features: shape—plain or convex; length—20 to 100 feet (6 to 30 m)

Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—very dark brown silt loam
*2 to 36 inches (5 to 91 cm)—dark yellowish brown, dark grayish brown, and dark brown silt loam
*36 to 60 inches (91 to 152 cm)—variegated extremely gravelly coarse sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: high
Depth to contrasting very gravelly material: 22 to 43 inches (56 to 109 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 35 percent
*poorly drained soils in depressions
*soils with very gravelly material at less than 20 inches (less than 51 cm)

Major Uses

Current uses: cropland, wildlife habitat, and homesites
Potential uses: forestry and livestock

Major Management Factors

Elevation: 50 to 200 feet (15 to 61 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: slope, water erosion, wind erosion, excessive permeability, cutbank instability, excess surface fines, corrosivity, and frost action
Ecological sites:
*Yensus, sloping soil—silty slopes
*Yensus, moderately steep soil—silty slopes

Cropland (Yensus, sloping soil)

General management considerations:
*This portion of the unit has moderate limitations for cropland and hayland due to slope and relatively high late summer precipitation.
*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:

*Use permanent grass cover or native vegetation in depressions that pond water during spring.

*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.

*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.

*Use shallow cuts during land smoothing to avoid exposing gravelly outwash underlying material.

*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Yensus, moderately steep soil)

General management considerations:

*This portion of the unit has severe limitations for cropland due to steep slopes.

*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.

*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.

Suitable management practices:

*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.

*Use permanent grass cover or native vegetation in depressions that pond water during spring.

*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.

*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.

Building Site Development (Yensus, sloping soil)

General management considerations:

*This portion of the unit has severe limitations for shallow excavations due to cutbank instability.

*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.

*Temporary ponding over annual frost occurs in depressional areas during spring.

*Excavation can expose soil material that is highly susceptible to wind and water erosion.

*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.

*The quality of roadbeds and road surfaces can be adversely affected by frost action.

*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.

*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:

*Install a sand filter below septic absorption lines to reduce permeability.

*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.

*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Yensus, moderately steep soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.
*This portion of the unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this portion of the unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Design and construct buildings and access roads to compensate for steep slopes.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Yensus, sloping soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.

*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Yensus, moderately steep soil)

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Yensus, sloping soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is well suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Yensus, moderately steep soil)

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: severe—slope, frost action
Limitations to uniform distribution of livestock: moderate—slope

General management considerations:
*This soil is suited for livestock grazing.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

214—Yensus silt loam, undulating

Composition

Yensus soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Yensus and similar soils

Landform: glacial outwash plains (Figure 3)
Position on the landscape: all positions
Slope range: 0 to 10 percent
Slope features: shape—undulating; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch-white spruce/bluejoint reedgrass-horsetail forest and paper birch/bluejoint reedgrass-horsetail forest
Minor vegetation type(s): paper birch-balsam poplar/bluejoint reedgrass-horsetail forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—very dark brown silt loam
*2 to 36 inches (5 to 91 cm)—dark yellowish brown, dark grayish brown, and dark brown silt loam
*36 to 60 inches (91 to 152 cm)—variegated extremely gravelly coarse sand

Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Available water capacity: high
Depth to contrasting very gravelly material: 20 to 43 inches (51 to 109 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with very gravelly material at less than 20 inches (less than 51 cm)
*depressions that are temporarily ponded during spring
*soils with slopes greater than 10 percent

Major Uses

Current uses: homesites, cropland, hayland and pastureland, and gravel source
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 20 to 300 feet (6 to 91 m)

Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: wind erosion, water erosion, excessive permeability, depth to gravel, slope, frost action, excess surface fines, cutbank instability, and corrosivity
Ecological sites:
*Yensus soil—silty slopes

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to slope and relatively high late summer precipitation.
*Temporary ponding over annual frost occurs in depressional areas during spring, often delaying access to fields and postponing crop establishment.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use permanent grass cover or native vegetation in depressions that pond water during spring.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has severe limitations for shallow excavations due to cutbank instability.
*This unit has a high potential for frost action and a moderate risk of corrosion.
*Temporary ponding over annual frost occurs in depressional areas during spring.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The rapid permeability of the substratum may allow effluent from moderate or high density housing to pollute the water table.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high gravel content of the substratum.
*The substratum material from this unit is a probable source of gravel and sand.

Suitable management practices:
*Install a sand filter below septic absorption lines to reduce permeability.
*Avoid constructing buildings in depressions and provide drainage outlets for roads that cross depressions to reduce water damage to structures and roads during spring.
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion

hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch, white spruce, and balsam poplar
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—45 (50 year, *Gregory and Haack 1965*)
*balsam poplar—72 (estimated, 50 year, *B. C. Forest Service 1979*)
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—19.8 cubic feet per acre (1.4 cubic m per hectare) per year at age 95
*balsam poplar—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—bluejoint reedgrass, horsetail, highbush cranberry, prickly rose, red currant, common fireweed, tall bluebells, oakfern, bunchberry dogwood, and arctic starflower
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-white spruce/bluejoint reedgrass-horsetail forest, paper birch/bluejoint reedgrass-horsetail forest, and paper birch-balsam poplar/bluejoint reedgrass-horsetail forest—3200 pounds per acre (3585 kilograms per hectare)
Soil limitation(s) for fencing: moderate—frost action
Limitations to uniform distribution of livestock: slight
General management considerations:
*This soil is well suited for livestock grazing.
*Frozen soils result in a shallow, perched water table and surface ponding in many areas in spring.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

215—Yohn silt loam, 0 to 5 percent slopes

Composition

Yohn soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Characteristics of Yohn and similar soils

Landform: glacial till plains
Position on the landscape: all positions
Slope range: 0 to 5 percent
Slope features: shape—plain
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*****2 to 7 inches (5 to 18 cm)—yellowish red and strong brown very fine sandy loam
*****7 to 32 inches (18 to 81 cm)—stratified dark yellowish brown fine sand and silt
*****32 to 60 inches (81 to 152 cm)—dark grayish brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silty and stratified sandy and silty surface layers—moderate; in the cobbly and gravelly material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 17 to 50 inches (43 to 127 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, slight if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with very gravelly material at less than 10 inches (less than 25 cm)
*****poorly drained soils in depressions
*****soils with slopes greater than 5 percent

Major Uses

Current uses: wildlife habitat, homesites, and cropland
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 300 feet (15 to 91 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: restricted permeability, wind erosion, frost action, low fertility, corrosivity, excess surface fines, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*****Yohn soil—till deposits, 15-25 inch pz.

Cropland

General management considerations:
*This unit has moderate limitations for cropland and hayland due to low fertility and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Land clearing and tillage operations increase wind and water erosion hazard.
*Occasional surface stones limit some fieldwork.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Add lime to improve soil fertility.
*Use shallow cuts during land smoothing to avoid exposing gravelly underlying material.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has moderate limitations for homesites and shallow excavations due to the dense nature of the substratum.
*This unit has a moderate potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*The substratum material from this unit is a probable source of roadfill.
*Only the silty surface material is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch and white spruce
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—74 (100 year, *Farr 1967*)
*paper birch—55 (50 year, *Gregory and Haack 1965*)

Estimated growth at culmination of mean annual increment:
*white spruce—27.7 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—31.8 cubic feet per acre (2.2 cubic m per hectare) per year at age 85
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
*paper birch-spruce forest—Labrador tea ledum, lingonberry, bog blueberry, bunchberry dogwood, black crowberry, American twinflower, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
*paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy
Limitations to uniform distribution of livestock: slight
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

216—Yohn silt loam, rolling

Composition

Yohn soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Characteristics of Yohn and similar soils

Landform: till plains (Figure 3)
Position on the landscape: all positions
Slope range: 2 to 16 percent
Slope features: shape—rolling; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 3 inches (3 to 8 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 7 inches (5 to 18 cm)—yellowish red and strong brown very fine sandy loam
*7 to 32 inches (18 to 81 cm)—stratified dark yellowish brown fine sand and silt
*32 to 60 inches (81 to 152 cm)—dark grayish brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silty and sandy surface—moderate; in the gravelly and cobbly material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 17 to 50 inches (43 to 127 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 16 percent
*****poorly drained soils in depressions

Major Uses

Current uses: homesites and wildlife habitat
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free period—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: restricted permeability, wind erosion, water erosion, slope, frost action, low fertility, excess surface fines, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*****Yohn soil—till deposits, 15-25 inch pz.

Cropland

General management considerations:
*****This unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.
*****Suitable crops for planting are timothy grass and oats and barley as forage.
*****Occasional surface stones limit some fieldwork.
*****Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*****Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*****Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*****Add lime to improve soil fertility.
*****Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*****Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*****Use shallow cuts during land smoothing to avoid exposing gravelly till underlying

material.
*Avoid the cultivation of grain crops on slopes in excess of 12 percent to reduce water erosion hazard.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development

General management considerations:
*This unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to the dense nature of the substratum.
*This unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry

Major tree species: paper birch and white spruce
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—74 (100 year, *Farr 1967*)
*paper birch—55 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—27.7 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—31.8 cubic feet per acre (2.2 cubic m per hectare) per year at age 85
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant,

horsetail, and bunchberry dogwood
*paper birch-spruce forest—Labrador tea ledum, lingonberry, bog blueberry, bunchberry dogwood, black crowberry, American twinflower, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
*paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

217—Yohn-Deception complex, rolling

Composition

Yohn soil and similar inclusions: 70 percent
Deception soil and similar inclusions: 20 percent
Contrasting inclusions: 10 percent

Characteristics of Yohn and similar soils

Landform: till plains (Figure 3)
Position on the landscape: all positions
Slope range: 2 to 15 percent
Slope features: shape—rolling; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*2 to 7 inches (5 to 18 cm)—yellowish red and strong brown very fine sandy loam
*7 to 32 inches (18 to 81 cm)—stratified dark yellowish brown fine sand and silt
*32 to 60 inches (81 to 152 cm)—dark grayish brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silty and stratified sandy and silty surface material—moderate; in the very cobbly and very gravelly material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 16 to 45 inches (41 to 114 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Deception and similar soils

Landform: till plains (Figure 3)
Position on the landscape: all positions

Slope range: 2 to 15 percent
Slope features: shape—rolling; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 5 inches (3 to 13 cm) thick
Major vegetation type(s): paper birch-spruce forest and paper birch forest
Minor vegetation type(s): black spruce forest

Typical profile:
*****0 to 1 inch (0 to 3 cm)—dark grayish brown silt loam
*****1 to 5 inches (3 to 13 cm)—brown silt loam
*****5 to 60 inches (13 to 152 cm)—dark yellowish brown and dark grayish brown very cobbly sandy loam and very gravelly loam

Drainage class: well drained
Permeability: in the silty surface layer—moderate; in the gravelly and cobbly material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: moderate
Depth to contrasting very gravelly and very cobbly material: 4 to 13 inches (10 to 33 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*****soils with slopes greater than 15 percent
*****soils with very gravelly material at less than 10 inches (less than 25 cm)
*****soils with sandy material at less than 40 inches (less than 102 cm)
*****poorly drained soils in depressions

Major Uses

Current uses: homesites, cropland, and pastureland
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 200 to 600 feet (61 to 183 m)
Climatic factors (average annual):
*****precipitation—15 to 20 inches (38 to 51 cm)
*****air temperature—34 to 36 °F (1 to 2 °C)
*****frost free season—90 to 110 days
*****growing degree days—1300 to 1500
Soil related factors: slope, water erosion, wind erosion, frost action, restricted permeability, corrosivity, low fertility, excess surface fines, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*****Yohn soil—till deposits, 15-25 inch pz.
*****Deception soil—till deposits, thin surface

Cropland (Yohn soil)

General management considerations:
*****This portion of the unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.

*Suitable crops for planting are timothy grass, oats and barley as forage, and potatoes and cole crops.
*Occasional surface stones limit some fieldwork.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.
*Avoid the cultivation of grain crops on slopes in excess of 12 percent to reduce water erosion hazard.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Cropland (Deception soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to the shallow depth to gravelly and cobbly glacial till material.
*This portion of the unit is best suited to permanent hayland and pastureland due to the shallow depth to gravelly and cobbly glacial till material.
*Occasional surface stones limit some fieldwork.
*Land clearing and tillage operations increase wind and water erosion hazard.
*Hay crops respond well to fertilizer if precipitation is adequate.

Suitable management practices:
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development (Yohn soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted

permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.
*The substratum material from this portion of the unit is a probable source of roadfill.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Deception soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This portion of the unit has a moderate potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Yohn soil)

Major tree species: paper birch and white spruce
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—74 (100 year, *Farr 1967*)
*paper birch—55 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—27.7 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—31.8 cubic feet per acre (2.2 cubic m per hectare) per year at age 85

Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*****This soil is well suited for forestry.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Deception soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*****white spruce—56 (estimated, 100 year, *Farr 1967*)
*****paper birch—46 (estimated, 50 year)
*****black spruce—not estimated
Estimated growth at culmination of mean annual increment:
*****white spruce—15.6 cubic feet per acre (1.1 cubic m per hectare) per year at age 140
*****paper birch—20.8 cubic feet per acre (1.8 cubic m per hectare) per year at age 95
*****black spruce—not estimated
Soil limitation(s) for equipment use: moderate—silt, cobbles
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—high available moisture
General management considerations:
*****This soil is suited for forestry.

Livestock Grazing (Yohn soil)

Major understory species:
*****paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
*****paper birch-spruce forest—Labrador tea ledum, lingonberry, bog blueberry, bunchberry dogwood, black crowberry, American twinflower, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
*****paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Deception soil)

Major understory species:
*****paper birch-spruce forest, paper birch forest, and black spruce forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch-spruce forest, paper birch forest, and black spruce forest—not estimated

Soil limitation(s) for fencing: severe—too cobbly, slope
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*****This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

218—Yohn-Delyndia complex, hilly

Composition

Yohn soil and similar inclusions: 60 percent
Delyndia soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Yohn and similar soils

Landform: hills (Figure 2)
Position on the landscape: all positions
Slope range: 10 to 25 percent
Slope features: shape—plain to convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 6 inches (3 to 15 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*****0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam
*****2 to 7 inches (5 to 18 cm)—yellowish red and strong brown very fine sandy loam
*****7 to 32 inches (18 to 81 cm)—stratified dark yellowish brown fine sand and silt
*****32 to 60 inches (81 to 152 cm)—dark grayish brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silt loam, very fine sandy loam, and stratified layers—moderate; in the very cobbly and very gravelly till material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 18 to 40 inches (46 to 102 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Delyndia and similar soils

Landform: hills (Figure 2)
Position on the landscape: all positions
Slope range: 10 to 25 percent
Slope features: shape—plain to convex; length—20 to 100 feet (6 to 30 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch-white spruce forest, paper birch forest, and black spruce forest
Minor vegetation type(s): mixed broadleaf forest

Typical profile:
*****0 to 4 inches (0 to 10 cm)—grayish brown, strong brown, and yellowish brown silt loam

*4 to 60 inches (10 to 152 cm)—strong brown and dark yellowish brown stratified loamy sand, sand, and gravelly coarse sand

Drainage class: well drained
Permeability: in the silty surface layer—moderate; below this—moderately rapid
Available water capacity: low
Depth to contrasting sandy material: 5 to 13 inches (13 to 33 cm)
Runoff: medium
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, severe if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 25 percent
*soils with very gravelly material at less than 10 inches (less than 25 cm)
*poorly drained soils in depressions

Major Uses

Current uses: homesites, wildlife habitat, and sand source areas
Potential uses: forestry and livestock grazing

Major Management Factors

Elevation: 50 to 500 feet (15 to 152 m)
Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: low available water capacity, slope, wind erosion, water erosion, frost action, restricted permeability, excess surface fines, excess sand in substratum, corrosivity, low fertility, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Yohn soil—till deposits, 15-25 inch pz.
*Delyndia soil—glaciofluvial deposits, 15-25 inch pz.

Cropland (Yohn soil)

General management considerations:
*This portion of the unit has severe limitations for cropland due to steep slopes.
*This portion of the unit is best suited to permanent hayland and pastureland due to steep slopes and the associated severe erosion hazard.
*Occasional surface stones limit some fieldwork

Suitable management practices:
*Leave native vegetation intact on slopes greater than 20 percent to reduce water erosion hazard.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Add lime to improve soil fertility.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing

wind direction to reduce wind erosion hazard during clearing.

Cropland (Delyndia soil)

General management considerations:

*This portion of the unit has severe limitations for cropland due to slope and low available water capacity.
*This portion of the unit is best suited to permanent hayland and pastureland due to the shallow depth to sandy material and slope.
*Land clearing and tillage operations increase the hazard of wind and water erosion

Suitable management practices:

*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing sandy outwash underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development (Yohn soil)

General management considerations:

*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:

*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Reduce erosion in steeper areas by disturbing only the part of the site that is used for construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.
*Design and construct buildings and access roads to compensate for steep slopes.

Building Site Development (Delyndia soil)

General management considerations:

*This portion of the unit has moderate limitations for homesites due to slope, and severe limitations for shallow excavations due to cutbank instability.

*This portion of the unit has a low potential for frost action and a high risk of corrosion.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty surface material is suitable for revegetation due to the high sand content.
*This portion of the unit is a probable source of sand.

Suitable management practices:
*Install gently sloping grades on cutbanks and excavations to reduce the risk of caving.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.
*Design and construct buildings and access roads to compensate for steep slopes.

Forestry (Yohn soil)

Major tree species: paper birch and white spruce
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—74 (100 year, *Farr 1967*)
*paper birch—55 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—27.7 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—31.8 cubic feet per acre (2.2 cubic m per hectare) per year at age 85
Soil limitation(s) for equipment use: moderate—silt, slope
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Delyndia soil)

Major tree species: paper birch, black spruce, and white spruce
Minor tree species: quaking aspen
Mean site index:
*white spruce—69 (estimated, 100 year, *Farr 1967*)
*paper birch—50 (estimated, 50 year, *Gregory and Haack 1965*)
*black spruce—not estimated
Estimated growth at culmination of mean annual increment:
*white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
*black spruce—not estimated
Soil limitation(s) for equipment use: moderate—texture
Seedling mortality: severe—shallow
Windthrow hazard: severe—shallow
Plant competition: moderate—competitive species
General management considerations:
*This soil is well suited for forestry.

Livestock Grazing (Yohn soil)

Major understory species:
*paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
*paper birch-spruce forest—Labrador tea ledum, lingonberry, bog blueberry, bunchberry dogwood, black crowberry, American twinflower, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
*paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: severe—slope, too sandy
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Delyndia soil)

Major understory species:
*paper birch-spruce forest, paper birch forest, black spruce forest, and mixed broadleaf forest—Labrador tea ledum, lingonberry, bunchberry dogwood, common fireweed, Bebb's willow, northern comandra, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*paper birch-spruce forest, paper birch forest, black spruce forest, and mixed broadleaf forest —not estimated
Soil limitation(s) for fencing: severe—slope, too sandy
Limitations to uniform distribution of livestock: moderate—slope
General management considerations:
*This soil is poorly suited for livestock grazing due to the low abundance of suitable forage plants.

219—Yohn-Flat Horn complex, rolling

Composition

Yohn soil and similar inclusions: 60 percent
Flat Horn soil and similar inclusions: 30 percent
Contrasting inclusions: 10 percent

Characteristics of Yohn and similar soils

Landform: till plains (Figure 3)
Position on the landscape: backslopes, shoulders, and crests
Slope range: 0 to 12 percent
Slope features: shape—undulating to rolling; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—dark grayish brown silt loam

*2 to 7 inches (5 to 18 cm)—yellowish red and strong brown very fine sandy loam
*7 to 32 inches (18 to 81 cm)—stratified dark yellowish brown fine sand and silt
*32 to 60 inches (81 to 152 cm)—dark grayish brown very cobbly and very gravelly loam

Drainage class: well drained
Permeability: in the silty and stratified sandy and silty surface layers—moderate; in the cobbly and gravelly material—moderate to moderately slow; permeability rates in substratum materials vary considerably over short distances
Available water capacity: high
Depth to contrasting very gravelly and very cobbly material: 16 to 40 inches (41 to 102 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Characteristics of Flat Horn and similar soils

Landform: till plains (Figure 3)
Position on the landscape: footslopes and toeslopes
Slope range: 0 to 12 percent
Slope features: shape—undulating or rolling; length—50 to 300 feet (15 to 91 m)
Organic mat on surface: 1 to 4 inches (3 to 10 cm) thick
Major vegetation type(s): paper birch forest and paper birch-white spruce forest
Minor vegetation type(s): paper birch-spruce forest

Typical profile:
*0 to 2 inches (0 to 5 cm)—gray silt loam
*2 to 9 inches (5 to 23 cm)—reddish brown, brown, and strong brown silt loam
*9 to 60 inches (23 to 152 cm)—stratified olive brown and olive silt through fine sand

Drainage class: well drained
Permeability: moderate
Available water capacity: moderate
Depth to contrasting stratified sand and silt material: 8 to 14 inches (20 to 36 cm)
Runoff: slow
Depth to seasonally high water table: more than 5 feet (more than 1.5 m)
Hazard of erosion: by water—slight if organic mat is not removed, moderate if the mat is removed; by wind—slight if organic mat is not removed, severe if the mat is removed
Hazard of flooding: none

Included Areas

*soils with slopes greater than 12 percent
*soils with very gravelly materials at less than 40 inches (less than 102 cm)
*poorly drained soils in depressions

Major Uses

Current uses: homesites and wildlife habitat
Potential uses: cropland, forestry, and livestock grazing

Major Management Factors

Elevation: 50 to 400 feet (15 to 122 m)

Climatic factors (average annual):
*precipitation—15 to 20 inches (38 to 51 cm)
*air temperature—34 to 36 °F (1 to 2 °C)
*frost free season—90 to 110 days
*growing degree days—1300 to 1500
Soil related factors: wind erosion, water erosion, restricted permeability, frost action, slope, low fertility, excess surface fines, corrosivity, depth to gravelly and cobbly material, and dense substratum
Ecological sites:
*Yohn soil—till deposits, 15-25 inch pz.
*Flat Horn soil—glaciofluvial deposits, 15-25 inch pz.

Cropland

General management considerations:
*This portion of the unit has moderate limitations for cropland and hayland due to slope, low fertility, and relatively high late summer precipitation.
*Suitable crops for planting are timothy grass and oats and barley as forage.
*Occasional surface stones limit some fieldwork.
*Land clearing and tillage operations increase wind and water erosion hazard.

Suitable management practices:
*Maintain adequate surface crop residue and use conservation cropping sequences during field operations to conserve moisture and reduce wind and water erosion hazard.
*Incorporate organic matter left following clearing operations into the soil surface to improve soil tilth and increase moisture-holding capacity.
*Add lime to improve soil fertility.
*Clear land in the winter or early spring while the ground surface is frozen to minimize soil displacement.
*Use cross slope or contour tillage during planting operations to reduce water erosion hazard.
*Use shallow cuts during land smoothing to avoid exposing gravelly till underlying material.
*Leave planned strips of trees and other existing vegetation perpendicular to the prevailing wind direction to reduce wind erosion hazard during clearing.

Building Site Development (Yohn soil)

General management considerations:
*This portion of the unit has moderate limitations for homesites due to slope and cobbles, and moderate limitations for shallow excavations due to slope and the dense nature of the substratum.
*This portion of the unit has a high potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*Excavation is hampered by cobbles in the soil and the dense nature of the substratum consistence.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.
*Only the silty mantle is suitable for revegetation due to the low fertility and dense nature of the substratum.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.

*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Building Site Development (Flat Horn soil)

General management considerations:
*This portion of the unit has slight limitations for homesites and moderate limitations for shallow excavations due to slope.
*This portion of the unit has a moderate potential for frost action and a high risk of corrosion.
*Untreated effluent can move along the surface of the restrictive layer and seep in downslope areas, creating a health hazard.
*Septic tank adsorption fields can be expected to function poorly because of the restricted permeability of the soil.
*Excavation can expose soil material that is highly susceptible to wind and water erosion.
*The quality of roadbeds and road surfaces can be adversely affected by frost action.

Suitable management practices:
*Increase the size of the absorption area to compensate for the restricted permeability.
*Revegetate disturbed areas at construction sites as soon as possible to reduce erosion hazard.
*Stockpile topsoil and use it to reclaim areas disturbed during construction.
*Install footings below the frostline to overcome the risk of frost action.
*Remove silty surface layers from local roads and underlay with a special base to prevent frost heave damage.

Forestry (Yohn soil)

Major tree species: paper birch and white spruce
Minor tree species: black spruce and quaking aspen
Mean site index:
*white spruce—74 (100 year, *Farr 1967*)
*paper birch—55 (50 year, *Gregory and Haack 1965*)
Estimated growth at culmination of mean annual increment:
*white spruce—27.7 cubic feet per acre (1.9 cubic m per hectare) per year at age 100
*paper birch—31.8 cubic feet per acre (2.2 cubic m per hectare) per year at age 85
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: severe—competitive species
General management considerations:
*This soil is well suited for forestry.
*When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Forestry (Flat Horn soil)

Major tree species: paper birch and white spruce
Minor tree species: black spruce, quaking aspen, and balsam poplar
Mean site index:
*white spruce—69 (100 year, *Farr 1967*)
*paper birch—50 (50 year, *Gregory and Haack 1965*)

Estimated growth at culmination of mean annual increment:
*****white spruce—24.0 cubic feet per acre (1.7 cubic m per hectare) per year at age 110
*****paper birch—25.2 cubic feet per acre (1.8 cubic m per hectare) per year at age 90
Soil limitation(s) for equipment use: moderate—silt
Seedling mortality: slight
Windthrow hazard: moderate—shallow rooted trees
Plant competition: moderate—competitive species
General management considerations:
*****This soil is well suited for forestry.
*****When the forest canopy is removed and the ground surface disturbed, bluejoint reedgrass tends to dominate this soil and inhibit successful tree regeneration.

Livestock Grazing (Yohn soil)

Major understory species:
*****paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
*****paper birch-spruce forest—Labrador tea ledum, lingonberry, bog blueberry, bunchberry dogwood, black crowberry, American twinflower, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch forest and paper birch-white spruce forest—2400 pounds per acre (2690 kilograms per hectare)
*****paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy
Limitations to uniform distribution of livestock: moderate—short, steep slopes
General management considerations:
*****The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

Livestock Grazing (Flat Horn soil)

Major understory species:
*****paper birch forest and paper birch-white spruce forest—alder, devil's club, highbush cranberry, prickly rose, bluejoint reedgrass, oakfern, common fireweed, currant, horsetail, and bunchberry dogwood
*****paper birch-spruce forest—Labrador tea ledum, lingonberry, bog blueberry, bunchberry dogwood, black crowberry, American twinflower, and feathermoss
Mean annual understory production (vascular plants, air-dry weight):
*****paper birch forest, paper birch-white spruce forest, and paper birch-spruce forest—not estimated
Soil limitation(s) for fencing: moderate—too sandy
Limitations to uniform distribution of livestock: moderate—short, steep slopes
General management considerations:
*****The suitability of this soil for livestock grazing may change due to the varying abundance of appropriate forage plants.
*****Nutritional quality of bluejoint reedgrass and other herbaceous plants decreases rapidly toward the end of the growing season.

W—Water

Composition

Water: 95 percent

Included Areas

*****ponded and very poorly drained soils along water body fringes

Characteristics of Water

Landform: hills, mountains, glacial plains, floodplains, and stream terraces
Position on landscape: all positions
Native vegetation: nonvegetated water bodies with emergent herbs in shallow areas and along shorelines

Plates

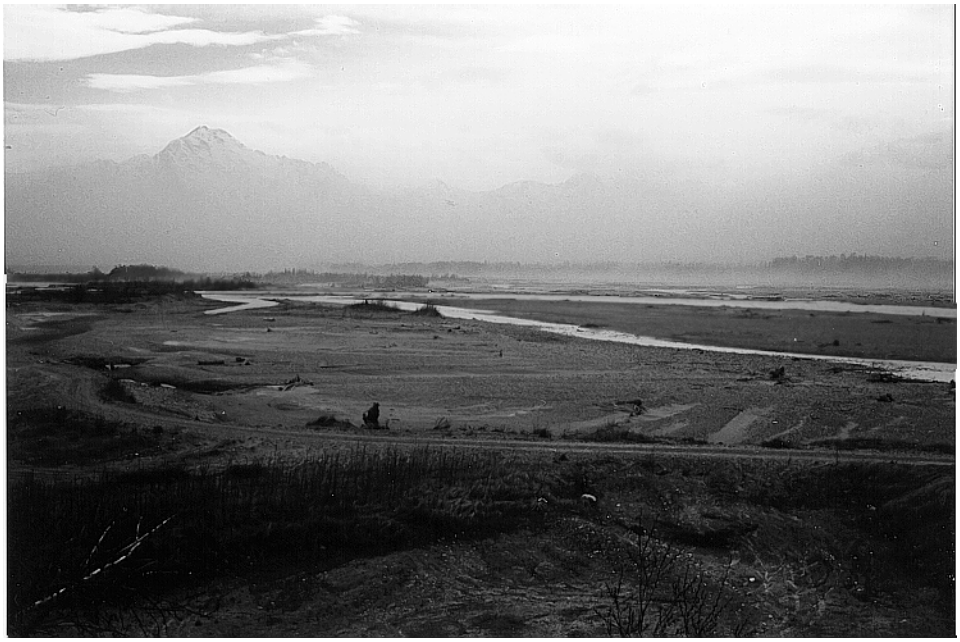

Plate 1—Windblown silt or loess forms a cloud of dust above the barren floodplains of the Knik and Matanuska Rivers south of Palmer (Pioneer Peak is visible in the upper left).

Plate 2—Rolling glacial terrain, characteristic of extensive portions of the Susitna Valley. The well drained Deception soils on the hills are forested (map unit 123). The poorly drained Cryaquepts, depressional and Histosols soils between the hills support stunted spruce woodland, scrub, and sedge wet meadow vegetation (map units 116 and 141).

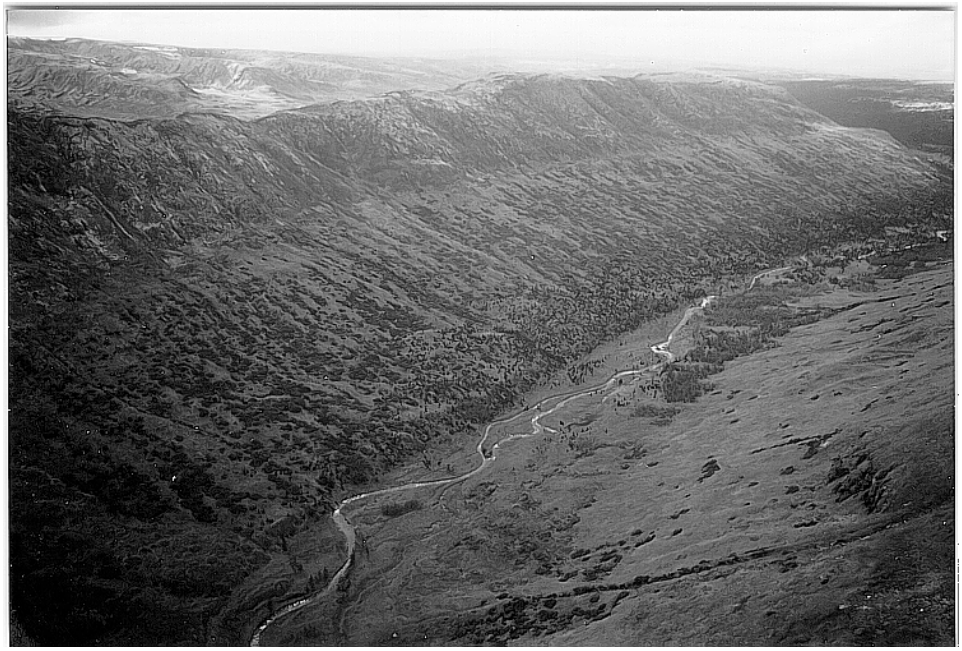

Plate 3—A glaciated river valley in the southern Talkeetna Mountains. Soils on mid-mountain slopes are formed in deep deposits of glacial till mantled by loess and volcanic ash (map unit 195). Upper slopes and summits have extensive areas of surface bedrock and shallow cobbly soils formed in bedrock residuum and mixed loess and ash (map unit 183).

Plate 4—A narrow, steep floodplain and adjacent toeslopes in the southern Talkeetna Mountains (map unit 181).

Plate 5—Treeline in the Talkeetna Mountains is characterized by a mosaic of white spruce and mixed paper birch-white spruce forest and woodland, tall Sitka alder shrub, and bluejoint reedgrass grassland on Talkeetna, warm; Talkeetna, thick surface; and Talkeetna, cool soils, respectively.

Plate 6—Agricultural fields in the vicinity of Palmer (map unit 105). Settlement and agricultural development began around 1935 with the federally sponsored Matanuska Colony.

Plate 7—A roadcut through a Deception silt loam (map unit 125) illustrates gravelly glacial till substratum material.

Plate 8—A roadcut through a Knik silt loam (map unit 164) illustrates a dark silty surface mantle underlain by sandy and gravelly glacial outwash.

Plate 9—Fall harvest of barley in the Palmer vicinity (map unit 164). Other locally grown agricultural crops include hay, potatoes, and a variety of row crops.

Plate 10—Urban development in Palmer on Bodenburg soils (map unit 105).

Plate 11—A split ring infiltrometer is used to measure the rate of permeability in Kalambach silt loam soil.

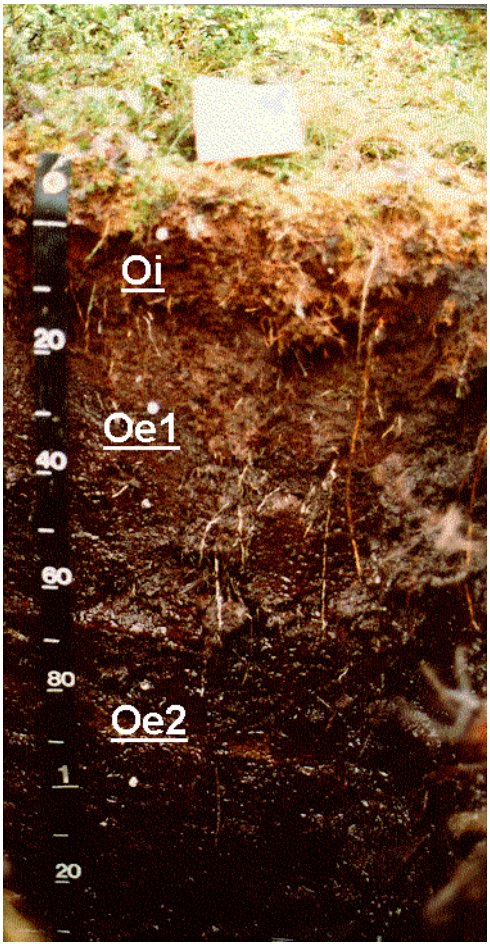

Plate 12—Soil profile of a Histosols soil formed in thick peat deposits. Histosols are common in bogs and fens throughout the Susitna Valley (depths are in centimeters).

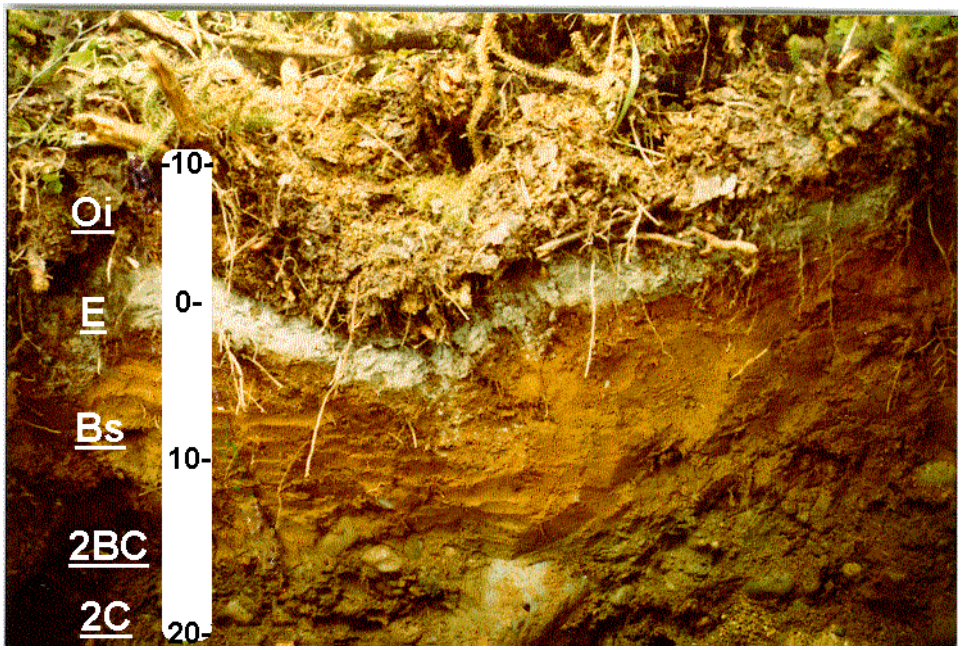

Plate 13—Soil profile of Deception silt loam. Note the thin silty mantle, represented by the “E” and “Bs” horizons, over the firm gravelly glacial till in the “2BC” and “2C” horizons (depths are in centimeters).

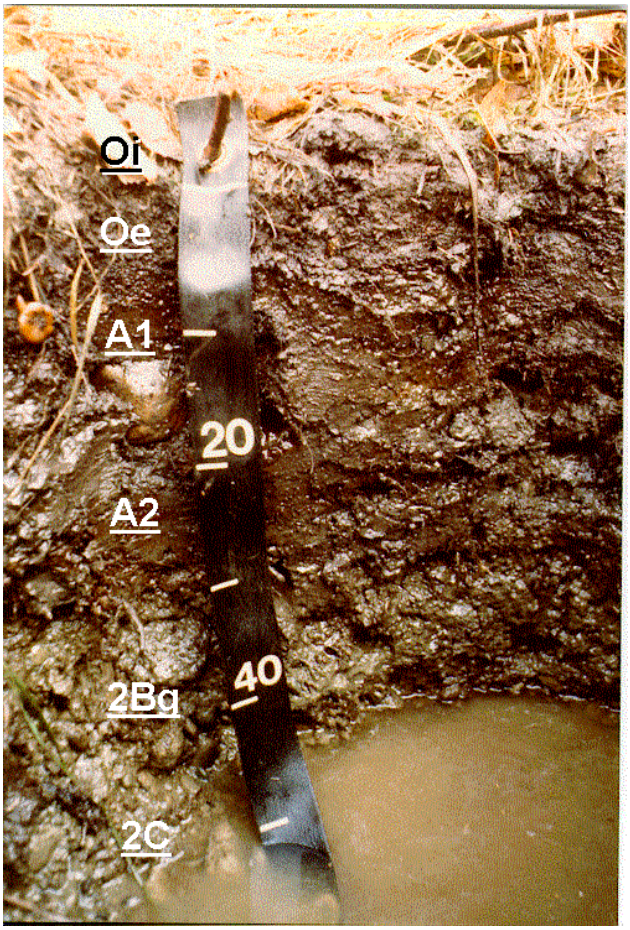

Plate 14—Soil profile of Disappoint silt loam with a thick, dark mineral soil surface over gray glacial till. The shallow water table is perched on the dense till substratum (depths are in centimeters).

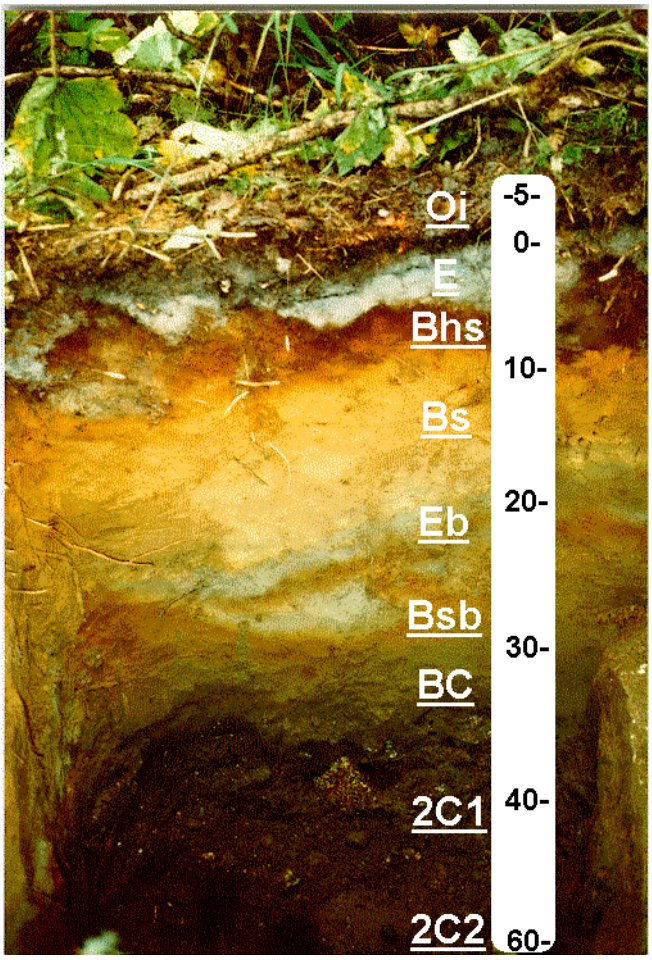

Plate 15—Soil profile of Nancy silt loam formed in silty surface layers of mixed loess and volcanic ash over gravelly glacial outwash (depths are in centimeters).

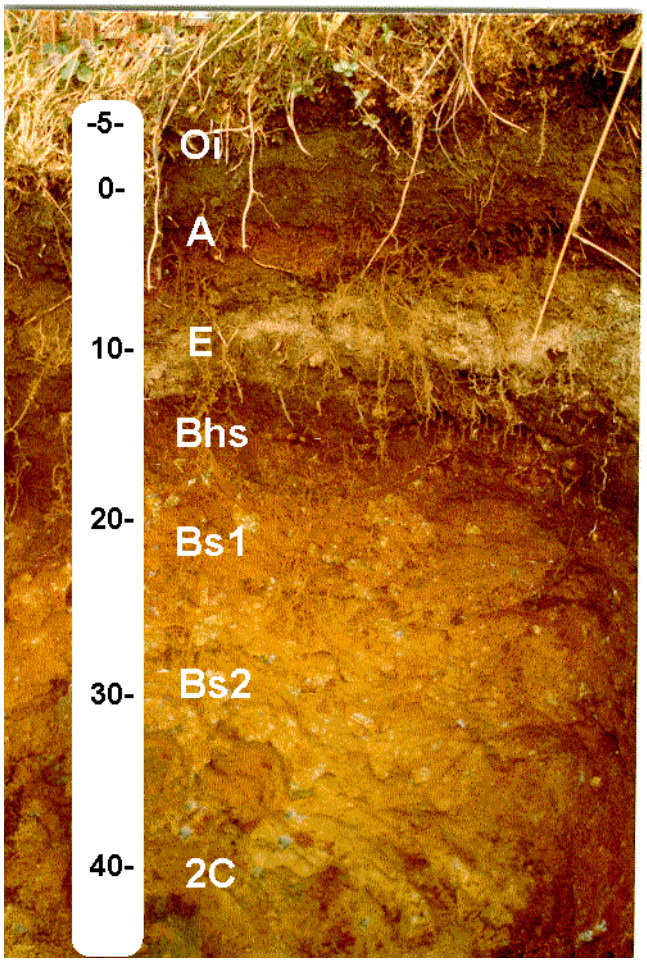

Plate 16—Soil profile of Talkeetna silt loam soil formed in silty surface layers of mixed loess and volcanic ash over gravelly and cobbly glacial till (depths are in centimeters).

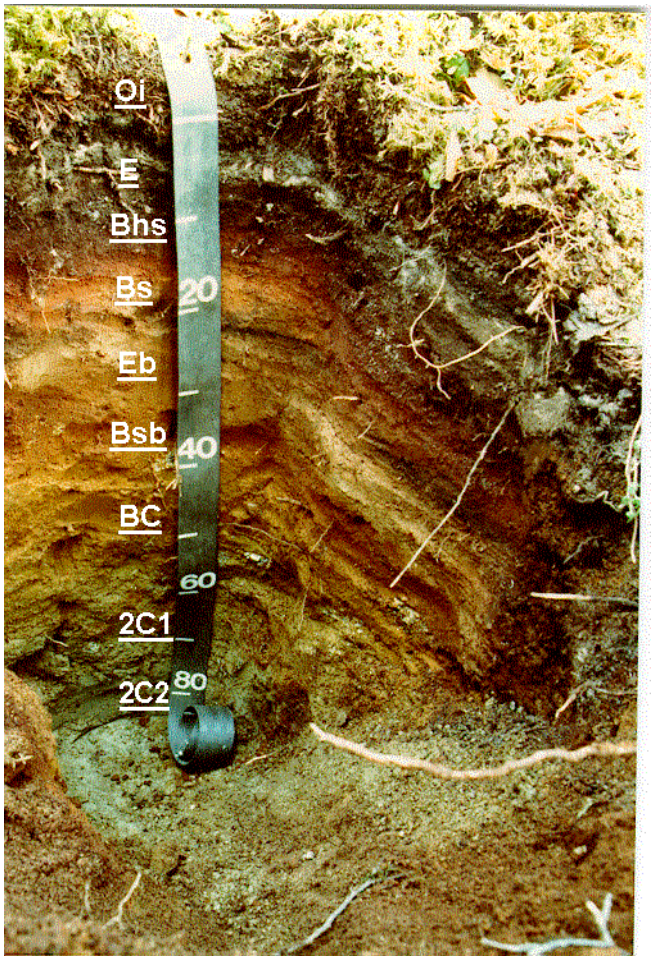

Plate 17—Soil profile of Tokositna silt loam with a thin, grayish, leached “E” horizon overlying a thin, dark reddish brown “Bhs” layer of iron and organic accumulation. A second sequence of buried soil horizons is visible at 36 to 56 centimeters.

Figures

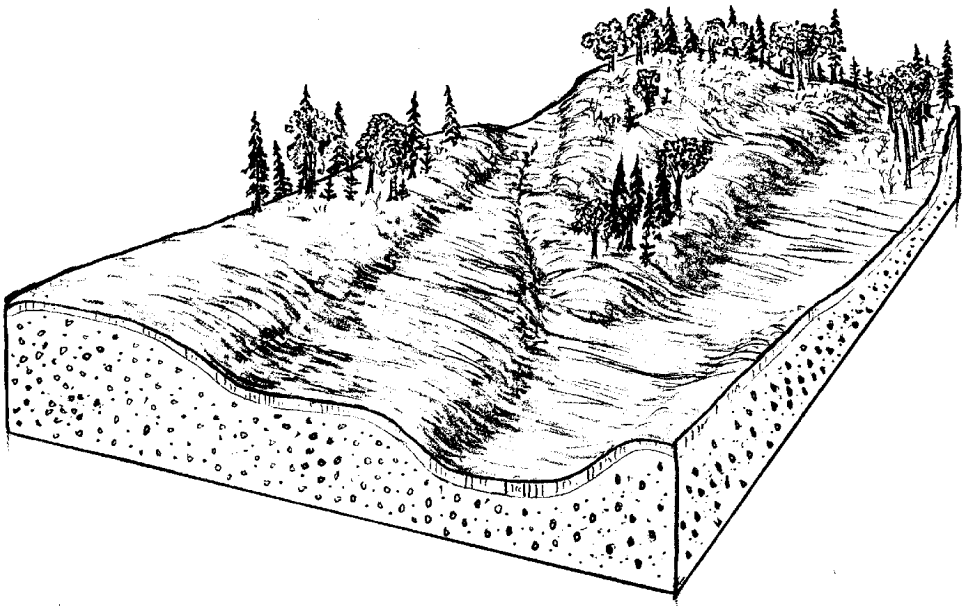

Figure 2—Representative landscape for map units with slope modifiers of sloping and moderately steep, or gently sloping and moderately steep.

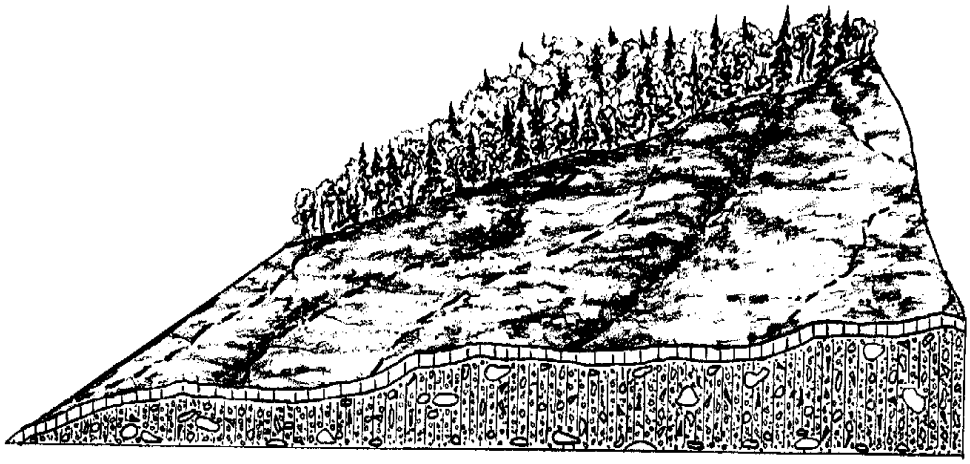

Figure 3—Representative landscape for map units with slope modifiers of undulating or rolling.

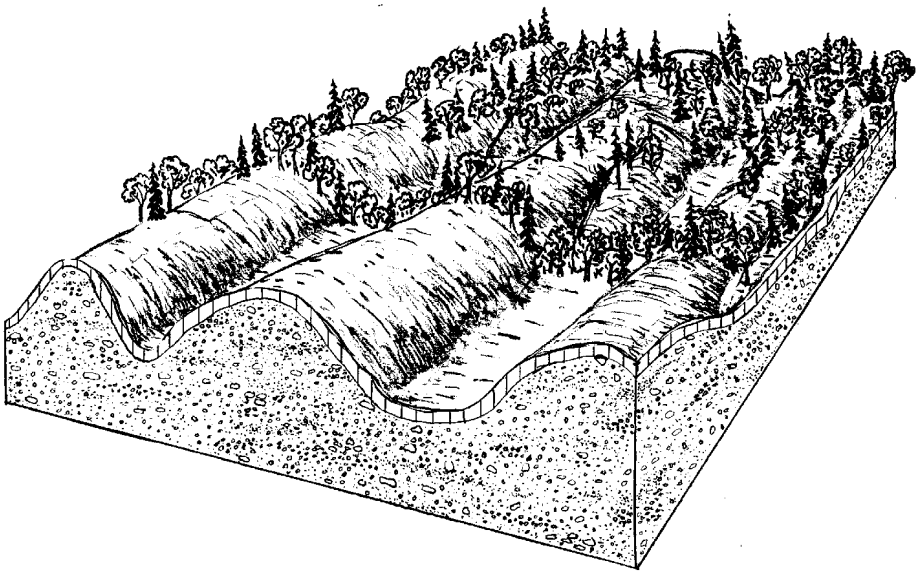

Figure 4—Representative landscape for map units with slope modifiers of steep and moderately sloping.

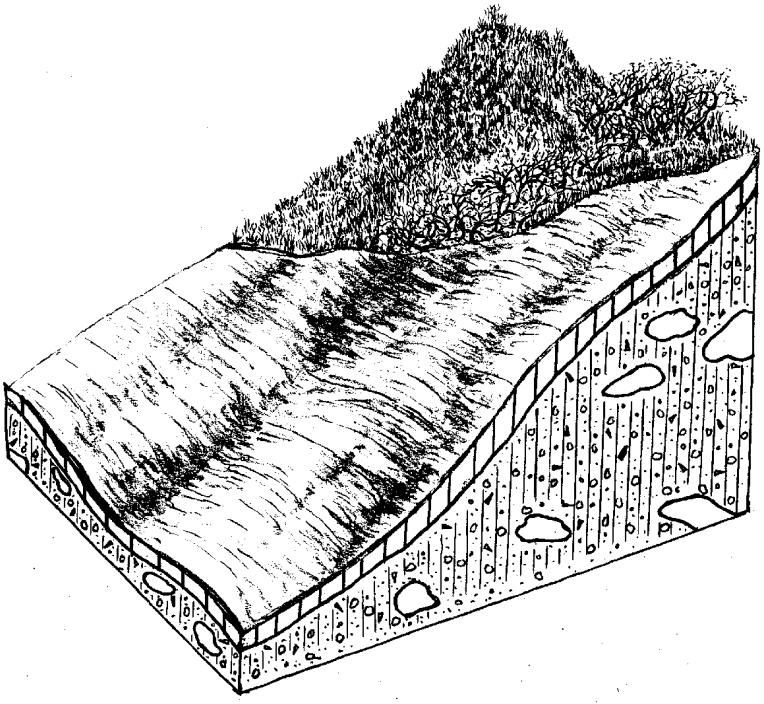

Figure 5—Mountain backslopes (map unit 189) support tall Sitka alder scrub and bluejoint reedgrass-forb grassland.

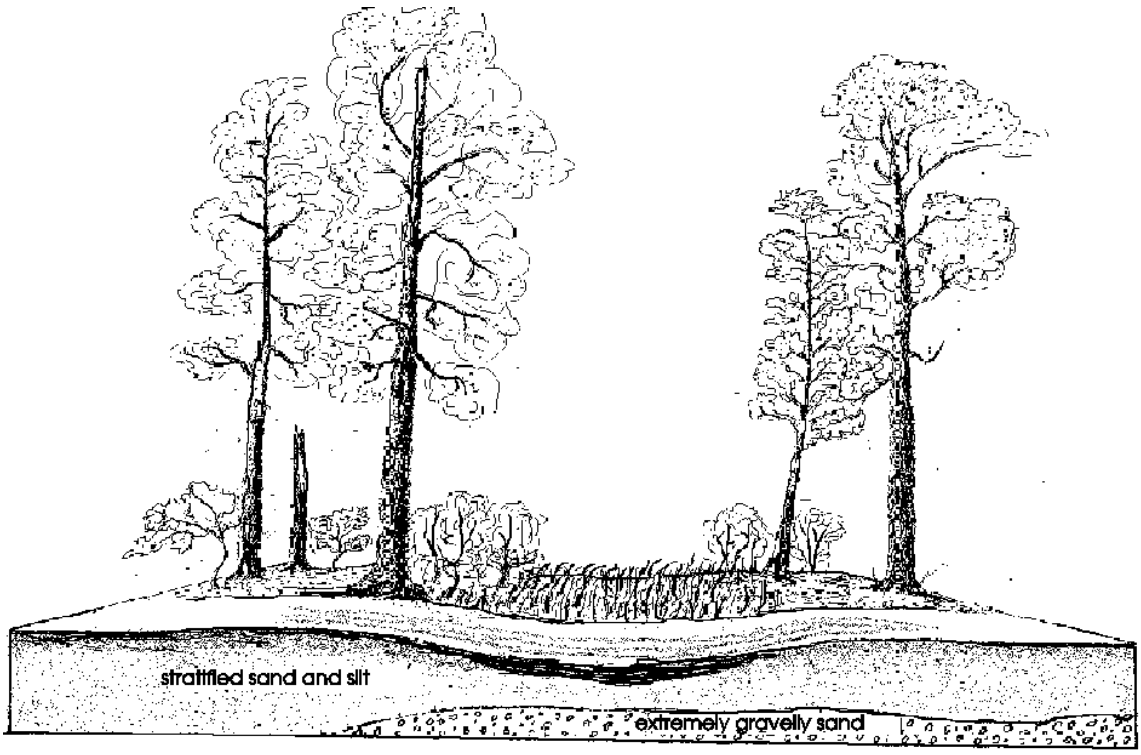

Figure 6—Floodplain landscape representative of map unit 186. The somewhat poorly drained Susivar soils support balsam poplar and mixed balsam poplar-white spruce forest. The poorly drained Moose River soils with sedge-grass wet meadow and tall alder scrub are in depressions and old channels.

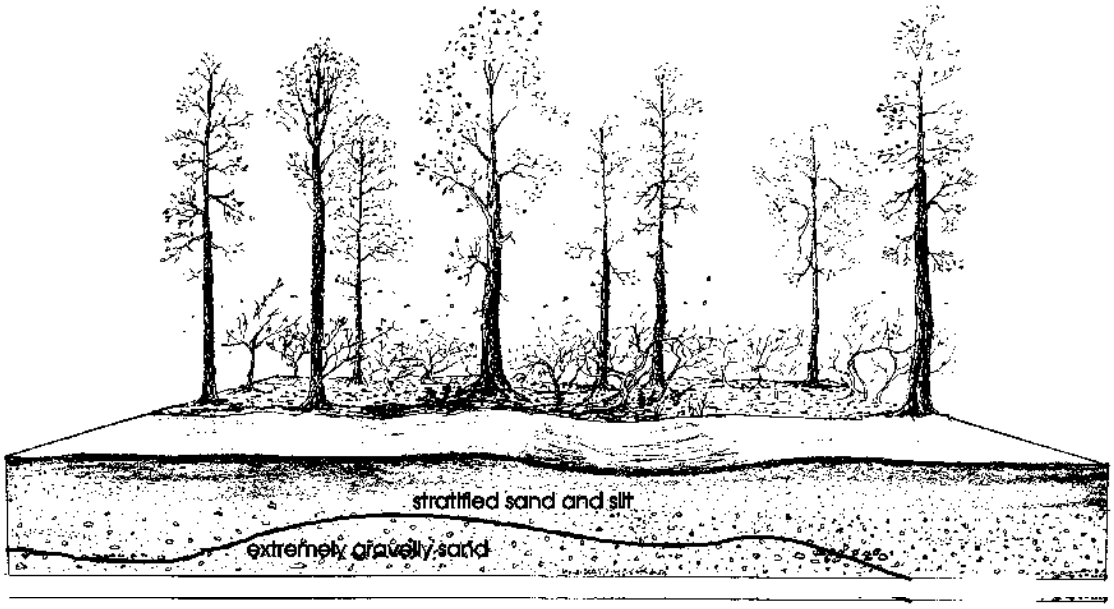

Figure 7—Floodplain landscape representative of map unit 187. Vegetation in many places consists of balsam poplar forest with an understory dominated by tall alder.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the Survey Area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment, and to help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. Field experience and data collected on soil properties, such as erosion, droughtiness, flooding, and other factors that affect various soil uses and management, are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; for livestock grazing and forestry; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the suitability and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and the environment in all or part of the Survey Area. The survey can help planners maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil; and to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation. Health officials, highway officials, engineers, and others may find this survey useful in planning the safe disposal of wastes and locating sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Agricultural Soils

Soils in the Matanuska Valley that are well suited to agricultural use and have historically supported a diversity of climatically adapted vegetable, grain, and hay crops include Knik, Yensus, and Bodenburg soils (see Table 8 for yields of commonly grown crops). Favorable properties of these soils are a thick layer of silty loess on the soil surface, near neutral pH values, and high inherent fertility. The nearly level terrace in the Palmer area, which is the largest contiguous area of these soils, is best suited to vegetable and grain crops. On nearby rolling uplands, these soils are better suited to hay and pastureland. However, smaller areas with soils and slope suitable for intensive agricultural use are scattered throughout the uplands. Strong winds during winter, spring, and occasionally summer, and soil materials susceptible to blowing, contribute to the severe wind erosion hazard associated with these soils.

A gradual change in soils and soil properties occurs with increasing distance from the Matanuska River. West of Wasilla, Kichatna and Deception soils become dominant. The thinner loess mantle of these soils restricts the rooting depth for crops that can be grown; increased soil acidity reduces the variety of crops these soils can support and requires higher inputs of lime and fertilizer to achieve optimum yields.

Large blocks of undeveloped Nancy, Benka, and Whitsol soils occur on nearly level glacial outwash plains along the Susitna River. Small areas of Nancy and Tokositna soils occur interspersed between soils on short, steep slopes and poorly drained soils. Each of these soils has favorable characteristics for agricultural development including good drainage, thick silty surface layers, and coarse textured substrata. However, they are also acidic and inherently low in fertility, requiring substantial lime and fertilizer for optimum yields.

Precipitation in the Matanuska-Susitna Valley Area is usually adequate for most agronomic crops; however, seasonal patterns can cause significant management problems. Less than average spring and early summer precipitation can result in a moderate to severe moisture deficit from May to mid-July. This deficit may be partially offset by snowmelt and recharge of soil moisture if the preceding winter had average or better snowfall. Sprinkler irrigation can be used during late spring and summer to maintain soil moisture and improve crop yields. However, excessive precipitation in late summer and early autumn can restrict access to fields, delaying harvest and negatively impacting the quality and yield of crops.

Seasonal winds in the Matanuska Valley have several important impacts on area agricultural soils. In the Palmer area, the "Matanuska" winds remove the insulating winter snow cover, resulting in lower soil temperatures and deeper frost penetration. During breakup, the frost perches ground water causing ponding in low places and depressions. Ponding and local drainage problems may last for several days to several weeks, especially in areas cleared for agriculture, limiting early access to portions of fields.

In spring, when the "Knik" winds, and occasionally "Matanuska" winds, are strong, blowing dust up to 3000 feet (915 m) or higher (Plate 1) darkens the air. The best agricultural soils in the Matanuska Valley are formed in this wind blown silt or “loess.” However, spring winds blowing during cultivation and planting, when the soil surface is relatively dry and exposed, can cause significant soil loss, destroying early seedlings and necessitating replanting. Natural and planted windbreaks help to control wind erosion in many places.

Agricultural Development

Several methods of land clearing have been used successfully in the Area. On large acreages, forest vegetation is knocked down by “chaining” with a heavy chain pulled between two bulldozers, stacked into berm rows, and burned. On smaller acreages, trees are walked down with a bulldozer, pushed into berms, and burned. Both of these methods waste a significant wood resource. A preferred method is to cut and utilize the fuel wood and high quality logs from the stand, and pile the stumps and woody debris into berms for burning.

Clearing operations are best accomplished after freeze-up in the fall and during winters with low snowfall. Initial tillage or “breaking” of the newly cleared land may be done with a plow or heavy disc. A root rake can then be used to windrow the roots and sticks, or they may be picked up by hand.

Soil Fertility

Prepared by Gary Michaelson, Soil Scientist, University of Alaska Fairbanks Agriculture and Range Experiment Station.

The soils of the Matanuska-Susitna Valley Area are separated into two groups for the purpose of making general soil fertility assessments. Division of the Area soils follows basic differences in the types of minerals the soils contain. This differing mineral character, under the influence of other soil forming processes in the environment, results

in soils with distinct chemical and fertility characteristics. The majority of the minerals in Area soils were deposited through the action of wind. These minerals are either layered/crystalline (loess) or noncrystalline/ allophanic of volcanic origin (tephra/glass). The relative proportion of these two types of minerals contained in the soil, and their degree of alteration (weathering), determine the soil fertility characteristics. Soils with properties dominated by weathered volcanic glass are grouped as *tephra-affected soils* and other soils as *loess soils*. Years of soil fertility research in the Matanuska and Susitna Valleys have demonstrated the differences in fertility and fertilizer requirements of the two soil groups. Specific conditions at a particular location and management history can alter these general fertility assessments.

Group One: Tephra-affected Soils

Tephra-affected soils contain relatively high amounts of volcanic glass minerals. Soils commonly farmed include Kashwitna, Kichatna, Nancy, Benka, Whitsol, Tokositna, Talkeetna, Delyndia, and Estelle soils. Most are located west of Wasilla or in the Susitna Valley. Not only is the volcanic glass mineral content of these soils high, but these minerals have been sufficiently weathered to produce significant amounts of allophane, active aluminum, and acidity. Tephra-affected soils have a distinct chemical character in relation to other soils in the Area. They are very strongly to moderately acidic, and have lower base saturation with high aluminum saturation percentage and phosphorus sorption capacity. These chemical characteristics have an important effect on the fertility of these soils. Tephra-affected soils generally produce lower yields of crops such as potatoes, lettuce, carrots, and beets than do the other soils in the Area (*Carling and Michaelson 1983; Laughlin, Smith, and Peters 1987*).

pH and lime requirements. Tephra-affected soils are often strongly acidic, and the more acid tolerant crops are usually recommended for these soils. For example, forages that have been found to do well without liming are timothy (perennial), and oats and ryegrass (annuals) (*Mitchell 1982*, *1984, and 1989*). Barley and brome-grass do relatively poor on these acidic soils (*Mitchell, Mitchell, and Helm 1987*).

The application of one ton/acre (2240 kilograms/ hectare) of lime to the surface 4 to 6 inches (10 to 15 cm) of soils in this group will result in an increase of about 0.5 pH unit (*Loynachan 1979; Michaelson and Ping 1987*). In conjunction with fertilizer applications, one ton/acre of lime has been found to be optimum for increasing forage barley production by about 70 percent. However, when using the fertilizer rates necessary for higher production, soil pH was found to return to pre-liming levels in two to three years. Un-limed soils decreased in pH about 0.1 pH unit/year (*Michaelson and Ping 1987*). Field trials on soils from this group have also shown that liming can increase the yields of potatoes (*Laughlin, Martin, and Smith 1974*), lettuce, carrots, and beets (*Laughlin and Martin 1969; Laughlin, Smith, and Peters 1987*).

Nitrogen (N), phosphorus (P), and potassium (K) fertilization. Tephra-affected soils require application of N and P for commercial production of high quality crops, and K application to maintain a high level of production for more than one or two years. These soils have a high capacity to fix applied fertilizer P. Very high rates of applied P are necessary to significantly increase soil available P levels for an extended period of time (*Michaelson and Ping 1990*).

Annual Forages:

Barley and oat forage have been found to respond to N applications of up to 120 lb. N/acre (134 kilograms/hectare) from urea or ammonium nitrate. Both cereals have been found to respond to P applications of up to 60 lb. P_2O_5/acre (67 kilograms/ hectare)—barley up to 90 lb. P_2O_5/acre (101 kilograms/ hectare) on soils with pH values of 5.5 or less. Forage barley has been found to initially respond to K applications of up to 24 lb./acre (27 kilograms/hectare) on a newly-cleared soil, and after three years of cropping respond with up to 72 lb. K_2O/acre (81 kilograms/hectare). Oats increased in yield with up

to 60 lb. K_2O/acre (67 kilograms/ hectare) (*Mitchell 1989; Michaelson, Offner, and Ping 1984; Michaelson and Ping 1987*).

Perennial Forages:

The general rate of N recommended for timothy grown on group one soil is 60 lb. N/acre (67 kilograms/hectare) in the establishment year; up to 120 lb. N/acre (134 kilograms/hectare) applied the following spring; and up to 80 lb. N/acre (90 kilograms/hectare) after the first cutting each year thereafter (*Klebesadel et al. 1983*). Timothy grown on these soils has been found to respond to up to 40 lb. P_2O_5/acre (45 kilograms/hectare) applied in the spring (*Mitchell, Mitchell, and Helm 1987; Michaelson and Ping 1989*). Recommended rates of K application are 60 lb. K_2O/acre (67 kilograms/ hectare) at establishment, and up to 120 lb. K_2O/acre (134 kilograms/hectare) applied annually thereafter in the spring (*Klebesadel et al. 1983*).

Other Crops:

Potato yields have been found to increase with application of 60 to 80 lb. N/acre (67-90 kilograms/ hectare) (*Laughlin 1971*), and up to 300 lb. P_2O_5/acre (336 kilograms/hectare) (*Laughlin, Martin, and Smith 1974*). With N and K_2O rates of 100 and 200 lb./acre (112 and 124 kilograms/ hectare) respectively, carrot and lettuce yields increase with up to 400 lb. P_2O_5/acre (448 kilograms/hectare), and beet yields increase with up to 300 lb. P_2O_5/acre (336 kilograms/ hectare) (*Laughlin, Smith, and Peters 1987*). In general, for most vegetable crops 800 to 1200 lb./acre (896 to 1344 kilograms/hectare) of a complete fertilizer mix, such as 8-32-16, will meet the fertilizer requirements for good crop yields (*Laughlin et al. 1964*).

Other nutrients. Few micronutrient problems have been documented for these soils. Lime induced boron (B) deficiency in table beets has been observed in the Big Lake-Willow area and was corrected with the application of 1 lb. B/acre (1 kilogram/hectare) (*Laughlin 1964*). Rapeseed yield has responded to boron application at both Point MacKenzie and Trapper Creek.

Available magnesium (Mg) is generally relatively low on these soils and decreases rapidly with soil depth. With higher rates of K fertilization and liming, ratios of K:Mg can become large rather rapidly. This may be responsible for magnesium deficiencies observed with K fertilization on potatoes and, in the early season, on timothy grown on Nancy soils in the Talkeetna area (*Purser and Burgett 1988; Michaelson and Ping 1989*). Magnesium additions may become necessary over the long term and dolomitic lime may be preferable to calcitic lime for these soils.

Group Two: Loess Soils

Loess soils contain high amounts of layered or crystalline minerals. They may contain measurable amounts of volcanic glass, but in a low enough proportion, or relatively unweathered state, so as not to dominate the chemical properties of the soil as they relate to soil fertility. Soil series in this group are Bodenburg, Knik, Yensus, Eska, and Kalambach soils. These soils are located in the Matanuska Valley, mostly east of Wasilla. Loess soils are only moderately to slightly acidic with a relatively high base saturation, lower active aluminum, and lower phosphorus sorption capacity.

pH and lime requirement. Loess soils generally do not require liming. The surface soil has been found to be less acidic after land clearing but is susceptible to increased acidification, over time, in crop production. With no liming materials added, soil pH can be expected to decrease as much as 0.1 pH unit/year with annual N application of 200 lb./acre (224 kilograms/hectare) (*Laughlin, Smith, and Peters 1981*).

Nitrogen (N), phosphorus (P), and potassium (K) fertilization. Loess soils require annual applications of N, P, and K for sustained commercial yields of high quality over an extended period of time.

Annual Forages:

Cereal forages grown on loess soils respond to 20 to 40 lb. N/acre, (22-45 kilograms/ hectare), 40 to 80 lb. P_2O_5/acre (45-90 kilograms/hectare), and 20-40 lb. K_2O/acre (22-45 kilograms/hectare), with soil conditions ranging from high fertility to low fertility (newly cleared) lands (*Klebesadel et al. 1983*).

Perennial Forages:

Generally, brome-grass is the recommended forage for loess soils with pH greater than 5.5 (*Mitchell 1982*). Brome-grass has been found to respond to annual applications of up to 200 lb. N/acre (224 kilograms/hectare) (spring or split application as urea or ammonium nitrate), 80 lb. P_2O_5/acre (90 kilograms/hectare), and 80 lb. K_2O/acre (90 kilograms/hectare) (*Laughlin 1962*).

Native bluejoint reedgrass stands require fertilization with a complete N-P-K fertilizer if they are to be utilized continuously. Bluejoint reedgrass has been found to respond to N applications at least up to 80 lb. N/acre (90 kilograms/hectare), when applied with 80 lb. P_2O_5/acre and 80 lb. K_2O/acre (90 kilograms/hectare) (*Laughlin 1969*).

Other Crops:

Potatoes respond to broadcast-incorporated N applications (as ammonium nitrate or urea) of up to 100 lb. N/acre (112 kilograms/ hectare), and in-row banded applications of up to 80 lb. N/acre (90 kilograms/hectare) (*Laughlin 1971*). High potato yields have been obtained with as little as 120 lb. P_2O_5/acre (134 kilograms/hectare) and as much as 200 to 400 lb. P_2O_5/acre (224-448 kilograms/ hectare), depending on previous cropping history and residual soil P levels. Similarly, high potato yields have been obtained with 160 to 400 lb. K_2O/acre (179-448 kilograms/ hectare) (*Laughlin 1959; Walworth, Gavlak, and Muniz 1990b*).

Lettuce responds to N application of up to 100 lb. N/acre (112 kilograms/hectare) with sufficient P [320 lb. P_2O_5/acre (358 kilograms/hectare)] and K [160 lb. K_2O/acre (179 kilograms/hectare)] (*Walworth et al. 1990a*). In many years, irrigation of potatoes and vegetables is necessary to obtain high yields with high rates of fertilization.

Other nutrients. Loess soils can become deficient in sulfur with years of high-level forage production. Addition of K in the sulfate form is recommended and will eliminate sulfur deficiencies (*Laughlin, Smith, and Peters 1981*). Although not widespread, molybdenum deficiency has been observed on crucifer crops grown on the Knik soil in a year with excellent growing conditions (*Allen and Laughlin 1967*).

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in Table 8. In any given year, yields may be higher or lower than those indicated in the table due to variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table. The yields are based mainly on information provided by the USDA National Agricultural Statistics Service in Palmer.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. However, the productivity of a given soil compared with that of other soils is not likely to change.

Crops other than those shown in Table 8 are grown in the Survey Area, but estimated

yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or the Alaska Cooperative Extension can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification (*Soil Conservation Service 1961*) listed in Table 8 shows, in a general way, the suitability of soil map units for most kinds of field crops. Map units that consist of two or more soil components are rated based on the most restrictive soil component. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used to group soils neither take into account major, and generally expensive, land shaping that would change slope, depth, or other characteristics of the soils; nor include possible, but unlikely, major reclamation projects. Capability classification is not a substitute for interpretations that are designed to show suitability and limitations of groups of soils for rangeland, woodland, or engineering purposes.

In the capability system, soils can be grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest group, are designated by numerals 1 to 8. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use. All soils in Alaska are restricted from class 1 due to soil temperature.

Class 2 soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or require very careful management, or both.

Class 5 soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation.

Class 7 soils have very severe limitations that make them unsuitable for cultivation.

Class 8 soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter—*e, w, s,* or *c*—to the class numeral, for example 2e. The letter *e* indicates that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* indicates that water in or on the soil interferes with plant growth or cultivation; *s* indicates that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, indicates that the chief limitation is climate that is very cold or very dry.

There are no subclasses in Class 1 because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because these soils are subject to little or no erosion. They have other limitations that restrict their use mainly to pasture, rangeland, woodland, wildlife habitat, or recreation.

Ecological Sites

An **ecological site** is an area of land, or collective areas of land, with a distinctive mix and pattern of potential natural plant communities, soils, landforms, hydrology, climate, and ecological properties and processes (such as nutrient cycling, vegetative succession, and productivity). Ecological site classification is not oriented to any type of land or land use and is applicable to forestlands and rangelands, wetlands, and uplands. The relationship between climate, landforms, soils, and vegetation, and the ability to discern differences in these factors from one site to another, is the basis for ecological site classification.

The primary emphasis of ecological site classification is usually the vegetation on a site. Vegetation is considered to be an indicator of the integrated factors of the environment. Productivity, the response of the vegetation to various types of disturbances, and use and management of the vegetation are principal concerns to landowners and managers.

A secondary, but equally important emphasis of site classification, is landform and soil relationships. In general, the relationships between landforms and soils across the landscape are fairly predictable. Natural disturbances by wildfire, wind, and flooding, to name a few, result in considerable variation in vegetation. Landforms and soils provide a stable resource base by which ecological sites can be determined regardless of existing vegetative conditions. In addition, inferences can be made regarding site dynamics and stability, soil processes, and appropriate management systems based on landform and soil types.

While abrupt or distinct breaks between landforms, soils, and vegetation occasionally do occur, more often than not the transition is gradual and indistinct. In addition, precipitation, temperature, and other climatic patterns, as well as micro-climatic variables such as elevation, change gradually across the landscape. Therefore, an ecological site classification should be viewed as a landscape model. The boundaries between ecological sites are sometimes arbitrary and approximate. On the ground, the characteristics and properties within and between ecological sites are complex and variable, and usually overlap to some degree.

Ecological site classification does, however, provide a useful framework for correlating and compiling data and interpretations on multiple resources and landscape processes. Site classification is also a valuable framework for organizing, applying, and monitoring resource conservation systems for livestock grazing, forestry, wildlife habitat management, and other land uses.

Potential Natural Plant Community

In most cases, a single potential natural plant community characterizes an ecological site. The **potential natural plant community (PNC)** is the assemblage of plant species that most nearly achieves a long-term steady state of productivity, structure, and composition on a site (*Tueller 1973*, cited by *National Research Council 1994*). The occurrence of single potential plant community is based on the theory that, over time, succession, or the gradual and successive replacement of one plant community by another, eventually leads to a single plant community which best reflects the integrated factors of the environment. While this theory has been questioned on both theoretical and practical grounds (*National Research Council 1994*), the PNC does provide a benchmark from which long and short term responses of the vegetation to disturbances, and the pathways and processes of succession, can be related.

Ecological Site-Soils-Vegetation Correlation

An ecological site classification is developed by grouping soils within known climatic zones based on similarities in landforms, soils, and vegetation characteristics and potentials. Soils that support similar vegetation, have similar productivity, have similar ranges in physical characteristics, and whose known or expected ecological and management responses are similar, are grouped together into an ecological site. To achieve a high degree of correlation between the soils and vegetative potentials, soils usually are classified at the series or phase level, and occasionally the family level. At this level of soil classification, an ecological site is correlated to a single PNC. More than one soil may be grouped into an ecological site. A soil, however, may not be included in more than one site.

Often, some segments of the landscape are inventoried and mapped at a lower level of intensity. Soils are classified at the subgroup level or higher, and ecological sites are defined primarily on general relationships between soils, landforms, and general environmental relationships. Ecological sites associated with this level of soil classification usually support more than one PNC. Specific relationships between soil and landscape characteristics and the various potential plant communities often can be recognized in such a way that each community can be associated with a discernible portion of the site.

In most cases, the correlation between the soils and ecological sites enables users of the soil survey to identify the ecological site from the soils map. An ecological site map also can be derived from the soils map. Once defined and described an ecological site often can be determined based on the structure, composition, and productivity of the vegetation. Frequently, however, vegetation is not a definitive indicator of the site. Many sites support a variety of vegetation types that are similar to vegetation found on other sites. The vegetation also may have been altered or degraded by disturbances or through management. Other landscape characteristics and internal site properties must be used to identify the site. Internal site properties which are not readily apparent include, but are not limited to, soil texture and horizonation; soil drainage; and microclimate associated with elevation, slope gradient, slope position, and slope exposure.

Ecological Site Classification in the Matanuska-Susitna Valley Area

Ecological site classification within the Matanuska-Susitna Valley Area was done separately by Major Land Resource Areas (MLRAs) (*Soil Conservation Service 1981*). MLRA 170—Cook Inlet-Susitna Lowlands, which encompasses the majority of the forested portion of the Area, was divided into 22 ecological sites. That portion of the area near and above treeline in the Talkeetna Mountains, in MLRA 169—Southcentral Alaska Mountains, was divided into 17 ecological sites.

Identifying a single PNC on an ecological site was difficult and uncertain for a number of sites in the Survey Area. On a number of forested sites, more than one apparently stable vegetation type was encountered. In most cases, differences in the composition and structure of the vegetation between these types was relatively minor. Often, only the abundance of the community dominants varied appreciably and differences appeared to reflect the ranges in soil and other physical properties of the site. For these sites, the vegetation types that represented the more mesic and productive vegetation were identified as the PNC. On a few forested sites, some rather dramatic differences in composition and structure of apparently stable vegetation types were observed. Different plants dominated the understory and apparent productivity varied widely between some types. In these cases, however, one or more vegetation types were usually highly localized and found on only a small portion of the extent of the site. The most extensive vegetation type was identified as the PNC. Extensive peatlands in the Susitna Valley and steep slopes in the Talkeetna Mountains were inventoried and mapped at a lower level of

intensity as described under "Ecological Site-Soils-Vegetation Correlation". Ecological sites on these soils usually support more than one PNC.

The ecological site correlated to each soil component is shown in the Detailed Map Unit Descriptions, under "Major Management Factors." In Table 9, each **Ecological site** is listed by **Map symbol and soil name**. **Dry weight** is the average amount of vegetation, either rangeland or forest understory, that can be expected to grow annually in the PNC. It includes the current year's growth of herbaceous plants, and leaves, twigs, and fruits of woody plants, but does not include the increase in stem diameter of trees and shrubs. Total production is expressed in pounds per acre of air-dry vegetation produced in a normal growing season**. Common plants in the potential natural plant community** is a list of the most abundant herbs and shrubs in the PNC. Dominant overstory trees are listed for forest types as well. **Composition** is the percentage of the total dry weight production made up of the associated plant species. **Canopy Cover** is the representative percentage of the ground surface covered by the associated plant species. Missing data under production and composition indicate that the forage production on the site is limited, and production and composition data are not available. Missing data under common plants and canopy cover indicate that the site supports more than one PNC. A brief narrative description of each site is included below. Scientific names of plants mentioned in Table 9 and in the text are given in Table 10. Detailed descriptions of each ecological site are maintained in the Field Office Technical Guide at the local office of the Natural Resources Conservation Service.

Ecological Sites of the Cook Inlet-Susitna Lowlands

Alluvial bottoms, very wet includes very poorly drained, occasionally flooded soils under scrub vegetation in channels, depressions, and flats on floodplains of the Susitna, lower Matanuska, and Knik Rivers, and along smaller streams throughout the Area. Elevation ranges from 0 to 700 feet (0 to 213 m). Moose River soils are formed in stratified loamy alluvium, and typically have a seasonally high water table from 0 to 1.5 feet (0 to 0.5 m) below the surface during the summer. Vegetation cover on most areas consists of open stands of tall thinleaf alder with an understory dominated by bluejoint reedgrass and various sedges. Diamondleaf willow is a well-represented low shrub in many stands. Areas of bluejoint reedgrass moist meadow and sedge wet meadow are also common. This site typically occurs in association with ecological sites Alluvial bottoms, wet and Floodplain deposits, moderately wet.

Alluvial bottoms, very wet produces abundant moose browse and other forage; and small streams provide habitat for trout, grayling, and salmon.

Alluvial bottoms, wet includes very poorly drained, occasionally flooded soils under forest vegetation on floodplains along smaller rivers, streams, and other drainages in the Susitna Valley. Elevation ranges from 0 to 700 feet (0 to 213 m). Killey soils are formed in stratified loamy alluvium over sandy and gravelly alluvium, and typically have a seasonally high water table from 0 to 1.5 feet (0 to 0.5 m) below the surface during the summer. Vegetation cover on most areas consists of mixed paper birch-white spruce open forest, and occasionally paper birch open forest. Tall thinleaf alder and other shrubs, bluejoint reedgrass, and various ferns and other herbs dominate the understory. Areas of tall alder scrub and bluejoint reedgrass moist meadow are also found. This site often occurs in association with ecological site Alluvial bottoms, very wet, but is generally on slightly higher landscape positions.

Alluvial bottoms, wet produces moderately abundant browse and hiding cover for moose; and small streams provide habitat for trout, grayling, and salmon.

Alluvial terrain, wet includes poorly drained and very poorly drained, occasionally flooded soils under forest and scrub vegetation on floodplains of small streams and along drainages throughout the Survey Area. Elevation ranges from 0 to 1800 feet (0 to 549 m).

Alluvial terrain, wet can best be described as an intricate complex of soils and vegetation characteristic of ecological sites Alluvial bottoms, wet and Alluvial bottoms, very wet. Typic Cryaquents soils are formed in stratified loamy alluvium of varying thickness over sandy and gravelly alluvium. A seasonally high water table occurs from 0 to 1.5 feet (0 to 0.5 m) below the surface during the summer. Vegetation cover throughout this site is a mosaic of mixed paper birch-white spruce forest, tall alder and alder-willow scrub, and occasionally bluejoint reedgrass moist meadow and sedge wet meadow.

Alluvial terrain, wet produces moderately abundant browse for moose, and the mosaic of vegetation types provides excellent hiding cover. Small streams provide habitat for trout, grayling, and salmon.

Bedrock hills, 15-25 inch pz. includes well drained, forested soils on hills and ridges in the Matanuska River canyon and upper Matanuska Valley, and on isolated bedrock hills and low mountains, such as the Butte, in the lower Matanuska Valley. Elevation ranges from 50 to 1500 feet (15 to 457 m); slope ranges from 0 to 60 percent or more. Moderately deep Jim soils are formed in a mantle of wind blown silt over bedrock. Bedrock is usually present at a depth of 20 to 40 inches (51 to 102 cm) below the surface. In most places, the vegetation consists of paper birch-white spruce open forest. Balsam poplar is a common overstory tree in many stands. Quaking aspen forest is common on southerly aspects and other warm, dry microsites. Understory vegetation varies considerably because of differences in soil depth, aspect, and slope. This site often occurs in association with ecological sites Silty slopes and Silty slopes, cool.

Bedrock hills, 15-25 inch pz. is suited for forestry and livestock grazing, and provides suitable habitat for moose and spruce and ruffed grouse.

Bedrock hills, 20-35 inch pz. includes well drained, forested soils on the lower foothills and ridges of the Talkeetna Mountains in the northeastern portions of the Susitna Valley. Elevation ranges from 600 to 2400 feet (183 to 732 m); slope ranges from 2 to 35 percent. Shallow to very shallow Deneka, low elevation soils are formed in a mantle of mixed volcanic ash and wind blown silt over loamy glacial till. Bedrock is present at 12 to 20 inches (30 to 51 cm) below the surface in most places. Vegetation is predominately mixed paper birch-white spruce open forest with an understory dominated by dense, tall shrubs. Common tall shrubs include Sitka alder and rusty menziesia. Bluejoint reedgrass, shield fern, and other herbs are abundant on the forest floor. This site occurs in association with ecological sites Mountain slopes and Till deposits, high elevation.

Bedrock hills, 20-35 inch pz. is well suited for forestry, suited for livestock grazing, and provides habitat for moose and spruce grouse.

Depressions includes very poorly and poorly drained soils under forest vegetation in depressions, flats, and toeslopes on plains and hills in widely scattered locations throughout the Survey Area. Elevation ranges from 50 to 1000 feet (15 to 305 m); slope ranges from 0 to 7 percent. Cryaquepts, depressional soils are formed in a variety of materials including windblown silts and volcanic ash, stratified loamy outwash, and gravelly till and outwash. A seasonally high water table is present from 0 to 1.5 feet (0 to 0.5 m) below the surface during the summer. Vegetation consists of black spruce open forest and woodland, with an understory dominated by low shrub birch, Labrador tea ledum and other ericaceous shrubs, and dense moss cover on the soil surface. The most common and abundant herbs include horsetail, cloudberry, and bunchberry dogwood. Small sized paper birch trees are common in the overstory of many stands.

Depressions provides marginal quality habitat for moose and favorable habitat for spruce grouse and other wildlife. Wet soils limit most other land uses.

Drift deposits, very poorly drained includes very poorly and poorly drained forested soils in depressions on plains, and on toeslopes and depressions on hills, in widely scattered locations throughout the Survey Area. Elevation ranges from 50 to 1000 feet (15 to 305 m); slope ranges from 0 to 7 percent. Poorly and very poorly drained

Cryaquepts, Disappoint, and Chunilna soils are formed in a mantle of mucky silt loam and silt loam over glacial drift of varying texture. The substratum ranges from silt and clay loams to cobbly and gravelly loams, sandy loams, and sands. The seasonally high water table is at 0 to 1.5 feet (0 to 0.5 m) in spring, dropping to below 3 feet (below 0.9 m) during mid summer (Figure 11). In most places, the vegetation consists of mixed paper birch-white spruce open forest with a dense layer of low and tall shrubs in the understory. The most abundant shrubs include alder, devil's club, rusty menziesia, oval-leaf blueberry, and red elderberry. Bluejoint reedgrass, various ferns, horsetail, and other herbs are also usually abundant in the understory. This site occurs in association with ecological sites Glaciofluvial deposits, 15-25 inch pz.; Glaciofluvial deposits, 20-35 inch pz.; Till deposits, 15-25 inch pz.; Till deposits, 20-35 inch pz.; and Silty slopes, thin surface.

Drift deposits, very poorly drained provides marginal habitat for moose and favorable habitat for spruce grouse and other wildlife. Wet soils limit most other land uses.

Escarpments includes well drained and somewhat excessively drained soils on very steep, and in places unstable, escarpments along terrace breaks, mountain streams, and mountain slopes. Escarpments are common in the Matanuska River canyon, along the western front of the Talkeetna Mountains, and on outwash plains. Elevation ranges from 50 to 2200 feet (15 to 671 m); slope ranges from 30 to 70 percent, and occasionally greater. Cryods, low elevation and Cryochrepts soils are mostly formed in windblown silts and volcanic ash over variable texture materials including loamy, sandy, and gravelly glacial drift and colluvium. Vegetation varies, but in most places consists of hardwood forest dominated by quaking aspen, paper birch, or mixed stands of these species. Balsam poplar and white spruce are common in some stands. Forest understory varies widely depending on slope, aspect, elevation, and stand disturbances. In some places, tall alder scrub and bluejoint reedgrass grassland are common vegetation types.

Escarpments provides suitable habitat for moose, spruce and ruffed grouse, and other wildlife. Steep slopes limit most other land uses.

Floodplain deposits includes well drained to somewhat excessively drained, rarely to occasionally flooded, forested soils on floodplains and low stream terraces along the Matanuska, Susitna, and other major rivers throughout the Survey Area. Elevation ranges from 0 to 1000 feet (0 to 305 m); slope ranges from 0 to 2 percent. Kidazqeni, Niklason, and Susitna soils are formed in stratified loamy alluvium over gravelly alluvium. Kidazqeni soils have 2 to 10 inches (5 to 25 cm) of stratified loamy alluvium over coarse alluvium. Niklason and Susitna soils have 14 to 40 inches (36 to 102 cm) and 40 to 60 inches (102 to 152 cm) of stratified loam material over sand and gravel, respectively. Vegetation is varied. The latest successional stage, and presumed potential plant community, is mixed paper birch-white spruce forest. Earlier forest stages include paper birch forest and balsam poplar forest. The understory of all forest types varies considerably in plant species composition, but is typically dominated by a dense, jungle-like layer of tall and low shrubs and a fairly luxuriant ground layer of tall herbs. The most frequent and abundant shrubs include thinleaf and Sitka alder, devil's club, prickly rose, common red raspberry, and highbush cranberry. The most abundant herbs include bluejoint reedgrass, horsetail, shield fern, common lady fern, and ostrich fern. Small stands of tall alder scrub are found on younger segments of the floodplain, typically adjacent to the river channel. This site is often found in complex with ecological site Floodplain deposits, moderately wet; site, soils, and vegetation characteristics on these two sites are very similar.

Floodplain deposits is well suited for forestry and suited for livestock grazing. This site produces abundant moose browse and other forage, and provides favorable habitat for spruce grouse and other wildlife. Dense understory vegetation provides excellent cover. Large balsam poplar trees are often favorable nesting and perch sites for bald eagles. Rivers and streams provide habitat for trout, grayling, burbot, and salmon.

Floodplain deposits, moderately wet includes somewhat poorly to poorly drained,

occasionally flooded, forested soils on floodplains and low stream terraces along the Matanuska, Susitna, and other major rivers throughout the Survey Area. Elevation ranges from 0 to 1600 feet (0 to 488 m); slope ranges from 0 to 2 percent. Kidazqeni, moderately wet, Niklavar, and Susivar soils are formed in stratified loamy alluvium over gravelly alluvium. Kidazqeni, moderately wet soils have about 2 to 8 inches (5 to 20 cm) of stratified loamy material over sand and gravel. Niklavar and Susivar soils have 14 to 40 inches (36 to 102 cm) and over 60 inches (over 152 cm) of stratified loamy material over sand and gravel, respectively. In most places, a seasonally high water table is present within about 1 to 5 feet (about 0.3 to 1.5 m) of the surface during the summer. Vegetation is varied. The latest successional stage, and presumed potential plant community, is mixed paper birch-white spruce forest. Earlier forest stages include paper birch forest and balsam poplar forest. The understory of all forest types varies considerably in plant species composition, but is typically dominated by a dense, jungle-like layer of tall and low shrubs and a fairly luxuriant tall herb layer. The most frequent and abundant shrubs include thinleaf and Sitka alder, devil's club, prickly rose, common red raspberry, and highbush cranberry. The most abundant herbs include bluejoint reedgrass, horsetail, shield fern, common lady fern, and ostrich fern. Small stands of tall alder scrub are found on younger segments of the floodplain, typically adjacent to the river channel. This site is often found in complex with ecological site Floodplain deposits; site, soils, and vegetation characteristics on these two sites are very similar.

Floodplain deposits, moderately wet is well suited for forestry and suited for livestock grazing. This site produces abundant moose browse and other forage, and provides favorable habitat for spruce grouse and other wildlife. Dense understory vegetation provides excellent cover. Large balsam poplar trees are often favorable nesting and perch sites for bald eagles. Rivers and streams provide habitat for trout, grayling, burbot, and salmon.

Glaciofluvial deposits, 15-25 inch pz. includes well drained soils under forest vegetation on glaciolacustrine and outwash plains and hills throughout the lower Matanuska and Susitna Valleys. Elevation ranges from 50 to 500 feet (15 to 152 m); slope ranges from 0 to 60 percent. Chilligan, Delyndia, Flat Horn, and Kashwitna soils are formed in a mantle of mixed volcanic ash and wind blown silt 3 to 26 inches (8 to 66 cm) thick over sandy and gravelly outwash and stratified loamy glaciofluvial deposits. This site supports a variety of forest types including mixed paper birch-white spruce open forest, paper birch-quaking aspen forest, and black spruce forest. Paper birch-white spruce forest is the latest successional stage, and the presumed potential vegetation. Black spruce forest probably developed after forest fires and may persist indefinitely. The understory in all three forest types is dominated by low ericaceous shrubs, primarily Labrador tea ledum, lowbush cranberry, and bog blueberry. Bunchberry dogwood and a nearly continuous layer of moss cover the forest floor. This site occurs in association with ecological sites Till deposits, 15-25 inch pz.; Glaciofluvial deposits, thin surface; and occasionally Drift deposits, very poorly drained.

Glaciofluvial deposits, 15-25 inch pz. is well suited for forestry. Occasional stands with abundant herbaceous understory are suited for livestock grazing. This site provides marginal habitat for moose and favorable habitat for spruce grouse and other wildlife.

Glaciofluvial deposits, 20-35 inch pz. includes well drained soils under forest vegetation on plains, terraces, and hills adjacent to the Susitna River, from Cook Inlet to the northern end of the Survey Area. This site generally occurs immediately above the floodplains and stream terraces along the river. Elevation ranges from 50 to 650 feet (15 to 198 m); slope typically ranges from 0 to 35 percent, and occasionally to 60 percent. Benka, Nancy, and Whitsol soils are formed in a mantle of windblown silt and volcanic ash 14 to 35 inches (36 to 89 cm) thick over sandy, stratified loamy and gravelly glaciofluvial material. In Whitsol, till substratum soils, gravelly glacial till is present at a depth of 40 to 60 inches (102 to 152 cm). This site supports a variety of forest types including mixed paper birch-white spruce open forest, paper birch and mixed paper birch-quaking aspen

forest, and black spruce and mixed black spruce-paper birch forest. Forests dominated by black spruce probably developed after forest fires and may persist indefinitely. Understory characteristics within and between these forest types vary considerably, reflecting a wide range in stand age, microsite, and disturbance history. Mature paper birch-white spruce forest is the latest successional stage and the presumed potential vegetation. Dense tall and low shrubs dominate the understory of this type. The most abundant shrubs include Sitka alder, devil's club, rusty menziesia, highbush cranberry, ovalleaf blueberry, and occasionally willow. Scattered herbs, patches of moss, and leafy litter characterize the forest floor. This site often occurs in association with ecological sites Till deposits, 20-35 inch pz.; Drift deposits, very poorly drained; and occasionally Sand dunes.

Glaciofluvial deposits, 20-35 inch pz. is well suited for forestry, and occasional stands with abundant herbaceous understory are suited for livestock grazing. This site provides favorable habitat for moose, spruce grouse, and other wildlife.

Glaciofluvial deposits, thin surface includes well drained, forested soils on outwash plains and hills, south and west of Willow, Houston, and Wasilla, to Cook Inlet. Elevation ranges from 50 to 500 feet (15 to 152 m); slope ranges from 0 to 35 percent, and occasionally to 60 percent. Kichatna soils are formed in a thin mantle of mixed volcanic ash and wind blown silt 2 to about 10 inches (5 to about 25 cm) thick over sandy and gravelly outwash. A variety of forest types, including mixed paper birch-white spruce open forest, paper birch-quaking aspen forest, and black spruce forest, are found on this site. Paper birch-white spruce forest is the latest successional stage and the presumed potential vegetation. Black spruce forest probably developed after forest fires and may persist indefinitely. The understory in all three forest types is dominated by low ericaceous shrubs, primarily Labrador tea ledum, lowbush cranberry, and bog blueberry. Bunchberry dogwood and a nearly continuous layer of moss cover the forest floor. This site often occurs in association with ecological site Till deposits, thin surface.

Glaciofluvial deposits, thin surface is suited for forestry, and provides marginal habitat for moose and favorable habitat for spruce grouse and other wildlife.

Organic terrain consists of very poorly drained peatland soils in extensive bogs and fens throughout the Susitna Valley and lower Little Susitna drainage. This site occurs in depressions and flats on plains, along drainages, and occasionally in depressions on hills. Elevation ranges from 50 to 850 feet (15 to 259 m). Histosols soils are formed in thick deposits of moss, sedge, and shrub peat over 16 inches (over 41 cm) thick, underlain by varying organic and mineral materials (Figure 11). Most areas are ponded during much of the growing season; however, during extended periods of dry weather, the soil can dry out to moderate depths as the water table drops. Vegetation potential varies throughout this site depending on such factors as water flow and drainage, microtopography and elevation, and peat thickness and type. Common vegetation types include black spruce/ericaceous shrub woodland, ericaceous shrub scrub, sedge-shrub bog meadow, and sedge wet meadows and bog meadows.

Organic terrain provides habitat for moose and a variety of other wildlife. Wet, organic soils limit most other land uses.

Sand dunes includes somewhat excessively drained soils under forest vegetation on hills and stabilized sand dunes along the lower reaches of the Susitna and Little Susitna Rivers, and in the Goose Bay-Point MacKenzie area. Elevation ranges from 50 to 250 feet (15 to 76 m); slope ranges from 2 to 35 percent. Liten soils are formed in a thin mantle of wind blown silt 1 to 10 inches (3 to 25 cm) thick over wind blown sand. Gravelly glacial till is present below 50 inches (below 127 cm) in some places. Most areas support mixed paper birch-quaking aspen forest. Black spruce forests, which probably developed following forest fires, are found in a number of locations. Understory vegetation in both forest types consists of sparse shrubs and herbs, with a nearly continuous layer of forest litter and scattered patches of moss covering the ground surface. Common understory plants include Labrador tea ledum, willow, highbush cranberry, bunchberry dogwood, and

American twinflower. This site often occurs in association with ecological site Glaciofluvial deposits, 20-35 inch pz.

Sand dunes is well suited for forestry, and provides favorable habitat for grouse and other wildlife.

Silty slopes includes well drained, forested soils on loess covered outwash plains in the Matanuska Valley, in the vicinity of Palmer and the Butte. Isolated areas are found in the Matanuska River canyon as well. Elevation ranges from 100 to occasionally as much as 750 feet (30 to as much as 229 m). Slope ranges from 0 to 35 percent in most places, and up to 60 percent in a few scattered locations. Bodenburg and Yensus soils are formed in a mantle of wind blown silt over sandy and gravelly glacial outwash. Depth to the sandy and gravelly material ranges from 24 to 60 inches (61 to 152 cm) or more. Bodenburg and Yensus soils are well drained; however, ponded water may be present in depressions in the spring prior to soil thawing, particularly in areas cleared of forest cover. Vegetation consists of mixed paper birch-white spruce forest and paper birch forest, with balsam poplar trees present in many stands. The understory is dominated mostly by bluejoint reedgrass and other tall and medium herbs, often with a broken to nearly continuous layer of low shrubs. Common shrubs include highbush cranberry, prickly rose, and red currant. Sitka alder, and occasionally devil's club and red elderberry, are found in many stands within the Matanuska River canyon. This site occasionally occurs in association with ecological site Bedrock hills, 15-25 inch pz.

Silty slopes is well suited for forestry and livestock grazing, produces moderately abundant moose browse and hiding cover, and is favorable habitat for spruce grouse and other wildlife.

Silty slopes, cool includes well drained soils under forest vegetation on loess covered till plains, hills, and ridges in the Matanuska River canyon east of Moose Creek. Elevation ranges from 600 to 1500 feet (183 to 457 m); slope ranges from 2 to 35 percent. Eska soils are formed in a mantle of wind blown silt 22 to 40 inches (56 to 102 cm) thick over cobbly and gravelly till. Vegetation consists of mixed paper birch-white spruce open forest, with balsam poplar and quaking aspen trees present in most stands. The understory is characterized by scattered to moderately dense tall and low shrubs, with abundant tall and medium herbs in the ground layer. Common shrubs include Sitka and thinleaf alder, highbush cranberry, and often willow. On cooler northerly aspects and moist microsites, devil's club, Labrador tea ledum, and lowbush cranberry are often found. Dominant herbs include bluejoint reedgrass, horsetail, and various ferns. This site often occurs in association with ecological site Bedrock hills, 15-25 inch pz.

Silty slopes, cool is well suited for forestry and livestock grazing, produces moderately abundant moose browse and hiding cover, and is favorable habitat for spruce grouse and other wildlife.

Silty slopes, thin surface includes well drained, forested soils on outwash plains and hills in the lower Matanuska Valley in the vicinity of Palmer and Wasilla. Isolated areas are found in the Matanuska River canyon as well. Elevation ranges from 50 to 750 feet (15 to 229 m); slope ranges from 0 to 35 percent, and occasionally to 65 percent. Knik soils are formed in a mantle of wind blown silt 10 to 24 inches (25 to 61 cm) thick over sandy and gravelly glacial outwash. Vegetation consists of mixed paper birch-white spruce forest and paper birch forest, with balsam poplar trees present in many stands. The understory is dominated mostly by bluejoint reedgrass and other tall and medium herbs, often with a broken to nearly continuous layer of low shrubs. Common shrubs include highbush cranberry, prickly rose, and red currant. This site often occurs in association with ecological sites Till deposits, 15-25 inch pz. and occasionally Drift deposits, very poorly drained.

Silty slopes, thin surface is well suited for forestry and livestock grazing, produces moderately abundant moose browse and hiding cover, and is favorable habitat for spruce grouse and other wildlife.

Tidal basin includes very poorly drained soils under scrub and wet meadow vegetation on tidal flats along Cook Inlet, at the mouths of the Susitna, Little Susitna, and Matanuska Rivers and in Goose Bay. Elevation is 0 to 30 feet (0 to 9 m), and areas are sometimes partially to entirely inundated by tide water. At other times, the water table remains within 1 foot (0.3 m) or less of the surface continuously. Weakly developed Typic Cryaquents soils are formed in silty marine sediments. Vegetation consists primarily of halophytic sedge-grass wet meadows, with alder scrub and willow scrub along drainages and elevated microsites. Ecological site Organic terrain, which generally occurs on slightly higher landscapes above the tidal influence, is occasionally associated with this site.

Tidal basin provides habitat for moose, bald eagles and hawks, and a variety of waterfowl, shore birds, and other wildlife. Tides and wet soils limit most other land uses.

Till deposits, 15-25 inch pz. includes well drained, forested soils on till plains and hills in the Matanuska Valley, and lower Susitna Valley south of Willow. Elevation ranges from 100 to 750 feet (15 to 229 m); slope ranges from 0 to 35 percent, and occasionally to 60 percent. Estelle, Kalambach, and Yohn soils are formed in a silty or loamy mantle of volcanic ash and wind blown deposits about 10 to 40 inches (25 to 102 cm) thick over gravelly and cobbly till. In Keba soils, the silty surface is about 4 to 10 inches (10 to 25 cm) thick over loamy glaciolacustrine material. Vegetation consists of mixed paper birch-white spruce forest and paper birch forest, with balsam poplar and quaking aspen trees present in many stands. Understory characteristics within and between these forest types vary considerably, reflecting a wide range in stand age, microsite, and disturbance history. The understory in mature stands is dominated by bluejoint reedgrass and other tall and medium herbs, often with a broken to nearly continuous layer of low and tall shrubs. Common shrubs include devil's club, highbush cranberry, prickly rose, and alder. This site often occurs in association with ecological sites Glaciofluvial deposits, 15-25 inch pz.; Till deposits, 15-25 inch pz.; and Drift deposits, very poorly drained.

Till deposits, 15-25 inch pz. is well suited for forestry and livestock grazing. This site produces moderately abundant moose browse, other forage, and suitable hiding cover; and is favorable habitat for spruce grouse and other wildlife.

Till deposits, 20-35 inch pz. includes well drained soils under forest vegetation on till plains, hills, and mountain slopes in the Susitna Valley north of Houston. Elevation ranges from 400 to 1500 feet (122 to 457 m); slope typically ranges from 0 to 35 percent, and occasionally as much as 60 percent. Tokositna and Talkeetna, low elevation soils are formed in a mantle of silty loess and volcanic ash 14 to 35 inches (36 to 89 cm) thick over gravelly and cobbly till. This site supports a variety of forest types including mixed paper birch-white spruce open forest, paper birch forest, and mixed paper birch-quaking aspen forest. Understory characteristics within and between these forest types vary considerably, reflecting a wide range in stand age, microsite, and disturbance history. Paper birch-white spruce forest is the latest successional stage and the presumed potential vegetation. Dense tall and low shrubs, the most important of which are Sitka alder, devil's club, rusty menziesia, and ovalleaf blueberry, dominate the understory of this type. Bluejoint reedgrass, various ferns, and a number of medium and low growing herbs dominate the forest floor. This site often occurs in association with ecological sites Drift deposits, very poorly drained; Bedrock hills, 20-35 inch pz.; and Glaciofluvial deposits, 20-35 inch pz.

Till deposits, 20-30 inch pz. is well suited for forestry and suited for livestock grazing. This site produces moderately abundant moose browse, other forage, and suitable hiding cover; and is favorable habitat for spruce grouse and other wildlife.

Till deposits, thin surface includes well drained, forested soils on till plains and hills, primarily south and west of Wasilla and Houston, to Goose Bay. Elevation ranges from 50 to 350 feet (15 to 107 m); slope ranges from 0 to 20 percent, and occasionally as high as 60 percent. Deception soils are formed in a thin mantle of mixed volcanic ash and wind blown loess 4 to about 10 inches (10 to about 25 cm) thick over cobbly and gravelly till.

Vegetation in most places consists of mixed paper birch-white spruce open forest and paper birch-quaking aspen forest. Paper birch-white spruce forest is the latest successional stage and the presumed potential vegetation. The understory in these forest types is dominated by low ericaceous shrubs, primarily Labrador tea ledum, lowbush cranberry, and bog blueberry. Bunchberry dogwood and a nearly continuous layer of moss cover the forest floor. This site often occurs in association with ecological sites Till deposits, 15-25 inch pz. and Glaciofluvial deposits, thin surface.

Till deposits, thin surface is suited for forestry, and provides moderate quality moose habitat and favorable habitat for spruce grouse and other wildlife.

Ecological Sites of the Southcentral Alaska Mountains

Alpine hummocks includes well drained, alpine soils on mountain slopes and valley bottoms, between 1700 and 3000 feet (518 to 914 m) elevation in the Talkeetna Mountains. Slope ranges from 0 to 30 percent. Surface microtopography is characterized by low earth hummocks 6 to 15 inches (15 to 38 cm) high. Soils include Tsadaka and Siwash. Tsadaka soils are formed in volcanic ash and windblown silt 14 to 26 inches (36 to 66 cm) thick over cemented cobbly and gravelly till. Siwash soils are formed in volcanic ash and silty windblown deposits 8 to 14 inches (20 to 36 cm) thick over cobbly and gravelly till. These soils are underlain by bedrock at a depth of 9 to 20 inches (23 to 51 cm). In most places, vegetation includes black crowberry-bog blueberry dwarf scrub and black crowberry-Altai's fescue dwarf scrub. This site often occurs in association with ecological sites Alpine ridges; Loamy slopes, cool; and Mountain slopes, drainages.

Alpine hummocks provides suitable habitat for caribou, ptarmigan, and other wildlife found in alpine tundra and is used to some degree by moose.

Alpine ridges includes well drained, alpine soils on mountain ridges and convex slopes in the high Talkeetna Mountains, from 1700 to 3500 feet (518 to 1067 m) elevation. Slope ranges from 0 to 30 percent or more. Goldcord soils are formed in a thin layer of very cobbly sandy loam 8 to 20 inches (20 to 51 cm) thick over bedrock. A nearly continuous cover of rock fragments characterizes the soil surface. Bedrock exposures of small extent are present in many places. The sparse, low growing dwarf shrub-lichen scrub vegetation on this site reflects the harsh conditions and short growing season. Common plant species include alpine bearberry, dwarf shrub birch, pin-cushion plant, bog blueberry, and lowbush cranberry. Herbs are represented by a wide variety of species but none are particularly abundant. Fruticose lichens and mosses cover between 25 and 60 percent or more of the ground surface. This site often occurs in association with ecological site Alpine hummocks.

Alpine ridges provides habitat for caribou, Dall sheep, ptarmigan, and other alpine wildlife.

Alpine terrain includes well drained, alpine soils on high mountain peaks, ridges, slopes, and basins in the Talkeetna Mountains, above 2000 feet (610 m) elevation. Alpine terrain includes that portion of the alpine zone not included in ecological sites Alpine hummocks and Alpine ridges. Slope ranges up to 100 percent or more. Miscellaneous land types associated with this site are rock outcrops, cliffs, talus, and boulder fields. Vegetation characteristics vary widely. Cryumbrepts soils are generally very to extremely cobbly and stony with bedrock at 4 to 60 inches (10 to 152 cm) or more below the surface. The fine earth component is usually loamy textured. Soils in most areas are well drained, although poorly drained soils can be found in basins and drainages. Vegetation varies in response to slope, aspect, soil depth and drainage, wind patterns, and snow avalanching and accumulation; and includes a variety of alpine dwarf scrub and herbaceous types.

Alpine terrain provides a variety of potential habitats for caribou, Dall sheep, and other wildlife adapted to alpine tundra.

Bedrock hills, high elevation includes well drained, wooded soils on crests and shoulders of slopes in the Talkeetna Mountains, in the far northern end of the Survey Area. Elevation ranges from 1000 to 1800 feet (305 to 549 m); slope ranges from 2 to 20 percent. Deneka soils are formed in silt loam over very cobbly sandy loam, and bedrock is present between 12 and 20 inches (30 to 51 cm) below the surface. Predominant vegetation cover includes mixed paper birch-white spruce woodland and open forest. With increasing elevation, paper birch decreases in abundance and white spruce generally dominates. Dense bluejoint reedgrass, common fireweed, shield fern, and a variety of other herbs characterize the understory. This site often occurs in association with ecological sites Mountain slopes and Till deposits, high elevation.

Bedrock hills, high elevation is suited for forestry and livestock grazing, and provides habitat for moose, spruce grouse, and other wildlife.

Fans includes well drained to somewhat excessively drained, occasionally flooded, forested soils on alluvial fans in the Talkeetna and Chugach Mountains, between 600 and 1500 feet (183 to 457 m) elevation. Slope ranges from 4 to 12 percent. Kidazqeni, cool and Niklason, cool soils are formed in stratified loamy alluvium over sandy and gravelly alluvium. Depth to coarse substratum materials ranges from 2 to 10 inches (5 to 25 cm) in the Kidazqeni, cool soils and 14 to 40 inches (36 to 102 cm) in the Niklason, cool soils. Vegetation cover consists of mixed paper birch-white spruce open forest and white spruce open forest and woodland. A dense cover of bluejoint reedgrass, ferns, and a variety of medium and low growing herbs dominate the understory. Many stands also have a prominent tall and low shrub layer composed of Sitka alder, devil's club, Beauverd's spiraea, bog blueberry, and occasionally rusty menziesia and ovalleaf blueberry. This site often occurs in association with ecological sites Till deposits, high elevation and Mountain slopes.

Fans is suited for forestry and well suited for livestock grazing, and provides habitat for moose, spruce grouse, and other wildlife.

Loamy slopes includes well drained soils under grassland vegetation on slopes in the subalpine zone in the Talkeetna Mountains. Elevation ranges from 1400 to 2500 feet (427 to 762 m); slope ranges from 15 to 35 percent, and occasionally greater. Talkeetna soils are formed in a silty mantle of loess and volcanic ash 14 to 25 inches (36 to 64 cm) thick over gravelly and cobbly till. Vegetation consists of bluejoint reedgrass-forb grassland dominated by bluejoint reedgrass, common fireweed, ferns, and a wide variety of medium and low growing herbs. This site is more productive than, but otherwise similar to, ecological sites Loamy slopes, cool and Loamy slopes, wet. Loamy slopes usually occurs in complex with ecological site Mountain slopes and tall Sitka alder scrub vegetation; and is occasionally associated with Till deposits, high elevation.

Loamy slopes is well suited to livestock grazing and provides some summer range for moose. Bears and other wildlife utilize this site as well.

Loamy slopes, cool includes well drained soils under grassland on slopes in the subalpine zone in the Talkeetna Mountains. Elevation ranges from 1500 to 3000 feet (457 to 914 m); slope ranges from 10 to 35 percent, and occasionally greater. Talkeetna, cool and Cryods, cold soils are formed in a mantle of silty loess and volcanic ash 5 to 28 inches (13 to 71 cm) thick over gravelly and cobbly till and colluvium. Vegetation consists of bluejoint reedgrass-forb grassland dominated by bluejoint reedgrass, common fireweed, ferns, false hellebore, and a wide variety of medium and low growing herbs. This site is similar to, but less productive than, ecological site Loamy slopes, and has vegetation similar to ecological site Loamy slopes, wet. Loamy slopes, cool usually occurs in complex with ecological sites Mountain slopes, drainages and low willow scrub vegetation; Alpine hummocks and dwarf black crowberry-bog blueberry scrub; and/or Mountain slopes, drainages and tall alder scrub.

Loamy slopes, cool is well suited to livestock grazing and provides some summer range for moose. Bears and other wildlife utilize this site as well.

Loamy slopes, wet includes poorly drained soils under grassland vegetation on slopes in the subalpine zone on Willow Mountain, and in scattered locations elsewhere in the southwest portion of the Talkeetna Mountains. Elevation ranges from 2100 to 3000 feet (640 to 914 m); slope ranges from 5 to 20 percent. Psuyaah soils are formed in a mantle of silty loess and volcanic ash 16 to 27 inches (41 to 69 cm) thick over gravelly and cobbly till. They are poorly drained, with a seasonally high water table at a depth of 0.5 to 2.0 feet (0.2 to 0.6 m) during the summer. Vegetation consists of bluejoint reedgrass-forb grassland dominated by bluejoint reedgrass, common fireweed, ferns, false hellebore, and a wide variety of medium and low growing herbs. This site is similar to ecological site Loamy slopes, cool, and usually occurs in complex with ecological site Mountain slopes, drainages and low willow scrub vegetation.

Loamy slopes, wet is suited for livestock grazing; however, wet soils may limit use during much of the grazing season. This site provides excellent seasonal range for moose, particularly where found in association with ecological site Mountain slopes, drainages. Bears and other wildlife utilize this site as well.

Mountain slopes includes well drained soils under scrub vegetation on slopes in the Talkeetna Mountains. Elevation ranges from 600 to 2600 feet (183 to 792 m); slope ranges from 2 to 60 percent. Talkeetna, thick surface soils are formed in a mantle of silty loess and volcanic ash 14 to 27 inches (36 to 69 cm) thick over gravelly and cobbly till. Vegetation consists of tall Sitka alder scrub with an understory dominated by bluejoint reedgrass and ferns. Common low shrubs, present in many stands, are currant, devil's club, and Beauverd's spiraea. The tall alder canopy varies open to closed. Understory abundance generally increases as shrub cover decreases. This site is similar to ecological site Mountain slopes, wet, and usually occurs in complex with ecological sites Till deposits, high elevation and forest vegetation; or Loamy slopes and bluejoint reedgrass grassland.

Mountain slopes is suited for livestock grazing, primarily in those stands with open alder cover, and also provides habitat for moose and other wildlife.

Mountain slopes, cool includes well drained or somewhat excessively drained soils under scrub vegetation on steep slopes, between 1400 and 3700 feet (427 to 1128 m) elevation in the Talkeetna Mountains. Slope ranges from 35 to 90 percent. Cryods soils are formed in silty loess over gravelly, cobbly, and stony colluvium. Bedrock is present in some places at a depth of 20 inches (51 cm) or more. Vegetation consists of dense low willow scrub. Associated herbaceous cover varies from sparse to moderately abundant. Common plant species include bluejoint reedgrass, Altai's fescue, northern geranium, false hellebore, Canadian burnet, and oak fern. This site usually occurs in complex with other grassland and scrub sites in the subalpine zone, primarily Mountain slopes and Loamy slopes, cool.

Mountain slopes, cool produces abundant moose browse, with most stands evidencing moderate to severe browsing, and also provides favorable habitat for ptarmigan and other wildlife.

Mountain slopes, drainages includes very poorly or poorly drained soils under scrub vegetation in depressions and shallow drainages, and adjacent to small, low gradient streams in the subalpine zone in the Talkeetna Mountains. Elevation ranges from 1700 to 3500 feet (518 to 1067 m); slope ranges from 0 to 15 percent. Snowdance and Cryaquepts, cool soils are formed in a mantle of silty loess and volcanic ash over gravelly and cobbly till. Surface texture is often mucky silt loam. Depth to the substratum materials is usually greater than 10 inches (greater than 25 cm). A seasonally high water table is present at 0 to 1.5 feet (0 to 0.5 m) below the surface during the summer. Vegetation consists of dense low willow scrub. Common willows include Barclay's willow and diamondleaf willow. Associated herbaceous cover is usually abundant and composed of a rich variety of plant species including bluejoint reedgrass, various sedges, horsetail, lady fern, northern geranium, Canadian burnet, and oak fern. This site usually occurs in complex with ecological sites Loamy slopes, cool and Loamy slopes, wet and grassland

vegetation; and Alpine hummocks and dwarf scrub vegetation.

Mountain slopes, drainages produces abundant moose browse, with most stands evidencing moderate to severe browsing, and also provides favorable habitat for ptarmigan and other wildlife.

Mountain slopes, wet includes very poorly drained and poorly drained soils under scrub vegetation on slopes in the Talkeetna Mountains, between 800 and 3000 feet (244 to 914 m) elevation. Slope ranges from 5 to 25 percent. Chunilna, cool soils are formed in a mantle of mucky silt loam and silt loam 14 to 32 inches (36 to 81 cm) thick over gravelly and cobbly till. A seasonally high water table is present at 0 to 1.5 feet (0 to 0.5 m) below the surface during the summer. Vegetation consists of tall Sitka alder scrub with an understory dominated by bluejoint reedgrass and ferns. Willow and devil's club are common tall and medium shrubs in many stands. The tall alder canopy varies open to closed. Understory abundance generally increases as shrub cover decreases. This site is similar to ecological site Mountain slopes, and usually occurs in complex with ecological sites Loamy slopes, cool and bluejoint reedgrass grassland; and Alpine hummocks and dwarf scrub.

Mountain slopes, wet provides favorable habitat for moose and other wildlife.

Organic terrain, high elevation includes very poorly drained peatland soils in small bogs and fens on summits and shoulders above treeline in the Talkeetna Mountains. Elevation is generally 1700 to 3200 feet (518 to 975 m); slope ranges from 0 to 7 percent. Histosols, high elevation soils are formed in deposits of moss, sedge, and shrub peat and mucky peat 16 inches (41 cm) thick or more, over mineral soil of variable texture. The soil surface is ponded most of the growing season, except during extended periods of dry weather when the soil can dry out to moderate depths as the water table drops. Vegetation varies in response to water flow and drainage, microtopography and elevation, and peat thickness and type; and includes sedge wet meadows and bog meadows, and sedge-shrub bog meadows.

Organic terrain, high elevation is suitable habitat for moose and other adapted wildlife. Wet organic soils limit other land uses.

Stream terraces includes rarely to occasionally flooded, forested soils on low stream terraces and floodplains in valley bottoms of major streams in the Talkeetna Mountains. Elevation ranges from 1000 to 2300 feet (305 to 701 m); slope ranges from 2 to 5 percent. Moderately well drained Niklason, moderately wet and somewhat poorly drained Qeni soils are formed in stratified loamy alluvium over gravelly and cobbly alluvium. Depth to the gravelly and cobbly material ranges from 2 to 10 inches (5 to 25 cm) in the Qeni soils and from 14 to 35 inches (36 to 89 cm) in the Niklason, moderately wet soils. A seasonally high water table occurs at a depth between 1.0 and 5.0 feet (0.3 and 1.5 m). Vegetation consists of white spruce woodland and occasionally open forest, with an understory dominated by low willows, bluejoint reedgrass, common fireweed, Canadian burnet, and a variety of low growing herbs. This site generally occurs down stream from ecological site Stream terraces, wet.

Stream terraces produces abundant willow browse, with most stands evidencing slight to moderate use, and also provides habitat for spruce grouse and other wildlife.

Stream terraces, cool includes well drained, wooded soils on stream terraces and alluvial fans in valley bottoms associated with major streams in the Talkeetna Mountains. Elevation ranges from 1000 to 2300 feet (305 to 701 m); slope ranges from 0 to 15 percent. Cryods, cool soils are formed in a thin layer of silty loess and volcanic ash over gravelly and cobbly alluvium. Depth to the gravelly and cobbly layer typically ranges from 3 to 14 inches (8 to 36 cm). Vegetation consists of mixed white and black spruce woodland and occasionally open forest, with an understory dominated by low shrubs and a nearly continuous layer of moss on the forest floor. Dominant shrubs include bog blueberry, black crowberry, shrub birch, Beauverd's spiraea, lowbush cranberry, and

willow. A variety of herbs, including bluejoint reedgrass, bunchberry dogwood, and oak fern, are scattered throughout the shrub layer and on the forest floor. This site usually occurs in complex with ecological site Stream terraces.

Stream terraces, cool is suited for livestock grazing and provides favorable habitat for spruce grouse and other wildlife.

Stream terraces, wet includes poorly and somewhat poorly drained, rarely to occasionally flooded soils under scrub vegetation on low stream terraces and floodplains in valley bottoms of major streams in the Talkeetna Mountains. Elevation ranges from 2200 to 2800 feet (671 to 853 m); slope ranges from 0 to 5 percent. Niklavar, cool and Qeni, cool soils are formed in loamy alluvium over gravelly and cobbly alluvium. Depth to the gravelly and cobbly material varies from 2 to 22 inches (5 to 56 cm). These soils have a seasonally high water table during the growing season at 1.0 to 3.0 feet (0.3 to 0.9 m) below the surface. Vegetation consists of low willow scrub. Dominant willows include Barclay's willow, undergreen willow, and diamondleaf willow. Intermixed with, and below the willow layer is a moderately abundant herbaceous layer dominated by bluejoint reedgrass and Altai's fescue. Other common herbs include sedge, common fireweed, Canadian burnet, and bunchberry dogwood. This site is usually found immediately up stream from ecological site Stream terraces, and in association with Loamy slopes, cool.

Stream terraces, wet is suited for livestock grazing; however, wet soils and flooding may limit use during the grazing season. This site produces abundant moose browse and other forage, with most stands evidencing moderate to heavy use.

Till deposits, high elevation includes well drained, forested soils on slopes and ridges near tree line in the Talkeetna Mountains. Elevation ranges from 800 to 1800 feet (244 to 549 m); slope ranges from 0 to occasionally as high as 60 percent. Talkeetna, warm soils are formed in a mantle of silty loess and volcanic ash 14 to 25 inches (36 to 64 cm) thick over gravelly and cobbly till. Vegetation consists of mixed paper birch-white spruce open forest, and white spruce woodland at higher elevations. Small, isolated stands of balsam poplar forest are found in scattered locations. A dense cover of bluejoint reedgrass, ferns, and a variety of other medium and low growing herbs dominate understory vegetation. Tall shrubs, primarily Sitka alder, devil's club, and red elderberry, are common to well represented in many stands. At tree line, this site occurs in complex with ecological sites Loamy slopes and Loamy slopes, cool and bluejoint reedgrass grassland; and Mountain slopes and tall alder scrub.

Till deposits, high elevation is suited for forestry and livestock grazing; however, steep slopes limit grazing in many stands. This site provides habitat for moose, spruce grouse, and other wildlife.

Livestock Grazing on Native Vegetation

Livestock grazing on native vegetation has been only a minor, incidental land use in the Matanuska-Susitna Valley Area. Early settlers often maintained a small number of horses, and occasionally cattle, near mining claims and homesteads. In 1951, the State of Alaska leased a portion of the upper valley of the Little Susitna River for summer range for dairy herd replacement heifers and steers. Initially, the lease area was utilized annually; average stocking for the period from 1953 through 1983 was 133 animals per year (*State of Alaska et al. 1986a*). After 1983, the lease area was utilized intermittently, and the lease has since been terminated.

Land use planning for State lands within the Matanuska-Susitna Valley Area, and elsewhere in the Susitna River Basin, recognized livestock grazing as an appropriate and potential land use (*State of Alaska et al. 1982, 1985, 1986a, 1986b, 1989*). Management goals, and guidelines in planning documents, specified that leasing and permitting for grazing would be directed where resource conditions were suitable and where grazing was

economically feasible. Grazing would be implemented on a sustained yield basis to preserve the integrity of the resource, and in a manner consistent with wildlife and other resource management goals and efforts. Grazing was identified as a primary or secondary use in a number of Management Units and Subunits.

At the time this report was prepared, there were no lands under lease or permit for grazing within the Matanuska-Susitna Valley Area. On many local farms and other private lands, small numbers of horses and cattle are turned out on forest understory and other native pasture, but the overall extent of this use in the Area is minor. Most livestock are maintained on tame pasture and supplemental feeds.

Grazing Resources

Suitable site and soil characteristics for grazing include native vegetation with abundant growth of desirable forage plants, good availability of water, moderate slopes, and otherwise favorable soil and topographic characteristics. Access, proximity to agricultural areas and markets, and compatibility with other resource uses and values are additional considerations when assessing the potential of an area for livestock grazing.

Native vegetation on many soils in the Matanuska-Susitna Valley Area provides abundant forage suitable for livestock grazing. In the subalpine zone, immediately above treeline in the Talkeetna Mountains, Talkeetna; Talkeetna, cool; and Psuyaah soils support highly productive grassland well suited to grazing. In the forested zone in the Matanuska and Susitna Valleys, the forest understory on Bodenburg, Knik, Estelle, and a number of other soils is dominated or codominated by grasses and broadleaf forbs suited to grazing.

Bluejoint reedgrass[1] is the principal native forage grass on both forested and non-forested soils. It is common throughout Alaska and highly productive on a wide variety of soil conditions. Growth of 60 inches (152 cm) or more during the relatively short growing season is not unusual. Protein content and digestibility, however, decline rapidly as the season progresses (*McKendrick 1983*).

Grazing Management Concerns

Conservation systems that maintain or improve the condition of all resources are needed on lands grazed by livestock. The interests of livestock operators, conservationists and biologists, environmentalists, and the general public are best served with practices that: 1) provide for proper stocking; 2) provide for optimal distribution of stock and forage utilization; 3) allow for a period of rest and recovery of grazed plants, in conjunction with an appropriate grazing system; 4) accommodate the spatial and temporal resource requirements of native ungulates and other wildlife; 5) maintain water quality and minimize impacts to riparian zones and fisheries; 6) minimize conflicts with forestry, recreation, and other resource uses; 7) provide for timely and effective monitoring; and 8) are economically feasible.

Grazing livestock in the Area is not without numerous management challenges and problems. The grazing season is short, limited to the summer months only. At higher elevations, snow cover usually persists until early summer and cold temperatures delay plant growth. Operators need adequate resources to pasture and feed their stock for eight months or more. Nutritional characteristics of native forages, such as protein content and digestibility, are often poor. Supplemental feeding may be required to prevent weight loss towards the end of the grazing season, and young cattle and smaller animals may require supplements whenever they are on native range. There is limited access and no significant structural range improvements on public lands in the Matanuska-Susitna Area.

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[1] Scientific names of plants are given in Table 10.

Livestock Grazing-Soils Interpretations

Soil surveys can provide useful and important information to livestock operators, conservationists, planners, and others when making land use decisions and designing and implementing effective conservation systems for grazing livestock on native vegetation. Included in the detailed map unit descriptions section is information about the major and minor vegetation types found on the soil components, common plants found in each type, annual production of vascular plants, soil limitations for selected livestock management factors, and grazing suitability ratings. Each soil component in a map unit is also correlated to an ecological site. The concepts and applications of ecological sites are discussed in this report under "Use and Management of the Soils, Ecological Sites". Table 9—Ecological Sites, Productivity, and Characteristic Vegetation, and Table 11—Livestock Grazing Management, summarize much of the livestock grazing information given in the detailed soil map units, and can serve as quick reference for ecological site-soils correlation and livestock grazing-soils interpretations. The methods and procedures used by range conservationists and soil scientists to develop this information are contained in the "National Soil Survey Handbook" (*Soil Survey Staff 1996b*), "National Range Handbook" (*Soil Conservation Service 1976*), and applicable state supplements.

Grazing Management

In Table 11, soil limitation ratings for fencing and livestock distribution are given for each map unit and soil component. *Slight, moderate,* and *severe* are ratings used to indicate the degree of major soil limitations**.** *Very severe* is used in conjunction with livestock distribution. Soils with moderate, severe, and very severe ratings may require special measures or conservation practices designed to overcome the limitations. For each moderate, severe, and very severe rating, the primary restrictive feature or features associated with the rating are given in the table as well as in the applicable map unit description.

Fencing limitation ratings indicate the degree of soil limitations associated with constructing and maintaining fencing to facilitate the management of grazing animals. This rating covers fences with metal or wooden posts buried at least 24 inches (61 cm) into the soil, and is based on soil properties and qualities that influence the ease of setting posts in the soil, maintaining the desired wire tension, and minimizing replacement and maintenance costs over the projected life of the fence. A rating of slight indicates that fencing can usually be constructed using conventional equipment and techniques with no special maintenance problems. A rating of moderate or severe indicates a need for more sophisticated design considerations, particularly with regard to setting posts to the desired depth and strength, and special equipment or techniques for construction and maintenance.

Critical properties in the ratings are depth to restrictive layers, cobbles, texture, soil wetness, and slope. Shallow bedrock and cobbles and stones influence the ease and depth of excavation of postholes and driving posts. Flooding and a shallow water table restrict the season in which the fence can be constructed, and influence maintenance and replacement costs. A shallow water table may require deeper post settings to offset low soil strength when saturated. Low soil strength and loose materials often make post alignment and desired wire tension difficult to achieve. In addition, frost action in loamy textured and poorly drained soils may result in frost heaving of posts. Soil reaction influences the type of post used and maintenance costs due to corrosivity. Risk of corrosion to steel and concrete is given in Table 23. The use of power augurs and transport of materials and supplies becomes more difficult with increasing slope.

Livestock distribution limitation ratings indicate the degree to which soil, site, and map unit properties influence livestock movements and grazing distribution. The ratings apply to the map unit as a whole; separate ratings are not made for individual soil components.

Proper grazing distribution is often more important to proper use of grazing lands than number of animals. Poor grazing distribution generally results in nonuse or under utilization of part of the forage in a grazing unit. However, a grazing unit may be significantly under stocked and still contain extensive areas that are damaged from excessive use. A rating of slight indicates that livestock movements are not restricted by soil and site properties, and that satisfactory grazing distribution across the soil component within a grazing unit can be expected. A rating of moderate or severe indicates that impediments to livestock distribution will likely limit or prevent use of certain portions of the map unit. Satisfactory grazing distribution can not be expected without appropriate conservation practices.

The most obvious limitation to the movement of livestock is steep slopes, particularly in combination with long slope lengths. The relative time cattle spend grazing on an area decreases markedly with increasing slope gradient and greater distances up the slope. A rating of very severe is assigned to soils with slope greater than 65 percent. Satisfactory grazing distribution on these soils may not be achievable.

Soil wetness limits livestock movements to the degree that stock are unwilling to graze or cross poorly drained and boggy soils. Gullies and drainages; short, steep slopes and escarpments; and dense brush may limit or prevent stock movements and access to some areas of a grazing unit.

Conservation practices of value in attaining proper animal distribution include fencing and the design and layout of grazing units and subunits; the amount, location, and dependability of water supplies; the proper location of salt, minerals, and supplemental feeds; herding; and the presence of walkways and stock trails. Stocking rates may need to be reduced to achieve proper grazing distribution. Use of different species and classes of livestock can be helpful in obtaining more uniform use of forage.

Grazing Suitability

Grazing suitability ratings for each soil component are given in the map unit descriptions. Grazing suitability is a combined rating that incorporates productivity of the potential plant community on a soil and its suitability for use by grazing animals, and soil limitations associated with the satisfactory distribution of livestock. Ratings are based on soil and vegetation properties. Other considerations that impact the potential of a soil for grazing but are not considered in the ratings are land use designations, conflicts with other resources and uses, social and cultural values, and economics.

Well suited, suited, poorly suited, and *unsuited* are ratings used to describe the grazing suitability of a soil. A relatively high annual production of suitable forage plants and slight or moderate limitations for livestock distribution characterize well suited and suited soils. Low forage production or severe limitations to livestock distribution characterize poorly suited soils. Unsuited soils have very severe limitations to livestock distribution, support vegetation that is not suitable for grazing, or both.

Grazing suitability ratings are based on the PNC for the ecological site although other successional stages and plant communities on a soil may be more suitable for grazing, particularly on forested soils. For example, bluejoint reedgrass readily invades forest clear cuts and other disturbed lands and may be the dominant vegetation for a number of years. A soil in this stage of forest succession may be well suited for grazing even though the potential vegetation is poorly suited. The detailed descriptions for each ecological site, on file in the Field Office Technical Guide in the local office of the Natural Resources Conservation Service, have additional information on successional stages and plant communities, and associated grazing interpretations.

Forestry

Commercial forestry has been a minor land use in the Matanuska-Susitna Valley Area. Compared to the extent of the resource, relatively few acres have been logged. With the exception of agricultural development and clearing of the Alaska Railroad right-of-way in the early part of the century, most tree harvesting activities were of small extent and highly selective. Only stands accessible from the transportation corridors and populated areas were utilized, and only the best trees were taken (*Hegg 1970*). Small timber sales were concentrated in the Talkeetna and Petersville road area (*United States Department of Agriculture 1986*). A number of local saw mills, operating on an intermittent basis, produced rough cut lumber, house logs, mine props, and other industrial products for local markets (*Hegg 1970*). In recent years, the State of Alaska and the Matanuska-Susitna Borough have had occasional personal use and commercial fuel wood and timber sales, and additional acres have been cleared for agriculture. However, commercial forestry is still a relatively minor land use, with most locally consumed wood products being imported from outside the area.

Local government agencies and economic development groups have repeatedly expressed a desire for an expanded forest industry; however, numerous related factors limit the potential for significant growth (*Massie 1966; Alaska State Housing Authority 1968; Hegg 1970; United States Department of Agriculture 1986*). Extensive, well stocked stands of paper birch, mixed paper birch-quaking aspen, and mixed paper birch-white spruce are found from north of Palmer, southwest to Knik. Most of these lands are in private ownership and used primarily for urban and semi-rural development. In areas where the majority of the land is under public ownership and management, much of the forest is understocked (to varying degrees) and contains a high percentage of poor quality trees with excessive defects. Many stands suitable for harvesting are surrounded by wet, boggy terrain, resulting in severe limitations and high construction costs for forest roads. Winter roads across frozen ground provide a suitable road surface; however, deep snow cover and short daylight limit the efficiency of winter logging. In addition, the primary road system throughout the area is very limited, and hauling distances from the forests to points of product manufacture are great.

Forest Resources

The diversity of native tree species in the Matanuska-Susitna Valley Area is low when compared with the forests of temperate North America. Botanists do not agree on the taxonomic placement of some species; however, most forest users recognize five trees occurring in the Area—white spruce, black spruce, paper birch, balsam poplar, and quaking aspen.[1]

While all tree species are of value for wood products, white spruce, paper birch, and balsam poplar are the most important in terms of value, potential uses, and abundance. White spruce is well suited for dimensional lumber for millwork and general construction purposes, can be used for posts and poles, and is average quality fuel wood. Paper birch is well suited for veneer and small dimension lumber used in furniture manufacture, paneling, and flooring, and is high quality fuel wood. Balsam poplar is suitable for rough cut lumber and core stock for plywood. Tall, large diameter, white spruce trees, and on occasion balsam poplar, make excellent house logs. Quaking aspen is suited for small dimension lumber used in paneling and cabinetry. Balsam poplar and quaking aspen provide marginal quality fuel wood. Black spruce is best suited for posts and poles because of its small diameter and short height, and provides average quality fuel wood. All area trees are suitable for chips or pulping material.

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[1] Scientific names of plants are given in Table 10.

Forestry-Soils Interpretations

Soil surveys are becoming increasingly more important to forestland owners and managers as they seek ways to improve the productivity and management of their lands, and plan the most efficient use of forest resources. The detailed map unit descriptions contain information on each forested soil including forest vegetation, tree productivity, and soil limitations and hazards for forestry practices. Tables 12—Forestland Productivity, 13—Forestland Management, and 14—Soil Limitations and Hazards for Unsurfaced Roads summarize forestry information developed in conjunction with this soil survey, and can serve as quick references for important forestry-soils interpretations. The methods and procedures used by foresters and soil scientists to develop this information are contained in the "National Soil Survey Handbook" (*Soil Survey Staff 1996b*), "National Forestry Manual" (*Soil Conservation Service 1980*), and applicable state supplements.

Forestland Productivity

In Table 12, *common trees,* those species most commonly encountered on the soil, are listed for each *map symbol* and *soil name*. *Site index* is the average height growth in feet of dominant and codominant trees in a specified number of years in fully stocked, even-aged, unmanaged stands. The specified number of years (base age) varies for the different species. Site index is determined from height and age measurements of selected trees from stands throughout the Survey Area. Tables and equations for determining site index are given in the appropriate publication for each tree species (*B. C. Forest Service 1979; Gregory and Haack 1965; Farr 1967*). Site index should be used as a comparative index between soils and an approximate measure of height growth, not an absolute or expected value. The most rapid tree growth and greatest yields of a particular tree species can be expected on soils with the highest site indexes.

Site index values can be converted into estimated yields using yield tables published with the site index tables and equations. The maximum average annual volume growth of the stand in cubic feet per acre per year is listed under *cubic feet*. Stand age at which this volume growth occurs varies by species and site index. Foresters refer to this volume as the culmination of mean annual increment (CMAI). Actual yield and stand volume, however, vary from stand to stand and must be measured in the field.

Productivity class is a number that denotes potential productivity of forest overstory tree species based on site index and corresponding CMAI. The larger the number, the greater the potential productivity. Productivity class is assigned by converting the CMAI volume from cubic feet per acre per year to cubic meters per hectare per year. A productivity class of 1 indicates the soil has the potential to produce 1 cubic meter of wood per hectare per year (14.3 cubic feet per acre per year); and 2 indicates 2 cubic meters per hectare per year (28.6 cubic feet per acre per year), etc.

Forestland Management

Table 13 lists the *ordination symbol* and major management concerns for each forested soil by *map symbol* and *soil name*. The ordination symbol is based on a uniform system of labeling individual soils and groups of soils that are similar in forest productivity, use, and management. All soils having the same ordination symbol have about the same potential productivity and require the same general kinds of management.

The first element of the ordination symbol is the *productivity class* for the indicator species (see preceding section for description). The indicator tree species is the first species listed for a particular map unit and generally the most productive on the soil. For

the Matanuska-Susitna Area, white spruce is used as the indicator species for all productive forest soils.

The second element of the ordination symbol, the *subclass*, is a letter that indicates the soil or physiographic characteristics that contribute to the hazards or limitations considered in forest management. The letter *R* indicates restrictions due to steep slopes; *X* indicates limitations because of stones or rocks on or in the soil; *W* indicates excessive water on or in the soil; *D* indicates restrictions due to limited rooting depth; *C* indicates limitations because of the kind or amount of clay in the upper portion of the soil profile; *S* indicates limitations associated with dry sandy soils; and *F* indicates restrictions because of fragmental or skeletal soils. The letter *A* indicates few or no limitations or restrictions.

In Table 13, the soils are rated for a number of factors for consideration in use and management. *Slight*, *moderate*, and *severe* are ratings used to indicate the degree of major soil limitations. Soils with *slight* limitations require only the local procedures normally used in forest management. Soils with *moderate* and *severe* limitations may require special measures or conservation practices designed to overcome the limitations.

Equipment limitation ratings refer to the operability and use of wheeled and tracked equipment over the general logging area. *Slight* indicates that equipment use normally is not restricted in kind or time of year because of soil factors; *moderate* indicates a limitation due to soil slope, seasonal wetness or flooding, or some other factor; and *severe* indicates a need for special equipment, a hazard in the use of equipment, or a longer seasonal limitation.

The most obvious limitation to the use of equipment is slope. As slope gradient increases, the operability of wheeled equipment becomes restricted and tracked equipment must be used. Very steep slopes may require the use of more sophisticated harvesting systems. Even on level and gently sloping areas, equipment use may be limited by soil wetness, especially in combination with silty, sandy, and organic surface textures. Equipment getting stuck in mud and severe soil disturbance contribute to erosion hazard. Other factors that account for equipment limitations include surface bedrock and rock fragments, cobbly and stony surface textures, and deep snowpack in winter.

Seedling mortality ratings refer to the probability of death of tree seedlings as influenced by soil properties. The ratings apply to healthy, dormant seedlings that are naturally established or properly planted; plant competition is not considered. *Slight* indicates that no problem is expected under normal conditions; *moderate* indicates some mortality can be expected and extra precautions are advisable; and *severe* indicates that mortality will be high and extra precautions are essential for successful reforestation. Seed source availability and dispersal may be of greater importance to successful reforestation than seedling mortality.

A number of factors contribute to seedling mortality including excessive soil wetness due to a high water table or saturated soil conditions. Seedlings in wet soils may also be susceptible to frost heaving during periods of diurnal freeze-thaw cycles, particularly at higher elevations. Another factor is soil droughtiness due to the low available water capacity of coarse textured soils and soils with high amounts of coarse fragments. Mortality problems associated with dry soil conditions are compounded on convex slope positions such as ridges and shoulder slopes. Shallow or restricted rooting depth due to bedrock, contrasting layers, or compact layers is also a factor. Special site preparation or reinforcement plantings may be needed on soils with *moderate* and *severe* seedling mortality hazard.

Windthrow hazard ratings consider soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. Windthrow hazard is highly variable and depends largely on the frequency and duration of strong winds; turbulence and wind funneling created by topography, orographic effects, and cutting boundary patterns; and tree heights and density. Restricted rooting depth is the principal reason for increased windthrow hazard. In Alaska, low soil temperatures and soil wetness restrict root growth, and the supporting roots of all tree species typically are concentrated in the upper soil horizons. Shallow bedrock also limits rooting depth, although in many instances

fractures in bedrock enhance wind firmness by favoring the anchoring of roots.

Because of the shallow rooting characteristics of Alaska trees, *slight* ratings are not used. *Moderate* indicates that an occasional tree may blow down during periods of excessive wetness combined with moderate or strong winds; and *severe* indicates that many trees may be expected to blow down during such periods. Soils with *moderate* and *severe* ratings require more caution in thinning operations; more attention to wind occurrence, direction, and speed when designing timber sales and cuts; and contingency plans for periodic salvage of windthrown trees.

Plant competition ratings refer to the likelihood of invasion or growth of understory plants that inhibit reforestation and stand development following logging or other soil disturbances. The rating varies considerably depending on the occurrence and proximity of competitive species. It also assumes that seed dispersal or planting on the soil occurs within 3 to 5 years following disturbance. A rating of *slight* indicates that understory plants are not likely to delay reforestation, and natural or planted seedlings have good prospects for development without undue competition; *moderate* indicates that plant competition will delay natural or planted reforestation; and *severe* indicates that competition can be expected to prevent the establishment of a new forest for tree crop production unless precautionary measures are taken.

Favorable climate and soil moisture characteristics, which contribute to rapid and lush growth or invasion of understory plants, account for most plant competition problems. Sources of competing vegetation include sprouting of existing plants, vegetative spread of plants from adjacent areas, and germination of new seed. *Moderate* and *severe* ratings indicate the need for careful consideration of occurrence and competitiveness of understory vegetation from pre-harvest planning through post-harvest clean up in preparation for reforestation. Biological, mechanical, or chemical treatments may be needed to retard growth of undesirable plants. Where the competing species is bluejoint reedgrass, intensive grazing by cattle for several years can be used to reduce grass and mulch cover and create a suitable seed bed for trees.

Forest Roads

In Table 14, limitations and hazards to the use of the soil for primitive forest roads and skid trails are listed for each *map symbol* and *soil name*. These unsurfaced roads and trails are constructed directly across the soil surface with a minimum of clearing and grading, and without the addition of subgrade fill and surfacing. They are designed for low intensity or short-term use. The organic surface and some mineral soil may be removed or disturbed during construction. Limitations and hazards are based on the surface 10 inches (25 cm) of soil.

Moderate slope applies to soils with slope between 15 and 30 percent; *steep slope* to soils with slope between 30 and 50 percent; and *very steep slope* to soils with slope greater than 50 percent. Soils with very steep slope limitations are considered unsuited for primitive roads as defined above, and additional limitations and hazards are not listed.

Flooding refers to soils with a flooding hazard of occasional or frequent. The source of floodwater is usually stream overflow but may also be runoff or tide water.

Wetness refers to soils that are poorly drained or very poorly drained. However, even soils with good drainage may have a wetness problem following snowmelt in spring and during periods of wet weather.

Low strength refers to soils that are not strong enough to support loads due to low resistance to deforming, sliding, or failure. *Low strength, organics* indicates that the limitation or hazard is primarily due to a thick layer of organic material on the surface. *Low strength, wet* refers to silty soils that are easily deformed and subject to failure when saturated. *Low strength, dry* refers to loose, sandy soils that have low bearing strength when dry.

Slippery when wet refers to soils with greater than 2 inches of silt, silt loam, or very fine sandy loam on the surface, which causes tire and track slippage when the soil is wet

following spring snowmelt and during periods of wet weather.

Dusty when dry refers to soils with silt, silt loam, or very fine sandy loam surfaces which produce dust under traffic.

Depth to rock refers to soils with hard bedrock at a depth of less than 6 inches.

Areas of rock outcrop refers to soils in map units with rock outcrop as a named component.

Stones refers to soils with a stony surface texture. *Boulders* refers to soils with a bouldery surface texture.

Forestry Suitability

Forestry suitability ratings for each soil component are given in the map unit descriptions. Forestry suitability is a combined rating that incorporates the potential forest productivity of a soil with soil limitations or hazards associated with various forestry practices and management concerns. The ratings apply to use of the soil under conventional wheeled and tracked harvesting and regeneration systems, and are based on soil productivity and soil and site properties. Factors not considered in the suitability ratings are land use designations, conflicts with other resources, social and cultural values, and economics.

Well suited, *suited*, *poorly suited*, and *unsuited* are ratings used to indicate forestry suitability. *Well suited* refers to soils in productivity class 2 or greater, for which the limitations and hazards for use of the soil are minimal. These soils are the most productive in the Area and require only the local procedures normally used in forest management. *Suited* refers to soils that are either in productivity class 1 or have one or more soil limitations or hazards to use of the soil. *Poorly suited* refers to soils that are in productivity class 1 and have one or more hazards or limitations to use of the soil. These soils are the least productive in the Area and have significant or costly management considerations. Soils rated as *unsuited* are those on which the potential natural vegetation is not forest.

Wildlife Habitat

Soil is the natural medium for the growth of the native forests, rangelands, and agricultural lands that provide habitat for the wide variety of terrestrial wildlife found in the Matanuska-Susitna Valley Area. Soils enhance the quantity and quality of the water in rivers, streams, and lakes where fish and other aquatic wildlife reside by regulating runoff, filtering pollutants, and purifying the water.

Wildlife habitats in the Area include a wide range of environments and plant communities. Estuaries and tidal flats along the Knik Arm of Cook Inlet support halophytic sedge-grass wet meadow and willow and alder scrub communities, and provide habitat for moose and a host of waterfowl, shore birds, and gulls. Floodplains and stream terraces adjacent to rivers and streams typically support an intricate mosaic of forest, scrub, and meadow vegetation types. In addition to providing habitat for moose, black and grizzly bears, bald eagles, various furbearers, and other wildlife, riverine vegetation helps maintain adjacent aquatic habitats. The extensive system of bogs, fens, and lakes throughout the Area support a variety of woodland, scrub, and meadow communities utilized by moose, greater and lesser yellowlegs, common snipe, and many other species.

Uplands throughout the Matanuska and Susitna Valleys support extensive stands of mixed paper birch-white spruce, paper birch, paper birch-quaking aspen, and spruce forest. These forest types provide habitat for black and grizzly bear, moose, porcupine, red squirrel, Northern goshawk, bald eagle, spruce grouse, and many other mammals and birds. Above treeline, in the subalpine and true alpine zones, are productive grasslands; tall, low, and dwarf shrub communities; sedge wet meadows and bog meadows; alpine

herblands; and sparsely vegetated mountain ridges, cliffs, and rock outcrops. The complex of bluejoint reedgrass grasslands, Sitka alder and willow scrub, and stringers of white spruce woodland provides some of the most productive and densely populated moose habitat in the State. The low growing vegetation of the true alpine provides seasonal and yearlong habitat for many species not generally found elsewhere in the Area, including caribou, American golden plover, and hoary marmot.

Wildlife Habitat Management

Wildlife in the Matanuska-Susitna Valley Area is an important social, cultural, and economic resource and greatly enhances the quality of life enjoyed by local residents and visitors. However, human population growth has increased use and conversion of wild lands and threatens wildlife populations and habitat quality and quantity. The desire to maintain diverse wildlife populations and healthy wildlife habitats is reflected in recent policies and attitudes of land management agencies, conservation organizations, private landowners, and the general public.

Historically, wildlife management has been centered on understanding and managing animal populations. However, wildlife biologists and land managers are now becoming increasingly aware of the potential for managing and enhancing wildlife habitat in order to maintain animal populations. Wildlife habitat can be created or improved by planting appropriate vegetation, maintaining or enhancing the existing plant cover, or promoting the natural establishment and mosaic of desirable plant communities. Habitat management involves coordinated planning and application of forestry, livestock grazing, and agronomic practices to benefit wildlife.

Farms and other intensively managed lands present special considerations and opportunities for wildlife habitat management. For example, a windbreak can be designed and planted to alleviate wind erosion problems on adjoining fields, as well as provide habitat for selected wildlife. Building a pond can provide stock or irrigation water as well as habitat for waterfowl. The diverse interests and goals of many landowners often incorporate the use of plant materials and a variety of agronomic practices to create a mosaic of habitats for a variety of wildlife. These same types of activities can be applied to smaller parcels of land, such as yards and common areas in residential developments.

Habitat management, like population management, begins with a knowledge and understanding of the resources including the spatial and temporal distribution of various habitat factors, natural soil potentials and productivity, pathways and processes of vegetative succession, and the existence and availability of adapted plant materials. Considerable information relative to habitat resources and appropriate conservation practices is provided in the detailed map unit descriptions, and other sections and tables in this report. Major and minor vegetation types known to occur naturally on each soil component, and the common plant species found in each type, are listed in the detailed soil map descriptions. Tree productivity and annual production of vascular plants are given for many soil components; and suitable conservation practices and soil limitations are given for crop and pastureland, forestry, and livestock grazing. Many of these same practices are applicable to habitat manipulation as well.

Additional, detailed information about habitat resources is given in the ecological site descriptions, which are part of the Field Office Technical Guide located in the local office of the Natural Resources Conservation Service. These site descriptions contain sections on physical, biological, and ecological properties, as well as interpretations for wildlife habitat and other land uses. Detailed data on the physiography, soils, and vegetation and interpretations on the stages, pathways, and processes of vegetative succession are also included. Concepts and applications of ecological sites and brief narrative site descriptions can be found under the heading "Ecological Sites". Additional information and knowledge necessary to better understand, describe, and refine ecological site classifications can be obtained through application and monitoring of conservation practices. Site descriptions are periodically updated to reflect the latest knowledge and

understanding.

The District Conservationist at the local office of the Natural Resources Conservation Service, as well as resource specialists with the State of Alaska Department of Fish and Game and Division of Forestry, can provide assistance in planning and implementing conservation practices for managing and enhancing wildlife habitat.

Recreation

Table 15 rates the soils of the Survey Area according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features such as wetness, slope, texture of the surface layer, and susceptibility to flooding. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites, and either access to public sewer lines or the capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degrees, for recreational uses by the duration of flooding and the season when it occurs. On-site assessment of the height, duration, intensity, and frequency of flooding is essential in planning recreational facilities.

The degree of soil limitation in Table 15 is expressed as *slight*, *moderate*, or *severe*. *Slight* indicates that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* indicates that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* indicates that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures. This information can be supplemented by other information in this survey; for example, interpretations for septic tank absorption fields in Table 16, and interpretations for dwellings without basements and for local roads and streets in Table 17.

Camp areas are tracts of land used intensively as sites for tents, trailers, and campers and for outdoor activities that accompany such sites. These areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The soils are rated on the basis of soil properties that influence the ease of developing camp areas and performance of the areas after development. Also considered are the soil properties that influence trafficability and promote the growth of vegetation after heavy use.

Picnic areas are natural or landscaped tracts of land subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The soils are rated on soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation after development. The best soils for use as picnic areas readily absorb rainfall, remain firm under heavy foot traffic, and are not dusty when dry.

Playgrounds are areas used intensively for baseball, football, or similar activities. These areas require a nearly level soil that is free of stones, and that can withstand heavy foot traffic and maintain an adequate cover of vegetation. The soils are rated on soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation. Slope and stoniness are the main concerns in developing playgrounds. The best soils for use as playgrounds readily absorb rainfall, remain firm under heavy foot traffic, and are not dusty when dry.

Paths and trails are areas used for hiking and horseback riding. These areas should require little or no cutting and filling during site preparation. The soils are rated on soil properties that influence trafficability and erodibility. The best soils for use as paths and trails remain firm under foot traffic and are not dusty when dry.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have

moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in the ratings.

Engineering

This section provides information for planning land uses related to urban development and water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, evaluating land use alternatives, and planning site investigations prior to design and construction. However, the information has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for on-site investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing this section. Local ordinances and regulations should be considered in planning, site selection, and design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about mineralogy of the sand and silt fractions and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, potential frost action, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed on-site investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with soil maps, soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the glossary.

Building Site Development

Table 17 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or

so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or a dense layer, cobble and stone content, soil texture, and slope affect the ease of digging, filling, and compacting. Depth to a seasonal high water table and the susceptibility of the soil to flooding affect the time of the year excavations can be made. Soil texture and depth to the water table affect the resistance of the excavation walls or banks to sloughing or caving.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. It is assumed that for small commercial buildings and dwellings without basements the foundation is spread footings of reinforced concrete at a depth of 4 feet. For dwellings with basements, the foundation is at a depth of about 7 feet. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, dwellings with basements, and dwellings without basements, and are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, potential frost action, and organic layers can cause the movement of footings. A high water table, depth to bedrock or a cemented pan, cobbles, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, cobbles, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), potential for frost action, and depth to a high water table affect the traffic-supporting capacity.

Sanitary Facilities

Table 16 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills; and the suitability of the soils for use as a daily cover for landfill. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Cobbles, bedrock, or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. Unsaturated soil material must be located beneath the absorption field to effectively filter the effluent. Many local ordinances require that this

material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments, and utilize compacted, relatively impervious soil material for the floor and sides to minimize seepage and contamination of local ground water. Generally, aerobic lagoons hold the sewage within a depth of 2 to 5 feet.

Table 16 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and generally 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or a cemented pan, flooding, cobbles, and content of organic matter.

Excessive seepage due to rapid permeability in the soil, or a water table that is high enough to raise the level of sewage and overtop the lagoon, cause the lagoon to function unsatisfactorily and may result in pollution. Also detrimental to proper functioning of the lagoon is a high content of organic matter, which inhibits the aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and cobbles can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench and spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil and spread, compacted, and covered daily with a thin layer of soil from a source away from the site. Both types of landfill must be able to carry heavy vehicular traffic, and both involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in Table 16 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, cobbles, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. On-site investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained off-site, transported to the landfill, and spread over the waste. Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of cobbles, stones, boulders, or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 18 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is excavated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. Cobbles or stones, soil density, a high water table, and slope affect the ease of excavation. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and potential for frost heaving.

Soils rated *good* contain significant amounts of sand or gravel, or both. They have at least 5 feet of suitable material, few cobbles and stones, and slopes of less than 15 percent where slope lengths exceed 120 feet (37 m), or slopes of 35 percent or less where slope lengths are less than 120 feet (37 m). Depth to the water table is more than 3 feet.

Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate frost action potential, soil bulk density of 1.8 g/cc or higher, slopes of 15 to 25 percent where slope lengths are greater than 120 feet (37 m), or many stones. Depth to the water table is 1 to 3 feet.

Soils rated *poor* have one or more of the following characteristics: a plasticity index of more than 10, high frost action potential, many stones, slopes of more than 25 percent where slope lengths exceed 120 feet (37 m), slopes of more than 35 percent where slopes are less than 120 feet (37 m), or a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction, and specifications for each use vary widely. In Table 18, only the probability of finding material in suitable quantity in or below the soil is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a *probable* source has a layer of clean sand or gravel, or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, cobbles or stones. All other soils are rated as an *improbable* source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil are evaluated for use as topsoil. The reclamation potential of the borrow area is also evaluated.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. Rock fragments, slope, a water table, soil texture, and thickness of suitable material affect the ease of excavating, loading, and spreading. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent where slope lengths exceed 120 feet (37 m), or slopes of 35 percent or less where slope lengths are less than 120 feet (37 m). They are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils; loamy soils that have a relatively high content of clay; soils that have only 20 to 40 inches of suitable material; soils that have an appreciable amount of gravel, cobbles, or stones; or soils that have slopes of 8 to 15 percent where slope lengths exceed 120 feet (37 m). The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy; have less than 20 inches of suitable material; have a large amount of gravel, cobbles, or stones; have slopes of more than 35 percent where slope lengths are less than 120 feet (37 m), or slopes more than 15 percent where slope lengths exceed 120 feet (37 m); or have a seasonal high water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data listed in Tables 23, 24, and 25 with respect to soil features, hydric soils, and water features are explained on the following pages.

Soil properties are determined by field examination of the soils and laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in Table 19.

Estimates of soil properties are based on field examinations, laboratory tests of samples from the Survey Area, and laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features are also given.

Engineering Index Properties

Table 19 gives estimates of the engineering classification and the range of index properties for the major layers of each soil in the Survey Area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series, Higher Taxa, and Their Morphology".

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the glossary.

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*American Association of State Highway and Transportation Officials 1986*) and the Unified soil classification system (*American Society for Testing and Materials 1993*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP (Plate 8), GM (Plate 7), GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT (Plate 12). Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway

construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups, from A-1 to A-7, on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 10 inches in diameter, and 3 to 10 inches in diameter, are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the Survey Area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the Survey Area or nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 20 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the Survey Area. The estimates are based on field observations and test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth, and information on other properties of each layer, are given in the series descriptions in this survey.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105 °C. In Table 20—Physical and Chemical Properties of the Soils, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank

absorption fields.

Infiltration trials were conducted on several soils using the double-ring method (*American Society for Testing and Materials 1988*) (Plate 11) and results are provided in Figures 8 and 9. Infiltration data are guardedly used to estimate permeability in soils. Although the units of infiltration rate and permeability are similar, there is a distinctive difference between these two quantities. Infiltration includes both vertical and lateral water movements. Permeability, as used in the engineering profession and traditional usage in soil surveys, is reserved for the vertical flow rate in soils. Permeability and infiltration cannot be directly related unless the extent of lateral flow of water can be reliably estimated by field observations. Soil properties that promote lateral water movement include stratification of soil materials, variable soil bulk densities, platy or horizontally oriented soil aggregates, and impermeable soil layers. Infiltration rates approach the true permeability rates only after trial periods of several hours or more, and these values normally overestimate the true permeability of the soil.

The nearly level portions of the graphs in Figures 8 and 9 suggest that steady-state infiltration rates have been attained, and inferences regarding infiltration and permeability rates may be made. Note the high degree of variability in steady state infiltration rates in the very gravelly loam materials of the Deception and Kalambach soils. Variations in soil bulk density, relative percentages of massive and platy soil structure, variable void volumes, and soil texture over short distances result in high variability in measured infiltration rates in these soils. Significant lateral flow was observed in excavations following the trials, suggesting that the calculated infiltration rates are substantially higher than permeability rates. Observed lateral flow was also significant in the Whitsol soil trials. Stratification of soil materials with textures ranging from sand to silt promotes lateral saturated flow, and results in infiltration rates substantially higher than estimated permeability values. Lateral flow was minimal in the more uniform substratum material of the Benka and Bodenburg trials, suggesting that permeability and infiltration values are closely related. Infiltration tests are useful
for estimating downward flow of water; however, the degree of lateral flow is a consideration when designing septic drainage systems and other sanitary facilities.

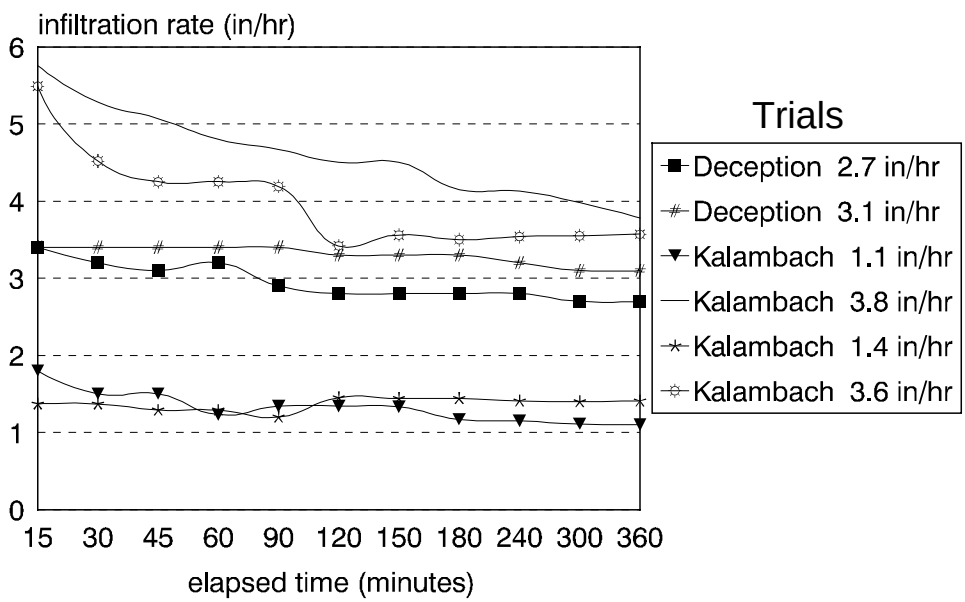

Figure 8. Percolation trials in substratum materials of Deception and Kalambach silt loams.

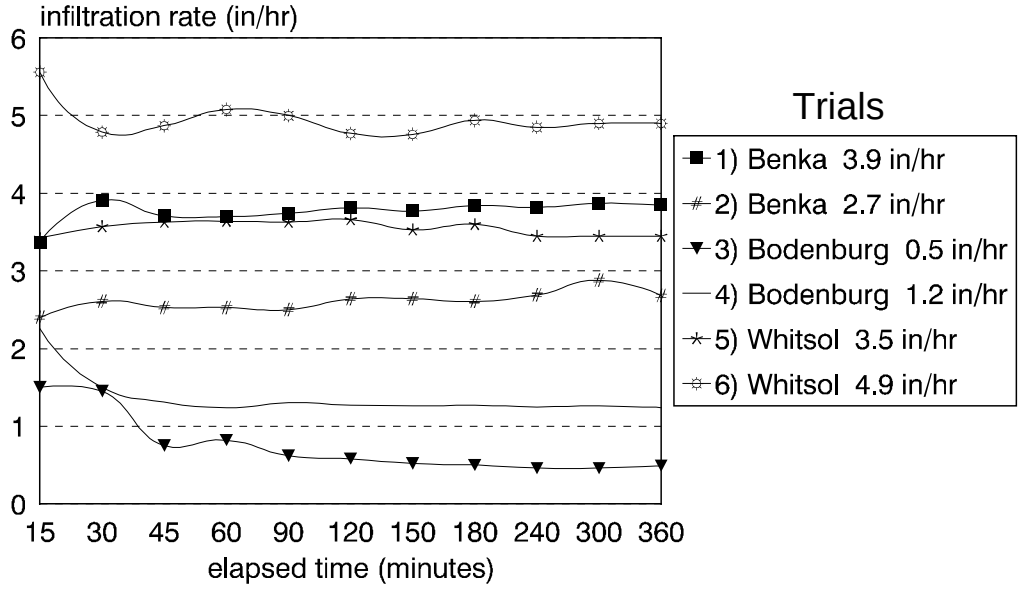

Figure 9. Percolation trials in substratum materials of Benka, Bodenburg, and Whitsol silt loams.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer, and varies depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests, and for many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, evaluating soil amendments for fertility and stabilization, and determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 °C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The quality of irrigation water and the frequency of water application affect the salinity of irrigated soils. Consequently, the salinity of soils in individual fields can differ greatly from the values given in the table. Salinity affects the suitability of a soil for crop production, the stability of the soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs primarily due to the interaction of clay minerals with water, and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils. If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod

as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (as much as 4 percent), and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion.

Erosion factor T is an estimate of the maximum average rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. Soils are grouped according to the following distinctions:

1. *1 to 9 percent dry soil aggregates*. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
2. *10 to 24 percent dry soil aggregates*. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. *25 to 39 percent dry soil aggregates*. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.
4. *25 to 39 percent dry soil aggregates with greater than 35 percent clay or greater than 15 percent calcium carbonate*. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.
5. *40 to 44 percent dry soil aggregates*. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.
6. *45 to 49 percent dry soil aggregates*. These soils are very slightly erodible. Crops can easily be grown.
7. *50 percent or more dry soil aggregates*. These soils are very slightly erodible. Crops can easily be grown.
8. *Stony, gravelly, or wet soils and other soils not subject to wind erosion*.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In Table 20, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects available water capacity, infiltration rate, and tilth, and is a source of nitrogen and other nutrients for crops.

Soil temperature is one of the most critical factors that influence important physical, chemical, and biological processes in soils. Bacterial production, plant production, and organic matter decomposition and mineralization are all strongly temperature dependent (*Jury, Gardner, and Gardner 1991*). Soil temperatures at 20 inches (51 cm) depth for the Disappoint, Cryaquepts, and Bodenburg soils are provided in Figure 10.

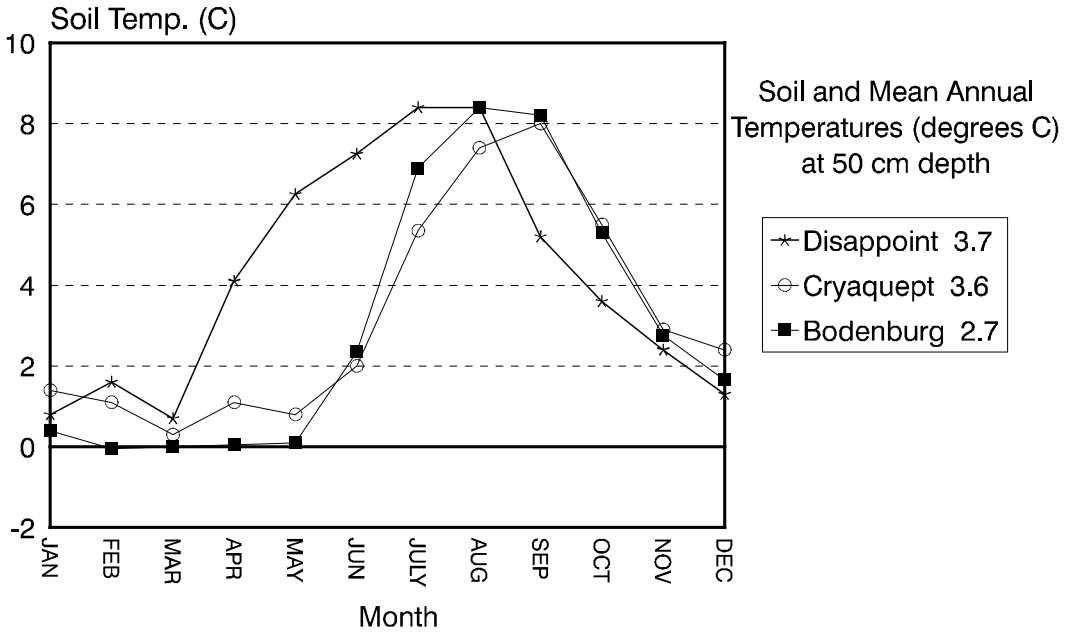

Figure 10. Mean monthly and mean annual soil temperatures at 20 inches (51 cm) depth for Disappoint, Cryaquepts, and Bodenburg soils.

Physical and Chemical Analysis of Selected Soils

The results of physical analysis of several typical pedons in the Survey Area are given in Table 21, and the results of chemical analysis in Table 22. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the pedons are representative of the series. However, the horizon designations may differ slightly from the typical soil profile described in the section "Soil Series, Higher Taxa, and Their Morphology". The National Soil Survey Laboratory in Lincoln, Nebraska analyzed soil samples.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the lists that follow. The codes in parentheses refer to published methods in the "Soil Survey Laboratory Methods Manual" (*Soil Survey Staff 1996a*).

Table 21 procedures:

Sand=(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1)

Silt=(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1)

Clay=(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1)

Water retained=pressure extraction, percentage of ovendry weight of less than 2 mm material; 1/3 bar (4B1), 15 bars (4B2)

Water retention difference=between 1/3 and 15 bars for whole soil (4C1)

Bulk Density=of less than 2 mm material, saran-coated clods field moist (4A1a), 1/3 bar (4A1d), ovendry (4A1h)

Table 22 procedures:

Cation-exchange capacity=sum of cations (5A3a)

Cation-exchange capacity=ammonium acetate, pH 7.0, steam distillation (5A8b)

Reaction (pH)=1:1 water dilution (8C1f)

Reaction (pH)=calcium chloride (8C1f)

Organic carbon=wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c)

Total nitrogen=Kjeldahl (6B3)

Extractable acidity=barium chloride-triethanolamine IV (6H5a)

Extractable cations (bases)=ammonium acetate pH 7.0, atomic absorption; calcium (6N2e), magnesium (6O2d), sodium (6P2b), potassium (6Q2b)

Aluminum=acid oxalate extraction (6G9)

Iron=acid oxalate extraction (6C9a)

Sesquioxides=citrate-dithionite extraction; iron (6C2b), aluminum (6G7a)

Phosphorus=retention (6S4)

Soil Features

Table 23 gives estimates of several important soil features used in land use planning that involves engineering considerations. These features are described in the following paragraphs.

Depth to bedrock is given if bedrock is within a depth of 60 inches. The depth is based on many soil borings and observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 23 shows the expected initial subsidence that usually is a result of drainage, and total subsidence that results from a combination of factors.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave), and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in

evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

A *low* potential for frost action indicates that the soil is rarely susceptible to the formation of ice lenses; a *moderate* potential indicates that the soil is susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength; and a *high* potential indicates that the soil is highly susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Hydric Soils

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and hydrology (*Cowardin et al. 1979; Environmental Laboratory 1987; National Research Council 1995; Tiner 1985*). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (*Federal Register 1994*). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as the depth and duration of the water table, is needed. Thus, criteria which identify those estimated soil properties unique to hydric soils have been established (*Federal Register 1995*). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (*Soil Survey Staff 1975, 1996c*) and in the "Soil Survey Manual" (*Soil Survey Division Staff 1993*).

If soils are wet for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators that can be used to make on-site determinations of hydric soils in the Matanuska-Susitna Valley Survey Area are specified in "Field Indicators of Hydric Soils in the United States" (*United States Department of Agriculture 1996*).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires.

It is always recommended that soils be excavated and described as deep as necessary to understand the redoximorphic processes. Then, using the completed soil description, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if one or more of the approved indicators is present.

This survey can be used to locate probable areas of hydric soils. Table 24 indicates the hydric soil status for each map unit. Each dominant soil component, as well as each inclusion, is rated. The criteria used to rate each soil component and inclusion is also given. This information can help in planning land uses; however, on-site investigation is recommended to determine the hydric soils on a specific site.

Water Features

Table 25 gives estimates of several important water features used in land use planning that involves engineering considerations. These features are described in the following paragraphs.

Hydrologic soil groups are groups of soils that, when saturated, have the same runoff potential under similar storm and ground cover conditions. The soil properties that affect the runoff potential are those that influence the minimum rate of infiltration in a bare soil after prolonged wetting, and when the soil is not frozen. These properties include the depth to a seasonal high water table, intake rate, permeability after prolonged wetting, and depth to a very slowly permeable layer. The influences of ground cover and slope are treated independently and are not taken into account in hydrologic soil groups.

In the definitions of the hydrologic soil groups, the infiltration rate is the rate at which water enters the soil at the surface and is controlled by surface conditions. The transmission rate is the rate at which water moves through the soil and is controlled by properties of the soil layers.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well or well drained soils that have a moderately fine to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water, or soils that have a moderately fine or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of soils that have a permanent high water table and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in marshes and swamps or in closed depressions is considered to be ponding.

Table 25 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur. Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none*, *rare*, *occasional*, or *frequent*. *None* indicates that flooding is not probable; *rare* that it is unlikely but is possible under unusual weather conditions (the chance of flooding is nearly 0 to 5 percent in any year);

occasional that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is 50 percent in any year). The term *common* includes both frequent and occasional flooding.

Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 to 30 days), and *very long* (more than 30 days). The time of year that flooding is most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Local information about the extent and level of flooding and the relationship of each soil on the landscape to historic floods are also considered. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites, and on the evidence of a saturated zone—namely grayish colors or mottles (redoximorphic features) in the soil. Table 25 indicates the depth to the seasonal high water table; the kind of water table—perched, apparent, or artesian; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated.

An *apparent* water table is indicated by the level at which water stands in a freshly dug, unlined borehole after adequate time for adjustments in the surrounding soil.

A *perched* water table is one that is above an unsaturated zone in the soil. The basis for determining that a water table is perched may be general knowledge of the area. The water table is proven to be perched if the water level in a borehole is observed to fall when the borehole is extended.

An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Water table observations for three soils during 1992 are reported in Figure 11. These data represent a year of near normal precipitation when compared to the 30-year average at Palmer. Two periods of peak water table height were observed in the three soils measured. Aquifer recharge from snowmelt produced the first peak in April through May and gradually receded during the normally dry late spring. The second water table peak in September through October was in response to increased precipitation typical of late summer and fall.

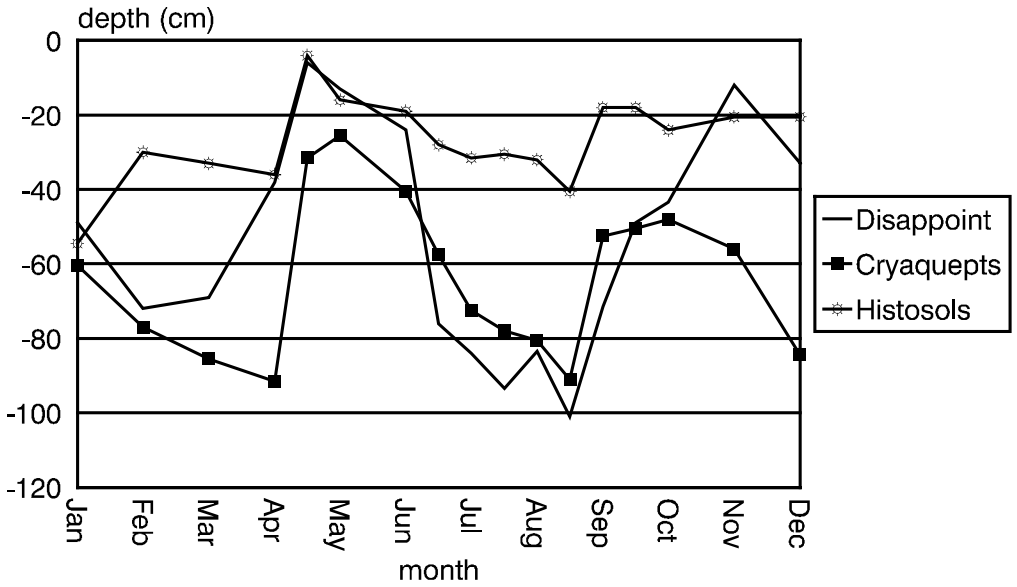

Figure 11. Water table fluctuations during a near normal precipitation year (1992) for the Cryaquepts, Disappoint, and Histosols soils.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*Soil Survey Staff 1975*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field, or inferred from those observations, or from laboratory measurements. Table 26 shows the classification of the soils in the Survey Area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Spodosol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth, or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Cryod (*Cry*, meaning cold, plus *od*, from Spodosol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplocryods (*Haplo*, meaning minimal horizonation, plus *cryod*, the suborder of the Spodosols that has a cryic temperature regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplocryods.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed Typic Haplocryods.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series, Higher Taxa, and Their Morphology

In this section, each soil series or higher taxa recognized in the Survey Area is described. Characteristics of the soil and the material in which it formed are identified for

each soil series or higher taxa. A pedon, a small three-dimensional area of soil that is typical of the series in the Survey Area, is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (*Soil Survey Division Staff 1993*). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (*Soil Survey Staff 1975*) and in "Keys to Soil Taxonomy" (*Soil Survey Staff 1996c*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units".

Benka Series

Taxonomic class: medial over sandy or sandy-skeletal, mixed Andic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty material—moderate; below this—moderately rapid
Position on landscape: glacial outwash plains and hills
Parent material: silty loess dominated by volcanic ash overlying stratified sandy glacial outwash deposits
Slope range: 0 to 35 percent
Elevation: 50 to 400 feet (15 to 122 m)
Climatic data (average annual):
precipitation—20 to 25 inches (51 to 64 cm)
air temperature—33 to 35 °F (1 to 2 °C)

Typical Pedon

Benka silt loam—on a nearly level slope under quaking aspen and black spruce forest at 150 feet (46 m) elevation (All colors are for moist soil.)

Oi—3 inches to 0 (8 cm to 0); black (10YR 2/1) fibrous forest litter (1 to 4 inches thick)
E—0 to 2 inches (0 to 5 cm); dark gray (10YR 4/1) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; very strongly acid (pH 4.8); abrupt wavy boundary (1 to 5 inches thick)
Bs1—2 to 5 inches (5 to 13 cm); reddish brown (5YR 4/4) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; strongly acid (pH 5.2); clear wavy boundary (2 to 7 inches thick)
Bs2—5 to 7 inches (13 to 18 cm); strong brown (7.5YR 4/6) silt loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; strongly acid (pH 5.2); abrupt wavy boundary (2 to 6 inches thick)
Eb—7 to 10 inches (18 to 25 cm); brown (10YR 5/3) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; strongly acid (pH 5.4); abrupt wavy boundary (0 to 3 inches thick)
Bsb—10 to 13 inches (25 to 33 cm); strong brown (7.5YR 4/4) silt loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; few very fine roots; medium acid (pH 5.6); gradual irregular boundary (0 to 11 inches thick)
BC—13 to 22 inches (33 to 56 cm); dark yellowish brown (10YR 4/4) silt loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; medium acid (pH 5.6); clear smooth boundary (4 to 12 inches thick)
C1—22 to 27 inches (56 to 69 cm); dark yellowish brown (10YR 3/4) silt loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; medium acid (pH 5.6); clear smooth boundary (0 to 11 inches thick)
2C—27 to 60 inches (69 to 152 cm); grayish brown (2.5Y 5/2), olive brown (2.5Y 4/4), and dark brown (10YR 3/3) stratified coarse sand through fine sand, with occasional

pockets and strata of very fine sand and silt; massive; very friable, nonsticky and nonplastic; medium acid (pH 5.8)

Typical Pedon Location

Map unit in which located: 101—Benka silt loam, 0 to 3 percent slopes
Location in survey area: approximately 3 miles N of Willow; in the NE 1/4 of the NW 1/4 of Section 36, T.20N, R.5W, Seward Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 5 inches (3 to 13 cm)
Depth to sand: 14 to 30 inches (36 to 76 cm)
Thickness of solum: 12 to 26 inches (30 to 66 cm)

E and Eb horizons:
Color—hue of 7.5YR to 2.5Y; value moist of 4 or 5; chroma moist of 1 to 4
Texture—silt loam or very fine sandy loam
Reaction—very strongly acid to strongly acid

Bs and Bsb horizons:
Color—hue of 5YR or 7.5YR; value moist of 4 or 5; chroma moist of 4 to 8
Texture—silt loam and very fine sandy loam
Reaction—very strongly acid to strongly acid

BC and C horizons:
Color—hue of 10YR or 2.5YR; value moist of 3 or 4; chroma moist of 2 to 4
Texture—silt loam or very fine sandy loam
Reaction—very strongly acid to moderately acid

2C horizon:
Color—hue of 10YR to 2.5Y; value moist of 3 to 5; chroma moist of 2 to 4
Texture—stratified, and includes coarse sand, sand, fine sand, very fine sand, and silt
Rock fragments—0 to 5 percent gravel and cobbles
Reaction—moderately acid to slightly acid

Bodenburg Series

Taxonomic class: coarse-silty, mixed Typic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Position on landscape: stream terraces, hills, and outwash plains
Parent material: silty loess underlain by very gravelly glaciofluvial material
Slope range: 0 to 60 percent
Elevation: 50 to 500 feet (15 to 152 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Bodenburg silt loam—on a 2 percent slope under birch forest and bluejoint reedgrass vegetation at 150 feet (46 m) elevation (All colors are for moist soil.)

Oe—2 inches to 0 (5 cm to 0); partially decomposed forest and grass litter (1 to 3 inches thick)

A1—0 to 3 inches (0 to 8 cm); dark brown (10YR 3/3) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; medium acid (pH 5.8); clear smooth boundary (2 to 5 inches thick)

A2—3 to 10 inches (8 to 25 cm); dark brown (10YR 3/3) and dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; medium acid (pH 6.0); gradual smooth boundary (0 to 10 inches thick)

AC—10 to 19 inches (25 to 48 cm); dark grayish brown (10YR 4/2) and brown (10YR 4/3) silt loam; few fine faint dark yellowish brown (10YR 4/4) mottles; weak thin platy structure; very friable, nonsticky and nonplastic; common very fine and fine roots; slightly acid (pH 6.4); gradual irregular boundary (4 to 15 inches thick)

C/Bw—19 to 31 inches (48 to 79 cm); dark grayish brown (10YR 4/2) and dark gray (10YR 4/1) silt loam mixed with common medium faint dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and fine roots; slightly acid (pH 6.4); gradual irregular boundary (10 to 26 inches thick)

Bwb—31 to 50 inches (79 to 127 cm); dark yellowish brown (10YR 4/4) silt loam with few fine faint dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine roots; neutral (pH 6.6); clear smooth boundary (12 to 25 inches thick)

2BC—50 to 53 inches (127 to 135 cm); brown (10YR 4/3) very gravelly loamy coarse sand; weak medium subangular structure; very friable, nonsticky and nonplastic; 30 percent rounded gravel and 10 percent rounded cobbles; few very fine roots; neutral (pH 6.6); clear wavy boundary (0 to 8 inches thick)

2C—53 to 60 inches (135 to 152 cm); variegated very gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 45 percent rounded gravel and 10 percent rounded cobbles; neutral (pH 6.8)

Typical Pedon Location

Map unit in which located: 108—Bodenburg silt loam, undulating

Location in survey area: in the NW 1/4 of the E 1/4 of Section 32, T.18N, R.2E, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)

Thickness of the organic mat: 1 to 3 inches (3 to 8 cm)

Depth to sand and gravel: 40 to over 60 inches (102 to over 152 cm)

Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May

Reaction: moderately acid to neutral in the loess cap; slightly acid or neutral in the substratum

A horizon:

Color—hue of 10YR to 2.5Y; value moist of 2 to 4; chroma moist of 2 or 3

Texture—silt loam and very fine sandy loam with occasional strata of fine sand

Bw/C and C/Bw horizons:

Color Bw—hue of 7.5YR or 10YR; chroma moist of 4 to 6

Color C—hue of 10YR to 5Y; chroma moist of 1 or 2

Texture—silt loam and very fine sandy loam

Bwb horizon:
Color—hue of 7.5YR or 10YR; chroma moist of 4 to 6
Texture—silt loam and very fine sandy loam

BC or 2BC horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 3 or 4
Texture—silt loam, very fine sandy loam, loamy sand, and loamy coarse sand
Rock fragments—20 to 45 percent gravel; 0 to 20 percent cobbles

2C horizon (when present):
Color—variegated
Texture—sand, coarse sand and loamy coarse sand
Rock fragments—30 to 60 percent gravel; 10 to 30 percent cobbles

Chilligan Series

Taxonomic class: medial over loamy, mixed Andic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty material—moderate; in the loamy lacustrine and glacial till material—moderately slow
Position on landscape: glaciolacustrine plains and hills
Parent material: silty mantle of loess and volcanic ash underlain by loamy glaciolacustrine deposits
Slope range: 0 to 35 percent
Elevation: 50 to 300 feet (15 to 91 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Chilligan silt loam—on a 3 percent slope under paper birch vegetation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); dark reddish brown (5YR 2.5/2) fibrous forest and grass litter; abrupt smooth boundary (2 to 4 inches thick)
E—0 to 1 inch (0 to 3 cm); gray (10YR 5/1) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; very strongly acid (pH 5.0); abrupt wavy boundary (1 to 3 inches thick)
Bhs—1 to 3 inches (3 to 8 cm); dark reddish brown (5YR 2.5/2) very fine sandy loam; moderate fine granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; strongly acid (pH 5.2); abrupt wavy boundary (0 to 3 inches thick)
Eb—3 to 5 inches (8 to 13 cm); grayish brown (2.5Y 5/2) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; strongly acid (pH 5.2); abrupt wavy boundary (1 to 3 inches thick)
Bsb—5 to 9 inches (13 to 23 cm); reddish brown and dark reddish brown (5YR 4/4 and 3/3) very fine sandy loam; moderate fine granular structure; very friable, nonsticky and nonplastic; common very fine roots; strongly acid (pH 5.4); clear smooth boundary (3 to 6 inches thick)
BCb—9 to 24 inches (23 to 61 cm); yellowish brown and brown (10YR 5/4 and 4/3) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine roots; medium acid (pH 5.6); abrupt smooth boundary (6 to 16 inches thick)
2C1—24 to 41 inches (61 to 104 cm); grayish brown (2.5Y 5/2) stratified fine sand, very

fine sand, silt, and silty clay loam; massive; friable, slightly sticky and plastic; medium acid (pH 6.0); gradual smooth boundary (15 to 35 inches thick)

2C2—41 to 60 inches (104 to 152 cm); dark yellowish brown and dark grayish brown (10YR 3/4 and 4/2) stratified fine sand, very fine sand, silt, and silty clay loam; massive; very friable, slightly sticky and slightly plastic; medium acid (pH 6.0)

Typical Pedon Location

Map unit in which located: 114—Chilligan, undulating-Cryaquepts complex
Location in survey area: approximately 9 miles SW of Knik; in the NW 1/4 of the NE 1/4 of Section 21, T.14N, R.4W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 2 to 4 inches (5 to 10 cm)
Depth to loamy glaciolacustrine material: 14 to 26 inches (36 to 66 cm)
Thickness of solum: 18 to 32 inches (46 to 81 cm)
Reaction: very strongly acid to moderately acid in the solum; moderately acid to slightly acid in the substratum

E and Eb horizons:
Color—hue of 10YR or 2.5Y; value moist of 4 or 5; chroma moist of 1 or 2

Bh horizon:
Color—hue of 2.5YR or 5YR; value moist of 2.5 or 3; chroma moist of 2 or 3
Texture—silt loam, very fine sandy loam, and loam

Bs and Bsb horizons:
Color—hue of 2.5YR to 7.5YR; value moist of 3 or 4; chroma moist of 3 to 6
Texture—silt loam, very fine sandy loam, and loam

BC horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 to 5; chroma moist of 3 or 4

2C horizon:
Color—hue of 10YR to 5Y; value moist of 3 to 5; chroma moist of 2 or 3
Texture—stratified, and includes fine sand, very fine sandy loam, silt loam, loam, and silty clay loam

Chunilna Series

Taxonomic class: medial over loamy-skeletal, mixed Typic Cryaquands
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly or poorly drained
Permeability: in the surface layers—moderate; in the underlying material—moderately slow
Position on landscape: glacial till plains and hills
Microtopography: depressions
Parent material: silty mantle of loess and volcanic ash underlain by friable or firm glacial till material
Slope range: 0 to 25 percent
Elevation: 400 to 1800 feet (122 to 549 m)
Climatic data (average annual):
precipitation—25 to 35 inches (64 to 89 cm)

air temperature—32 to 35 °F (0 to 1 °C)

Typical Pedon

Chunilna silt loam—on a level slope under paper birch forest at 450 feet (137 m) elevation (All colors are for moist soil.)

Oe—4 inches to 0 (10 cm to 0); dark brown (7.5YR 4/4) partially decomposed forest litter and moss (2 to 5 inches thick)

A1—0 to 4 inches (0 to 10 cm); very dark brown (10YR 2/2) mucky silt loam with occasional lenses of yellowish brown (10YR 5/8) fine sandy loam lenses of volcanic ash; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; very strongly acid (pH 4.6); clear smooth boundary (3 to 8 inches thick)

A2—4 to 9 inches (10 to 23 cm); dark brown (10YR 3/3) silt loam with occasional lenses of yellowish brown (10YR 5/8) fine sandy loam and very fine sandy loam lenses of volcanic ash; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and fine roots; very strongly acid (pH 4.8); clear smooth boundary (0 to 5 inches thick)

Bg1—9 to 14 inches (23 to 36 cm); dark brown (10YR 4/3) silt loam with common medium distinct dark grayish brown (2.5Y 4/2) mottles; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and fine roots; very strongly acid (pH 4.8); clear wavy boundary (4 to 16 inches thick)

2Bg2—14 to 22 inches (36 to 56 cm); dark grayish brown (2.5Y 4/2) gravelly loam with common medium distinct strong brown (7.5YR 4/6) mottles; weak coarse subangular blocky structure; friable, slightly sticky and slightly plastic; 20 percent subangular gravel and 5 percent subangular cobbles; strongly acid (pH 5.2); gradual wavy boundary (4 to 12 inches thick)

2C1—22 to 34 inches (56 to 86 cm); dark grayish brown (2.5Y 4/2) very gravelly sandy loam; massive; friable, slightly sticky and slightly plastic; 40 percent subangular gravel; medium acid (pH 5.4); diffuse irregular boundary (10 to 22 inches thick)

2C2—34 to 60 inches (86 to 152 cm); olive gray (5Y 4/2) very gravelly sandy loam; massive; friable, slightly sticky and slightly plastic; 40 percent subangular gravel and 5 percent subangular cobbles; medium acid (pH 5.4)

Typical Pedon Location

Map unit in which located: 201—Tokositna, undulating-Chunilna complex
Location in survey area: approximately 4 miles N of Trapper Creek; in the NE 1/4 of the NE 1/4 of Section 7, T.26N, R.5W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 2 to 5 inches (5 to 13 cm)
Depth to glacial till: 14 to 33 inches (36 to 84 cm)
Thickness of solum: 18 to 28 inches (46 to 71 cm)
Reaction: very strongly acid to strongly acid in the solum; strongly acid in the substratum

A horizon:
Color—value moist of 2 or 3; chroma moist of 1 to 3
Texture—mucky silt loam or silt loam

Bg horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 2 or 3
Texture—sandy loam or loam

2Bg horizon:
Color—hue of 10YR or 2.5Y; value moist of 1, 2, or 3; chroma moist of 2 or 3
Texture—sandy loam or loam
Rock fragments—20 to 40 percent gravel; 0 to 10 percent cobbles

2C horizon:
Color—hue of 10YR, 2.5Y or 5Y; value moist of 4 or 5; chroma moist of 1 or 2
Texture—sandy loam or loam
Rock fragments—25 to 40 percent gravel; 0 to 25 percent cobbles

Cryaquepts

Taxonomic class: Cryaquepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly or poorly drained
Permeability: variable
Position on landscape: glacial till plains, outwash plains, stream terraces, and mountainslopes
Parent material: silty loess or volcanic ash, stratified glacial outwash, and gravelly glacial drift
Slope range: 0 to 15 percent
Elevation: 50 to 4000 feet (15 to 1219 m)
Climatic data (average annual):
precipitation—15 to 45 inches (38 to 114 cm)
air temperature—32 to 36 °F (0 to 2 °C)

Sample Pedon

Cryaquepts mucky silt loam—on a 4 percent slope under paper birch and white spruce forest at 900 feet (274 m) elevation (All colors are for moist soil.)

Oi—7 inches to 0 (18 cm to 0); dark reddish brown (5YR 2.5/2) fibrous undecomposed twigs, roots, and moss (2 to 16 inches thick)
A1—0 to 4 inches (0 to 10 cm); dark reddish brown (5YR 2.5/2) mucky silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; strongly acid (pH 5.2); clear smooth boundary (3 to 9 inches thick)
Bg1—4 to 11 inches (10 to 28 cm); very dark gray (5Y 3/1) silt loam; massive; slightly sticky and slightly plastic; few very fine roots; 5 percent gravel; strongly acid (pH 5.2); clear wavy boundary (0 to 12 inches thick)
2Bg2—11 to 40 inches (28 to 102 cm); dark gray (5Y 4/1) gravelly sandy loam; massive; firm, slightly sticky and slightly plastic; many medium distinct dark yellowish brown (10YR 4/4) mottles; 20 percent gravel and 5 percent cobbles; strongly acid (pH 5.2); gradual wavy boundary (0 to 30 inches thick)
2C—40 to 60 inches (102 to 152 cm); dark gray (5Y 4/1) gravelly sandy loam; massive; firm, slightly sticky and slightly plastic; 20 percent gravel and 10 percent cobbles; moderately acid (pH 5.6)

Typical Pedon Location

Map unit in which located: 116—Cryaquepts, depressional, 0 to 7 percent slopes
Location in survey area: approximately 12 miles NE of Wasilla; in the SW 1/4 of the NE 1/4 of Section 2, T.18N, R.3W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 2 to 16 inches (5 to 41 cm)
Thickness of solum: 12 to 34 inches (30 to 86 cm)
Reaction: very strongly acid to slightly acid

A horizon:
Texture—silt loam, mucky silt loam, very cobbly mucky silt loam, or loam
Rock fragments—0 to 20 percent gravel; 0 to 25 percent cobbles

Bg or 2Bg horizon:
Texture—silt loam, sandy loam, loam, or stratified sand to silt
Rock fragments—0 to 60 percent gravel; 0 to 25 percent cobbles

2Cg or 2C horizon:
Texture—silt loam, sandy loam, loam, or stratified sand to silt
Rock fragments—0 to 60 percent gravel; 0 to 25 percent cobbles

Cryochrepts

Taxonomic class: Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well to somewhat excessively drained
Permeability: in the upper part—moderate; below this—variable
Position on landscape: terrace escarpments
Parent material: silty loess and volcanic ash, alluvium, stratified glacial outwash, and gravelly glacial drift
Slope range: 30 to 100 percent
Elevation: 50 to 1200 feet (15 to 366 m)
Climatic data (average annual):
precipitation—15 to 30 inches (38 to 76 cm)
air temperature—33 to 36 °F (1 to 2 °C)

Sample Pedon

Cryochrepts silt loam—on a 62 percent slope under paper birch forest at 300 feet (91 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); very dark brown (10YR 2/2) fibrous slightly decomposed twigs and roots (0 to 5 inches thick)
A—0 to 2 inches (0 to 5 cm); very dark brown (10YR 2/2) and dark grayish brown (10YR 4/2) silt loam; weak medium platy structure; very friable, nonsticky and nonplastic; many roots of all sizes; slightly acid (pH 6.2); clear smooth boundary (1 to 6 inches thick)
ABw—2 to 12 inches (5 to 30 cm); dark grayish brown (10YR 4/2) and brown (10YR 4/3) silt loam with few medium faint dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky, parting to moderate medium platy structure; nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; slightly acid (pH 6.2); gradual wavy boundary (0 to 14 inches thick)
Bw—12 to 26 inches (30 to 66 cm); dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; slightly acid (pH 6.4); gradual wavy boundary (2 to 18 inches thick)
BC1—26 to 29 inches (66 to 74 cm); brown (10YR 4/3) gravelly fine sandy loam; massive; very friable, nonsticky and nonplastic; 20 percent gravel and occasional cobbles; few

very fine and fine roots; slightly acid (pH 6.4); clear wavy boundary (0 to 10 inches thick)

2BC2—29 to 35 inches (74 to 89 cm); brown (10YR 4/3) extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 60 percent gravel and occasional cobbles; few very fine and fine roots; slightly acid (pH 6.4); gradual wavy boundary (0 to 6 inches thick)

2C—35 to 60 inches (89 to 152 cm); variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 60 percent gravel and occasional cobbles; neutral (pH 6.6)

Typical Pedon Location

Map unit in which located: 120—Cryods, low elevation and Cryochrepts, 30 to 70 percent slopes

Location in survey area: approximately 4 miles SW of Palmer; in the NW 1/4 of the NW 1/4 of Section 11, T.17N, R.1E, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 34 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 0 to 5 inches (0 to 13 cm)
Thickness of solum: 14 to 38 inches (36 to 97 cm)
Reaction: moderately acid to neutral

A and ABw horizons:
Color—hue of 10YR to 2.5Y; value moist of 2 to 4; chroma moist of 2 to 4
Texture—silt loam, very fine sandy loam, or fine sandy loam

Bw, 2Bw and BC horizons:
Color—hue of 7.5YR to 10YR; value moist of 3 to 6; chroma moist of 3 to 6
Texture—silt loam, very fine sandy loam, sandy loam, or loam
Rock fragments—0 to 60 percent gravel; 0 to 25 percent cobbles

2BC or 2C horizon:
Color—hue of 10YR to 5Y; value moist of 3 to 6; chroma moist of 3 to 6
Texture—silt loam, very fine sandy loam, sandy loam, loam, or stratified sand to silt
Rock fragments—0 to 60 percent gravel; 0 to 25 percent cobbles

Cryods

Taxonomic class: Cryods
Depth class: moderately deep to very deep—20 to more than 60 inches (51 to more than 152 cm)
Drainage class: somewhat poorly to somewhat excessively drained
Permeability: in the upper part—moderate; below this—variable
Position on landscape: escarpments and mountains
Parent material: silty loess and volcanic ash, alluvium, stratified glacial outwash and gravelly glacial till, and outwash deposits
Slope range: 0 to 100 percent
Elevation: 50 to 4000 feet (15 to 1219 m)
Climatic data (average annual):
precipitation—15 to 45 inches (38 to 114 cm)
air temperature—32 to 36 °F (0 to 2 °C)

Sample Pedon

Cryods silt loam—on a 48 percent slope under paper birch and white spruce forest at 1000 feet (305 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); very dusky red (2.5YR 2.5/2) fibrous undecomposed twigs, roots, and moss (1 to 7 inches thick)

E—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/2) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; very strongly acid (pH 4.8); abrupt smooth boundary (1 to 3 inches thick)

Bhs—1 to 3 inches (3 to 8 cm); dark reddish brown (5YR 4/4) fine sandy loam; weak medium subangular blocky structure; nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; very strongly acid (pH 4.8); clear wavy boundary (0 to 5 inches thick)

Bs—3 to 10 inches (8 to 25 cm); brown (7.5Y 4/4) and strong brown (7.5YR 4/6) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; very strongly acid (pH 5.0); gradual wavy boundary (3 to 13 inches thick)

Eb—10 to 12 inches (25 to 30 cm); brown (7.5YR 4/2) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; strongly acid (pH 5.2) (0 to 3 inches thick)

2Bsb—12 to 19 inches (30 to 48 cm); dark reddish brown (5YR 3/4) loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; 10 percent gravel; few very fine roots; strongly acid (pH 5.4) (0 to 10 inches thick)

2BC—19 to 29 inches (48 to 74 cm); dark yellowish brown (10YR 4/4) gravelly sandy loam; massive; friable, nonsticky and nonplastic; 20 percent gravel; moderately acid (pH 5.6) (5 to 18 inches thick)

3C1—29 to 42 inches (74 to 107 cm); brown (10YR 4/3) very gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 40 percent gravel; moderately acid (pH 5.6) (8 to 30 inches thick)

3C2—42 to 60 inches (107 to 152 cm); pale brown (10YR 6/3) very gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 40 percent gravel; moderately acid (pH 5.6)

Sample Pedon Location

Map unit in which located: 121—Cryods and Cryochrepts, 30 to 70 percent slopes
Location in survey area: approximately 12 miles NE of Willow; in the NE 1/4 of the SW 1/4 of Section 3, T.20N, R.3W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 32 to 37 °F (0 to 3 °C)
Thickness of the organic mat: 1 to 7 inches (3 to 18 cm)
Thickness of solum: 8 to 30 inches (20 to 76 cm)
Depth to bedrock: 20 to over 60 inches (51 to over 152 cm)
Reaction: extremely acid to slightly acid

E or Eb horizon:
Color—hue of 2.5Y to 7.5YR; value moist of 4 to 6; chroma moist of 2 to 4
Texture—silt loam, very fine sandy loam, sandy loam, or loam
Rock fragments—0 to 20 percent gravel; 0 to 25 percent cobbles

Bhs, Bs or 2Bs horizon:
Color—hue of 10R to 7.5YR; value moist of 2.5 to 5; chroma moist of 2 to 6
Texture—silt loam, very fine sandy loam, sandy loam, or loam

Rock fragments—0 to 60 percent gravel; 0 to 25 percent cobbles

C or 2C horizon:
Texture—silt loam, very fine sandy loam, sandy loam, loam, or stratified sand through silt
Rock fragments—0 to 60 percent gravel; 0 to 25 percent cobbles

Cryumbrepts

Taxonomic class: Cryumbrepts
Depth class: very shallow to very deep—4 to 60 inches (10 to 152 cm)
Drainage class: well drained
Permeability: in the very cobbly sandy loam material—moderate
Position on landscape: mountains
Parent material: loess, colluvium, glacial drift, and bedrock
Slope range: 25 to 70 percent
Elevation: 2000 to 5100 feet (610 to 1554 m)
Climatic data (average annual):
precipitation—30 to 45 inches (76 to 114 cm)
air temperature—32 to 34 °F (0 to 1 °C)

Sample *Pedon*

Cryumbrepts very cobbly sandy loam—on a north facing slope of 45 percent under lichen and crowberry vegetation at 3500 feet (1067 m) elevation (All colors are for moist soil.)

Oe—1 inch to 0 (3 cm to 0); dark brown (10YR 3/3) mucky peat; mat of decomposing organic matter; clear smooth boundary (1 to 3 inches thick)
A1—0 to 6 inches (0 to 15 cm); dark brown (10YR 3/3) very cobbly sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; 25 percent cobbles and 30 percent gravel; many very fine and fine roots; strongly acid (pH 5.2); gradual smooth boundary (4 to 10 inches thick)
A2—6 to 10 inches (15 to 25 cm); dark brown (10YR 3/3) very cobbly sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; 25 percent angular cobbles, 30 percent angular gravel, and 1 percent angular stone; few very fine and fine roots; strongly acid (pH 5.4); gradual smooth boundary (0 to 14 inches thick)
C—10 to 60 inches (25 to 152 cm); brown (10YR 4/3) very cobbly sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; 25 percent angular cobbles, 30 percent angular gravel, and 1 percent angular stones; moderately acid (pH 5.6)

Sample Pedon Location

Map unit in which located: 183—Rock outcrop-Cryumbrepts association, very steep
Location in survey area: approximately 16 miles N of Wasilla; in the SW 1/4 of the NW 1/4 of Section 15, T.20N, R.1W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 32 to 34 °F (0 to 2 °C)
Thickness of the organic mat: 1 to 3 inches (3 to 8 cm)
Depth to bedrock: 4 to over 60 inches (10 to over 152 cm)
Thickness of solum: 4 to 12 inches (10 to 30 cm)
Reaction: very strongly acid to moderately acid throughout

A horizon:
Color—hue of 7.5YR or 10YR; value moist of 2 or 3; chroma moist of 2 or 3
Rock fragments—10 to 45 percent gravel; 10 to 45 percent cobbles; 0 to 50 percent stones

C horizon:
Color—hue of 7.5YR to 2.5Y; value moist of 2 or 3; chroma moist of 2 to 4
Rock fragments—25 to 55 percent gravel; 5 to 55 percent cobbles; 0 to 50 percent stones

Deception Series

Taxonomic class: loamy-skeletal, mixed Typic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the very gravelly and very cobbly loam substratum—moderate to moderately slow
Position on landscape: glacial till plains and hills
Parent material: silty mantle of loess and volcanic ash underlain by very gravelly and cobbly loam glacial till material
Slope range: 0 to 60 percent
Elevation: 50 to 1000 feet (15 to 305 m)
Climatic data (average annual):
precipitation—15 to 25 inches (38 to 64 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Deception silt loam (Plate 12)—on a 37 percent slope under paper birch and bluejoint reedgrass at 150 feet (46 m) elevation (All colors are for moist soil.)

Oi—4 inches to 0 (10 cm to 0); dark reddish brown (2.5YR 2.5/2) undecomposed moss and forest litter (1 to 6 inches thick)
E—0 to 1 inch (0 to 3 cm); dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; strongly acid (pH 5.4); abrupt wavy boundary (1 to 3 inches thick)
Bs—1 to 5 inches (3 to 13 cm); brown (7.5YR 4/4) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; 5 percent subrounded gravel; many very fine, fine, medium, and coarse roots; moderately acid (pH 5.8); clear smooth boundary (3 to 10 inches thick)
2BC—5 to 17 inches (13 to 43 cm); dark yellowish brown (10YR 4/4) very cobbly sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; 35 percent subrounded gravel, 20 percent subrounded and angular cobbles, and 1 percent angular stones; few very fine and fine roots; moderately acid (pH 6.0); gradual wavy boundary (0 to 14 inches thick)
2C1—17 to 33 inches (43 to 84 cm); dark grayish brown (2.5Y 4/2) very cobbly sandy loam; massive; firm, slightly sticky and slightly plastic; 35 percent subrounded gravel, 20 percent subrounded and angular cobbles, and 1 percent angular stones; neutral (pH 6.6); diffuse wavy boundary (12 to 45 inches thick)
2C2—33 to 60 inches (84 to 152 cm); dark grayish brown (2.5Y 4/2) very gravelly loam; massive; firm, slightly sticky and slightly plastic; 35 percent subrounded gravel, 10 percent subangular cobbles, and 1 percent angular stones; neutral (pH 6.6)

Typical Pedon Location

Map unit in which located: 124—Deception silt loam, steep and sloping
Location in survey area: approximately 10 miles SW of Knik village; approximately 1000 feet N and 900 feet W of the SE corner of Section 28, T.15N, R.4W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 1 to 6 inches (3 to 15 cm)
Depth to very gravelly glacial till: 4 to 10 inches (10 to 25 cm)
Thickness of solum: 4 to 11 inches (10 to 28 cm)
Reaction: very strongly acid to moderately acid in the solum; slightly acid or neutral in the substratum

E horizon:
Color—hue of 10YR to 2.5Y; value moist of 4 to 6; chroma moist of 1 or 2

Bs horizon:
Color—hue of 5YR to 10YR; value moist of 3 to 5; chroma moist of 4 to 6
Texture—silt loam, loam, or fine sandy loam
Rock fragments—0 to 10 percent gravel; 0 to 5 percent cobbles

2BC horizon:
Color—hue of 10YR to 2.5Y; value moist of 3 to 5; chroma moist of 2 to 4
Texture—fine sandy loam, sandy loam, or loam
Rock fragments—25 to 40 percent gravel; 5 to 25 percent cobbles

2C horizon:
Color—hue of 10YR to 5Y; value moist of 3 to 5; chroma moist of 2 to 4
Texture—sandy loam or loam
Rock fragments—25 to 40 percent gravel; 5 to 25 percent cobbles

Delyndia Series

Taxonomic class: sandy, mixed Typic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the sandy and gravelly substratum—moderately rapid
Position on landscape: glacial outwash plains and hills
Parent material: silty mantle of loess and volcanic ash underlain by loose sandy glacial outwash material
Slope range: 0 to 25 percent
Elevation: 50 to 400 feet (15 to 122 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Delyndia silt loam—on a 12 percent slope under white spruce and paper birch at 150 feet (46 m) elevation (All colors are for moist soil.)

Oi—3 inches to 0 (8 cm to 0); dark brown (7.5YR 3/4) undecomposed moss and forest

litter; abrupt smooth boundary (1 to 4 inches thick)

E—0 to 2 inches (0 to 5 cm); grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; very friable, nonsticky and nonplastic; common very fine, fine, and few medium roots; strongly acid (pH 5.2); abrupt smooth boundary (1 to 3 inches thick)

Bs—2 to 3 inches (5 to 8 cm); strong brown (7.5YR 5/6) silt loam; weak medium granular structure; very friable, nonsticky and nonplastic; common very fine and fine roots; moderately acid (pH 5.6); abrupt smooth boundary (1 to 6 inches thick)

Eb—3 to 4 inches (8 to 10 cm); yellowish brown (10YR 5/4) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; few very fine and fine roots; moderately acid (pH 5.6); abrupt smooth boundary (0 to 2 inches thick)

2Bsb—4 to 7 inches (10 to 18 cm); strong brown (7.5YR 4/6) loamy sand; weak fine granular structure; very friable, nonsticky and nonplastic; few fine roots; moderately acid (pH 5.8); clear smooth boundary (0 to 5 inches thick)

2BC—7 to 9 inches (18 to 23 cm); strong brown (10YR 4/6) loamy sand; weak medium subangular blocky structure, parting to single grain; loose, nonsticky and nonplastic; 5 percent rounded gravel; few fine roots; moderately acid (pH 6.0); clear smooth boundary (0 to 9 inches thick)

2C1—9 to 33 inches (23 to 84 cm); dark yellowish brown (10YR 3/4) and (10YR 4/4) sand with occasional discontinuous strata of fine sandy loam; single grain; loose, nonsticky and nonplastic; 5 percent rounded gravel; few fine roots; neutral (pH 6.6); gradual smooth boundary (10 to 45 inches thick)

2C2—33 to 60 inches (84 to 152 cm); dark yellowish brown (10YR 3/4) gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 15 percent rounded gravel; few fine roots; neutral (pH 6.8)

Typical Pedon Location

Map unit in which located: 218—Yohn-Delyndia complex, hilly

Location in survey area: approximately 6 miles SW of Knik; approximately 1200 feet E and 600 feet S of the NW corner of Section 1, T.15N, R.4W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)

Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)

Depth to sand: 2 to 10 inches (5 to 25 cm)

Thickness of solum: 3 to 11 inches (8 to 28 cm)

Reaction: very strongly acid to moderately acid in the solum; moderately acid to neutral in the substratum

E and Eb horizons:

Color—value moist of 4 to 7; chroma moist of 1 to 4

Texture—silt loam or very fine sandy loam

Bs horizon:

Color—hue of 5YR to 7.5YR; value moist of 3 to 5; chroma moist of 3 to 6

Texture—silt loam, very fine sandy loam, or fine sandy loam

2Bs horizon (when present):

Color—hue of 7.5YR or 10YR; value moist of 3 to 5; chroma moist of 4 to 6

Texture—fine sand, loamy sand, or sandy loam

Rock fragments—0 to 20 percent gravel; 0 to 5 percent cobbles

2C horizon:

Color—hue of 2.5Y or 10YR; value moist of 3 or 4; chroma moist of 2 to 4

Texture—fine sand, sand, or coarse sand
Rock fragments—0 to 20 percent gravel, with occasional pockets and strata with up to 50 percent gravel

Deneka Series

Taxonomic class: medial over loamy-skeletal, mixed Lithic Humicryods
Depth class: shallow—12 to 20 inches (30 to 51 cm)
Drainage class: well drained
Permeability: in the upper part—moderate; in the gravelly and cobbly glacial till material—moderate to moderately slow; in the underlying bedrock—variable
Position on landscape: mountains
Parent material: loess mixed with volcanic ash over friable to firm very gravelly glacial till underlain by consolidated bedrock
Slope range: 0 to 65 percent
Elevation: 600 to 2400 feet (183 to 732 m)
Climatic data (average annual):
precipitation—25 to 35 inches (64 to 89 cm)
air temperature—33 to 35 °F (1 to 2 °C)

Typical Pedon

Deneka silt loam—on a northwest facing slope of 2 percent under mixed paper birch and white spruce forest at 1200 feet (366 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); very dusky red (2.5YR 2.5/2) fibrous organic mat of roots, moss, and organic matter; abrupt smooth boundary (1 to 4 inches thick)
A—0 to 2 inches (0 to 5 cm); dark reddish brown (5YR 3/2) silt loam; weak medium granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; extremely acid (pH 4.0); abrupt smooth boundary (0 to 3 inches thick)
E—2 to 4 inches (5 to 10 cm); light brownish gray (10YR 6/2) silt loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; extremely acid (pH 4.0); abrupt wavy boundary (1 to 3 inches thick)
Bhs1—4 to 6 inches (10 to 15 cm); very dusky red (2.5YR 2.5/2) fine sandy loam; moderate medium subangular blocky structure, parting to strong very fine granular; few very fine and fine roots; extremely acid (pH 4.0); clear wavy boundary (3 to 6 inches thick)
Bhs2—6 to 10 inches (15 to 25 cm); very dusky red (2.5YR 2.5/2) fine sandy loam; moderate medium subangular blocky structure, parting to strong very fine granular; few very fine and fine roots; friable with firm lenses and pockets, nonsticky and nonplastic; extremely acid (pH 4.2); abrupt wavy boundary (0 to 6 inches thick)
Eb—10 to 11 inches (25 to 28 cm); brown (10YR 4/3) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; extremely acid (pH 4.2); abrupt wavy boundary (0 to 3 inches thick)
Bsb—11 to 17 inches (28 to 43 cm); dark reddish brown (5YR 3/4) silt loam; weak medium subangular blocky structure; very friable, nonsticky and slightly plastic; very strongly acid (pH 5.0); clear wavy boundary (0 to 6 inches thick)
2BC—17 to 20 inches (43 to 51 cm); dark yellowish brown (10YR 4/6) very cobbly sandy loam; weak coarse subangular blocky structure; friable, nonsticky and nonplastic; 15 percent subangular gravel and 20 percent angular and subangular cobbles; moderately acid (pH 5.8); abrupt wavy boundary (0 to 6 inches thick)
3R—20 inches (51 cm); consolidated granite bedrock

Typical Pedon Location

Map unit in which located: 192—Talkeetna, low elevation-Deneka, low elevation association, steep and moderately steep
Location in survey area: approximately 20 miles NE of Willow; in the NE 1/4 of the SE 1/4 of Section 2, T.22N, R.3W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 34 to 36 °F (1 to 2 °C)
Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Depth to bedrock: 12 to 20 inches (30 to 51 cm)
Thickness of solum: 11 to 18 inches (28 to 46 cm)
Reaction: extremely acid to strongly acid

A horizon (when present):
Color—hue of 5YR to 10YR; value moist of 2 or 3; chroma moist of 1 to 3

E and Eb horizons:
Color—hue of 5YR to 10YR; value moist of 4 to 6; chroma moist of 2 or 3

Bhs horizon:
Color—hue of 10R to 5YR; value moist of 2 or 3; chroma moist of 2 or 3
Texture—silt loam, fine sandy loam, sandy loam, and loam

Bs and Bsb horizons:
Color—hue of 2.5YR to 7.5YR; value moist of 3 to 5; chroma moist of 4 to 8
Texture—silt loam, fine sandy loam, and sandy loam

2BC horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 4 to 6
Texture—sandy loam or loam
Rock fragments—5 to 25 percent gravel; 10 to 30 percent cobbles

Disappoint Series

Taxonomic class: coarse-loamy, mixed, nonacid Humic Cryaquepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly or poorly drained
Permeability: in the upper layers—moderate; in the substratum—moderately slow to slow
Position on landscape: glacial till plains and hills
Microtopography: depressions and toeslopes
Parent material: a thin loess mantle over coarse and medium textured glacial till deposits
Slope range: 0 to 12 percent
Elevation: 100 to 1000 feet (30 to 305 m)
Climatic data (average annual):
precipitation—15 to 25 inches (38 to 64 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Disappoint very cobbly mucky silt loam (Plate 14)—on a 2 percent slope under paper birch and white spruce forest at 500 feet (152 m) elevation (All colors are for moist soil.)

Oi—4 to 3 inches (10 to 8 cm); dark reddish brown (5YR 3/3) fibrous undecomposed twigs,

roots, moss, and grass fibers (2 to 5 inches thick)

Oe—3 inches to 0 (8 cm to 0); dark reddish brown (5YR 2.5/2) partially decomposed twigs, moss, and grass (0 to 3 inches thick)

A1—0 to 4 inches (0 to 10 cm); black (10YR 2/1) very cobbly silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; 30 percent cobbles, 5 percent gravel, and 5 percent stones; strongly acid (pH 5.2); clear smooth boundary (3 to 9 inches thick)

A2—4 to 13 inches (10 to 33 cm); very dark grayish brown (10YR 3/2) very cobbly silt loam; weak medium subangular blocky structure; slightly sticky and slightly plastic; few fine distinct dark yellowish brown (10YR 4/4) mottles; very fine, fine, and medium roots; 30 percent cobbles, 5 percent gravel, and 5 percent stones; strongly acid (pH 5.4); abrupt smooth boundary (0 to 12 inches thick)

2Bg—13 to 27 inches (33 to 69 cm); very dark grayish brown (2.5Y 3/2) gravelly silt loam; occasional pockets and lenses of sandy loam material; moderate thick platy structure; firm, slightly sticky and slightly plastic; common medium distinct brown (7.5YR 4/4) mottles; few very fine and fine roots; 10 percent gravel and 5 percent cobbles; moderately acid (pH 5.6); gradual irregular boundary (12 to 30 inches thick)

2C1—27 to 41 inches (69 to 104 cm); olive (5Y 4/4 and 5Y 4/3) gravelly silt loam with pockets of sandy loam; moderate thick platy structure; firm, slightly sticky and slightly plastic; 20 percent gravel, few cobbles; moderately acid (pH 6.0); diffuse irregular boundary (10 to 34 inches thick)

2C2—41 to 60 inches (104 to 152 cm); olive (5Y 4/4 and 5Y 4/3) very gravelly sandy loam; massive; firm, slightly sticky and slightly plastic; 35 percent gravel and 1 percent cobbles; moderately acid (pH 6.0)

Typical Pedon Location

Map unit in which located: 136—Estelle, undulating-Disappoint complex

Location in survey area: approximately 5 miles E of Palmer; in the NE 1/4 of the NE 1/4 of Section 27, T.18N, R.2E, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)

Thickness of the organic mat: 2 to 5 inches (5 to 13 cm)

Thickness of solum: 16 to 34 inches (41 to 86 cm)

Reaction: very strongly acid to moderately acid

A1 horizon:

Color—hue of 5YR to 10YR; value moist of 2 to 4; chroma moist of 1 or 2

Texture—silt loam and mucky silt loam

Rock fragments—5 to 20 percent gravel; 10 to 40 percent cobbles

A2 horizon:

Color—hue of 5YR to 10YR; value moist of 2 to 4; chroma moist of 1 or 2

Texture—silt loam or loam

Rock fragments—5 to 20 percent gravel; 10 to 40 percent cobbles

2Bg horizon:

Color—hue of 5GY, 2.5Y, or 5Y; value moist of 2 to 5; chroma moist of 1 to 4

Texture—sandy loam, loam, or silt loam

Rock fragments—5 to 15 percent gravel; 5 to 15 percent cobbles

2C horizon:

Color—hue of 2.5Y or 5Y; chroma moist of 1 to 4

Texture—loam or silt loam

Rock fragments—20 to 35 percent gravel; 5 to 15 percent cobbles

Eska Series

Taxonomic class: coarse-silty, mixed Typic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly and very cobbly loam till material—moderate or moderately slow
Position on landscape: glacial till plains and hills
Parent material: silty mantle of loess underlain by friable to firm, gravelly glacial till material
Slope range: 0 to 40 percent
Elevation: 600 to 1500 feet (183 to 457 m)
Climatic data (average annual):
precipitation—20 to 25 inches (51 to 64 cm)
air temperature—33 to 35 °F (1 to 2 °C)

Typical Pedon

Eska silt loam—on a southeast facing slope of 16 percent under white spruce and paper birch forest at 1200 feet (366 m) elevation (All colors are for moist soil.)

Oi—3 inches to 0 (8 cm to 0); very dark brown (10YR 2/2) undecomposed moss and forest litter (2 to 4 inches thick)
AE/Bw—0 to 3 inches (0 to 8 cm); dark grayish brown (2.5 YR 4/2) and strong brown (7.5YR 4/6) silt loam; weak medium granular structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately acid (pH 5.6); clear smooth boundary (3 to 8 inches thick)
Bw1—3 to 16 inches (8 to 41 cm); dark yellowish brown (10YR 4/4) silt loam, with common medium distinct dark grayish brown (10YR 4/2) mottles; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; moderately acid (pH 5.8); gradual smooth boundary (6 to 15 inches thick)
Bw2—16 to 25 inches (41 to 64 cm); dark yellowish brown (10YR 3/4) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; moderately acid (pH 5.8); clear wavy boundary (0 to 6 inches thick)
2BC—25 to 36 inches (64 to 91 cm); dark yellowish brown (10YR 3/4) very gravelly sandy loam; massive; friable, nonsticky and nonplastic; 40 percent subangular gravel and 5 percent subangular cobbles; moderately acid (pH 5.8); gradual irregular boundary (0 to 16 inches thick)
2C1—36 to 60 inches (91 to 152 cm); dark grayish brown (10YR 4/2) very gravelly sandy loam; massive; firm, slightly sticky and slightly plastic; 40 percent subangular gravel and 5 percent angular cobbles; moderately acid (pH 6.0)

Typical Pedon Location

Map unit in which located: 130—Eska-Jim complex, sloping and moderately steep
Location in survey area: approximately 5 miles SW of Chickaloon; in the NW 1/4 of the NW 1/4 of Section 33, T.20N, R.5E, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 34 to 36 °F (1 to 2 °C)
Thickness of the organic mat: 2 to 4 inches (5 to 10 cm)
Depth to glacial till: 22 to 40 inches (56 to 102 cm)

Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May
Thickness of solum: 20 to 31 inches (51 to 79 cm)
Reaction: moderately acid to slightly acid

A, AE and AE/Bw horizons:
Color—hue of 10YR or 2.5Y; value moist of 3 to 5; chroma moist of 1 to 3. The Bw portion, when present, has hue of 7.5YR or 10YR; value moist of 3 or 4; chroma moist of 4 to 6.

Bw horizon:
Color—hue of 7.5YR to 10YR; value moist of 3 or 4; chroma moist of 4 to 6
Texture—silt loam or very fine sandy loam

BC or 2BC horizon:
Color—hue of 10YR or 2.5YR; value moist of 3 or 4; chroma moist of 2 to 4
Texture—silt loam, very fine sandy loam, loam, or sandy loam
Rock fragments—0 to 40 percent gravel; 0 to 20 percent cobbles

2C horizon:
Color—hue of 10YR to 2.5Y; value moist of 3 or 4; chroma moist of 2 or 3
Texture—sandy loam or loam
Rock fragments—30 to 45 percent gravel; 5 to 20 percent cobbles; 0 to 5 percent stones

Estelle Series

Taxonomic class: medial over loamy-skeletal, mixed Andic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty material—moderate; in the very gravelly and very cobbly loam till material—moderate or moderately slow
Position on landscape: glacial till plains, hills, and mountain toeslopes
Parent material: silty mantle of loess and volcanic ash underlain by friable to firm, gravelly glacial till material
Slope range: 0 to 65 percent
Elevation: 50 to 600 feet (15 to 183 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Estelle silt loam—on a 22 percent slope under white spruce and paper birch at 200 feet (61 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); dark brown (7.5YR 4/4) undecomposed moss and forest litter (1 to 6 inches thick)
E—0 to 2 inches (0 to 5 cm); dark grayish brown (10YR 4/2) and dark brown (10YR 4/3) silt loam; moderate fine granular structure; very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; strongly acid (pH 5.2); abrupt smooth boundary (1 to 3 inches thick)
Bs1—2 to 4 inches (5 to 10 cm); yellowish red (5YR 5/6) very fine sandy loam; weak medium granular structure; very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; moderately acid (pH 5.6); clear smooth boundary (2 to

6 inches thick)

Bs2—4 to 8 inches (10 to 20 cm); strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; 2 percent subangular gravel; common very fine, fine, medium, and coarse roots; moderately acid (pH 5.6); gradual wavy boundary (0 to 6 inches thick)

BC—8 to 16 inches (20 to 41 cm); dark yellowish brown (10YR 4/4) very fine sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; occasional subangular gravel and cobbles; few very fine, fine, and medium roots; moderately acid (pH 5.8); clear irregular boundary (4 to 14 inches thick)

2C1—16 to 26 inches (41 to 66 cm); brown (10YR 4/3) very gravelly loam; massive; friable, slightly sticky and slightly plastic; 25 percent subangular gravel and 10 percent angular cobbles; neutral (pH 6.8); diffuse irregular boundary (8 to 26 inches thick)

2C2—26 to 60 inches (66 to 152 cm); dark grayish brown (2.5Y 4/2) very gravelly loam; weak thick platy structure; slightly sticky and slightly plastic; 30 percent subangular gravel and 10 percent angular cobbles; neutral acid (pH 6.8)

Typical Pedon Location

Map unit in which located: 133—Estelle silt loam, steep and sloping

Location in survey area: approximately 7 miles W of Knik; approximately 900 feet N and 1400 feet E of the SW corner of Section 34, T.16N, R.4W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)

Thickness of the organic mat: 1 to 6 inches (3 to 15 cm)

Depth to glacial till: 14 to 26 inches (36 to 66 cm)

Thickness of solum: 8 to 20 inches (20 to 51 cm)

Reaction: very strongly acid to moderately acid in the solum; slightly acid to neutral in the substratum

E and Eb horizons:

Color—value moist of 4 or 5; chroma moist of 1 to 3

Bs and Bsb horizons:

Color—hue of 2.5YR to 7.5YR; value moist of 2 to 5; chroma moist of 4 to 6

Texture—silt loam or very fine sandy loam

BC horizon:

Color—hue of 7.5YR or 10YR; value moist of 3 to 5; chroma moist of 3 to 6

Texture—silt loam or very fine sandy loam

2BC horizon (when present):

Color—hue of 7.5YR or 10YR; value moist of 3 to 5; chroma moist of 3 to 6

Texture—loam or sandy loam

Rock fragments—0 to 35 percent gravel; 0 to 10 percent cobbles; 0 to 5 percent stones

2C horizon:

Color—hue of 10YR to 2.5Y; value moist of 3 to 5; chroma moist of 2 to 4

Texture—sandy loam or loam

Rock fragments—25 to 45 percent gravel; 0 to 20 percent cobbles; 0 to 5 percent stones

Flat Horn Series

Taxonomic class: coarse-loamy, mixed Typic

Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: moderate
Position on landscape: stream terraces, glacial till plains, and outwash plains
Parent material: thin silty mantle of loess and volcanic ash underlain by stratified glaciofluvial deposits
Slope range: 0 to 45 percent
Elevation: 50 to 400 feet (15 to 122 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Flat Horn silt loam—on a 2 percent slope under mixed paper birch and white spruce forest vegetation at 200 feet (61 m) elevation (All colors are for moist soil.)

Oe—3 inches to 0 (8 cm to 0); dark reddish brown (5YR 2/2) mat of partially decomposed forest litter and moss; abrupt wavy boundary (1 to 5 inches thick)
E—0 to 2 inches (0 to 5 cm); gray (10YR 5/1) silt loam; weak thin platy structure; very friable, slightly sticky and nonplastic; many roots; very strongly acid (pH 4.6); abrupt wavy boundary (1 to 4 inches thick)
Bs1—2 to 3 inches (5 to 8 cm); reddish brown (5YR 4/4) silt loam; weak fine granular structure; very friable, slightly sticky and nonplastic; many fine roots; few fine concretions; very strongly acid (pH 4.6); clear wavy boundary (1 to 5 inches thick)
Bs2—3 to 8 inches (8 to 20 cm); brown (7.5YR 4/4) and strong brown (7.5YR 5/6) silt loam; weak fine subangular blocky structure; very friable, slightly sticky and nonplastic; common roots; strongly acid (pH 5.2); abrupt wavy boundary (0 to 10 inches thick)
Eb—8 to 9 inches (20 to 23 cm); grayish brown (2.5Y 5/2) silt loam; weak fine subangular blocky structure; friable, slightly sticky and nonplastic; common roots; strongly acid (pH 5.2); abrupt broken boundary (0 to 2 inches thick)
2Bsb—9 to 15 inches (23 to 38 cm); dark yellowish brown (10YR 4/4) fine sandy loam with patches of brown (7.5YR 4/4) and yellowish brown (10YR 5/4); weak medium subangular blocky structure; friable, nonsticky and nonplastic; common roots; strongly acid (pH 5.2); clear smooth boundary (0 to 9 inches thick)
3C1—15 to 21 inches (38 to 53 cm); olive brown (2.5Y 4/4) fine sand stratified with silt; strata are well sorted and range from 1/4 to 2 inches thick; fine sand is single grained and loose, silt has weak medium subangular blocky structure; friable, nonsticky and nonplastic; few roots; strongly acid (pH 5.2); gradual wavy boundary (4 to 12 inches thick)
3C2—21 to 60 inches (53 to 152 cm); olive (5Y 4/3) fine sand stratified with silt; strata are well sorted and range from 1/2 to 4 inches thick; fine sand is single grained and loose, silt is massive; friable, nonsticky and nonplastic; few weakly cemented streaks of dark yellowish brown (10YR 4/4) in fine sand stratas; few roots to 30 inches, none below; strongly acid (pH 5.2)

Typical Pedon Location

Map unit in which located: 138—Flat Horn silt loam, rolling
Location in survey area: approximately 300 yards N of Kroto Creek; in the NW 1/4 of the SW 1/4 of Section 22, T.20N, R.6W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)

Thickness of the organic mat: 1 to 5 inches (3 to 13 cm)
Depth to stratified sandy and silty material: 8 to 14 inches (20 to 36 cm)
Thickness of solum: 8 to 24 inches (20 to 61 cm)
Reaction: very strongly acid to medium acid

E and Eb horizons:
Color—hue of 5YR to 10YR; value moist of 3 to 7; chroma moist of 1 or 2

Bs horizon:
Color—hue of 5YR to 10YR; value moist of 3 to 5; chroma moist of 3 to 6

2Bsb horizon (when present):
Color—hue of 7.5YR or 10YR; value moist of 4 or 5; chroma moist of 3 or 4
Texture—stratified fine sand, silt, and very fine sand

2C horizon:
Color—hue of 2.5Y or 5Y; value moist of 4 or 5; chroma moist of 3 or 4
Texture—stratified very fine sand, fine sand, and silt

Goldcord Series

Taxonomic class: loamy-skeletal, mixed Lithic Cryumbrepts
Depth class: very shallow or shallow—8 to 20 inches (20 to 51 cm)
Drainage class: well drained
Permeability: above the bedrock—moderate
Position on landscape: crests and backslopes of mountains
Parent material: admixture of loess and gravelly glacial till material over bedrock
Slope range: 0 to 30 percent
Elevation: 1700 to 3500 feet (518 to 1067 m)
Climatic data (average annual):
precipitation—30 to 45 inches (76 to 114 cm)
air temperature—32 to 34 °F (0 to 1 °C)

Typical Pedon

Goldcord very cobbly sandy loam—on a north facing slope of 12 percent under lichen vegetation at 2400 feet (732 m) elevation (All colors are for moist soil.)

Oe—1 inch to 0 (3 cm to 0); dark brown (7.5YR 3/2) mucky peat; mat of decomposing organic matter; clear smooth boundary (1 to 5 inches thick)
A—0 to 8 inches (0 to 20 cm); dark brown (7.5YR 3/2) very cobbly sandy loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; 15 percent cobbles and 20 percent gravel; common very fine and fine roots; strongly acid (pH 5.2); clear wavy boundary (4 to 12 inches thick)
AC—8 to 16 inches (20 to 41 cm); dark brown (10YR 3/3) very cobbly sandy loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; 15 percent cobbles and 20 percent gravel; few very fine and fine roots; strongly acid (pH 5.4); gradual smooth boundary (3 to 14 inches thick)
C—16 to 19 inches (41 to 48 cm); dark grayish brown (2.5Y 4/2) very cobbly sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; 20 percent cobbles and 20 percent gravel; moderately acid (pH 5.6); abrupt smooth boundary (1 to 10 inches thick)
2R—19 inches (48 cm); consolidated granite bedrock

Typical Pedon Location

Map unit in which located: 140—Goldcord-Tsadaka complex, 0 to 30 percent slopes
Location in survey area: approximately 15 miles E of Talkeetna; in the NE 1/4 of the NW 1/4 of Section 22, T.27N, R.2E, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 33 to 35 °F (1 to 2 °C)
Thickness of the organic mat: 1 to 5 inches (3 to 13 cm)
Depth to bedrock: 8 to 20 inches (20 to 51 cm)
Thickness of solum: 4 to 12 inches (10 to 30 cm)
Reaction: very strongly acid to moderately acid throughout

A horizon:
Color—hue of 7.5YR to 2.5Y; value moist of 2 or 3; chroma moist of 2 or 3
Rock fragments—5 to 40 percent gravel; 5 to 25 percent cobbles

AC horizon:
Color—hue of 7.5YR to 2.5Y; value moist of 2 or 3; chroma moist of 2 to 4
Rock fragments—30 to 55 percent gravel; 5 to 25 percent cobbles

C horizon:
Color—hue of 10YR to 5Y; value moist of 3 to 5; chroma moist of 2 to 4
Rock fragments—30 to 55 percent gravel; 5 to 25 percent cobbles

Histosols

Taxonomic class: Histosols
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly drained
Permeability: in the upper organic horizons—moderately rapid; below this—variable
Position on landscape: bogs and fens on glacial till plains, outwash plains, stream terraces, and mountainslopes
Parent material: organic material underlain by variable texture mineral soil and organic material
Slope range: 0 to 4 percent
Elevation: 30 to 3200 feet (9 to 975 m)
Climatic data (average annual):
precipitation—15 to 45 inches (38 to 114 cm)
air temperature—32 to 36 °F (0 to 2 °C)

Sample Pedon

Histosols—(Plate 12) on a 4 percent slope under paper birch and white spruce forest at 900 feet (274 m) elevation (All colors are for moist soil.)

Oi—0 to 8 inches (0 to 20 cm); yellowish brown (10YR 5/4) and light yellowish brown (10YR 6/4) peat consisting of fibrous undecomposed twigs, roots, and moss; many roots of all sizes; 90 percent fibers before and 75 percent fibers after rubbing; extremely acid (pH 4.0) clear smooth boundary (4 to 20 inches thick)
Oe1—8 to 28 inches (20 to 71 cm); dark brown (7.5YR 3/2) mucky peat consisting of partially decomposed twigs, roots, and moss; few very fine and fine roots; 50 percent fibers before and 30 percent fibers after rubbing; extremely acid (pH 4.0); gradual smooth boundary (10 to 30 inches thick)

Oe2—28 to 60 inches (71 to 152 cm); dark reddish brown (5YR 2/2) mucky peat consisting of partially decomposed roots, twigs, and moss; 40 percent fibers before and 20 percent fibers after rubbing; extremely acid (pH 4.0) (0 to 30 inches thick)

Sample Pedon Location

Map unit in which located: 144—Histosols
Location in survey area: approximately 11 miles NW of Wasilla; in the SW 1/4 of the NW 1/4 of Section 36, T.19N, R.3W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 33 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 16 to over 60 inches (41 to over 152 cm)
Depth to mineral soil: 16 to over 60 inches (41 to over 152 cm)
Depth to water lenses or layers: 6 to over 60 inches (15 to over 152 cm)
Reaction: extremely acid to strongly acid

Oi, Oe or Oa horizon:
Texture—peat, mucky peat, or muck

2C horizon (when present):
Texture—variable

Jim Series

Taxonomic class: coarse-silty, mixed, nonacid Typic Cryorthents
Depth class: moderately deep—20 to 40 inches (51 to 102 cm)
Drainage class: well drained
Permeability: above the bedrock—moderate
Position on landscape: low mountains and hills
Parent material: silty mantle of loess over bedrock
Slope range: 0 to 60 percent
Elevation: 50 to 1500 feet (15 to 457 m)
Climatic data (average annual):
precipitation—15 to 25 inches (38 to 64 cm)
air temperature—33 to 36 °F (1 to 2 °C)

Typical Pedon

Jim silt loam—on a 37 percent slope under bluejoint reedgrass at 500 feet (152 m) elevation (All colors are for moist soil.)

Oe—1 inch to 0 (3 cm to 0); dark reddish brown (5YR 2/2) undecomposed grass litter (1 to 3 inches thick)
A—0 to 5 inches (0 to 13 cm); dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; strongly acid (pH 5.3); clear wavy boundary (3 to 7 inches thick)
C1—5 to 22 inches (13 to 56 cm); olive gray (5Y 4/2) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; few patches of dark yellowish brown silt loam and few thin streaks of organic matter; moderately acid (pH 5.8); gradual wavy boundary (13 to 20 inches thick)
C2—22 to 26 inches (56 to 66 cm); olive brown (2.5Y 4/4) silt loam; massive; very friable,

nonsticky and nonplastic; few coarse roots; moderately acid (pH 5.8); abrupt wavy boundary

2R—26 inches (66 cm); consolidated metamorphic bedrock

Typical Pedon Location

Map unit in which located: 112—Bodenburg-Jim complex, steep and sloping
Location in survey area: approximately 4 miles SE of Palmer; in the SW 1/4 of the SW 1/4 of Section 23, T.17N, R.2E, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 1 to 3 inches (3 to 8 cm)
Depth to bedrock: 20 to 40 inches (51 to 102 cm)
Thickness of solum: 3 to 7 inches (8 to 18 cm)
Reaction: very strongly acid to slightly acid throughout

A horizon:
Color—hue of 7.5YR to 2.5Y; value moist of 3 to 5; chroma moist of 1 to 3

C horizon:
Color—hue of 10YR to 5Y; value moist of 3 to 5; chroma moist of 2 to 4

Kalambach Series

Taxonomic class: coarse-loamy, mixed Typic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the substratum—moderate or moderately slow
Position on landscape: glacial till plains and hills
Parent material: silty mantle of loess underlain by very gravelly glacial till material
Slope range: 0 to 60 percent
Elevation: 50 to 600 feet (15 to 183 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Kalambach silt loam—on a 6 percent slope under paper birch and quaking aspen at 500 feet (152 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); very dark brown (10YR 2/2) undecomposed fibrous moss, roots, leaves, and twigs (1 to 4 inches thick)

AE—0 to 6 inches (0 to 15 cm); dark grayish brown (10YR 4/2) and dark brown (10YR 3/3) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; common large distinct dark brown and dark yellowish brown (10YR 4/4) mottles; common very fine, fine, and few medium roots; slightly acid (pH 6.1); abrupt irregular boundary (3 to 8 inches thick)

Bw1—6 to 9 inches (15 to 23 cm); dark yellowish brown (10YR 3/6) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; many medium distinct dark brown (7.5YR 3/4) and dark grayish brown (2.5YR 4/2) mottles; few roots of all sizes; slightly acid (pH 6.2); clear wavy boundary (3 to 15 inches thick)

Bw2—9 to 14 inches (23 to 36 cm); dark yellowish brown (10YR 3/4) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; slightly acid (pH 6.2) (0 to 10 inches thick)
BC—14 to 21 inches (36 to 53 cm); dark brown (10YR 3/3) silt loam; very friable, nonsticky and nonplastic; common large faint very dark grayish brown (10YR 3/2) mottles; slightly acid (pH 6.4) (4 to 9 inches thick)
2C1—21 to 34 inches (53 to 86 cm); dark grayish brown (10YR 4/2) very gravelly loam; friable, slightly sticky and slightly plastic; 35 percent subangular gravel and 5 percent subangular cobbles; neutral (pH 6.6) (10 to 28 inches thick)
2C2—34 to 60 inches (86 to 152 cm); dark grayish brown (2.5Y 4/2) and 10YR 4/2) very gravelly loam; firm, slightly sticky and slightly plastic; 30 percent subangular gravel and 5 percent subangular cobbles; neutral (pH 6.8)

Typical Pedon Location

Map unit in which located: 145—Kalambach silt loam, undulating
Location in survey area: approximately 2 miles NE of Wasilla; approximately 800 feet S and 100 feet E of the NW corner of Section 36, T.18N, R.1W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Depth to glacial till: 10 to 31 inches (25 to 79 cm)
Thickness of solum: 13 to 25 inches (33 to 64 cm)
Reaction: moderately acid or slightly acid in the solum; slightly acid or neutral in the substratum

AE and A horizons:
Color—value moist of 3 or 4; chroma moist of 2 or 3

Bw horizon:
Color—hue of 7.5YR or 10YR; value moist of 3 or 4; chroma moist of 4 to 6

BC horizon:
Color—value moist of 3 or 4; chroma moist of 2 to 4

2C horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 2 or 3
Texture—loam or sandy loam
Rock fragments—30 to 45 percent gravel; 5 to 20 percent cobbles

Kashwitna Series

Taxonomic class: medial over sandy or sandy-skeletal, mixed Andic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty material—moderate; in the underlying gravel and sand—rapid
Position on landscape: glacial outwash plains and hills
Parent material: silty mantle of loess and volcanic ash overlying gravelly and sandy outwash material
Slope range: 0 to 45 percent
Elevation: 50 to 400 feet (15 to 122 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)

air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Kashwitna silt loam—on a 2 percent slope under forest vegetation at 150 feet (46 m) elevation (All colors are for moist soil.)

Oi—3 inches to 0 (8 cm to 0); very dark brown (10YR 2/2) mat of slightly decomposed forest litter, moss, mycelia, and fine roots; very strongly acid; abrupt wavy boundary (1 to 5 inches thick)

E—0 to 2 inches (0 to 5 cm); gray (10YR 5/1) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many medium and coarse roots; very strongly acid; abrupt smooth boundary (1 to 3 inches thick)

Bs1—2 to 4 inches (5 to 10 cm); dark reddish brown (5YR 3/4) silt loam; weak fine subangular blocky structure; very friable, slightly smeary, nonsticky and nonplastic; many medium and coarse roots; few fine concretions; very strongly acid; abrupt wavy boundary (1 to 4 inches thick)

Bs2—4 to 7 inches (10 to 18 cm); strong brown (7.5YR 4/6) silt loam; weak fine granular structure; very friable, slightly smeary, nonsticky and nonplastic; many medium and coarse roots; very strongly acid; abrupt smooth boundary (2 to 6 inches thick)

Eb—7 to 9 inches (18 to 23 cm); very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; very friable, slightly smeary, nonsticky and nonplastic; many medium and coarse roots; very strongly acid; abrupt smooth boundary (0 to 3 inches thick)

Bsb—9 to 15 inches (23 to 38 cm); dark brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; very friable, slightly smeary, nonsticky and nonplastic; common coarse roots; strongly acid; clear wavy boundary (3 to 6 inches thick)

BC—15 to 18 inches (38 to 46 cm); dark yellowish brown (10YR 3/4) silt loam; weak fine subangular blocky structure; very friable, slightly smeary, nonsticky and nonplastic; 10 percent coarse gravel; strongly acid; clear smooth boundary (3 to 8 inches thick)

2C—18 to 60 inches (46 to 152 cm); olive brown (2.5Y 4/4) very gravelly sand; single grain; loose; 45 percent gravel; strongly acid

Typical Pedon Location

Map unit in which located: 147—Kashwitna silt loam, 0 to 3 percent slopes
Location in survey area: in the SW 1/4 of the NW 1/4 of Section 36, T.12N, R.11W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 1 to 5 inches (3 to 13 cm)
Depth to sand and gravel: 10 to 20 inches (25 to 51 cm)
Thickness of solum: 14 to 21 inches (36 to 53 cm)
Reaction: extremely acid to strongly acid

E and Eb horizons:
Color—hue of 5YR to 10YR; value moist of 2 to 6; chroma moist of 1 or 2
Texture—silt loam, very fine sandy loam, or fine sandy loam

Bs and Bsb horizons:
Color—hue of 2.5YR to 7.5YR; value moist of 3 to 5; chroma moist of 3 to 6
Texture—silt loam or very fine sandy loam

2C horizon:
Color—variegated
Texture—sand, coarse sand
Rock fragments—30 to 65 percent gravel; 0 to 25 percent cobbles

Keba Series

Taxonomic class: fine-loamy, mixed Typic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the loamy substratum—moderately slow
Position on landscape: glacial till plains and hills
Parent material: silty mantle of loess and volcanic ash underlain by firm, loamy lacustrine and glacial till material
Slope range: 0 to 10 percent
Elevation: 100 to 300 feet (30 to 91 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Keba silt loam—on a 3 percent slope under paper birch forest vegetation at 200 feet (61 m) elevation (All colors are for moist soil.)

Oi—1 inch to 0 (3 cm to 0); dusky red (2.5YR 3/2) fibrous undecomposed moss and forest litter (1 to 4 inches thick)
E—0 to 2 inches (0 to 5 cm); dark grayish brown (2.5Y 4/2) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; strongly acid (pH 5.2); abrupt smooth boundary (1 to 3 inches thick)
Bs—2 to 6 inches (5 to 15 cm); reddish brown (2.5YR 4/4) and brown (7.5YR 4/4) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; strongly acid (pH 5.4); clear wavy boundary (3 to 8 inches thick)
2BC—6 to 10 inches (15 to 25 cm); dark yellowish brown (10YR 4/4) gravelly silty clay loam; weak medium subangular blocky structure; friable, sticky and plastic; 15 percent subrounded gravel and 1 percent subrounded cobbles; moderately acid (pH 6.0); gradual wavy boundary (0 to 8 inches thick)
2C1—10 to 21 inches (25 to 53 cm); dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/4) gravelly silty clay loam; massive; friable, sticky and plastic; 15 percent subrounded gravel and 1 percent subrounded cobbles; slightly acid (pH 6.2); diffuse wavy boundary (10 to 50 inches thick)
2C2—21 to 60 inches (53 to 152 cm); dark grayish brown (2.5Y 4/2) loam; massive; firm, sticky and plastic; 10 percent subrounded gravel and 1 percent subrounded cobbles; slightly acid (pH 6.4)

Typical Pedon Location

Map unit in which located: 150—Keba silt loam, undulating
Location in survey area: approximately 3 miles S of Houston; approximately 600 feet S and 500 feet W of the NE corner of Section 7, T.16N, R.4W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Depth to loamy lacustrine material: 4 to 10 inches (10 to 25 cm)
Thickness of solum: 4 to 15 inches (10 to 38 cm)
Reaction: very strongly acid to strongly acid in the solum; moderately acid to neutral in the substratum

E and Eb horizons:
Color—hue of 10YR to 5Y; value moist of 3 to 5; chroma moist of 1 to 3

Bs and Bsb horizons:
Color—hue of 2.5YR to 7.5YR; value moist of 3 to 5; chroma moist of 4 to 6

2BC horizon:
Color—hue of 10YR or 2.5YR; value moist of 3 or 4; chroma moist of 4 to 6
Texture—clay loam, silty clay loam, or loam

2C horizon:
Color—hue of 10YR or 5Y; value moist of 3 or 4; chroma moist of 2 to 6
Texture—silty clay loam, clay loam, or loam
Rock fragments—5 to 20 percent gravel; 0 to 10 percent cobbles

Kichatna Series

Taxonomic class: sandy-skeletal, mixed Typic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Position on landscape: glacial outwash plains, ridges, and hills
Parent material: silty mantle consisting of loess and volcanic ash underlain by very gravelly glacial outwash material
Slope range: 0 to 65 percent
Elevation: 50 to 400 feet (15 to 122 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Kichatna silt loam—on a 3 percent slope under black spruce, highbush cranberry, and moss at 150 feet (46 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); very dusky red (2.5YR 2.5/2) fibrous, undecomposed moss and forest litter (1 to 6 inches thick)
E—0 to 2 inches (0 to 5 cm); dark grayish brown (10YR 4/2) and gray (10YR 5/1) silt loam; weak medium granular structure; very friable, nonsticky and nonplastic; few very fine and fine roots; strongly acid (pH 5.4); abrupt wavy boundary (1 to 3 inches thick)
Bs—2 to 5 inches (5 to 13 cm); yellowish red (5YR 4/6) and strong brown (7.5YR 4/6) very fine sandy loam; weak medium granular structure; very friable, nonsticky and nonplastic; few very fine and fine roots; strongly acid (pH 5.4); abrupt smooth boundary (1 to 8 inches thick)
Eb—5 to 6 inches (13 to 15 cm); brown (10YR 5/3) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; few very fine and fine roots; moderately acid (pH

5.6); abrupt smooth boundary (0 to 2 inches thick)

Bsb—6 to 9 inches (15 to 23 cm); brown (7.5YR 4/4) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; few very fine and fine roots; slightly acid (pH 5.6); clear smooth boundary (0 to 6 inches thick)

2BC—9 to 12 inches (23 to 30 cm); dark yellowish brown (10YR 4/4) very gravelly loamy coarse sand; very friable, nonsticky and nonplastic; 30 percent rounded gravel and 5 percent rounded cobbles; slightly acid (pH 5.8); gradual wavy boundary (4 to 10 inches thick)

2C1—12 to 37 inches (30 to 94 cm); dark yellowish brown (10YR 3/4) very gravelly loamy coarse sand; loose, nonsticky and nonplastic; 45 percent rounded gravel and 5 percent rounded cobbles; neutral (pH 6.0); gradual wavy boundary (18 to 38 inches thick)

2C2—37 to 60 inches (94 to 152 cm); dark yellowish brown (10YR 3/4) extremely gravelly loamy coarse sand; loose, nonsticky and nonplastic; 55 percent rounded gravel and 10 percent rounded cobbles; neutral (pH 6.0)

Typical Pedon Location

Map unit in which located: 150—Kichatna silt loam, undulating

Location in survey area: approximately 15 miles SW of Houston; approximately 900 feet S and 1000 feet W of the NE corner of Section 31, T.16N, R.4W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)

Thickness of the organic mat: 1 to 6 inches (3 to 15 cm)

Depth to sand and gravel: 4 to 10 inches (10 to 25 cm)

Thickness of solum: 4 to 11 inches (10 to 28 cm)

Reaction: very strongly acid to moderately acid in the solum; moderately acid to slightly acid in the substratum

E and Eb horizons:

Color—hue of 10YR or 2.5Y; value moist of 3 to 5; chroma moist of 1 to 3

Bs and Bsb horizons:

Color—hue of 5YR or 7.5YR; value moist of 3 to 5; chroma moist of 4 to 6

Rock fragments—0 to 10 percent gravel; 0 to 5 percent cobbles

2Bs horizon:

Color—hue of 5YR or 7.5YR; value moist of 3 to 5; chroma moist of 4 to 6

Texture—loamy sand, loamy coarse sand, coarse sand, or sand

Rock fragments—20 to 60 percent gravel; 0 to 15 percent cobbles

2BC horizon:

Color—value moist of 3 or 4; chroma moist of 4 to 6

Texture—sandy loam, loamy coarse sand, or sand

Rock fragments—20 to 50 percent gravel; 0 to 10 percent cobbles

2C horizon:

Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 2 to 4

Texture—sand, coarse sand, or loamy coarse sand

Rock fragments—35 to 65 percent gravel; 0 to 15 percent cobbles

Kidazqeni Series

Taxonomic class: sandy-skeletal, mixed Typic Cryofluvents

Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: moderately well to somewhat excessively drained
Permeability: in the surface horizon—moderate; in the stratified sandy through silty material—moderately rapid; in the gravelly substrata—rapid
Position on landscape: floodplains, stream terraces, and alluvial fans
Parent material: thin mantle of stratified sandy and silty alluvium underlain by sandy and gravelly alluvium
Slope range: 0 to 12 percent
Elevation: 0 to 1600 feet (0 to 488 m)
Climatic data (average annual):
precipitation—15 to 30 inches (38 to 76 cm)
air temperature—32 to 36 °F (0 to 2 °C)

Typical Pedon

Kidazqeni very fine sandy loam—on a nearly level slope under balsam poplar at 350 feet (107 m) elevation (All colors are for moist soil.)

Oi—1 inch to 0 (3 cm to 0); very dark brown (10YR 2/2) fibrous forest litter (0 to 6 inches thick)
A—0 to 2 inches (0 to 5 cm); very dark grayish brown (10YR 3/2) very fine sandy loam, with occasional strata and pockets of dark gray (2.5Y 4/1) fine sand and sand; weak medium granular structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; moderately acid (pH 5.6); clear smooth boundary (1 to 4 inches thick)
AC—2 to 8 inches (5 to 20 cm); dark brown (10YR 3/3) and dark grayish brown (10YR 4/1) stratified fine sand to silt; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately acid (pH 5.6); clear smooth boundary (0 to 8 inches thick)
2C1—8 to 26 inches (20 to 66 cm); variegated extremely gravelly coarse sand with occasional lenses and pockets of dark gray (2.5Y 4/1) and dark brown (10YR 3/3) sand; single grain; very friable, nonsticky and nonplastic; moderately acid (pH 5.8); gradual smooth boundary (15 to 55 inches thick)
2C2—26 to 60 inches (66 to 152 cm); variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; moderately acid (pH 5.8)

Typical Pedon Location

Map unit in which located: 162—Kidazqeni-Niklason complex, 0 to 2 percent slopes
Location in survey area: approximately 3 miles E of Trapper Creek; in the NW 1/4 of the NE 1/4 of Section 27, T.26N, R.5W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 33 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 0 to 6 inches (0 to 15 cm)
Depth to sand and gravel: 2 to 10 inches (5 to 25 cm)
Depth to seasonally high water table: 40 to over 60 inches (102 to over 152 cm)
Thickness of solum: 2 to 6 inches (5 to 15 cm)
Reaction: strongly acid to moderately acid in the solum; moderately acid to slightly acid in the substratum

A horizon:
Color—hue of 10YR or 2.5Y; value moist of 2 or 3; chroma moist of 1 to 3
Texture—silt loam and very fine sandy loam

AC and C horizons:
Color—hue of 10YR to 5Y; value moist of 2 to 4; chroma moist of 1 to 4
Texture—stratified sand to silt

2C horizon:
Color—variegated
Texture—coarse sand or sand
Rock fragments—40 to 70 percent gravel; 0 to 15 percent cobbles

Killey Series

Taxonomic class: coarse-loamy over sandy or sandy-skeletal, mixed, acid Typic Cryaquents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly drained
Permeability: in the stratified surface layers—moderate; in the sand and gravel—rapid
Position on landscape: floodplains
Parent material: stratified sandy and silty alluvium underlain by sandy and gravelly alluvium
Slope range: 0 to 4 percent
Elevation: 0 to 700 feet (0 to 213 m)
Climatic data (average annual):
precipitation—20 to 25 inches (51 to 64 cm)
air temperature—33 to 35 °F (1 to 2 °C)

Typical Pedon

Killey silt loam—on a 2 percent slope under open birch forest and bluejoint reedgrass at 400 feet (122 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); dark reddish brown (5YR 2/2) mat of slightly decomposed organic materials; many fine roots; very strongly acid; abrupt smooth boundary (1 to 4 inches thick)
A—0 to 3 inches (0 to 8 cm); dark brown (7.5YR 3/2) silt loam; weak fine granular structure; very friable; few medium faint dark grayish brown (10YR 4/2) mottles; many roots; very strongly acid; abrupt wavy boundary (2 to 8 inches thick)
C1—3 to 10 inches (8 to 25 cm); olive brown (2.5YR 4/4) silt loam; weak fine subangular blocky structure; very friable; common medium faint dark grayish brown (10YR 4/2) and common fine distinct brown (7.5YR 4/4) mottles; few thin strata of fine sand; common roots; very strongly acid; gradual wavy boundary (2 to 10 inches thick)
C2—10 to 26 inches (25 to 66 cm); olive brown (2.5Y 4/4) and dark grayish brown (2.5Y 4/2) fine sandy loam; weak fine subangular blocky structure; very friable; common medium distinct brown (7.5YR 4/4) mottles; few roots; very strongly acid; clear smooth boundary (5 to 20 inches thick)
C3—26 to 36 inches (66 to 91 cm); dark grayish brown (2.5Y 4/2) fine sand; single grain; loose; few thin strata of silt; very strongly acid; clear smooth boundary (0 to 16 inches thick)
2C—36 to 60 inches (91 to 152 cm); olive gray (5Y 4/2) very gravelly coarse sand; single grain; loose; very strongly acid (0 to 30 inches thick)

Typical Pedon Location

Map unit in which located: 163—Killey and Moose River soils, 0 to 2 percent slopes
Location in survey area: approximately 11 miles W of Talkeetna; in the SW 1/4 of the SW 1/4 of Section 32, T.26N, R.6W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Depth to sand and gravel: 20 to 40 inches (51 to 102 cm)
Depth to seasonally high water table: 0 to 10 inches (0 to 25 cm)
Thickness of solum: 2 to 10 inches (5 to 25 cm)
Reaction: very strongly acid to moderately acid

A horizon:
Color—hue of 7.5YR or 10YR; value moist of 1 to 4

C horizon:
Color—hue of 10YR to 5Y; value moist of 3 to 5; chroma moist of 1 to 4
Texture—stratified silt, very fine sand, and fine sand

2C horizon:
Color—variegated
Texture—sand or coarse sand
Rock fragments—35 to 65 percent gravel; 0 to 20 percent cobbles

Knik Series

Taxonomic class: coarse-silty over sandy or sandy-skeletal, mixed Typic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the sand and gravel—rapid
Position on landscape: hills and glacial outwash plains
Parent material: silty loess mantle over gravelly glacial outwash deposits
Slope range: 0 to 65 percent
Elevation: 50 to 600 feet (15 to 183 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Knik silt loam—on a 2 percent slope under paper birch and white spruce at 800 feet (244 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); very dark brown (10YR 2/2) undecomposed grass, twigs, and leaves (1 to 5 inches thick)
EA—0 to 7 inches (0 to 18 cm); dark grayish brown (10YR 4/2) silt loam with common fine distinct dark yellowish brown (10YR 4/4) mottles; weak fine granular structure; very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; strongly acid (pH 5.2); clear irregular boundary (3 to 8 inches thick)
Bw1—7 to 12 inches (18 to 30 cm); dark yellowish brown (10YR 4/4 and 10YR 4/6) silt loam; weak medium platy structure; very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; strongly acid (pH 5.4); clear smooth boundary (3 to 9 inches thick)
Bw2—12 to 19 inches (30 to 48 cm); dark yellowish brown (10YR 4/4) silt loam; weak medium platy structure; very friable, nonsticky and nonplastic; few medium and fine roots; medium acid (pH 5.6); abrupt smooth boundary (0 to 10 inches thick)
C1—19 to 24 inches (48 to 61 cm); dark brown (10YR 4/3) silt loam; massive; very friable, nonsticky and nonplastic; few fine roots; medium acid (pH 5.6); abrupt smooth

boundary (0 to 14 inches thick)

2C2—24 to 38 inches (61 to 97 cm); variegated extremely gravelly sand; single grain; loose, nonsticky and nonplastic; 50 percent rounded gravel and 10 percent rounded cobbles; medium acid (pH 5.6); gradual wavy boundary (12 to 30 inches thick)

2C3—38 to 60 inches (97 to 152 cm); variegated extremely gravelly coarse sand with occasional lenses and pockets of coarse sand; single grain; loose, nonsticky and nonplastic; 60 percent rounded gravel and 10 percent rounded cobbles; medium acid (pH 5.8) (0 to 25 inches thick)

Typical Pedon Location

Map unit in which located: 164—Knik silt loam, 0 to 3 percent slopes

Location in survey area: in the SE 1/4 of the NW 1/4 of Section 8, T.18N, R.2E, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)

Thickness of the organic mat: 1 to 5 inches (3 to 13 cm)

Depth to sand and gravel: 10 to 24 inches (25 to 61 cm)

Thickness of solum: 12 to 25 inches (30 to 64 cm)

Reaction: strongly acid to moderately acid in the solum; moderately acid to neutral in the substratum

E or EA horizon (when present):

Color—value moist of 3 to 5; chroma moist of 1 to 3

A horizon (when present):

Color—hue of 7.5YR or 10YR; value moist of 2 or 3; chroma moist of 2 or 3

Bw horizon:

Color—hue of 7.5YR or 10YR; value moist of 4 or 5; chroma moist of 3 to 6

2Bw horizon (when present):

Color—hue of 7.5YR or 10YR; value moist of 4 or 5; chroma moist of 4 to 8

Texture—sandy loam, loamy sand, or loamy coarse sand

Rock fragments—15 to 30 percent gravel; 0 to 10 percent cobbles

2BC horizon:

Color—hue of 7.5YR or 10YR; value moist of 3 to 5; chroma moist of 4 to 6

Texture—sandy loam, loamy coarse sand, or coarse sand

Rock fragments—40 to 60 percent gravel; 0 to 10 percent cobbles

2C horizon:

Color—variegated

Texture—sand, coarse sand, or loamy coarse sand

Rock fragments—40 to 70 percent rounded gravel and cobbles

Liten Series

Taxonomic class: sandy, mixed Typic Haplocryods

Depth class: very deep—more than 60 inches (more than 152 cm)

Drainage class: somewhat excessively drained

Permeability: in the silty loess mantle—moderate; in the sandy material—moderately rapid

Position on landscape: hills

Parent material: loess over eolian sand
Slope range: 0 to 45 percent
Elevation: 50 to 400 feet (15 to 122 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Liten silt loam—on an 11 percent slope under paper birch, aspen, and white spruce at 200 feet (61 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); dark reddish brown (5YR 3/2) undecomposed moss and forest litter (1 to 4 inches thick)
E—0 to 2 inches (0 to 5 cm); dark gray (10YR 4/1) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine and fine, few coarse and medium roots; strongly acid (pH 5.4); abrupt smooth boundary (1 to 3 inches thick)
Bs1—2 to 4 inches (5 to 10 cm); yellowish red (5YR 4/6) very fine sandy loam; weak medium granular structure; very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; moderately acid (pH 5.6); abrupt smooth boundary (2 to 4 inches thick)
2Bs2—4 to 6 inches (10 to 15 cm); brown (7.5YR 4/4) sandy loam; weak medium granular structure; very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; moderately acid (pH 5.8); clear smooth boundary (0 to 3 inches thick)
2BC—6 to 15 inches (15 to 38 cm); dark yellowish brown (10YR 4/6) sand; single grain; loose, nonsticky and nonplastic; few fine roots; moderately acid (pH 5.8); clear smooth boundary (0 to 12 inches thick)
2C—15 to 60 inches (38 to 152 cm); brown (10YR 4/3) sand; single grain; loose, nonsticky and nonplastic; moderately acid (pH 5.8)

Typical Pedon Location

Map unit in which located: 169—Liten silt loam, hilly
Location in survey area: approximately 6 miles SW of Knik; approximately 900 feet N and 700 feet W of the SW corner of Section 1, T.15N, R.4W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Depth to sand: 1 to 8 inches (3 to 20 cm)
Depth to gravelly glacial till: 40 to over 60 inches (102 to over 152 cm)
Thickness of solum: 3 to 9 inches (8 to 23 cm)
Reaction: very strongly acid to moderately acid in the solum; very strongly acid to slightly acid in the substratum

E horizon:
Color—value moist of 4 or 5; chroma moist of 1 to 3

Bs horizon:
Color—hue of 5YR to 10YR; value moist of 4 or 5; chroma moist of 4 to 6
Texture—silt loam and very fine sandy loam

2Bs horizon:
Color—hue of 5YR to 10YR; value moist of 4 or 5; chroma moist of 4 to 6
Texture—sandy loam, fine sandy loam, fine sand, and loamy fine sand

2BC horizon:
Color—hue of 10YR to 2.5Y; value moist of 4 or 5; chroma moist of 3 to 6
Texture—sand, loamy sand, fine sand, and loamy fine sand

2C horizon:
Color—hue of 10YR to 2.5Y; value moist of 2 to 5; chroma moist of 2 to 4
Texture—fine sand or sand

3C horizon (till substratum):
Color—hue of 2.5Y or 10YR; value moist of 3 to 5; chroma moist of 2 to 4
Texture—sandy loam and loam
Rock fragments—25 to 40 percent gravel; 0 to 15 percent cobbles
Moist consistence—friable or firm

Moose River Series

Taxonomic class: coarse-loamy, mixed, nonacid Typic Cryaquents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly or poorly drained
Permeability: in the stratified surface layers—moderate; in the sand and gravel—rapid
Position on landscape: floodplains
Parent material: stratified sandy and silty alluvium underlain by sandy and gravelly alluvium
Slope range: 0 to 2 percent
Elevation: 0 to 700 feet (0 to 213 m)
Climatic data (average annual):
precipitation—20 to 25 inches (51 to 64 cm)
air temperature—33 to 35 °F (1 to 2 °C)

Typical Pedon

Moose River silt loam—on a 1 percent slope under alder shrub, sedge, and grass vegetation at 200 feet (61 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); very dark brown (10YR 2/2) peat; mat of roots, moss, and decomposing organic materials; strongly acid; abrupt smooth boundary (0 to 6 inches thick)
A—0 to 3 inches (0 to 8 cm); very dark brown (10YR 2/2) silt loam; moderate fine granular structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; strongly acid (pH 5.4); abrupt wavy boundary (2 to 8 inches thick)
C—3 to 8 inches (8 to 20 cm); very dark grayish brown (2.5Y 3/2) fine sand, stratified with lenses of silt with few fine distinct dark yellowish brown (10YR 4/4) mottles; massive; very friable, nonsticky and nonplastic; few very fine and fine roots; moderately acid (pH 5.8); gradual wavy boundary (0 to 10 inches thick)
Cg1—8 to 21 inches (20 to 53 cm); very dark grayish brown (2.5Y 4/2) fine sand, stratified with lenses of silt and with few fine distinct strong brown (7.5YR 4/6) mottles; massive; very friable, nonsticky and nonplastic; moderately acid (pH 5.8); gradual smooth boundary (12 to 35 inches thick)
Cg2—21 to 37 inches (53 to 94 cm); dark olive gray (5Y 3/2) and dark yellowish brown fine sand, stratified with lenses of silt with common medium distinct dark greenish gray (5GY 4/1) mottles; massive; very friable, nonsticky and nonplastic; moderately acid (pH 5.8); gradual wavy boundary (0 to 18 inches thick)
2Cg3—37 to 52 inches (94 to 132 cm); dark bluish gray (5B 4/1) silt loam stratified with lenses of fine sand; massive; friable, nonsticky and nonplastic; moderately acid (pH 6.0); clear smooth boundary (0 to 15 inches thick)

2Cg4—52 to 60 inches (132 to 152 cm); dark greenish gray (5GY 4/1) fine sand stratified with lenses of silt; massive; very friable, nonsticky and nonplastic; moderately acid (pH 6.0)

Typical Pedon Location

Map unit in which located: 186—Susivar-Moose River complex, 0 to 2 percent slopes
Location in survey area: approximately 15 miles NW of Willow; in the NE 1/4 of the SE 1/4 of Section 19, T.22N, R.4W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 0 to 6 inches (0 to 15 cm)
Depth to sand and gravel: 40 to over 60 inches (102 to over 152 cm)
Depth to seasonally high water table: 0 to 20 inches (0 to 51 cm)
Thickness of solum: 4 to 8 inches (10 to 20 cm)
Reaction: strongly acid to slightly acid

A horizon:
Color—hue of 10YR or 2.5Y; value moist of 2 to 4; chroma moist of 0 to 2

C horizon (when present):
Color—hue of 10YR to 5Y; value moist of 4 or 5; chroma moist of 0 to 2
Texture—stratified sand, fine sand, very fine sand, and silt

Cg horizon:
Color—hue of 10YR to 5B; value moist of 4 or 5; chroma moist of 0 to 2
Texture—stratified sand, fine sand, very fine sand, and silt
Rock fragments—0 to 10 percent gravel

Nancy Series

Taxonomic class: medial over sandy or sandy-skeletal, mixed Andic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the sand and gravel—rapid
Position on landscape: glacial outwash plains and hills
Parent material: silty mantle of loess and volcanic ash underlain by very gravelly and cobbly glacial outwash material
Slope range: 0 to 60 percent
Elevation: 100 to 1000 feet (30 to 305 m)
Climatic data (average annual):
precipitation—20 to 30 inches (51 to 76 cm)
air temperature—33 to 35 °F (1 to 2 °C)

Typical Pedon

Nancy silt loam (Plate 15)—on a level slope under mixed paper birch, aspen, and black spruce forest vegetation at 400 feet (122 m) elevation (All colors are for moist soil.)

Oi—1 inch to 0 (3 cm to 0); dark brown (7.5YR 3/2) mat of slightly decomposed forest litter; many roots of all sizes; abrupt smooth boundary (1 to 6 inches thick)
E—0 to 1 inch (0 to 3 cm); grayish brown (10YR 5/2) silt loam; weak medium granular structure; friable, nonsticky and nonplastic; common roots of all sizes; very strongly

acid (pH 4.6); abrupt smooth wavy boundary (1 to 3 inches thick)

Bhs—1 to 3 inches (3 to 8 cm); dark reddish brown (5YR 3/2 and 5YR 3/4) fine sandy loam; weak fine granular structure; friable, nonsticky and nonplastic; common roots of all sizes; very strongly acid (pH 4.6); abrupt smooth boundary (0 to 3 inches thick)

Bs—3 to 8 inches (8 to 20 cm); yellowish red (5YR 5/8) very fine sandy loam; moderate fine subangular blocky structure; friable, nonsticky and nonplastic; common roots of all sizes; very strongly acid (pH 4.8); abrupt smooth boundary (3 to 8 inches thick)

Eb—8 to 9 inches (20 to 23 cm); light yellowish brown (10YR 6/4) silt loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; few fine and very fine roots; very strongly acid (pH 5.0); abrupt smooth boundary (0 to 3 inches thick)

Bsb—9 to 12 inches (23 to 30 cm); strong brown (7.5YR 4/6) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few fine and very fine roots; strongly acid (pH 5.2); clear wavy boundary (0 to 6 inches thick)

BC1—12 to 15 inches (30 to 38 cm); dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; 2 percent rounded gravel; strongly acid (pH 5.4); gradual smooth boundary (0 to 6 inches thick)

2BC2—15 to 22 inches (38 to 56 cm); dark yellowish brown (10YR 4/4) very gravelly coarse sand; single grain; very friable, nonsticky and nonplastic; 30 percent rounded gravel and 10 percent rounded cobbles; moderately acid (pH 5.6); gradual smooth boundary (0 to 10 inches thick)

2C—22 to 60 inches (56 to 152 cm); variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 45 percent rounded gravel and 15 percent rounded cobbles; moderately acid (pH 5.8)

Typical Pedon Location

Map unit in which located: 174—Nancy silt loam, undulating

Location in survey area: 8 miles SE of Talkeetna; in the SE 1/4 of the NE 1/4 of Section 28, T.25N, R.4W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 34 to 36 °F (1 to 2 °C)

Thickness of the organic mat: 1 to 6 inches (3 to 15 cm)

Depth to sand and gravel: 14 to 30 inches (36 to 76 cm)

Thickness of solum: 12 to 23 inches (30 to 58 cm)

Reaction: extremely acid to strongly acid in the solum; strongly acid to moderately acid in the substratum

A horizon (when present):

Color—hue of 5YR to 10YR; value moist of 2 or 3; chroma moist of 2 or 3

Texture—silt loam, very fine sandy loam, or fine sandy loam

E and Eb horizons:

Color—hue of 5YR to 10YR; value moist of 4 to 6; chroma moist of 1 or 2

Bhs horizon (when present):

Color—hue of 2.5YR to 7.5YR; value moist of 2.5 or 3; chroma moist of 2 or 3

Texture—silt loam, very fine sandy loam, and fine sandy loam

Bs and Bsb horizons:

Color—hue of 5YR to 10YR; value moist of 3 to 5; chroma moist of 3 to 8

Texture—silt loam, very fine sandy loam, and fine sandy loam

BC and 2BC horizons (when present):

Color—value moist of 3 or 4; chroma moist of 3 to 6

Texture—silt loam, very fine sandy loam, sand, or coarse sand
Rock fragments—0 to 50 percent gravel; 0 to 15 percent cobbles

2C horizon:
Color—variegated
Texture—sand or coarse sand
Rock fragments—35 to 65 percent gravel; 0 to 20 percent cobbles

Niklason Series

Taxonomic class: coarse-loamy over sandy or sandy-skeletal, mixed, nonacid Typic Cryofluvents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well or moderately well drained
Permeability: in the surface horizon—moderate; in the stratified sandy through silty material—moderately rapid; in the gravelly substrata—rapid
Position on landscape: stream terraces, floodplains, and alluvial fans
Parent material: stratified loamy alluvium overlying very gravelly sand
Slope range: 0 to 15 percent
Elevation: 0 to 2300 feet (0 to 701 m)
Climatic data (average annual):
precipitation—15 to 30 inches (38 to 76 cm)
air temperature—33 to 36 °F (1 to 2 °C)

Typical Pedon

Niklason silt loam—on a level slope under balsam poplar forest at 350 feet (107 m) elevation (All colors are for moist soil.)

Oe—2 inches to 0 (5 cm to 0); very dark brown (10YR 2/2) mat of moderately decomposed organic matter; many fine roots; abrupt smooth boundary (0 to 3 inches thick)
A—0 to 4 inches (0 to 10 cm); very dark grayish brown (10YR 3/2) silt loam; weak coarse granular structure; very friable; many roots of all sizes; strongly acid (pH 5.4); clear smooth boundary (1 to 4 inches thick)
C1—4 to 13 inches (10 to 33 cm); very dark grayish brown (2.5Y 3/2) and dark grayish brown (2.5Y 4/2) stratified fine sand and sand; single grain; loose; few very fine, fine, and medium roots; strongly acid (pH 5.4); clear smooth boundary (3 to 15 inches thick)
C2—13 to 21 inches (33 to 53 cm); very dark grayish brown (2.5Y 3/2) and dark grayish brown (2.5Y 4/2) stratified sand to silt; massive; very friable; few very fine roots; medium acid (pH 5.6); clear smooth boundary (4 to 20 inches thick)
2C3—21 to 60 inches (53 to 152 cm); variegated extremely gravelly coarse sand; single grain; loose; 50 percent rounded gravel and 10 percent rounded cobbles; moderately acid (pH 5.8)

Typical Pedon Location

Map unit in which located: 162—Kidazqeni-Niklason complex, 0 to 2 percent slopes
Location in survey area: in the NW 1/4 of the SW 1/4 of Section 35, T.18N, R.2W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 34 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 0 to 3 inches (0 to 8 cm)

Depth to sand and gravel: 14 to 40 inches (36 to 102 cm)
Depth to seasonally high water table: 40 to over 60 inches (102 to over 152 cm)
Thickness of solum: 2 to 8 inches (5 to 20 cm)
Reaction: very strongly acid to moderately acid in the stratified surface layers; strongly acid to moderately acid in the gravelly substratum

A horizon:
Color—hue of 7.5YR to 2.5Y; value moist of 3 or 4; chroma moist of 1 to 4
Texture—silt loam, but ranges to include very fine sandy loam or fine sandy loam

C horizon:
Color—hue of 10YR; value moist of 3 to 6; chroma moist of 1 to 3
Texture—stratified silt loam, very fine sandy loam, sandy loam, and very fine sand

2C horizon:
Color—variegated
Rock fragments—30 to 50 percent gravel; 10 to 20 percent cobbles

Niklavar Series

Taxonomic class: coarse-loamy over sandy or sandy skeletal, mixed, nonacid Typic Cryaquents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: poorly drained
Permeability: in the surface horizons—moderate; in the gravelly substrata—rapid
Position on landscape: floodplains and low stream terraces
Parent material: stratified loamy alluvium overlying very gravelly sand
Slope range: 0 to 3 percent
Elevation: 20 to 650 feet (6 to 198 m)
Climatic data (average annual):
precipitation—15 to 30 inches (38 to 76 cm)
air temperature—33 to 36 °F (1 to 2 °C)

Typical Pedon

Niklavar silt loam—on a level slope under alder and bluejoint reedgrass vegetation at 200 feet (61 m) elevation (All colors are for moist soil.)

Oi—1 inch to 0 (3 cm to 0); black (10YR 2/1) mat of fibrous roots, twigs, and leaves; clear smooth boundary (0 to 3 inches thick)
A1—0 to 1 inch (0 to 3 cm); black (10YR 2/1) silt loam; weak fine granular structure; very friable; many very fine, fine, and medium roots; moderately acid (pH 5.8); abrupt smooth boundary (1 to 4 inches thick)
A2—1 to 4 inches (3 to 10 cm); dark brown (10YR 3/3) stratified fine sand, very fine sand, and silt; moderate medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and fine roots; moderately acid (pH 6.0); clear smooth boundary (0 to 8 inches thick)
C—4 to 9 inches (10 to 23 cm); very dark grayish brown (2.5Y 3/2) and dark grayish brown (2.5Y 4/2) stratified fine sand, very fine sand, and silt; massive; very friable, nonsticky and nonplastic; few very fine roots; slightly acid (pH 6.2); gradual wavy boundary (0 to 14 inches thick)
Cg1—9 to 23 inches (23 to 58 cm); dark greenish gray (5GY 4/1) stratified fine sand, very fine sand, and silt with few fine distinct dark brown (10YR 3/3) mottles; massive; very friable, nonsticky and nonplastic; slightly acid (pH 6.2); gradual smooth boundary (8 to 15 inches thick)

Cg2—23 to 30 inches (58 to 76 cm); very dark grayish brown (2.5Y 3/2) stratified sand, fine sand, very fine sand, and silt with few fine distinct dark greenish gray (5GY 4/1) mottles; massive; very friable, nonsticky and nonplastic; slightly acid (pH 6.2) (5 to 15 inches thick)

2C—30 to 60 inches (76 to 152 cm); variegated very gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 45 percent rounded gravel; slightly acid (pH 6.2)

Typical Pedon Location

Map unit in which located: 187—Susivar and Niklavar fine sandy loams

Location in survey area: in the NW 1/4 of the NW 1/4 of Section 24, T.22N, R.5W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)

Thickness of the organic mat: 0 to 3 inches (0 to 8 cm)

Depth to sand and gravel: 14 to 40 inches (36 to 102 cm)

Depth to seasonally high water table: 1 to 2 feet (0.3 to 0.6 m)

Thickness of solum: 2 to 8 inches (5 to 20 cm)

Reaction: strongly acid to slightly acid in the stratified surface layers; moderately acid to slightly acid in the gravelly substratum

A horizon:

Color—hue of 10YR to 5Y; value moist of 2 to 4; chroma moist of 1 to 3

Texture—silt loam, but ranges to include fine sandy loam or loamy fine sandy

ACg and Cg horizons:

Color—hue of 10YR to 5GY; value moist of 3 to 6; chroma moist of 1 to 4; greenish gray through red mottles are common

Texture—stratified silt loam, very fine sandy loam, sandy loam, and very fine sand

C horizon:

Color—hue of 10YR to 5Y; value moist of 3 or 4; chroma moist of 1 to 4

2C horizon:

Color—variegated

Rock fragments—30 to 50 percent gravel; 0 to 20 percent cobbles

Psuyaah Series

Taxonomic class: medial over loamy-skeletal, mixed Typic Vitricryands

Depth class: very deep—more than 60 inches (more than 152 cm)

Drainage class: poorly drained

Permeability: in the silty loess mantle—moderate; in the till material—moderately slow

Position on landscape: mountains

Parent material: loess mixed with volcanic ash over firm, very gravelly or cobbly glacial till

Slope range: 5 to 20 percent

Elevation: 1700 to 3000 feet (518 to 914 m)

Climatic data (average annual):

precipitation—30 to 45 inches (76 to 114 cm)

air temperature—32 to 34 °F (0 to 1 °C)

Typical Pedon

Psuyaah silt loam—on a 12 percent slope under bluejoint reedgrass and forbs at 2700 feet (823 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); black (7.5YR 2/0) mat of roots and decomposing organic matter; clear smooth boundary (1 to 4 inches thick)

A—0 to 6 inches (0 to 15 cm); dark brown (7.5YR 3/2) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine and fine roots; strongly acid (pH 5.2); clear smooth boundary (4 to 9 inches thick)

Bw—6 to 8 inches (15 to 20 cm); dark brown (7.5YR 3/4) silt loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many very fine and fine roots; strongly acid (pH 5.2); clear smooth boundary (2 to 5 inches thick)

Ab—8 to 10 inches (20 to 25 cm); dark brown (7.5YR 3/2) silt loam; weak fine granular structure; very friable, slightly sticky and nonplastic; common very fine and fine roots; strongly acid (pH 5.2); clear smooth boundary (1 to 3 inches thick)

Bwb1—10 to 15 inches (25 to 38 cm); dark yellowish brown (10YR 3/4) silt loam; weak medium subangular blocky structure; very friable, slightly sticky and nonplastic; few very fine and fine roots; strongly acid (pH 5.4); gradual wavy boundary (2 to 6 inches thick)

2Bwb2—15 to 21 inches (38 to 53 cm); dark yellowish brown (10YR 3/4) loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few very fine and fine roots; 10 percent subangular gravel and 2 percent subangular cobbles; strongly acid (pH 5.4); gradual smooth boundary (0 to 8 inches thick)

2C1—21 to 28 inches (53 to 71 cm); dark yellowish brown (10YR 3/4) very cobbly loam; massive; firm, slightly sticky and slightly plastic; 15 percent subangular gravel and 30 percent subangular cobbles; moderately acid (pH 5.6); gradual smooth boundary (6 to 18 inches thick)

2C2—28 to 60 inches (71 to 152 cm); dark yellowish brown (10YR 3/4) very cobbly sandy loam; massive; firm, slightly sticky and slightly plastic; 15 percent subangular gravel and 30 percent subangular cobbles; moderately acid (pH 5.6)

Typical Pedon Location

Map unit in which located: 180—Psuyaah-Snowdance complex, 5 to 20 percent slopes
Location in survey area: approximately 38 miles E of Willow; in the NE 1/4 of the NW 1/4 of Section 30, T.21N, R.2W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 33 to 35 °F (1 to 2 °C)
Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)
Depth to glacial till: 16 to 27 inches (41 to 69 cm)
Depth to seasonally high perched water table: 5 to 25 inches (13 to 64 cm)
Thickness of solum: 14 to 26 inches (36 to 66 cm)
Reaction: strongly acid to moderately acid in the solum; moderately acid to slightly acid in the substratum

A and Ab horizons:
Color—hue of 7.5YR or 10YR; value moist of 2 or 3; chroma moist of 1 to 3

Bw and Bwb horizons:
Color—hue of 7.5YR or 10YR; value moist of 3 or 4; chroma moist of 3 or 4
Rock fragments—0 to 5 percent gravel; 0 to 5 percent cobbles

2Bw and 2BC horizons:
Color—hue of 7.5YR or 10YR; value moist of 3 or 4; chroma moist of 3 or 4
Texture—sandy loam or loam
Rock fragments—5 to 15 percent gravel; 0 to 10 percent cobbles

2C horizon:
Color—hue of 7.5YR or 10YR; value moist of 3 or 4; chroma moist of 3 or 4
Texture—sandy loam or loam
Rock fragments—15 to 40 percent gravel; 10 to 30 percent cobbles

Qeni Series

Taxonomic class: sandy-skeletal, mixed Oxyaquic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: somewhat poorly drained
Permeability: in the silty surface and stratified subsurface layers—moderate; in the sand and gravel—rapid
Position on landscape: low stream terraces
Parent material: thin mantle of silty loess overlying stratified sandy and silty alluvium underlain by sandy and gravelly alluvium
Slope range: 0 to 5 percent
Elevation: 1000 to 2800 feet (305 to 853 m)
Climatic data (average annual):
precipitation—25 to 45 inches (64 to 114 cm)
air temperature—32 to 34 °F (0 to 1 °C)

Typical Pedon

Qeni very fine sandy loam—on a nearly level slope under willow shrub at 2400 feet (732 m) elevation (All colors are for moist soil.)

Oi—6 inches to 0 (15 cm to 0); very dark brown (10YR 2/2) fibrous litter (1 to 6 inches thick)
A—0 to 3 inches (0 to 8 cm); dark brown (10YR 3/3) very fine sandy loam; moderate medium granular structure; very friable, nonsticky and nonplastic; many very fine and fine roots; moderately acid (pH 5.6); abrupt smooth boundary (1 to 4 inches thick)
Bw—3 to 6 inches (8 to 15 cm); dark brown (7.5YR 3/4) fine sandy loam; weak coarse subangular blocky structure parting to moderate medium granular; very friable, nonsticky and nonplastic; common very fine and fine roots; moderately acid (pH 5.6); abrupt smooth boundary (2 to 6 inches thick)
Ab—6 to 7 inches (15 to 18 cm); black (10YR 2/1) silt loam; weak medium granular structure; very friable, slightly sticky and nonplastic; moderately acid (pH 5.8); abrupt smooth boundary (0 to 3 inches thick)
2C1—7 to 17 inches (18 to 43 cm); variegated gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 10 percent rounded gravel and 5 percent rounded cobbles; neutral (pH 6.6); gradual irregular boundary (10 to 45 inches thick)
2C2—17 to 60 inches (43 to 152 cm); variegated extremely cobbly sand; single grain; loose, nonsticky and nonplastic; 20 percent rounded gravel and 40 percent rounded cobbles; neutral (pH 6.6)

Typical Pedon Location

Map unit in which located: 181—Qeni, cool-Niklavar, cool-Cryods, cold complex, 0 to 25 percent slopes
Location in survey area: approximately 16 miles NE of Willow; in the SE 1/4 of the NW 1/4

of Section 17, T.21N, R.1W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 33 to 35 °F (1 to 2 °C)
Thickness of the organic mat: 1 to 6 inches (3 to 15 cm)
Depth to sand and gravel: 2 to 10 inches (5 to 25 cm)
Depth to seasonally high water table: 14 to 36 inches (36 to 91 cm)
Thickness of solum: 4 to 9 inches (10 to 23 cm)
Reaction: strongly acid to moderately acid in the solum; slightly acid to mildly alkaline in the substratum

A horizon:
Color—hue of 10YR or 2.5Y; value moist of 2 or 3; chroma moist of 1 to 3
Texture—fine sandy loam and very fine sandy loam

Bw horizon:
Color—hue of 7.5YR to 10YR; value moist of 3 or 4; chroma moist of 4 to 6
Texture—fine sandy loam or very fine sandy loam

2C horizon:
Color—variegated
Texture—coarse sand or sand
Rock fragments—10 to 70 percent gravel; 0 to 50 percent cobbles

Siwash Series

Taxonomic class: medial over loamy-skeletal, mixed Lithic Humicryods
Depth class: shallow—9 to 20 inches (23 to 51 cm)
Drainage class: well drained
Permeability: in the silty surface layers—moderate; in the gravelly till material—moderate or moderately slow
Position on landscape: hummocks on mountains
Parent material: silty mantle of loess and volcanic ash overlying friable to firm glacial till underlain by bedrock
Slope range: 0 to 30 percent
Elevation: 1700 to 2500 feet (518 to 762 m)
Climatic data (average annual):
precipitation—30 to 45 inches (76 to 114 cm)
air temperature—32 to 34 °F (0 to 1 °C)

Typical Pedon

Siwash silt loam—on a hummocky north facing slope of 4 percent at 2220 feet (677 m) elevation under bog blueberry and crowberry shrub vegetation (All colors are for moist soil.)

Oi—4 inches to 0 (10 cm to 0); very dusky red (2.5YR 2.5/3) peat, consisting of undecomposed organic matter (3 to 8 inches thick)
E—0 to 1 inch (0 to 3 cm); light grayish brown (10YR 5/2) silt loam, with occasional patches of very dusky red (2.5YR 2.5/2) Bhs material; weak fine subangular blocky and weak fine platy structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium, and few coarse roots; extremely acid (pH 4.0); abrupt broken boundary (1 to 3 inches thick)
Bhs—1 to 5 inches (3 to 13 cm); very dusky red (2.5YR 2.5/2) very fine sandy loam, with

occasional patches of reddish brown (5YR 4/4); moderate medium subangular blocky structure parting to strong very fine granular; common very fine and fine roots; friable with firm lenses and pockets, nonsticky and nonplastic; extremely acid (pH 4.0); abrupt irregular boundary (3 to 6 inches thick)

Bs/Eb—5 to 9 inches (13 to 23 cm); 75 percent yellowish red (5YR 4/6) and 25 percent brown (7.5YR 5/4) silt loam; moderate medium subangular blocky structure parting to strong very fine granular; few very fine and fine roots; friable with firm lenses and pockets, nonsticky and nonplastic; extremely acid (pH 4.2); abrupt wavy boundary (4 to 8 inches thick).

Bhsb—9 to 11 inches (23 to 28 cm); very dusky red (2.5YR 2.5/2) sandy loam; weak medium subangular blocky structure; friable with very firm pockets and lenses, nonsticky and nonplastic; very strongly acid (pH 4.8); clear wavy boundary (0 to 5 inches thick)

2BC—11 to 19 inches (28 to 48 cm); dark yellowish brown (10YR 3/4) very gravelly sandy loam; weak coarse subangular blocky structure; friable, nonsticky and nonplastic; 35 percent subrounded and angular gravel and 15 percent angular cobbles; moderately acid (pH 5.8); abrupt wavy boundary (0 to 6 inches thick).

3R—19 inches (48 cm); consolidated diorite bedrock

Typical Pedon Location

Map unit in which located: 184—Siwash-Talkeetna, cool-Snowdance association, 0 to 30 percent slopes

Location in survey area: approximately 10 miles N of Talkeetna; in the SE 1/4 of the SW 1/4 of Section 5, T.28N, R.3W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 33 to 35 °F (1 to 2 °C)
Thickness of the organic mat: 3 to 8 inches (8 to 20 cm)
Depth to bedrock: 9 to 20 inches (23 to 51 cm)
Depth to glacial till: 8 to 14 inches (20 to 36 cm)
Thickness of solum: 8 to 14 inches (20 to 36 cm)
Reaction: extremely acid to strongly acid throughout

A horizon (when present):
Color—hue of 5YR to 10YR; value moist of 2 or 3; chroma moist of 1 to 3

E and Eb horizons:
Color—hue of 5YR to 10YR; value moist of 4 to 6; chroma moist of 2 or 3
Texture—silt loam, fine sandy loam, sandy loam, and loam

Bhs horizon:
Color—hue of 10YR to 2.5YR; value moist of 2 or 3; chroma moist of 1 or 2
Texture—silt loam or very fine sandy loam

Bs portion of the Bs/Eb horizon:
Color—hue of 2.5YR to 7.5YR; value moist of 3 to 5; chroma moist of 4 to 8
Texture—silt loam, fine sandy loam, sandy loam, and loam

Eb portion of the Bs/Eb horizon:
Color—hue of 5YR to 10YR; value moist of 4 or 5; chroma moist of 2 to 4
Texture—silt loam, fine sandy loam, sandy loam, and loam

2BC horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 4 to 6

Texture—loam or sandy loam
Rock fragments—5 to 25 percent cobbles; 30 to 45 percent gravel

Snowdance Series

Taxonomic class: medial over loamy-skeletal, mixed Typic Cryaquands
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly or poorly drained
Permeability: in the surface layers—moderate; in the underlying material—moderately slow
Position on landscape: mountains
Parent material: silty mantle of loess and volcanic ash underlain by friable or firm glacial till material
Slope range: 0 to 15 percent
Elevation: 1700 to 3000 feet (518 to 914 m)
Climatic data (average annual):
precipitation—30 to 45 inches (76 to 114 cm)
air temperature—32 to 34 °F (0 to 1 °C)

Typical Pedon

Snowdance silt loam—on a 12 percent slope under willow shrub vegetation at 2450 feet (747 m) elevation (All colors are for moist soil; all textures are apparent field textures.)

Oi—3 inches to 0 (8 cm to 0); black (5YR 2.5/1) peat; fibrous undecomposed litter (1 to 6 inches thick)
A1—0 to 5 inches (0 to 13 cm); black (5YR 2.5/1) mucky silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; strongly acid (pH 5.2); clear smooth boundary (3 to 8 inches thick)
A2—5 to 8 inches (13 to 20 cm); dark brown (7.5YR 3/3) silt loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; 5 percent subangular cobbles; strongly acid (pH 5.4); clear wavy boundary (0 to 5 inches thick)
Bg1—8 to 16 inches (20 to 41 cm); dark brown (7.5YR 3/2) silt loam with common medium distinct reddish brown (5YR 4/4) mottles; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; 5 percent subangular cobbles; moderately acid (pH 5.6); clear wavy boundary (4 to 16 inches thick)
2Bg—16 to 31 inches (41 to 79 cm); dark brown (7.5YR 3/2) very gravelly sandy loam; massive; firm, slightly sticky and slightly plastic; 30 percent subangular gravel and 5 percent subangular cobbles; moderately acid (pH 5.6); gradual wavy boundary (6 to 22 inches thick)
2C—31 to 60 inches (79 to 152 cm); very dark grayish brown (10YR 3/2) very cobbly sandy loam; massive; firm, slightly sticky and slightly plastic; 15 percent subangular gravel and 35 percent subangular cobbles; moderately acid (pH 5.8)

Typical Pedon Location

Map unit in which located: 180—Psuyaah-Snowdance complex, 5 to 20 percent slopes
Location in survey area: approximately 18 miles NE of Willow; in the NE 1/4 of the SE 1/4 of Section 24, T.21N, R.3W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 33 to 35 °F (1 to 2 °C)

Thickness of the organic mat: 1 to 6 inches (3 to 15 cm)
Depth to glacial till: 14 to 32 inches (36 to 81 cm)
Depth to seasonally high perched water table: 5 to 20 inches (13 to 51 cm)
Thickness of solum: 18 to 38 inches (46 to 97 cm)
Reaction: very strongly acid to strongly acid in the solum; strongly acid to moderately acid in the substratum

A and ABw horizons:
Color—hue of 5YR to 10YR; value moist of 2 or 3; chroma moist of 1 to 3
Texture—mucky silt loam or silt loam

Bg horizon:
Color—hue of 7.5YR to 2.5Y; value moist of 3 or 4; chroma moist of 1 to 3
Rock fragments—0 to 10 percent gravel; 0 to 10 percent cobbles

2Bg horizon:
Color—hue of 7.5YR to 2.5Y; value moist of 3 or 4; chroma moist of 1 to 3
Texture—sandy loam or loam
Rock fragments—20 to 45 percent gravel; 0 to 10 percent cobbles

2C horizon:
Color—hue of 10YR to 5Y; value moist of 3 or 4; chroma moist of 1 or 2
Texture—sandy loam or loam
Rock fragments—35 to 50 percent gravel; 0 to 25 percent cobbles

Susitna Series

Taxonomic class: coarse-loamy, mixed, nonacid Typic Cryofluvents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the stratified sandy and silty material—moderate; in the sand and gravel—rapid
Position on landscape: floodplains and stream terraces
Parent material: stratified sandy and silty alluvium over gravelly and cobbly alluvium
Slope range: 0 to 7 percent
Elevation: 20 to 800 feet (6 to 244 m)
Climatic data (average annual):
precipitation—15 to 30 inches (38 to 76 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Susitna silt loam—on a level slope under native vegetation of mixed paper birch and white spruce forest at 300 feet (91 m) elevation (All colors are for moist soil.)

Oe—1 inch to 0 (3 cm to 0); very dark brown (10YR 2/2) mat of moderately decomposed organic material; many roots; strongly acid (pH 5.2); clear smooth boundary (1 to 4 inches thick)
A—0 to 3 inches (0 to 8 cm); dark brown (10YR 3/3) silt loam with common medium prominent reddish brown (5YR 4/4) mottles; weak medium granular structure; very friable, nonsticky and nonplastic; many roots; strongly acid (pH 5.4); clear smooth boundary (1 to 4 inches thick)
C1—3 to 11 inches (8 to 28 cm); dark grayish brown (10YR 4/2) fine sand, stratified with silt and very fine sand with common large reddish brown (5YR 4/4) mottles; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; strongly

acid (pH 5.4); clear smooth boundary (6 to 20 inches thick)

C2—11 to 33 inches (28 to 84 cm); very dark grayish brown (10YR 3/2) fine sand, stratified with silt and very fine sand with few fine prominent reddish brown (7.5YR 4/4) mottles; massive; very friable, nonsticky and nonplastic; moderately acid (pH 5.6); gradual smooth boundary (15 to 35 inches thick)

C3—33 to 51 inches (84 to 130 cm); very dark grayish brown (2.5Y 3/2) and dark grayish brown (2.5Y 4/2) fine sand, stratified with silt and very fine sand, few fine prominent yellowish red (5YR 4/6) mottles; massive; very friable, nonsticky and nonplastic; moderately acid (pH 5.6); gradual smooth boundary (0 to 20 inches thick)

2C4—51 to 60 inches (130 to 152 cm); variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; 60 percent rounded gravel; moderately acid (pH 5.8)

Typical Pedon Location

Map unit in which located: 185—Susitna silt loam, 0 to 2 percent slopes

Location in survey area: approximately 3 miles SW of Talkeetna; in the SE 1/4 of the NW 1/4 of Section 34, T.26N, R.5W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 34 to 37 °F (1 to 3 °C)

Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)

Depth to sand and gravel: 40 to over 60 inches (102 to over 152 cm)

Thickness of solum: 1 to 4 inches (3 to 10 cm)

Reaction: very strongly acid to moderately acid

A horizon:

Color—hue of 10YR to 5Y; value moist of 3 or 4; chroma moist of 1 to 3

Texture—silt loam, fine sandy loam, or loamy fine sand

C horizon:

Color—hue of 10YR to 5Y; value moist of 3 to 6; chroma moist of 1 to 4; mottles of reddish, brownish, or olive colors are common

Texture—stratified silt, very fine sand, fine sand, and sand

2C horizon:

Color—variegated

Rock fragments—35 to 60 percent gravel; 0 to 20 percent cobbles

Susivar Series

Taxonomic class: coarse-loamy, mixed, nonacid Typic Cryaquents

Depth class: very deep—more than 60 inches (more than 152 cm)

Drainage class: somewhat poorly drained

Permeability: in the stratified sandy and silty material—moderate; in the sand and gravel—rapid

Position on landscape: floodplains and stream terraces

Parent material: stratified sandy and silty alluvium over gravelly and cobbly alluvium

Slope range: 0 to 3 percent

Elevation: 10 to 700 feet (3 to 213 m)

Climatic data (average annual):

precipitation—15 to 30 inches (38 to 76 cm)

air temperature—33 to 36 °F (1 to 2 °C)

Typical Pedon

Susivar silt loam—on a 1 percent slope under mixed paper birch and white spruce forest at 100 feet (30 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); very dark brown (10YR 2/2) mat of fibrous roots, twigs, and leaves; clear smooth boundary (0 to 3 inches thick)

A—0 to 3 inches (0 to 8 cm); very dark brown (10YR 2/2) silt loam; moderate fine granular structure; very friable; many very fine and fine and few medium roots; moderately acid (pH 5.6); clear smooth boundary (1 to 4 inches thick)

AC—3 to 9 inches (8 to 23 cm); very dark brown (10YR 2/2) silt loam, stratified with few lenses of very fine and fine sand, with common medium distinct dark greenish gray (5GY 4/1) mottles confined to silty strata, and strong brown (7.5YR 4/6) mottles primarily confined to sandy strata; moderate medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and fine roots; moderately acid (pH 5.6); clear smooth boundary (0 to 11 inches thick)

C1—9 to 25 inches (23 to 64 cm); olive gray (5Y 4/2) and dark brown (10YR 3/3) stratified fine sand, very fine sand, and silt with common medium prominent reddish brown (5YR 4/4) mottles; massive; very friable, nonsticky and nonplastic; few very fine roots; moderately acid (pH 5.6); clear smooth boundary (8 to 27 inches thick)

Cg—25 to 37 inches (64 to 94 cm); reddish brown (5YR 4/4) stratified very fine sand and silt, with many large prominent dark greenish gray (5GY 4/1) mottles; massive; very friable, nonsticky and nonplastic; moderately acid (pH 5.8); gradual smooth boundary (0 to 15 inches thick)

C2—37 to 60 inches (94 to 152 cm); dark brown (10YR 3/3) stratified fine sand, very fine sand, and silt with few medium distinct strong brown (7.5YR 4/6) mottles; massive; very friable, nonsticky and nonplastic; moderately acid (pH 5.8)

Typical Pedon Location

Map unit in which located: 186—Susivar-Moose River complex, 0 to 2 percent slopes
Location in survey area: approximately 10 miles SW of Willow; in the NW 1/4 of the SW 1/4 of Section 1, T.18N, R.6W, Seward Meridian

Range in Characteristics

Thickness of the organic mat: 0 to 3 inches (0 to 8 cm)
Depth to seasonally high water table: 20 to 40 inches (51 to 102 cm)
Reaction: strongly acid to moderately acid

A horizon:
Color—hue of 10YR to 5Y; value moist of 3 or 4; chroma moist of 1 to 3
Texture—silt loam, fine sandy loam, or loamy fine sand

C horizon:
Color—hue of 10YR to 5Y; value moist of 3 or 4; chroma moist of 1 to 4

Cg horizon:
Color—hue of 10YR to 5GY; value moist of 3 to 6; chroma moist of 1 to 4

2C horizon (when present):
Color—variegated
Rock fragments—30 to 50 percent gravel; 10 to 20 percent cobbles

Talkeetna Series

Taxonomic class: medial over loamy-skeletal, mixed Andic Humicryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty material—moderate; in the underlying material—moderate or moderately slow
Position on landscape: mountains and hills
Parent material: loess mixed with volcanic ash over friable to firm very gravelly glacial till
Slope range: 0 to 70 percent
Elevation: 600 to 3000 feet (183 to 914 m)
Climatic data (average annual):
precipitation—25 to 45 inches (64 to 114 cm)
air temperature—32 to 35 °F (0 to 1 °C)

Typical Pedon

Talkeetna silt loam (Plate 16)—on a 25 percent slope under tall grass and shrubs at 2000 feet (610 m) elevation (All colors are for moist soil.)

Oi—3 inches to 0 (8 cm to 0); mat of roots and decomposing organic matter; clear smooth boundary (1 to 6 inches thick)
A—0 to 3 inches (0 to 8 cm); dark reddish brown (5YR 2/2) silt loam; strong fine granular structure; very friable, sticky and slightly plastic; many roots; mineral grains are coated and have a waxy appearance; extremely acid; clear wavy boundary (0 to 3 inches thick)
E—3 to 4 inches (8 to 10 cm); dark gray (10YR 4/1) silt loam; weak very thin platy structure; very friable, slightly sticky and slightly plastic; many roots; many uncoated mineral grains; extremely acid; clear wavy boundary (1 to 3 inches thick)
Bhs—4 to 7 inches (10 to 18 cm); very dusky red (2.5YR 2/2) silt loam; moderate thin platy structure parting to moderate fine granular; smeary; many roots; extremely acid; clear wavy boundary (2 to 4 inches thick)
Bs1—7 to 11 inches (18 to 28 cm); dark reddish brown (2.5YR 3/4) silt loam; weak thin platy structure parting to moderate fine granular; smeary; nonsticky and slightly plastic; many roots; many mica flakes; extremely acid; clear wavy boundary (3 to 8 inches thick)
Bs2—11 to 15 inches (28 to 38 cm); reddish brown (5YR 3/4) silt loam; moderate thin platy structure parting to moderate fine granular; smeary; nonsticky and slightly plastic; very strongly acid; clear wavy boundary (3 to 8 inches thick)
2C1—15 to 25 inches (38 to 64 cm); olive gray (5Y 5/2) very gravelly sandy loam; strong medium platy structure; very firm; patches and seams of red (2.5YR 4/6) along plates; strongly acid; gradual boundary (5 to 20 inches thick)
2C2—25 to 60 inches (64 to 152 cm); olive gray (5Y 4/2) very gravelly sandy loam; strong medium platy structure; firm, nonsticky and nonplastic; few red (2.5YR 4/6) mottles; strongly acid

Typical Pedon Location

Map unit in which located: 189—Talkeetna-Talkeetna, thick surface complex, 15 to 35 percent slopes
Location in survey area: approximately 12 miles N of Palmer; in the NW 1/4 of the SW 1/4 of Section 36, T.20N, R.1E, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 34 to 36 °F (1 to 2 °C)

Thickness of the organic mat: 1 to 6 inches (3 to 15 cm)
Depth to glacial till: 14 to 32 inches (36 to 81 cm)
Thickness of solum: 15 to 25 inches (38 to 64 cm)
Reaction: extremely acid to strongly acid

A horizon:
Color—hue of 5YR to 10YR; value moist of 2 to 4; chroma moist of 1 or 2
Texture—silt, silt loam, or very fine sandy loam

Bhs horizon:
Color—hue of 10YR to 2.5YR; value moist of 2 or 3; chroma moist of 1 or 2
Texture—silt loam or very fine sandy loam

Bs horizon:
Color—hue of 2.5YR to 7.5YR; value moist of 3 or 4; chroma moist of 3 or 4
Texture—silt loam or very fine sandy loam

2C horizon:
Color—hue of 2.5Y or 5Y; value moist of 4 or 5; chroma moist of 2 or 3
Texture—sandy loam or loam
Rock fragments—35 to 50 percent gravel; 10 to 20 percent cobbles

Tokositna Series

Taxonomic class: medial over loamy-skeletal, mixed Andic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty material—moderate; in the gravelly loam glacial till material—moderate or moderately slow
Position on landscape: glacial till plains and hills
Parent material: silty mantle of loess and volcanic ash underlain by friable or firm gravelly loam glacial till material
Slope range: 0 to 60 percent
Elevation: 300 to 1000 feet (91 to 305 m)
Climatic data (average annual):
precipitation—20 to 30 inches (51 to 76 cm)
air temperature—33 to 35 °F (1 to 2 °C)

Typical Pedon

Tokositna silt loam (Plate 17)—on a 15 percent slope under paper birch and white spruce forest at 800 feet (244 m) elevation (All colors are for moist soil.)

Oi—2 inches to 0 (5 cm to 0); very dusky red (2.5YR 2.5/2) fibrous forest litter (1 to 4 inches thick)
E—0 to 2 inches (0 to 5 cm); grayish brown (10YR 5/2) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; very strongly acid (pH 4.6); abrupt wavy boundary (1 to 3 inches thick)
Bhs—2 to 4 inches (5 to 10 cm); dark reddish brown (5YR 3/3) silt loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; very strongly acid (pH 4.6); clear wavy boundary (0 to 3 inches thick)
Bs—4 to 12 inches (10 to 30 cm); strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine

and fine roots; very strongly acid (pH 5.0); abrupt boundary (4 to 9 inches thick)

Eb—12 to 13 inches (30 to 33 cm); brown (7.5YR 5/4) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; few very fine and fine roots; very strongly acid (pH 5.0); abrupt wavy boundary (0 to 3 inches thick)

Bsb—13 to 21 inches (33 to 53 cm); strong brown (7.5YR 4/4) silt loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; few very fine roots; very strongly acid (pH 5.0); gradual wavy boundary (0 to 10 inches thick)

BC—21 to 28 inches (53 to 71 cm); brown (10YR 4/3) silt loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; few very fine roots; strongly acid (pH 5.2); clear smooth boundary (4 to 9 inches thick)

2C1—28 to 37 inches (71 to 94 cm); very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) very cobbly sandy loam; massive; friable, slightly sticky and slightly plastic; common medium distinct mottles of strong brown (7.5YR 4/6); 20 percent rounded and subangular gravel and 15 percent rounded and subangular cobbles; medium acid (pH 5.6); gradual smooth boundary (9 to 22 inches thick)

2C2—37 to 60 inches (94 to 152 cm); dark grayish brown (10YR 4/2) very cobbly loam; massive; firm, slightly sticky and slightly plastic; 20 percent rounded and subangular gravel and 15 percent rounded and subangular cobbles; medium acid (pH 6.0)

Typical Pedon Location

Map unit in which located: 197—Tokositna silt loam, sloping and moderately steep

Location in survey area: approximately 2 miles E of Talkeetna; in the SE 1/4 of the SW 1/4 of Section 21, T.26N, R.4W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 34 to 36 °F (1 to 2 °C)

Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)

Depth to glacial till: 14 to 35 inches (36 to 89 cm)

Thickness of solum: 18 to 29 inches (46 to 74 cm)

Reaction: extremely acid to strongly acid in the solum; medium acid or slightly acid in the substratum

E and Eb horizons:

Color—hue of 7.5YR to 2.5Y; value moist of 4 or 5; chroma moist of 2 to 4

Texture—silt loam or very fine sandy loam

Bhs horizon:

Color—hue of 2.5YR or 5YR; value moist of 2 or 3; chroma moist of 2 or 3

Texture—silt loam, very fine sandy loam, sandy loam, or loam

Bs and Bsb horizons:

Color—hue of 5YR or 7.5YR; value moist of 4 or 5; chroma moist of 4 to 8

Texture—silt loam or very fine sandy loam

BC horizon:

Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 2 to 4

Texture—silt loam or very fine sandy loam

2C horizon:

Color—hue of 10YR to 5Y; value moist of 3 or 4; chroma moist of 2 or 3

Texture—sandy loam and loam

Rock fragments—30 to 55 percent gravel; 0 to 20 percent cobbles; occasional stones

Tsadaka Series

Taxonomic class: medial over loamy-skeletal, mixed, ortstein Humic Duricryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the cemented horizon—slow; in the very gravelly underlying material—moderate or moderately slow
Position on landscape: hummocks on mountains
Parent material: silty mantle of loess and volcanic ash underlain by friable to firm very gravelly glacial till
Slope range: 0 to 35 percent
Elevation: 1500 to 3000 feet (457 to 914 m)
Climatic data (average annual):
precipitation—30 to 45 inches (76 to 114 cm)
air temperature—32 to 34 °F (0 to 1 °C)

Typical Pedon

Tsadaka silt loam—on a 20 percent slope under crowberry and blueberry shrub vegetation at 2300 feet (701 m) elevation (All textures are apparent field textures.)

Oi—8 to 3 inches (20 to 8 cm); dark reddish brown (5YR 3/4) peat; fibrous, undecomposed organic mat; clear wavy boundary (3 to 10 inches thick)
Oe—3 inches to 0 (8 cm to 0); dark reddish brown (2.5YR 3/4) mucky peat; partially decomposed organic mat; clear wavy boundary (0 to 4 inches thick)
A—0 to 2 inches (0 to 5 cm); very dark brown (10YR 2/2) silt loam; weak medium granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; extremely acid (pH 4.2); abrupt irregular boundary (0 to 3 inches thick)
E—2 to 5 inches (5 to 13 cm); grayish brown (10YR 5/2) silt loam; weak medium granular structure; very friable, nonsticky and nonplastic; common very fine and medium roots; extremely acid (pH 4.2); abrupt broken boundary (1 to 3 inches thick)
Bhs—5 to 9 inches (13 to 23 cm); very dusky red (2.5YR 2.5/2) loam; strong very fine granular structure; friable, nonsticky and nonplastic; few very fine and fine roots; very strongly acid (pH 4.6); abrupt broken boundary (3 to 5 inches thick)
Bs—9 to 15 inches (23 to 38 cm); yellowish red (5YR 4/6) and reddish brown (5YR 4/4) silt loam; weak medium subangular blocky structure; friable, nonsticky and nonplastic; few very fine roots; very strongly acid (pH 5.0); abrupt irregular boundary (3 to 10 inches thick)
2Bsm—15 to 26 inches (38 to 66 cm); dusky red (10R 3/4) and reddish brown (7.5YR 5/6) very cobbly sandy loam; massive; very firm, cemented, nonsticky and nonplastic; 20 percent angular and subrounded gravel and 20 percent subangular and angular cobbles; strongly acid (pH 5.2); clear irregular boundary (3 to 12 inches thick)
2C—26 to 60 inches (66 to 152 cm); brown (10YR 4/3) very cobbly sandy loam; massive; firm, nonsticky and nonplastic; 20 percent angular and subrounded gravel and 20 percent subangular and angular cobbles; moderately acid (pH 5.8)

Typical Pedon Location

Map unit in which located: 195—Talkeetna, cool-Tsadaka-Chunilna, cool complex, 10 to 35 percent slopes
Location in survey area: approximately 14 miles N of Wasilla; in the SE 1/4 of the SW 1/4 of Section 14, T.20N, R.2W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 33 to 35 °F (1 to 2 °C)

Thickness of the organic mat: 3 to 10 inches (8 to 25 cm)
Depth to very gravelly and very cobbly till material: 14 to 26 inches (36 to 66 cm)
Thickness of solum: 14 to 25 inches (36 to 64 cm)
Reaction: extremely acid to strongly acid in the solum; strongly acid to moderately acid in the underlying material

A horizon:
Color—hue of 5YR to 10YR; value moist of 2 or 3; chroma moist of 1 to 3; this horizon is absent in some pedons

Bhs horizon:
Color—hue of 10R to 5YR; value moist of 2 or 3; chroma moist of 2 or 3
Texture—silt loam, very fine sandy loam, sandy loam, or loam

Bs horizon:
Color—hue of 2.5YR to 7.5YR; value moist of 2 to 4; chroma moist of 4 to 6
Texture—silt loam, loam, or fine sandy loam

2Bsm or 2Bhsm horizon:
Color—hue of 10YR to 5YR; value moist of 2 to 4; chroma moist of 2 to 6
Consistence—hard or very hard; these horizons are weakly to strongly cemented
Texture—loam or sandy loam
Rock fragments—25 to 50 percent gravel; 10 to 20 percent cobbles

2C horizon:
Color—hue of 10YR to 5Y; value moist of 3 to 5; chroma moist of 1 to 3
Texture—loam or sandy loam
Rock fragments—30 to 50 percent gravel; 5 to 20 percent cobbles

Typic Cryaquents

Taxonomic class: Typic Cryaquents
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: very poorly or poorly drained
Permeability: moderate to moderately rapid
Position on landscape: floodplains and low stream terraces along small creeks and streams and tidal plains
Parent material: stratified silty, sandy, and gravelly alluvium and clayey lacustrine and marine material
Slope range: 0 to 10 percent
Elevation: 0 to 1800 feet (0 to 549 m)
Climatic data (average annual):
precipitation—20 to 35 inches (51 to 89 cm)
air temperature—32 to 36 °F (1 to 2 °C)

Sample Pedon

Typic Cryaquents silt loam—on a 0 percent slope under paper birch forest, bluejoint reedgrass, and alder vegetation at 1400 feet (427 m) elevation (All colors are for moist soil.)

Oi—4 inches to 0 (10 cm to 0); dark reddish brown (5YR 3/2) fibrous undecomposed twigs, roots, and grass (0 to 6 inches thick)
ABg—0 to 8 inches (0 to 20 cm); dark grayish brown (10YR 4/2) silt loam with occasional strata of fine sand; common medium distinct brown (7.5YR 4/4) mottles; weak medium

granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; very strongly acid (pH 4.6); clear smooth boundary (3 to 10 inches thick)

Cg1—8 to 16 inches (20 to 41 cm); very dark gray (5Y 4/2) stratified fine sand and silt; common medium distinct olive brown (2.5Y 4/4) mottles; discontinuous lenses of very dark brown (10YR 2/2) mucky silt loam; massive; nonsticky and nonplastic; few very fine and fine roots; very strongly acid (pH 4.8); clear wavy boundary (0 to 16 inches thick)

Cg—16 to 60 inches (41 to 152 cm); dark gray (5Y 4/1) stratified fine sand and silt; few medium distinct olive brown (2.5Y 4/4) mottles; massive; very friable, nonsticky and nonplastic; strongly acid (pH 5.2)

Sample Pedon Location

Map unit in which located: 212—Typic Cryaquents, 0 to 2 percent slopes
Location in survey area: approximately 10 miles NE of Wasilla; in the NW 1/4 of the NW 1/4 of Section 13, T.19N, R.3W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (1 to 3 °C)
Thickness of the organic mat: 0 to 6 inches (0 to 15 cm)
Thickness of solum: 10 to 28 inches (25 to 71 cm)
Reaction: very strongly acid to moderately acid

A or ABg horizon:
Texture—silt loam, fine sandy loam, loam, fine sand, loamy fine sand, or sand
Rock fragments—0 to 20 percent gravel; 0 to 25 percent cobbles

Bg, Cg, 2Cg or 2C horizon:
Texture—stratified sand to clay
Rock fragments—0 to 60 percent gravel; 0 to 25 percent cobbles

Whitsol Series

Taxonomic class: medial over loamy, mixed Andic Haplocryods
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty loess mantle—moderate; in the very gravelly loam and sandy loam material—moderate or moderately slow; in the gravelly sand material—rapid
Position on landscape: outwash plains, till plains, and hills
Parent material: silty mantle of loess and volcanic ash, underlain by loamy glaciofluvial deposits, underlain by very gravelly glacial outwash; the till substratum phase is underlain by very gravelly till material, and the silty substratum phase has stratified sandy through silty glaciofluvial material
Slope range: 0 to 60 percent
Elevation: 100 to 1500 feet (30 to 457 m)
Climatic data (average annual):
precipitation—20 to 35 inches (51 to 89 cm)
air temperature—33 to 35 °F (1 to 2 °C)

Typical Pedon

Whitsol silt loam—on a 2 percent slope under paper birch and white spruce forest at 300 feet (91 m) elevation (All colors are for moist soil.)

Oi—3 inches to 0 (8 cm to 0); dark reddish brown (5YR 2/2) mat of decomposing moss and forest litter; many roots; mycelia; very strongly acid; abrupt wavy boundary (1 to 4 inches thick)

E—0 to 2 inches (0 to 5 cm); gray (10YR 5/1) silt loam; weak thin platy structure; very friable; many roots; charcoal fragments; very strongly acid; abrupt irregular boundary (0 to 3 inches thick)

Bs1—2 to 4 inches (5 to 10 cm); dark reddish brown (5YR 3/4) silt loam; moderate fine granular structure; very friable; patches of brown (7.5YR 4/4); common roots; few very fine concretions; strongly acid; clear wavy boundary (1 to 3 inches thick)

Bs2—4 to 11 inches (10 to 28 cm); strong brown (7.5YR 5/6) silt loam; weak thin platy structure; friable; slightly smeary when rubbed; streaks and patches of dark brown (7.5YR 4/4) and yellowish brown (10YR 5/4); common roots; strongly acid; abrupt wavy boundary (3 to 10 inches thick)

Eb—11 to 13 inches (28 to 33 cm); grayish brown (2.5Y 5/2) silt loam; weak thin platy structure; friable; few roots; strongly acid; abrupt broken boundary (0 to 3 inches thick)

Bsb—13 to 17 inches (33 to 43 cm); dark brown (7.5YR 4/4) and yellowish brown (10YR 4/4) silt loam with convoluted color pattern; few patches of Eb material; weak fine subangular blocky structure; very friable; gritty when rubbed; few roots; strongly acid; clear wavy boundary (3 to 6 inches thick)

BCb—17 to 23 inches (43 to 58 cm); dark yellowish brown (10YR 4/4) and olive brown (2.5Y 4/4) silt loam with convoluted color pattern; weak thin platy structure; friable; few roots; few fine pores; strongly acid; gradual boundary (4 to 10 inches thick)

C1—23 to 34 inches (58 to 86 cm); olive (5Y 4/3) silt loam; moderate thin platy structure; friable; few fine pores; strongly acid; clear smooth boundary (9 to 20 inches thick)

2C2—34 to 44 inches (86 to 112 cm); olive gray (5Y 4/2) very fine sandy loam; massive; friable; few streaks of olive brown (2.5Y 4/4); strongly acid; clear smooth boundary (0 to 12 inches thick)

3C—44 to 60 inches (112 to 152 cm); olive (5Y 4/3) very gravelly coarse sand; single grain; loose; few pockets of silt and fine sand; many rounded cobbles; strongly acid

Typical Pedon Location

Map unit in which located: 205—Whitsol silt loam, 0 to 2 percent slopes

Location in survey area: approximately 7 miles N of Willow; in the SE 1/4 of the NE 1/4 of Section 18, T.20N, R.4W, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 33 to 35 °F (1 to 2 °C)

Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)

Depth to loamy glacial outwash: 14 to 35 inches (36 to 89 cm)

Depth to very gravelly glacial outwash or (when present) very gravelly glacial till: 40 to over 60 inches (102 to over 152 cm)

Thickness of solum: 14 to 27 inches (36 to 69 cm)

Reaction: very strongly acid to moderately acid

E and Eb horizons:

Color—hue of 10YR or 2.5Y; value moist of 4 or 5; chroma moist of 1 or 2

Bs and Bsb horizons:

Color—hue of 5YR or 7.5YR; value moist of 3 to 5; chroma moist of 3 to 6

BC horizon (when present):

Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 4 to 6

2C horizon:
Color—hue of 10YR to 5Y; value moist of 3 to 5; chroma moist of 2 to 4
Texture—stratified silt loam, very fine sandy loam, sandy loam, fine sand, and sand

3C horizon (when present):
Color—hue of 10YR to 5Y and is often variegated; value moist of 3 to 5; chroma moist of 2 to 4
Texture—coarse sand, sand, sandy loam, or loam
Rock fragments—35 to 60 percent gravel; 0 to 20 percent cobbles

Yensus Series

Taxonomic class: coarse-silty over sandy or sandy-skeletal, mixed Typic Cryochrepts
Depth class: very deep—more than 60 inches (more than 152 cm)
Drainage class: well drained
Permeability: in the silty material—moderate; in the sand and gravel—rapid
Position on landscape: glacial outwash plains, stream terraces, and hills
Parent material: silty loess material underlain by sandy and gravelly glaciofluvial material
Slope range: 0 to 45 percent
Elevation: 50 to 600 feet (15 to 183 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Yensus silt loam—on a 16 percent slope under paper birch and white spruce forest at 550 feet (168 m) elevation (All colors are for moist soil.)

Oe—1 inch to 0 (3 cm to 0); very dark brown (10YR 2/2) partially decomposed forest and grass litter (1 to 4 inches thick)
A—0 to 2 inches (0 to 5 cm); very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; few fine faint (10YR 4/6) mottles; medium acid (pH 5.6); clear smooth boundary (2 to 5 inches thick)
AC—2 to 7 inches (5 to 18 cm); brown (10YR 4/3) and dark grayish brown (10YR 4/2) silt loam; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common medium distinct strong brown (7.5YR 4/6) mottles; medium acid (pH 5.8); clear wavy boundary (4 to 12 inches thick)
Bw/C1—7 to 14 inches (18 to 36 cm); brown (7.5YR 4/4) silt loam, with patches of brown (10YR 4/3) comprising about 45 percent of the horizon; moderate coarse subangular blocky structure; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; few fine faint dark grayish brown (10YR 4/2) mottles; medium acid (pH 5.8); gradual wavy boundary (5 to 18 inches thick)
Bw/C2—14 to 18 inches (36 to 46 cm); dark yellowish brown (10YR 4/6) silt loam, with patches of brown (10YR 4/3) comprising about 30 percent of the horizon; moderate coarse subangular blocky structure; very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; few fine faint dark grayish brown (10YR 4/2) mottles; medium acid (pH 5.8); clear wavy boundary (0 to 11 inches thick)
Bwb—18 to 29 inches (46 to 74 cm); dark yellowish brown (10YR 4/6) silt loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; medium acid (pH 6.0); gradual smooth boundary (5 to 12 inches thick)
BCb—29 to 36 inches (74 to 91 cm); brown (10YR 4/3) and dark brown (10YR 3/3) silt

loam; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; few very fine and fine roots; slightly acid (pH 6.2); clear smooth boundary (0 to 8 inches thick)

2C—36 to 60 inches (91 to 152 cm); variegated extremely gravelly sand; single grain; loose, nonsticky and nonplastic; 45 percent rounded gravel and 15 percent rounded cobbles; slightly acid (pH 6.4)

Typical Pedon Location

Map unit in which located: 213—Yensus silt loam, sloping and moderately steep

Location in survey area: approximately 3 miles NE of Palmer; in the SE 1/4 of the SE 1/4 of Section 11, T.18N, R.2E, Seward Meridian

Range in Characteristics

Mean annual soil temperature: 35 to 37 °F (2 to 3 °C)

Thickness of the organic mat: 1 to 4 inches (3 to 10 cm)

Depth to sand and gravel: 24 to 40 inches (61 to 102 cm)

Depth to seasonally high water table: more than 5 feet (more than 1.5 m); however, saturated conditions may occur over seasonal frost for a brief period during late April or May

Thickness of solum: 22 to 34 inches (56 to 86 cm)

Reaction: moderately acid to slightly acid in the loess cap; slightly acid or neutral in the substratum

A and AC horizons:

Color—hue of 10YR or 2.5Y; value moist of 2 to 4; chroma moist of 2 or 3

Texture—silt loam or very fine sandy loam

Bw/C horizons:

Color—Bw has hue of 7.5YR or 10YR, chroma moist of 4 to 6; C has hue of 10YR to 5Y, chroma moist of 1 or 2

Texture—silt loam or very fine sandy loam

Bwb horizon:

Color—hue of 7.5YR or 10YR; chroma moist of 4 to 6

Texture—silt loam or very fine sandy loam

BCb or C horizon:

Color—hue of 10YR or 2.5YR; value moist of 3 or 4; chroma moist of 3 or 4

Texture—silt loam or very fine sandy loam

2C horizon:

Color—variegated

Texture—sand and coarse sand

Rock fragments—40 to 70 percent gravel; 0 to 25 percent cobbles

Yohn Series

Taxonomic class: coarse-loamy, mixed Typic Haplocryods

Depth class: very deep—more than 60 inches (more than 152 cm)

Drainage class: well drained

Permeability: in the loess mantle—moderate; in the very gravelly and very cobbly loam till—moderate to moderately slow

Position on landscape: glacial till plains and hills

Microtopography: all positions
Parent material: interbedded sandy and silty eolian material overlying friable to firm very gravelly and very cobbly loamy glacial till
Slope range: 0 to 25 percent
Elevation: 50 to 400 feet (15 to 122 m)
Climatic data (average annual):
precipitation—15 to 20 inches (38 to 51 cm)
air temperature—34 to 36 °F (1 to 2 °C)

Typical Pedon

Yohn silt loam—on a 9 percent slope under paper birch forest and bluejoint reedgrass vegetation at 100 feet (30 m) elevation (All colors are for moist soil.)

Oi—3 inches to 0 (8 cm to 0); dark reddish brown (5YR 3/2) undecomposed grass, moss, and forest litter (1 to 4 inches thick)
E—0 to 2 inches (0 to 5 cm); dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; strongly acid (pH 5.4); abrupt wavy boundary (1 to 3 inches thick)
Bs1—2 to 4 inches (5 to 10 cm); yellowish red (5YR 4/6) very fine sandy loam, with discontinuous strata and pockets of fine sand and silt; weak medium granular structure; very friable, nonsticky and nonplastic; many roots of all sizes; moderately acid (pH 5.6); clear smooth boundary (1 to 5 inches thick)
Bs2—4 to 7 inches (10 to 18 cm); strong brown (7.5YR 5/6) very fine sandy loam, with discontinuous strata and pockets of fine sand and silt; weak medium granular structure; very friable, nonsticky and nonplastic; common very fine and fine roots; moderately acid (pH 5.6); clear wavy boundary (0 to 4 inches thick)
BC—7 to 21 inches (18 to 53 cm); dark yellowish brown (10YR 4/6) fine sand and silt occurring as pockets and discontinuous strata; weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and fine roots; moderately acid (pH 5.8); gradual wavy boundary (8 to 17 inches thick)
C—21 to 32 inches (53 to 81 cm); dark yellowish brown (10YR 4/4) and dark brown (10YR 4/3) fine sand and silt occurring as pockets and discontinuous strata; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; moderately acid (pH 6.0); abrupt wavy boundary (0 to 10 inches thick)
2C1—32 to 39 inches (81 to 99 cm); dark grayish brown (2.5YR 4/2) very cobbly loam; weak medium subangular blocky structure; friable, sticky and plastic; 25 percent subangular gravel and 15 percent subangular cobbles; neutral (pH 7.0); gradual wavy boundary (5 to 30 inches thick)
2C2—39 to 60 inches (99 to 152 cm); dark grayish brown (2.5YR 4/2) very gravelly loam; weak thick platy structure; firm, sticky and plastic; 30 percent subangular gravel and 10 percent subangular cobbles; neutral (pH 7.0)

Typical Pedon Location

Map unit in which located: 216—Yohn silt loam, rolling
Location in survey area: approximately 8 miles SW of Knik; approximately 800 feet S and 300 feet E of the NW corner of Section 1, T.15N, R.4W, Seward Meridian

Range in Characteristics

Thickness of the organic mat: 1 to 6 inches (3 to 15 cm)
Depth to glacial till: 16 to 40 inches (41 to 102 cm)
Thickness of solum: 12 to 23 inches (30 to 58 cm)
Reaction: strongly acid to slightly acid in the solum; moderately acid to neutral in the substratum

E horizon:
Color—hue of 10YR or 2.5Y; value moist of 4 or 5; chroma moist of 1 or 2

Bs horizon:
Color—hue of 2.5Y to 7.5YR; value moist of 3 to 5; chroma moist of 4 to 6
Texture—silt, silt loam, fine sand, fine sandy loam, and very fine sandy loam occurring as pockets and discontinuous strata

BC and C horizons:
Color—value moist of 3 or 4; chroma moist of 3 to 6
Texture—silt, silt loam, fine sand, fine sandy loam, and very fine sandy loam occurring as pockets and discontinuous strata
Rock fragments—0 to 5 percent cobbles and 0 to 5 percent gravel in the lower part of horizons

2C horizon:
Color—hue of 10YR or 2.5Y; value moist of 3 or 4; chroma moist of 2 or 3
Texture—sandy loam or loam
Rock fragments—0 to 20 percent cobbles; 25 to 40 percent gravel

Formation of the Soils

Soil is the natural medium for the growth of our native forests, rangelands, and agricultural crops. It helps regulate runoff; filter and purify our water; support our roads, houses and other structures; and provide us with a variety of construction materials. Soil, and the vegetation it supports, are habitat for moose, bears, and a wide variety of other wildlife.

Although the soils we observe and use today appear stable, soil formation is a gradual and continually occurring process. Over time, the influence and interaction of a variety of dynamic genetic and environmental factors including climate, geologic parent materials, topography, and living organisms form a soil. The cumulative effects of these factors vary from place to place and determine the kinds of soils that form. The resultant soils exhibit significantly different physical, chemical, and morphologic properties than the materials from which they were derived.

Climate

The climate of the Matanuska-Susitna Valley Area can be characterized as a blend of the mild, moist maritime influences of the coastal zone of the Gulf of Alaska and the cold, dry continental influences of interior Alaska. The southern edge of the Area borders on the Chugach Mountains and Knik Arm of Cook Inlet, and is within 40 miles (64 km) of Prince William Sound and the Gulf of Alaska. Although the high peaks of the Chugach Mountains form a partial barrier to maritime conditions, Cook Inlet directly exposes the Area to weather systems originating in the Gulf. The Talkeetna Mountains to the east and Alaska Range to the north offer only partial protection from high pressure systems originating in interior and arctic Alaska. Continental climatic influences are more prevalent in the northern portions and upper elevations. Four distinct climatic zones and associated soil regions are recognized within the Matanuska-Susitna Valley Area.

Matanuska Valley

This zone includes the lower Matanuska Valley west to Pittman and south to Cook Inlet. Dale (*1956*) has described climatic components in detail. The Matanuska Valley zone lies in the rain shadow created by the Chugach Mountains and is characterized by relatively low precipitation, ranging from 15 to 20 inches (38.1 to 50.8 cm). Average annual precipitation at Palmer is 15.4 inches (39.1 cm) (Table 1). Potential evapotranspiration (water loss) from a fully vegetated surface at Palmer is about 19.7 inches (50 cm) (*Patric and Black 1968*). Since potential evapotranspiration exceeds precipitation, a moisture deficit is present, especially during late spring when precipitation is low and air temperature is relatively warm.

Localized winds are common along the Matanuska River during winter and the Knik River during summer. In addition, winter storm systems in Prince William Sound generate warm downslope winds along the western flanks of the Chugach Mountains, resulting in mid-winter thaws and rain.

Winds, deep annual frost, and relatively low precipitation have a profound influence on soil development within this region. Soils have weak to moderate horizon expression that

can be attributed to the gradual but constant accumulation of windblown materials, under an environment of low precipitation and low rates of downward water movement. Dominant soil Orders are Entisols and Inceptisols and include Bodenburg, Eska, Jim, Knik, Kalambach, and Yensus soils.

The combination of strong winds, thawing temperatures, and rainfall during most winters reduces or removes the insulating snow cover and has a significant impact on soil temperature and frost penetration. Ping (*1987*) observed that winter soil temperatures in Bodenburg soil near Palmer were not appreciably different than in Tanana soil near Fairbanks. Mean winter soil temperature at 20 inches (50.8 cm) in Bodenburg soil was 26.2 °F (-3.2 °C). Winter soil temperature at the same depth in Tanana soil was 26.4 °F (-3.1 °C). In contrast, winter air temperature is significantly warmer in the Palmer area (13.2 °F [-10.4 °C]), compared to Fairbanks (-4.4 °F [-20.4 °C]). Frost penetration in Bodenburg soil often exceeds 40 inches (101.6 cm), and the soil may remain frozen into early summer.

Upper Susitna Valley

This zone includes the lower elevations of the Susitna Valley from Big Lake west to the Susitna River and north to the Alaska Range. Warmer summer and colder winter temperatures are evidence of the greater distance inland from Cook Inlet and continental influences. The Upper Susitna Valley is directly exposed to weather systems encroaching from the Gulf of Alaska. Storm systems backup against the Talkeetna Mountains and Alaska Range, and up-slope air movement results in significantly higher precipitation ranging from 20 to 35 inches (50.8 to 88.9 cm). Precipitation generally increases from south to north. Average annual precipitation at Talkeetna is 28.3 inches (71.9 cm) (Table 2). Potential evapotranspiration (water loss) from a fully vegetated surface at Talkeetna is about 19 inches (48.3 cm) (*Patric and Black 1968*). Unlike the Matanuska Valley, the Upper Susitna Valley has an annual moisture surplus.

Winter winds and thawing temperatures are not a major factor. Snowpack normally ranges from 30 to 60 inches (76.2 to 152.4 cm) or more and remains intact throughout the winter, effectively insulating the soil. Frost penetration is generally less than 10 inches (less than 25.4 cm) despite the cold winter temperatures.

Soils are significantly better developed than those of the Matanuska Valley and Lower Susitna Valley are, due to specific climate variables. Higher precipitation encourages downward water movement and differentiation of horizons. Nearly half of the annual precipitation is tied up in the winter snowpack and is released in a two to three week period during spring. Following a brief period of soil moisture deficit in late spring and early summer, precipitation and water movement through the soils increase again in late summer. Water percolating downward through the soil causes weathering and translocation of soil minerals from surface horizons into the underlying horizons. Soils such as Nancy, Benka, and Tokositna are classified in the Spodosol soil Order and have thin gray leached surface horizons over reddish brown subsoils (Plates 17 and 15).

Lower Susitna Valley

This zone includes the southern reaches of the Susitna River and Little Susitna River drainages from Big Lake south to Point MacKenzie and west to the Susitna River. It is outside the influence of the Chugach Mountain rain shadow, and is impacted directly by storm systems coming up Cook Inlet from the Gulf of Alaska. Much of the precipitation carried by these storm systems passes over this zone and eventually falls in the Upper Susitna Valley and Talkeetna Mountains. Long term precipitation data for the Lower Susitna Valley are not available; however, patterns and amounts are similar to those in the western portions of the Anchorage Bowl—approximately 15 inches (38.1 cm) of precipitation annually. The strong seasonal winds, characteristic of the Matanuska Valley, are not experienced due to the distance from the Chugach and Talkeetna Mountains.

Prolonged periods of thawing temperatures are uncommon, and snowpack normally

remains intact throughout the winter. Snowpack ranges from 20 to 40 inches (50.8 to 101.6 cm) or more and effectively insulates the soil. Frost penetration is generally less than 10 inches (less than 25.4 cm), despite occasional periods of cold winter temperatures.

The degree of soil development is intermediate between the weakly expressed soils of the dry and windy Matanuska Valley zone and the better-developed soils in the wetter Upper Susitna Valley zone. Better development of soils within this zone, compared to the Matanuska Valley zone, is attributed to lower rates of loess deposition which create more stable surface conditions. Soils such as Kashwitna, Deception, and Kichatna are classified in the Spodosol soil Order and have thin gray leached surface horizons over reddish brown subsoils.

Talkeetna Mountains

This zone includes the higher elevation areas of the Talkeetna Mountains. High annual precipitation, ranging from 30 to 45 inches (76.2 to 114.3 cm), and deep snowfall characterize the climate. Thunderstorms are common during summer; and the mountains experience strong, localized winds during all seasons. Ridges and other exposed locations are usually blown free of snow, resulting in deep annual frost. Annual frost penetration is relatively shallow on lee slopes, depressions, and other areas of drifting.

Dominant climatically influenced soil processes include weathering and leaching of soil minerals by precipitation, weathering of rock, and movement of materials by frost action and cryoturbation. Soils on exposed, windswept ridges and slopes at higher elevations have thin dark soils over frost shattered bedrock. Rock fragments cover much of the surface on these soils. Exposed ridges at intermediate elevations are mantled with eolian material and experience deep frost penetration. Cryoturbation churns, desiccates, and heaves soil materials, forming hummocky surface microtopography such as that found in areas of Tsadaka soils. Soils on lee slopes and depressions are insulated from frost by deep snow cover, which percolates through the soil following spring and summer snowmelt. These soils have horizon characteristics more typical of Susitna Valley zone soils, with gray leached surface horizons and reddish brown subsoils such as those found in Talkeetna, cool soils.

Parent Materials

Glacial processes during the Pleistocene formed most upland landscapes throughout the Matanuska and Susitna Valleys and at lower elevations in the Talkeetna Mountains. A gradual accumulation of fine textured, windblown sediments followed during the Holocene, along with extensive alterations to the landscape due to a variety of alluvial processes. Massive floodplain and stream terrace systems were formed along the Susitna, Matanuska, and other major rivers. Alluvial fans were built on lower mountain slopes where smaller streams debauch from the mountains onto foothills and valley bottoms. The alluvial landscapes generally lack the mantle of windblown sediments found on glacial landforms. The vast deposits of peat found throughout the Susitna Valley and elsewhere also began to accumulate during the Holocene.

Above 3600 feet (1097 m) elevation in the Talkeetna Mountains, slope and local bedrock are the primary influences on the character of the landscape. Common processes in the mountains are downslope movement and accumulation of materials, frost shattering of exposed bedrock during freeze-thaw cycles, and frost churning of unconsolidated materials.

Glacial Deposits

During the Quaternary Period, the upper Cook Inlet region was repeatedly glaciated as

lobes of ice from alpine ice caps covered most of the landscape to sea level. Interglacial periods were characterized by ice stagnation and melting. Péwé (*1975*) described four major glaciations that occurred in the Matanuska-Susitna Valley Area. These include the Caribou Hills, greater than 200 thousand Years Before Present (YBP); the Eklutna, 200-70 thousand YBP; the Knik, 70-30 thousand YBP; and the Naptowne, 30-9 thousand YBP.

The Knik and Naptowne Glaciations sculpted most of the landscape at lower elevations. Common glacial landforms include nearly level to undulating plains interspersed with steep eskers and rolling hills (Plate 2). Lateral moraines and kame terraces on mountain slopes in the Talkeetna Mountains (Figure 5) are products of the older Eklutna and Caribou Hills Glaciations (*Reger and Updike 1983*). Remnant surfaces of older glaciations occur throughout the upper elevations in the mountains.

Glacial deposits on plains, hills, and mountain slopes above 400 feet (above 122 m) elevation are mostly firm to friable, gravelly, loamy till. Loose, gravelly, and sandy outwash is the dominant material below 400 feet (below 122 m) elevation. Other less common glacial materials include friable, stratified sandy through silty outwash and fine textured glacio-lacustrine deposits.

Eolian Deposits

Most upland landforms are mantled with a layer of eolian or windblown deposits. The primary types of eolian deposits are loess, derived from nearly barren floodplains and outwash plains; and volcanic ash, generated by volcanic eruptions. Silt-sized particles of these materials are carried by wind and air currents and redeposited away from the source areas (Plate 1). The thickness of the silty eolian mantle varies widely throughout the Area depending on the distance from source areas. There does not appear to be any relationship between landscape position and the thickness of the mantle within any relatively small geographic area. Field measurements indicate that on rolling topography the thickness on the crests and shoulders is approximately the same as it is on backslope and lower slope positions.

Minor deposits of eolian sands derived from glacio-deltaic deposits are found in a few places. They are transported by winds in close proximity to the ground surface and usually redeposit only a short distance from the source. The texture of eolian sand deposits is usually sand and fine sand.

Matanuska Valley

In the Matanuska Valley, the surface mantle is primarily loess intermixed with a small percentage of volcanic ash. Loess continues to accumulate as the Matanuska and Knik winds, and nearly barren floodplains of the Matanuska and Knik Rivers, combine to produce significant amounts of airborne dust (Plate 1). Volcanic ash content in Knik and Kalambach soils is less than 15 percent by volume; in Bodenburg soil, it is less than five percent. The mineral composition of loess is mixed and variable, reflecting both the diversity of bedrock types from which the rivers derive their alluvial materials and the actual ash content.

In general, the thickness of the loess cap decreases with increasing distance from the Matanuska and Knik Rivers. Loess deposits are the thickest in the Palmer vicinity. Cliff-head dunes, with loess as much as 50 feet (15 m) thick, are on escarpments adjacent to the Matanuska River. Within a mile or two to the north and west, the loess mantle thins to 30 inches (76 cm) thick; near Big Lake, 20 miles (32 km) west of Palmer, the loess mantle thins to 4 inches (10 cm).

The predominant field texture of the loess layer is silt loam. Cliff-head dunes immediately adjacent to the floodplain source areas often have a fairly high composition of sand. Chemical properties include relatively high pH values (5.8 to 7.3), high base status (base saturation from 60 to 90 percent by ammonium acetate), and high but variable organic carbon (2 to 9 percent). Physical properties include high porosity (50 to 60 percent) and high available water capacity.

Susitna Valley

In the Susitna Valley and on the western slopes of the Talkeetna Mountains, which are closer to the volcanoes of the Alaska and Aleutian ranges, the surface mantle is composed of mixed loess and volcanic ash. The loess component was most likely derived from the Susitna River floodplain and adjacent outwash areas during and immediately after Pleistocene Glaciation, when vegetation was sparse and strong winds were more common. Today, dense vegetation and general lack of winds minimize continuing loess depositions; however, periodic volcanic eruptions continue to add volcanic ash to area soils.

Ash content (volume basis) ranges from 10 to 30 percent for Deception and Kichatna soils; 15 to 40 percent for Kashwitna and Estelle soils; 30 to 45 percent for Liten, Delyndia, Nancy, and Benka soils; and 40 to 85 percent for Tokositna and Talkeetna soils. The ash content decreases progressively to the east and south, moving closer to the Matanuska Valley.

The thickness of the eolian mantle is relatively uniform throughout the Susitna Valley. The average thickness for Benka, Talkeetna, and Tokositna soils is 17, 19, and 20 inches (43, 48, and 51 cm), respectively. Riehle (*1985*) estimated the accumulation rate of Holocene tephra (volcanic ash) in the Susitna Valley at 0.4 inches (1 cm) per 1000 years.

Approximately half of the soil profiles observed on uplands in the northern Susitna Valley are bisequel; that is, they have a buried sequence of horizons at some depth below the near surface "E" and "Bs" horizons. Buried horizons initially develop as surface horizons and are subsequently buried by a major deposition of volcanic ash. Over time, soil development produces a new sequence of horizons in the newly deposited ash. Riehle (*1985*) dated a major volcanic ash deposit at approximately 3,500 YBP; the contemporary soils of the Susitna Valley formed in ash material deposited by that single volcanic event.

The predominant field texture of the ash layer, when wet, is silt loam with a smeary consistency; when dry, it feels sandy. Moist bulk density of ash soils is low, generally less than 0.9 grams/cubic centimeter, due to the high porosity of the ash particles and high humus content (*Shoji, Nanazyo, and Dahlgren 1993*). Water retention capacity is high (*Maeda, Takenaka, and Warkentin 1977*). Chemical characteristics include high phosphorus absorption capacity, high aluminum saturation, and very strongly to moderately acid soil pH values.

Eolian Sands

Sand sheets are frequent eolian landforms found in proximity to the Susitna River in the Lower Susitna Valley. Parabolic, longitudinal dunes, with relief of less than 30 feet (less than 9 m), are found in a few locations along the lower Susitna River and in the Point MacKenzie area. Soils formed in eolian sands include Liten soil. Benka and Whitsol soils, formed in glacio-deltaic deposits, are closely associated with Liten soil along the Susitna River. The presence of 4 to 14 inches (10 to 36 cm) of loess and volcanic ash on the surface, and well developed "E" and "Bs" horizons in Liten soil, suggest that the sand sheets and dunes have been stable for most of the Holocene.

Peat Deposits

Peat is unconsolidated soil material consisting largely of undecomposed to slightly decomposed organic matter. Peat accumulates on the surface under conditions of excess moisture and oxygen depletion, where production of organic materials greatly exceeds the rate of decomposition. Histosols (organic soils), formed in deposits of sedge, shrub, and sphagnum peat many feet thick, are found on extensive, poorly drained lowlands and drainage run-ins in the Susitna Valley and elsewhere in the Area (Plate 12). Thick, dark, organic rich surface mineral horizons are common in other areas on poorly drained mineral soils such as Disappoint and Chunilna soils.

Alluvial Deposits

Following the retreat of the Naptowne Glaciation, approximately 9 thousand YBP, alluvial processes associated with major drainage systems began to alter and reshape extensive areas of the landscape. Glacial materials were eroded, transported, and redeposited by runoff and floodwaters; reworked and resorted by moving water. Extensive systems of discontinuous and intermixed floodplains and stream terraces occur along the Susitna and Matanuska Rivers and other major drainages. Elsewhere, alluvial fans formed where smaller mountain streams discharge onto valley bottoms and foothills. Principal alluvial materials include loose, very gravelly and cobbly sands on high gradient reaches of rivers and streams, and stratified silts and sands in low gradient reaches and backwater areas.

Soil-Landform Relationships

Glacial Landforms

Loess Plains and Hills of the Matanuska Valley

The upland landscape, in close proximity to the Knik and Matanuska Rivers in the vicinity of Palmer, consists primarily of loess plains and hills composed of a layer of silty loess over glacial outwash and till. The loess cap ranges in thickness from many feet adjacent to the floodplains to approximately 2 feet (0.6 m) further from the loess source areas. Dominant soils are Bodenburg, Yensus, and Eska soils. In Bodenburg and Yensus soils, which occur below an elevation of 600 feet (183 m), the substratum is loose, very gravelly and sandy glacial outwash. In Eska soils, which occur above Bodenburg and Yensus soils to 1500 feet (457 m) elevation, the substratum is firm, very gravelly, and very cobbly loamy glacial till.

Windblown silt (loess) forms clouds of dust above the barren floodplains of the Knik and Matanuska Rivers which settle and accumulate on upland surfaces, contributing to the deep, productive nature of Bodenburg, Yensus, and Eska soils (Plate 1; General Soil Map Unit 1). Due to significant annual loess deposits, upper soil horizon expression is weak and soil properties reflect the properties of unaltered loess materials. Chemical properties of Bodenburg, Yensus, and Eska soils include moderately acid to slightly alkaline reaction (pH from 5.8 to 7.3), high base saturation (60 to 90 percent by ammonium acetate), and high but variable organic carbon throughout the loess (2 to 9 percent). Physical properties of loess include high porosity (50 to 60 percent by volume) and high total available water capacity.

Frost penetration in these soils is deep, as winter winds tend to remove the insulating snow cover. In undisturbed-forested areas, frost extends from 20 to over 40 inches (51 to over 102 cm) deep in most years and persists into late spring.

The subsoil of Bodenburg, Yensus, and Eska soils is mottled with streaks and patches of red and gray colors. The complex processes responsible for the formation of these features are associated with deep and persistent soil frost and the perching of water above the frost during spring. Following the onset of plant growth, accelerated plant respiration and microbial activity deplete existing oxygen reserves above the frost layer. Concurrently, near saturated conditions restrict the diffusion of oxygen from the atmosphere into the soil. These factors create a “reducing environment” (which can also occur below the frost layer). During this period of oxygen depletion, iron is chemically changed to soluble ferrous oxides, a mobile form which enables it to move downward in the soil water. Patches and zones where iron has been mobilized and removed appear gray in color. As the frost layer thaws, and soil drainage and aeration improve, the mobile iron encounters an oxygen rich zone or “oxidizing environment” where it is changed back to insoluble ferric oxides which are immobile and precipitate out as red patches of

concentrated iron. Ephemeral ponds and saturated conditions, perched over annual frost, are common in depressional landscape positions throughout the Palmer vicinity and are most evident on cleared hayland and pastureland. Yearly weather patterns vary considerably in the Matanuska Valley and these conditions may occur only following exceptionally windy or low snow winters.

The vegetation on Bodenburg, Yensus, and Eska soils is predominantly mixed white spruce-paper birch forest. Common understory plants include bluejoint reedgrass, highbush cranberry, red currant, and a variety of ferns and broadleaf forbs. Moss cover is generally low. The near neutral reaction and high base saturation of these soils favor the productive herbaceous growth found in the understory.

Matanuska Valley Glacial Uplands

Five miles (8 km) from the Matanuska and Knik Rivers, a transition in soils becomes apparent. Landforms still include rolling plains and hills composed of glacial outwash and till; however, the loess mantle thins to less than 24 inches (less than 61 cm). Knik and Kalambach soils are dominant. The substratum in Knik soils is loose, very gravelly and sandy glacial outwash; in Kalambach soils, it is friable to firm, very gravelly loamy glacial till.

Although silty loess is deposited on the soil surface on a regular basis, annual accretions are minor, and Knik and Kalambach soils are sufficiently stable for the development of brown "Bw" or cambic subsurface horizons (General Soil Map Unit 2). Soil forming processes include oxidation of primary minerals that impart a yellowish appearance to the upper profile. Translocation of soil nutrients or bases, which promotes the acidification of the upper horizons, is also typical of the cambic horizons. Chemically, Knik and Kalambach soils are more acidic (pH 5.2 to 5.6), have a lower base saturation (20 to 40 percent by ammonium acetate), and have a more gradual decrease in organic carbon content with depth (5 to 2 percent) than Bodenburg, Yensus, and Eska soils do. Physically, Knik and Kalambach soils have somewhat lower total available water capacity due to the thinner loess mantle.

Location of these soils on the fringes of the Knik River and Matanuska River wind corridors means lower average wind speeds, and lower frequency and duration of winds during the winter months. This allows for a deeper and more continuous snow cover that insulates the soil surface and reduces the depth of frost penetration compared to Bodenburg, Yensus, and Eska soils. Frost depth during most winters is generally less than 20 inches (less than 51 cm) in forested areas.

Vegetation on Knik and Kalambach soils is similar to Bodenburg, Yensus, and Eska soils. Understory production is somewhat lower and feathermoss cover higher on Knik and Kalambach soils, due in part to the thinner loess mantle, higher acidity, and lower base saturation. Moist forest species, such as devil's club and alder, are more prevalent on Kalambach soils.

Ten miles (16 km) from the Matanuska and Knik Rivers, toward Wasilla and Big Lake, the loess mantle thins to 6 to 12 inches (15 to 30 cm). Kichatna and Deception soils are dominant (Plates 7, 8, and 15; General Soil Map Unit 3). The substratum in Kichatna soils is loose, very gravelly and sandy glacial outwash; in Deception soils, it is friable to firm and consists of very gravelly, loamy glacial till.

Annual loess accretions on Kichatna and Deception soils are very low, and these soils are stable enough for the development of gray "E" or albic horizons over reddish brown "Bs" or spodic subsurface horizons. Processes include leaching and translocation of the primary minerals iron and aluminum from the albic horizon into the spodic horizon. Translocation of soil nutrients or bases promotes acidification of upper horizons typical of spodic horizons. Chemically, the upper parts of these soils are more acidic (pH 4.6 to 5.8), have a lower base saturation (6 to 25 percent by ammonium acetate), and have a decreased organic carbon content with depth (2 to 8 percent) compared to Knik and Kalambach soils. The available water capacity of Kichatna and Deception soils is very low due to the thin loess mantle. Winter winds are infrequent and of short duration, and the

snowpack is fairly continuous; frost penetration is generally less than 10 inches (less than 25 cm) in forested areas.

Vegetation on Kichatna and Deception soils is much more variable. Common forest types include paper birch-white spruce, paper birch, quaking aspen-spruce, and black spruce. In most places, the understory is dominated by ericaceous shrubs and feathermoss, plants better suited to the more acidic conditions on these soils.

Susitna Valley Glacial Uplands

Upland landforms in the Susitna Valley consist of a wide variety of plains, hills, and bogs. Nearly level plains formed in glacial outwash and glaciofluvial deposits from the Naptowne Glaciation predominate along the Susitna River, particularly towards the south. In the northern and eastern portions of the Valley, the majority of the landscape consists of sloping to steep hills formed in glacial till from the older Knik Glaciation. Extensive bogs formed in thick deposits of peat are found on lowlands and depressions where soil drainage is restricted and water accumulates.

The principal soils on glacial outwash and glaciofluvial deposits are well drained Benka, Nancy, and Whitsol soils (General Soil Map Units 4, 5, 6, 7, and 8). These soils are formed in windblown deposits of mixed volcanic ash and loess 14 to 35 inches (36 to 89 cm) thick over sandy, gravelly, and stratified sandy and silty deposits, respectively. Forest vegetation is predominately mixed stands of white spruce, paper birch, and quaking aspen, although black spruce forest and woodland is extensive in some places. The understory in these forests is equally variable. Open stands of hardwood trees, and mixed hardwoods and white spruce, have an understory of dense tall shrubs and herbs. The understory is sparser under more closed canopies of hardwoods and where the silty soil surface layer is thinner. Ground vegetation under spruce is dominated by feathermoss with relatively sparse shrubs and herbs. Black spruce forests probably developed following extensive forest fires in the Valley in the early part of this century.

Well drained Tokositna and poorly drained Chunilna soils are dominant on deposits of glacial till. These soils are also formed in mixed volcanic ash and loess 14 to 35 inches (36 to 89 cm) thick; however, the substratum is gravelly, loamy glacial till. Vegetation consists of mixed paper birch-white spruce forests with an understory of dense tall shrubs and herbs. The luxuriant and productive understory may be attributable, in part, to the high available water capacity of silty volcanic ash and loess and the concentration of moisture at the glacial till contact.

Bog soils are very deep and very poorly drained Histosols, or organic soils, that develop where saturated and anaerobic conditions favor organic matter accumulation. Strata of volcanic ash are common throughout these organic soils. Vegetation consists of stunted black spruce woodland with ericaceous shrubs and mosses in the understory, low and dwarf ericaceous shrub scrub, and sedge-grass wet meadows and bog meadows.

Soil development and horizonation in well drained soils in the Susitna Valley is greater in areas of higher precipitation and on older surfaces. For example, in the southern Susitna Valley, Benka soils are found on glacial outwash plains of Naptowne Glaciation—average annual precipitation is about 22 inches (56 cm) or less. A typical horizon sequence includes an “E” or albic surface horizon over a “Bs” subsurface horizon. The lower depth of the solum is approximately 26 inches (66 cm). In the northern Susitna Valley, Tokositna soils are extensive on Knik Glaciation till deposits—average annual precipitation is about 28 inches (71 cm). A typical profile includes an “E”, “Bhs”, and “Bs” sequence of horizons, with solum development extending to a depth of 35 inches (89 cm). Tokositna soils are more acidic than Benka soils.

A repeating, predictable pattern of slope position, hydrology, and soils is observed on the extensive, undulating glacial landscapes in the northern Susitna Valley. Well drained Tokositna soils are found on convex positions such as the crests and backslopes of hills; poorly drained Chunilna soils are common on toeslopes; and very poorly drained Histosols soils are found in the depressions between hills (General Soil Map Units 7 and 8).

The degree and duration of saturation influences the type of soil that forms. Chunilna

soils on toeslopes experience wide fluctuations in the water table throughout the growing season. The water table is highest during spring from snowmelt and again in late summer from rainfall. Although some fibrous peat accumulates on the surface of these soils, surface materials are primarily mucky silt loam. In the depressions between hills, water accumulates not only from snowmelt and rain but also from run-in from surrounding uplands. Histosols soils in the depressions remain saturated to near the surface for much of the growing season in most years. The saturated conditions inhibit the decomposition of organic matter, promoting the gradual, continuous accumulation of peat.

Alluvial Landforms

Floodplains

Floodplains are nearly level lands composed of sediments deposited during overflow and lateral migration of adjacent streams. Extensive floodplains up to a mile (1.6 km) or more in width are found along the Susitna, Matanuska, and other major rivers in the Area. Narrow floodplains are present along most perennial clear water streams. Floodplains consist of a variety of landforms including braided channels, point bars, natural levees, and backswamps.

Floodplains are subject to periodic flooding from channel overflow that occurs primarily during spring, summer, and fall. Flooding and fluctuations in discharge in the watershed occur in response to runoff originating from spring snowmelt, glacialmelt during periods of warm summer weather, and rainfall at any time of the year. The frequency and duration of flooding is determined to a large degree by the orientation of the active channel and the actual height of the floodplain above the channel. Although the location of a river or stream channel appears to be fixed and stable, river systems are dynamic and channel location is subject to rapid and dramatic changes. While the channel may abandon certain areas of the floodplain for years or even decades, the potential for future flooding remains throughout the floodplain.

The water table on floodplains fluctuates in response to changes in river levels. Discharge from adjoining bogs, marshes, sloughs, and uplands often helps maintain the water table even as the level of the river or stream drops.

Both depositional and erosional processes are active on floodplains. Depositional processes include overflow during flooding, and lateral and vertical accretions in backswamps and on point bars. Braiding is primarily a depositional process that occurs along shallow, steep gradient, low sinuosity channels that carry high bedloads and have non-cohesive bank material. The bar and channel micro-relief, characteristic of braided floodplains, consists of ridge-like bars of coarse textured materials and intervening channels filled with finer textured materials. Channel erosion occurs primarily along the outside edge of meanders, where river velocity and depth are greatest and the water is constantly impacting the bank.

Low floodplains, which are generally less than 4 feet (less than 1.2 m) above the active channel, are found along the Matanuska, Knik, and Susitna Rivers. Multiple braided channels with many bars and islands characterize them. Soils include Niklason and Kidazqeni soils, which are formed in a thin layer of stratified sandy and silty alluvium over very gravelly alluvium. These soils are weakly developed with little horizonation, due to frequent flooding and the associated deposition and erosion of materials on low floodplains.

Intermediate floodplains, characterized by subtle bar and channel micro-topography, are typically 4 to 12 feet (1.2 to 3.7 m) above the active channel and are common in the Area, particularly along the Susitna River. Dominant soils include occasionally flooded, somewhat poorly and moderately well drained, Niklavar and Susivar soils that are formed in irregularly stratified sandy and silty sediments 14 to over 40 inches (36 to over 102 cm) thick over very gravelly alluvium (Figure 7). These soils, which are somewhat better developed than Kidazqeni and Niklason soils, have "A" or "AC" surface horizons and "Bg" subsoil horizons. The "Bg" horizons typically are mottled with red and gray patterns.

Mottles occur due to the reduction and oxidation of iron in the soil. Air exchange between the atmosphere and soil is inhibited during periods of flooding and when the water table is at its highest. Concurrently, plant transpiration and decomposition of buried organic materials deplete the soil of oxygen reserves. During these periods of oxygen depletion, iron minerals undergo a process of chemical reduction. The resulting water soluble, mobile, reduced iron is able to move vertically and laterally in the soil solution under saturated conditions. As floodwaters recede and the water table drops, the soil is reoxygenated and the iron again becomes oxidized. The insoluble, immobile, oxidized iron precipitates and appears as the reddish colors seen in these soils. While the mottling observed in these soils is often a good indicator of wetness and hydric soil conditions, these features persist even following downcutting by the channel, reduced flooding, and lowering of the water table. Therefore, the occurrence of mottling can not be used with complete certainty to infer wetness on all landscapes.

Backswamps are common on intermediate floodplains along the Susitna River. They are found in abandoned channels and sloughs that are protected from high velocity floodwaters and erosion, either because of their distance from the channel or by the occurrence of natural levees. Slow moving, sediment rich overflow deposits new layers of fine sediments in backswamps during periods of high water. Run-in and groundwater recharge often cause these backswamps to remain ponded most of the year, enabling organic matter to accumulate on the surface. Very poorly drained Moose River soils, typically having more than 16 inches (more than 41 cm) of organic material over stratified sandy and silty alluvium, are characteristic of backswamps.

Vegetation on floodplains is often a good indicator of floodplain height, the frequency of flooding, and soil wetness. Recently deposited alluvium and low, frequently flooded soils typically support willow and alder shrub, often with considerable tree regeneration. The shrubs and balsam poplar regeneration are well adapted to frequent flooding, and continue to send up new growth through newly deposited alluvium. Over time, productive stands of balsam poplar forest and mixed balsam poplar-white spruce forest develop. Intermediate floodplains typically support mixed balsam poplar-white spruce forest, paper birch forest, and mixed paper birch-white spruce forest. The very poorly drained Moose River soils form narrow sinuous patterns of tall alder shrub and sedge-grass wet meadow across the floodplain (Figure 6).

Stream Terraces

Stream terraces are relict floodplains that, due to the natural downcutting of the river or stream channel, are elevated above the current floodplain and no longer subject to periodic flooding. Intermittent, discontinuous stream terraces, ranging from 12 to 22 feet (3.7 to 6.7 m) above the active channel, are found in association with all the major river systems in the Matanuska-Susitna Valley Area. Dominant soils along streams are the rarely flooded, well drained Susitna soils, formed in stratified sandy and silty alluvium over sandy and gravelly alluvium. Because of the relatively young age of the stream terraces, Susitna soils lack significant horizon development other than surface "A" horizons. Vegetation consists primarily of mixed paper birch-white spruce forest.

Alluvial Fans

Alluvial fans are conical shaped landforms built up from stream deposits where a steep gradient stream from a narrow mountain canyon or valley flows onto a more gently sloping valley or slope. The principal soils on alluvial fans in the Area are occasionally flooded, somewhat excessively drained and well drained Kidazqeni and Niklason soils, formed in irregularly stratified sandy and silty deposits of varying thickness, over very gravelly and sandy alluvium. Depth to substratum materials ranges from 2 to 40 inches (5 to 102 cm). Periodic erosion and deposition of materials by flooding limit the degree of soil development in these soils. Niklason and Kidazqeni soils have weakly expressed "A" and "AC" surface horizons over "2C" substratum horizons. Vegetation consists primarily of

mixed paper birch-white spruce forest, with balsam poplar being common in many stands.

Mountains

The northeastern portion of the Matanuska-Susitna Valley Area includes the high valleys and peaks of the Talkeetna Mountains. Below 3600 feet (1097 m) elevation, soil parent materials consist primarily of glacial drift deposited during the Knik Glaciation. Dominant soils on backslopes and toeslopes, just below and at treeline in this lower mountain zone, are various phases of well drained Talkeetna soils, formed in mixed volcanic ash and loess 14 to 32 inches (36 to 81 cm) thick over very cobbly, loamy glacial till (Plate 16). These soils are well developed with pronounced horizonation, reflecting the greater precipitation at higher elevations. The degree of profile development is particularly evident in the "Bhs" horizon, which ranges from 4 to 6 inches (10 to 15 cm) thick (Plate 16). Similar "Bhs" horizons in the Tokositna soils of the Susitna Valley are only 1 to 3 inches (3 to 8 cm) thick (Plate 17).

Talkeetna soils occur across a rather wide elevation range, from 600 to 3000 feet (183 to 914 m). These soils have been subdivided into a number of phases based on differences in potential vegetation, elevation, and productivity. The "low elevation" and "warm" phases occupy the upper-forested zone and support open stands of mixed paper birch-white spruce and white spruce. The “typical” and "cool" phases are found at and above treeline and support bluejoint reedgrass-forb grasslands. The "thick surface" phase also is found at and above treeline and supports tall Sitka alder shrub.

Other common soils found in association with Talkeetna soils in the subalpine zone, and formed in similar parent materials, are poorly drained Psuyaah and Chunilna, cool soils. Although Psuyaah soils have a shallow water table much of the growing season, steep slopes cause relatively rapid downslope flow and the water remains highly oxygenated. Vegetation on Psuyaah soils is bluejoint reedgrass-forb grassland similar to the Talkeetna, cool soils. Chunilna, cool soils are saturated much of the spring and late summer. The prolonged saturation during these periods inhibits decomposition of organic matter, allowing a buildup in the surface horizons. Chunilna, cool soils have dark, highly organic surface mineral horizons, and support tall Sitka alder shrub similar to Talkeetna, thick surface soils.

Above Talkeetna, Psuyaah, and Chunilna cool, soils to 3600 feet (1097 m) elevation, the landscape is generally dominated by dwarf black crowberry and ericaceous shrub vegetation on earth hummocks. Tsadaka soils, formed in a layer of mixed volcanic ash and loess over firm glacial till, are dominant. Earth hummock formation occurs primarily in response to cold temperatures and frost action. Deep frost penetration in winter (enhanced when winds remove and redistribute snow) and freeze-thaw cycles in fall and spring cause considerable mixing and redistribution of soil materials, and form hummocks. While soil horizons are often convoluted and fractured from frost churning, the high degree of horizon expression suggests that these soils have experienced prolonged periods of surface stability. Soil horizonation in Tsadaka soils consists of an "E", "Bhs", and "Bsm" sequence. The "Bsm" horizon is an indurated layer formed from the accumulation of iron at the loess-glacial till contact.

Poorly drained Cryaquepts, cool and very poorly drained Histosols, high elevation soils are found in association with Tsadaka soils on toeslopes and in depressions and drainages (General Soil Map Unit 12). Cryaquepts, cool soils typically have an organic rich "O", "A", and "Bg" sequence of horizons, and support low willow shrub vegetation. Histosols, high elevation soils, formed in thick deposits of slightly decomposed peat, are saturated to the surface most of the growing season and support sedge-grass and sedge-shrub wet meadows.

Steep mountainous areas 3600 to 5600 feet (1097 to 1707 m) elevation comprise the upper limits of the Area. Cryumbrepts soils, in association with extensive areas of surface bedrock, boulder fields, and talus, are dominant. These soils are poorly developed, with little horizonation except for dark, organic rich mineral surface horizons. Annual biomass production is low; however, low soil temperatures allow organic materials to accumulate in

surface soil horizons. Frost churning of unconsolidated materials incorporates organic matter into the soil profile. Vegetation consists of a variety of dwarf shrub, lichen, and herbaceous plant communities characteristic of the alpine zone.

References

Alaska State Housing Authority. 1968. *Timber resources in the Matanuska-Susitna Borough*. Comprehensive Planning Project Number P-24, Alaska State Housing Authority, pp. 119-138.

Allen, L. E., and W. M. Laughlin. 1967. "Molybdenum deficiency of cauliflower influenced by soil moisture and fertilizer rate." *Agronomy Journal* 59:505-506.

American Association of State Highway and Transportation Officials. 1986. *Standards and specifications for highway materials and methods of sampling and testing*. Ed. 14, 2 vols.

American Society for Testing and Materials. 1988. *Standard test method for infiltration rate of soils in field using double-ring infiltrometer*. ASTM Stand. D 3385-88.

American Society for Testing and Materials. 1993. *Standard classification of soils for engineering purposes*. ASTM Stand. D 2487.

B. C. Forest Service. 1979. *Site index curves for cottonwood*. Compiled by W. Sauerwein, USDA Natural Resources Conservation Service (formerly Soil Conservation Service), Portland, OR. 1 pp. mimeo.

Carling, D. E., and G. J. Michaelson. 1983. Unpublished data available at the Agricultural and Forestry Experiment Station, University of Alaska Fairbanks, Palmer, AK.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. *Classification of wetlands and deep-water habits of the United States.* U.S. Fish and Wildl. Serv. FWS/OBS. 79/31.

Dale, R. F. 1956. *The climate of the Matanuska Valley*. U.S. Dept. of Commerce Weather Bureau. Technical paper no. 27. Washington, DC: U.S. Govt. Printing Office.

Environmental Laboratory. 1987. *Corps of Engineers wetlands delineation manual*. Technical Report Y-87-1. US Army Engineers Waterways Experiment Station, Vicksburg, MS.

Farr, W. 1967. *Growth and yield of well-stocked white spruce stands in Alaska*. USDA Forest Service, Pacific NW Forest and Range Experiment Station, Portland, OR. Research paper PNW-53.

Federal Register. July 13, 1994. *Changes in hydric soils of the United States*. Washington, DC.

Federal Register. February 24, 1995. *Hydric soils of the United States*. Washington, DC.

Gregory, R. A., and P. M. Haack. 1965. *Growth and yield of well-stocked aspen and birch stands in Alaska*. USDA Forest Service, Pacific NW Forest and Range Experiment Station, Portland, OR. Research Paper NOR-2.

Hegg, K. M. 1970. *Forest resources of the Susitna Valley, Alaska*. USDA Forest Service, Pacific NW Forest and Range Experiment Station, Institute of Northern Forestry, Portland, OR. Resource Bulletin PNW-32.

Jury, W. A., W. R. Gardner, and W. H. Gardner. 1991. *Soil physics*, 5th ed. New York, NY: John Wiley and Sons, Inc.

Klebesadel, L. J., R. L. Taylor, W. M. Mitchell, G. J. Michaelson, and J. Purser. 1983. *Grain and forage crops for Southcentral Alaska*. Alaska Cooperative Extension, University of Alaska, Alaska Commercial Development Series A-00149.

Lamke, R. D. 1979. *Flood characteristics of Alaskan streams*. U.S. Geological Survey, Water Resources Investigations 78-129, Anchorage, AK, pp 34-36.

Laughlin, W. M. 1959. *Response of potatoes to potash fertilizer and spray*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Mimeo.

Laughlin, W. M. 1962. *Fertilizer practices for brome-grass*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Bulletin 32.

Laughlin, W. M. 1964. "Alaska soils vary in boron requirement." *Science in Alaska Proceedings, Fifteenth Alaska Science Conference*.

Laughlin, W. M. 1969. "Nitrogen, phosphorus, and potassium influence yield and chemical composition of bluejoint forage." *Agronomy Journal* 61:961-964.

Laughlin, W. M. 1971. *Response of potato to urea and other nitrogen sources*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Report 71-1.

Laughlin, W. M., and P. F. Martin. 1969. *Effects of lime on lettuce, beets, and carrot growth at two fertilizer rates on Homestead silt loam*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Misc. Publication 2.

Laughlin, W. M., P. F. Martin, and G. R. Smith. 1974. "Lime and phosphorus influences on Kennebec potato yield and chemical composition." *American Potato Journal* 51(12):392-402.

Laughlin, W. M., G. R. Smith, and M. A. Peters. 1981. "Sulfur, manganese, molybdenum, and magnesium influences on brome-grass forage yield and composition in Southcentral Alaska." *Communications in Soil Science and Plant Analysis* 12(4):299-317.

Laughlin, W. M., G. R. Smith, and M. A. Peters. 1987. "Effects of lime and four phosphate rates on yield of head lettuce, table beets, and carrots at Point MacKenzie." *Agroborealis* 19(1):34-38.

Laughlin, W. M., R. L. Taylor, L. J. Klebesadel, C. H. Dearborn, H. J. Hodgson, D. H. Dinkel, and A. Kallio. 1964. *General recommendations for fertilizers for Alaska*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Circular 13.

Loynachan, T. E. 1979. *Lime requirement indices of Alaska soils*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Bulletin 52.

Maeda, T., H. Takenaka, and B. P. Warkentin. 1977. "Physical properties of allophane soils." *Advances in Agronomy* 29:229-264.

Massie, M. R. C. 1966. *Marketing hardwoods from Alaska's Susitna Valley*. Institute of Social, Economic, and Government Research, University of Alaska. SEG Report no. 9.

McKendrick, J. D. 1983. *Alaska's rangelands*. Alaska Agriculture and Forestry. Alaska Rural Development Council Publication No. 3.

Michaelson, G. J., and C. L. Ping. 1987. "Effects of P, K, and liming on soil pH, Al, Mn, K, and forage barley dry matter yield and quality for a newly-cleared Cryorthod." *Plant and Soil* 104:155-161.

Michaelson, G. J., and C. L. Ping. 1989. *The effect of rock phosphate fertilizer on the establishment of timothy and brome-grass growth on volcanic ash-derived Alaska soils*. Agricultural and Foresty Experiment Station, University of Alaska Fairbanks. Research Progress Report No. 9.

Michaelson, G. J., and C. L. Ping. 1990. "Mehlich 3 extractable P of Alaska soils as affected by P fertilizer application." *Applied Agricultural Research* 5(4):261-267.

Michaelson, G. J., J. R. Offner, and C. L. Ping. 1984. "Soil fertility considerations for barley and oat forage production at Point MacKenzie." *Agroborealis* 16(1):5-8.

Mitchell, W. W. 1982. "Grasses and their uses in Alaska." *Agroborealis* 14:34-37.

Mitchell, W. W. 1984. *Ryegrasses: an option for an annual forage crop in Alaska*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Bulletin 64.

Mitchell, W. W. 1989. *Effects of nitrogen and phosphorus fertilization on yield and protein content of oat forage at Point MacKenzie*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Progress Report No. 10.

Mitchell, W. W., G. A. Mitchell, and D. Helm. 1987. *Perennial grass and soil response to four phosphorus rates at Point MacKenzie*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Progress Report No. 2.

Montgomery, J. M. 1990. *Conceptual model of groundwater resources from Big Lake to Palmer*. Palmer, AK: Matanuska-Susitna Borough Planning Dept.

National Research Council, Board of Agriculture, Committee on Rangeland Classification. 1994. *Rangeland health. New methods to classify, inventory, and monitor rangelands*. Washington, DC: National Academy Press.

National Research Council. 1995. *Wetlands: characteristics and boundaries*. Washington, DC: National Academy Press.

Packee, E. C. 1994. *Examining Alaska's forest vegetation zones*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Forest Sciences Notes No. 1.

Patric, J. H., and P. E. Black. 1968. *Potential evapotranspiration and climate in Alaska by Thornthwaite's Classification*. USDA Forest Service, Pacific NW Research Station. General Technical Report PNW-71.

Péwé, T. L. 1975. *Quaternary geology of Alaska*. Geological Survey Professional Paper 835. Washington, DC: U.S. Govt. Printing Office.

Ping, C. L. 1987. "Soil temperature profiles of two Alaskan soils." *Soil Science Society of America Journal* 51:1010-1018.

Purser, J., and M. Burgett. 1988. "Possible cation deficiency in potatoes in the Talkeetna area." In: *Demonstration and research report, 1988*, ed. K. Krieg. Alaska Cooperative Extension, Universitty of Alaska, pp. 75-77.

Reger, R. D., and R. G. Updike. 1983. "Physiographic map and index to field locations for guidebook I." In: *Guidebook to permafrost and quaternary geology along the Richardson and Glenn Highways between Fairbanks and Anchorage, Alaska*, ed. Péwé and Reger. Fourth International Conference on Permafrost, Division of Geological and Geophysical Surveys, Department of Natural Resources, State of Alaska.

Riehle, J. R. 1985. "A reconnaissance of the major Holocene tephra deposits in the upper Cook Inlet region, Alaska." *Journal of Volcanology and Geothermal Research* 26:37-74.

Schoephorster, D. B. 1968. *Soil survey of the Matanuska Valley Area, Alaska*. USDA Natural Resources Conservation Service (formerly Soil Conservation Service). Washington, DC: U.S. Govt. Printing Office.

Schoephorster, D. B., and R. B. Hinton. 1973. *Soil survey of the Susitna Valley Area, Alaska*. USDA Natural Resources Conservation Service (formerly Soil Conservation Service). Washington, DC: U.S. Govt. Printing Office.

Shoji, S., M. Nanazyo, and R. A Dahlgren. 1993. *Volcanic ash soils genesis, properties, and utilization*. Elsevier Science Publishers.

Soil Conservation Service. 1981. *Land resource areas of the United States*. U.S. Dept. Agric. Handb. 296. Washington, DC: U.S. Govt. Printing Office.

Soil Conservation Service. 1961. *Land capability classification*. U.S. Dept. Agric. Handb. 210. Washington, DC: U.S. Govt. Printing Office.

Soil Conservation Service. 1976. *National range handbook*. USDA Natural Resources Conservation Service (formerly Soil Conservation Service).

Soil Conservation Service. 1980. *National forestry manual*. USDA Natural Resources Conservation Service (formerly Soil Conservation Service).

Soil Survey Division Staff. 1993. *Soil survey manual*. U.S. Dept. Agric. Handb. No. 18. Washington, DC: U.S. Govt. Printing Office.

Soil Survey Staff. 1975. *Soil taxonomy: a basic system of soil classification for making and interpreting soil surveys*. USDA Natural Resources Conservation Service (formerly Soil Conservation Service). U.S. Dept. Agric. Handb. No. 436. Washington, DC: U.S. Govt. Printing Office.

Soil Survey Staff. 1996a. *Soil survey laboratory methods manual*. USDA Natural Resources Conservation Service. Soil Surv. Invest. Rep. 42, version 3.0. Washington, DC: U.S. Govt. Printing Office.

Soil Survey Staff. 1996b. *National soil survey handbook, title 430-VI*. USDA Natural Resources Conservation Service. Washington, DC: U.S. Govt. Printing Office.

Soil Survey Staff. 1996c. *Keys to soil taxonomy*. 6th ed., 1994. USDA Natural Resources Conservation Service. Washington, DC: U.S. Govt. Printing Office.

State of Alaska, AK Dept. of Natural Resources, AK Dept. of Fish and Game, Matanuska-Susitna Borough, and USDA Natural Resources Conservation Service (formerly Soil Conservation Service). 1982. *Willow sub-basin area plan. A land use plan for public lands*. 283 pp.

State of Alaska, AK Dept. of Natural Resources, AK Dept. of Fish and Game, Matanuska-Susitna Borough, and USDA Natural Resources Conservation Service (formerly Soil Conservation Service). 1985. *Susitna area plan*. 440 pp.

State of Alaska, AK Dept. of Natural Resources, AK Dept. of Fish and Game, AK Dept. of Transportation and Public Facilities, and Matanuska-Susitna Borough. 1986a. *Hatcher Pass management plan*. 364 pp.

State of Alaska, AK Dept. of Natural Resources, AK Dept. of Fish and Game, AK Dept. of Transportation and Public Facilities, and Matanuska-Susitna Borough. 1986b. *Matanuska Valley moose range management plan*. 256 pp.

State of Alaska, AK Dept. of Natural Resources, Div. of Land and Water Mgmt. 1989. *Deception Creek land use plan*. 98pp.

Tiner, R. W., Jr. 1985. *Wetlands of Delaware*. Cooperative Publication. U.S. Fish and Wildlife Service, Newton Corner, MA, USA and Delaware Department of Natural Resources and Environmental Control, Wetlands Section, Dover, DE, USA.

Tueller, P. T. 1973. "Secondary succession, disclimax, and range conditions standards in desert shrub vegetation." *Proceedings of the 3rd workshop of U.S./Australia Rangelands Panel, Tucson, AZ*, ed. D. N. Hyder. pp. 57-65.

United States Department of Agriculture. 1986. "Timber and vegetation resources of the Susitna River Basin, Alaska." *Susitna River Basin study report*. 49 pp.

United States Department of Agriculture. 1996. *Field indicators of hydric soils in the United States*, ed. G. W. Hurt, P. M. Whited, and R. F. Pringle. Fort Worth, TX: USDA Natural Resources Conservation Service.

United States Department of Agriculture, National Agricultural Statistics Service. 1997. *Alaska agricultural statistics 1997*. Annual Report. Palmer, AK: National Agricultural Statistics Service.

Viereck, L. A., C. T. Dyrness, A. R. Batten, and K. J. Wenzlick. 1992. *The Alaska vegetation classification*. USDA Forest Service, Pacific NW Research Station. General Technical Report PNW-GTR-286.

Vince, S. W., and A. A. Snow. 1984. "Plant zonation in an Alaska salt marsh: 1. distribution, abundance, and environmental factors." *Journal of Ecology* 72:651-667.

Walworth, J. L., D. E. Carling, G. J. Michaelson, and C. L. Ping. 1990a. *Effects of residual soil nitrogen and applied nitrogen on yields of head lettuce*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Research Progress Report No. 10.

Walworth, J. L., R. G. Gavlak, and J. E. Muniz. 1990b. *Effects of soil fertility on potato plant development in the Matanuska Valley*. Agricultural and Forestry Experiment Station, University of Alaska Fairbanks. Research Progress Report No. 15.

Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. A body of alluvium, with overflow of water and debris flow deposits, whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a less sloping surface. Source uplands range in relief and aerial extent from mountains to gullied terrain on hill slopes.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpine. Land and related resources occurring above the upper elevational limit of trees (treeline).

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Aspect. The direction in which a slope faces; or the general physical appearance of a vegetation cover type.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as:

Very low	0 to 2
Low	2 to 4
Moderate	4 to 6
High	More than 6

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, linear, and may or may not include cliff segments.

Basal area. For trees, the area of the cross section of a single tree or of all trees in a stand, usually measured at breast height (see breast height), expressed in ft^2/acre or m^2/ha. For herbs and shrubs, the area or proportion of the ground surface covered by the stem or stems of plants at about ground level, expressed in ft^2/acre, m^2/ha, or percent.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bog. A peat-forming ecosystem influenced solely by water which falls directly on to it as rain or snow. Bog vegetation is predominately herbs, shrubs, and stunted trees. *Sphagnum* spp. usually dominate the moss layer.

Boulders. Rock fragments larger than 2 feet (60 cm) in diameter.

Breast height. A standard height for measurement of tree diameter and age; 4.5 feet (1.37 m) above the average ground level.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Canopy. The cover of leaves and branches formed by the tops or crowns of plants as viewed from above.

Canopy cover. The proportion of the ground area covered by the vertical projections of the canopy, expressed as a percent.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil material. Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or shiest as much as 6 inches (15 cm) along the longest axis. A single piece is called a channer.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clayey soil. Silty clay, sandy clay, or clay.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobbles (or cobblestones). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25.4 cm) in diameter.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose—Noncoherent when dry or moist; does not hold together in a mass.

Friable—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft—When dry, breaks into powder or individual grains under very slight pressure.

Cemented—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is the part of the soil profile between 10 and 40 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover type. A unit of vegetation essentially similar in composition and development throughout its extent. Synonyms: community type, vegetation type.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cryoturbation. A collective term used to describe all soil movements due to frost action, characterized by folded, broken, and dislocated beds and lenses of unconsolidated deposits.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Depth, soil. Generally, the thickness of soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation; as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained

soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Dusty. Soil particles detach easily and cause dust.

Eluviation. The movement of material in a true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthly parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ericaceous. Refers primarily to the Heath (Ericaceae) family, for example, Labrador-tea (*Ledum* spp.); but usually includes the Crowberry (Empetraceae) family also.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods, and resulting in the wearing away of mountains and the building up of such landscape features as floodplains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, for example fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff, breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. The term is more often applied to cliffs resulting from differential erosion.

Esker. A long, narrow, sinuous, steep-sided ridge, composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier, and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length, and from 10 to 100 feet in height.

Excess fines (in tables). Excess silt and clay in soil. The soil does not provide a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured soil. Sandy clay, silty clay, or clay.

Flats. A general term for a level or nearly level surface or small area of land marked by little or no relief.

Floodplain. A nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The geomorphic component that forms the inner, gently inclined surface at the base of a hill slope. The surface profile is dominantly concave. In terms of gradational processes, a footslope is a transition zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A unit of forest vegetation essentially similar in composition and development throughout its extent.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciated uplands. Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the floodplain.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 mm to 7.6 cm) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, and as much as 3 inches (7.6 cm) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Herb. Grasses, sedges, forbs, and any other non-woody herbaceous plants.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 12 percent. The distinction between a hill and a mountain is arbitrary, and criteria in this manuscript use slope lengths of less than 1,000 feet (less than 305 m) to distinguish hills from mountains.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons of mineral soil are as follows:

O horizon—An organic layer of fresh and decaying plant residue.

A horizon—The mineral horizon at or near the surface in which an accumulation of

humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon—The mineral horizon below an A horizon. The B horizon is, in part, a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

E horizon—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

C horizon—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.

Cr horizon—Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Hummock. A rounded or conical mound or other small elevation. Also, a slight rise of ground above a level surface.

Humus. The well decomposed, more or less stable, part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. Group A soils have a high infiltration rate when thoroughly wet and a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. Group D soils, at the other extreme, have a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface and a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material; as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 cm) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam,

loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength (in tables). The soil is not strong enough to support loads.

Mean annual increment (MAI). The average annual increase in volume of a tree during the entire life of the tree, or stand of trees during the life of the stand.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches (5 to 30 cm) higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches (5 to 30 cm) lower than the adjacent microhigh.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minor components. A component of limited extent that may not be present.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Morphology, soil. The physical makeup of the soil including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface rising more than 1,000 feet (more than 305 m) above surrounding lowlands, commonly of limited summit area, and generally having steep sides (slopes greater than 25 percent) and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are primarily formed by deep-seated earth movements or volcanic action, and secondarily by differential erosion.

Muck. Dark, finely divided, well decomposed organic soil material (see sapric soil material).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3 (see reaction, soil).

Nutrient, plant. Any element taken in by a plant that is essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil; and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. An extensive, nearly level to gently rolling area of glaciofluvial material that was deposited by meltwater streams and that has a slope of from 0 to 12 percent.

Overstory. The trees in a forest that form the upper canopy layer or layers.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture (see fibric soil material).

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100

square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	Less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	More than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management; for example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil (see reaction, soil).

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential natural plant community. The assemblage of plants that most nearly achieves a long-term steady state of productivity, structure, and composition on a site. Synonyms: potential plant community, climax plant community, plant association.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproductive capacity of the key plants, and promotes the accumulation of litter and mulch necessary to conserve soil and water.

pz. Precipitation zone.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	Below 3.5
Extremely acid	3.5 to 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regeneration. The new growth of a natural plant community developing from seed.

Relief. The elevations or inequalities of a land surface, considered collectively.

Riparian zone. Land in close proximity to a water course, lake, or spring and influenced by surface and ground water during all or part of the year.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. Water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy soil. Sand or loamy sand.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Shoulder slope. The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 100 years is 75 feet, the site index is 75.

Slippery when wet. Wheeled vehicles tend to slide or lose grip when soil conditions are wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. Though slope ranges may vary somewhat, in this survey the following slope classes are recognized:

Undulating	0 to 10 percent
Gently sloping	2 to 12 percent
Sloping	2 to 20 percent
Moderately steep	12 to 35 percent

Steep	20 to 60 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (less than 7.6 cm) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	Less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stones. Rock fragments 10 to 24 inches (25 to 61 cm) in diameter if rounded, or 6 to 15 inches (15 to 38 cm) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned floodplain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are: *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. A general term for the top or highest level of an upland feature such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 cm). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from

and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive, nearly level to gently rolling area that is underlain by or consists of till, and that has a slope of 0 to 12 percent.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

Trace elements. Chemical elements, for example zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Understory. Any plants in a forest or scrub community growing below, and partially shaded by, the tree or shrub overstory.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Very deep soil. A soil that is more than 60 inches deep over bedrock or other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or other material that restricts the penetration of plant roots.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wetness (in tables). The soil is wet during the period of desired use.

Windthrow. The action of uprooting and tipping over trees by the wind.

Tables

TABLE 1--TEMPERATURE AND PRECIPITATION AT PALMER, ALASKA
(STATION AAES, 6870)

Month	Temperature (°F)						Precipitation (Inches)				
	avg. daily max.	avg. daily min.	avg.	2 yrs in 10 will have max. temp. >than	2 yrs in 10 will have min. temp. <than	avg. # of grow deg. days*	avg.	2 yrs in 10 will have less than	2 yrs in 10 will have more than	avg. # of days w/.1 or more	avg. total snow fall
January	20.8	5.1	13.0	47	-28	1	0.92	0.29	1.47	2	9.3
February	26.0	8.5	17.3	48	-22	1	0.75	0.24	1.19	2	9.9
March	34.3	15.5	24.9	50	-14	2	0.63	0.26	1.01	2	7.7
April	45.4	27.2	36.3	61	6	24	0.52	0.13	0.88	1	3.2
May	57.2	36.8	47.0	74	25	218	0.67	0.23	1.06	2	0.1
June	64.4	44.8	54.6	80	35	427	1.36	0.77	1.88	4	0.0
July	66.7	48.3	57.5	81	40	531	2.11	1.12	2.99	6	0.0
August	64.2	46.4	55.3	78	33	468	2.24	1.15	3.19	6	0.0
September	56.1	39.0	47.6	68	22	233	2.50	1.25	3.58	6	0.0
October	41.6	26.2	33.9	59	2	32	1.55	0.77	2.22	5	5.3
November	27.6	12.7	20.2	50	-15	3	1.04	0.36	1.68	3	8.5
December	21.9	6.9	14.4	47	-26	1	1.12	0.48	1.65	3	12.7
Yearly :	-----	-----	----	-----	-----	-----	----	-----	-----	----	----
Average	43.8	26.5	35.2	---	---	---	----	----	----	---	---
Extreme	87	-38	---	83	-30	---	----	----	----	---	---
Total	---	---	---	---	---	1940	15.40	10.99	17.75	42	56.7

Average # of days per year with at least 1 inch of snow on the ground: 91

*A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (Threshold: 40.0 F).

TABLE 2--TEMPERATURE AND PRECIPITATION AT TALKEETNA, ALASKA
(STATION WSCMO AP, 8976)

Month	Temperature (°F)						Precipitation (Inches)				
	avg. daily max.	avg. daily min.	avg.	2 yrs in 10 will have max. temp. >than	2 yrs in 10 will have min. temp. <than	avg. # of grow deg. days*	avg.	2 yrs in 10 will have less than	2 yrs in 10 will have more than	avg. # of days w/.1 or more	avg. total snow fall
January	19.1	0.8	9.9	39	-37	0	1.48	0.50	2.34	4	18.9
February	25.1	3.8	14.4	43	-35	0	1.51	0.52	2.39	4	19.4
March	33.2	8.9	21.1	49	-28	0	1.40	0.38	2.21	3	17.6
April	44.1	22.5	33.3	60	-4	8	1.30	0.35	2.06	3	9.8
May	56.3	34.0	45.2	75	21	173	1.47	0.81	2.05	4	0.9
June	65.2	44.6	54.9	84	32	443	2.38	1.09	3.50	6	0.0
July	67.8	48.8	58.3	86	38	567	3.45	2.02	4.72	8	0.0
August	64.5	45.8	55.1	80	31	468	4.65	2.70	6.38	9	0.0
September	55.2	36.6	45.9	70	20	191	4.24	2.31	5.93	9	0.3
October	39.6	23.3	31.4	57	-6	13	2.79	1.51	3.92	7	11.1
November	25.6	8.8	17.2	43	-25	0	1.84	0.58	2.86	5	19.2
December	19.4	2.3	10.9	40	-35	0	1.80	0.80	2.66	5	23.0
Yearly :	-----	-----	----	-----	-----	-----	-----	-----	-----	----	-----
Average	42.9	23.4	33.1	---	---	---	----	----	----	---	---
Extreme	91	-53	---	87	-41	---	----	----	----	---	---
Total	---	---	---	---	---	1864	28.30	21.75	33.55	67	120.1

Average # of days per year with at least 1 inch of snow on the ground: 189

*A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (Threshold: 40.0 °F).

TABLE 3--PROBABILITY OF FROST AT PALMER, ALASKA
(STATION AAES, 6870)

Probability	Temperature		
	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than --	May 1	May 13	May 27
2 years in 10 later than --	April 27	May 9	May 22
5 years in 10 later than --	April 19	May 1	May 15
First freezing temperature in fall:			
1 yr. in 10 earlier than --	September 23	September 5	August 27
2 yrs. in 10 earlier than--	September 28	September 12	September 2
5 yrs. in 10 earlier than--	October 6	September 23	September 14

TABLE 4--PROBABILITY OF FROST AT TALKEETNA, ALASKA
(STATION WSCMO AP, 8976)

Probability	Temperature		
	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than --	May 12	May 22	June 5
2 years in 10 later than --	May 8	May 18	June 1
5 years in 10 later than --	April 30	May 12	May 26
First freezing temperature in fall:			
1 yr. in 10 earlier than --	September 15	September 2	August 22
2 yrs. in 10 earlier than--	September 19	September 8	August 27
5 yrs. in 10 earlier than--	September 28	September 19	September 6

TABLE 5--GROWING SEASON PROBABILITY AT PALMER, ALASKA
(STATION AAES, 6870)

Probability	Daily Minimum Temperature		
	# days > 24°F	# days > 28°F	# days > 32°F
9 years in 10	136	116	95
8 years in 10	144	124	103
5 years in 10	158	140	119
2 years in 10	173	155	134
1 year in 10	181	163	142

TABLE 6--GROWING SEASON PROBABILITY AT TALKEETNA, ALASKA
(STATION WSCMO AP, 8976)

Probability	Daily Minimum Temperature		
	# days > 24°F	# days > 28°F	# days > 32°F
9 years in 10	121	104	82
8 years in 10	127	110	89
5 years in 10	138	122	101
2 years in 10	149	133	113
1 year in 10	155	139	119

TABLE 7--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map Symbol	Soil name	Acres	Percent
101	Benka silt loam, 0 to 3 percent slopes	30,201	1.7
102	Benka silt loam, sloping and moderately steep	3,362	0.2
103	Benka silt loam, undulating	6,228	0.4
104	Benka-Liten complex, nearly level and moderately steep	16,362	0.9
105	Bodenburg silt loam, 0 to 3 percent slopes	1,913	0.1
106	Bodenburg silt loam, sloping and moderately steep	1,286	0.1
107	Bodenburg silt loam, steep and sloping	838	*
108	Bodenburg silt loam, undulating	1,692	0.1
109	Bodenburg silt loam, silty substratum, 0 to 3 percent slopes	1,197	0.1
110	Bodenburg silt loam, silty substratum, sloping and moderately steep	3,283	0.2
111	Bodenburg silt loam, silty substratum, undulating	1,548	0.1
112	Bodenburg-Jim complex, steep and sloping	681	*
113	Chilligan, hilly-Cryaquepts complex	320	*
114	Chilligan, undulating-Cryaquepts complex	4,342	0.2
115	Chunilna mucky silt loam, cool, 5 to 20 percent slopes	11,414	0.6
116	Cryaquepts, depressional, 0 to 7 percent slopes	89,010	5.0
117	Cryods, 35 to 90 percent slopes	34,539	1.9
118	Cryods, cool-Niklason, moderately wet-Qeni complex, 0 to 15 percent slopes	3,696	0.2
119	Cryods and Cryaquepts, cool, 0 to 35 percent slopes	40,775	2.3
120	Cryods, low elevation and Cryochrepts, 30 to 70 percent slopes	34,163	1.9
121	Cryods, shallow, 35 to 90 percent slopes	20,377	1.1
122	Deception silt loam, rolling	16,424	0.9
123	Deception silt loam, sloping and moderately steep	8,044	0.5
124	Deception silt loam, steep and sloping	4,417	0.2
125	Deception silt loam, undulating	2,056	0.1
126	Delyndia silt loam, 0 to 5 percent slopes	7,343	0.4
127	Delyndia-Histosols complex, 0 to 3 percent slopes	4,180	0.2
128	Disappoint very cobbly mucky silt loam, 0 to 12 percent slopes	3,340	0.2
129	Eska silt loam, sloping and moderately steep	593	*
130	Eska-Jim complex, sloping and moderately steep	5,168	0.3
131	Estelle silt loam, rolling	9,408	0.5
132	Estelle silt loam, sloping and moderately steep	10,525	0.6
133	Estelle silt loam, steep and sloping	6,493	0.4
134	Estelle silt loam, undulating	2,293	0.1
135	Estelle, hilly-Disappoint complex	23,500	1.3
136	Estelle, undulating-Disappoint complex	22,493	1.3
137	Flat Horn silt loam, 0 to 5 percent slopes	899	0.1
138	Flat Horn silt loam, rolling	257	*
139	Flat Horn silt loam, sloping and moderately steep	324	*
140	Goldcord-Tsadaka complex, 0 to 30 percent slopes	21,079	1.2
141	Histosols	336,087	18.9
142	Histosols, high elevation	869	*
143	Kalambach silt loam, sloping and moderately steep	3,765	0.2
144	Kalambach silt loam, steep and sloping	335	*
145	Kalambach silt loam, undulating	4,088	0.2
146	Kalambach-Disappoint complex, 0 to 10 percent slopes	114	*
147	Kashwitna silt loam, 0 to 3 percent slopes	25,243	1.4
148	Kashwitna silt loam, sloping and moderately steep	4,436	0.2
149	Kashwitna silt loam, undulating	8,506	0.5
150	Keba silt loam, undulating	379	*
151	Kichatna silt loam, 0 to 3 percent slopes	14,853	0.8
152	Kichatna silt loam, sloping and moderately steep	13,497	0.8
153	Kichatna silt loam, steep and sloping	6,582	0.4
154	Kichatna silt loam, undulating	7,269	0.4
155	Kichatna-Deception complex, sloping and moderately steep	2,572	0.1
156	Kichatna-Deception complex, steep and sloping	2,763	0.2
157	Kichatna-Delyndia complex, moderately steep and gently sloping	1,505	0.1
158	Kichatna-Delyndia silt loams, 0 to 4 percent slopes	4,183	0.2

* See footnote at end of table.

TABLE 7--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
159	Kidazqeni, cool and Niklason, cool soils, 4 to 12 percent slopes	4,202	0.2
160	Kidazqeni silt loam, rarely flooded, 0 to 2 percent slopes	315	*
161	Kidazqeni soils, 0 to 2 percent slopes	6,468	0.4
162	Kidazqeni-Niklason complex, 0 to 2 percent slopes	16,159	0.9
163	Killey and Moose River soils, 0 to 2 percent slopes	17,236	1.0
164	Knik silt loam, 0 to 3 percent slopes	12,343	0.7
165	Knik silt loam, gently sloping and moderately steep	9,211	0.5
166	Knik silt loam, steep and sloping	10,643	0.6
167	Knik silt loam, undulating	8,533	0.5
168	Knik-Cryaquepts complex, 0 to 25 percent slopes	394	*
169	Liten silt loam, hilly	2,720	0.2
170	Mine spoils	163	*
171	Nancy silt loam, 0 to 3 percent slopes	52,976	3.0
172	Nancy silt loam, sloping and moderately steep	41,646	2.3
173	Nancy silt loam, steep and sloping	8,903	0.5
174	Nancy silt loam, undulating	13,760	0.8
175	Nancy-Cryaquepts complex, 0 to 5 percent slopes	2,704	0.2
176	Nancy-Tokositna complex, sloping and moderately steep	973	0.1
177	Nancy-Tokositna complex, steep and sloping	2,817	0.2
178	Nancy-Tokositna complex, undulating	744	*
179	Pits, gravel	801	*
180	Psuyaah-Snowdance complex, 5 to 20 percent slopes	8,921	0.5
181	Qeni, cool-Niklavar, cool-Cryods, cold complex, 0 to 25 percent slopes	2,588	0.1
182	Riverwash and Niklavar soils, 0 to 2 percent slopes	10,140	0.6
183	Rock outcrop-Cryumbrepts association, extremely steep	58,122	3.3
184	Siwash-Talkeetna, cool-Snowdance association, 0 to 30 percent slopes	16,888	0.9
185	Susitna silt loam, 0 to 2 percent slopes	14,158	0.8
186	Susivar-Moose River complex, 0 to 2 percent slopes	40,065	2.3
187	Susivar and Niklavar fine sandy loams	24,669	1.4
188	Talkeetna very fine sandy loam, warm, 15 to 35 percent slopes	2,855	0.2
189	Talkeetna-Talkeetna, thick surface complex, 15 to 35 percent slopes	15,325	0.9
190	Talkeetna, warm-Talkeetna, thick surface complex, hilly	25,203	1.4
191	Talkeetna, warm and Talkeetna, thick surface soils, 15 to 45 percent slopes	46,622	2.6
192	Talkeetna, low elevation-Deneka, low elevation association, steep and moderately steep	28,307	1.6
193	Talkeetna, warm-Talkeetna, thick surface-Deneka complex, hilly	11,415	0.6
194	Talkeetna, cool-Snowdance complex, 5 to 25 percent slopes	10,292	0.6
195	Talkeetna, cool-Tsadaka-Chunilna, cool complex, 10 to 35 percent slopes	4,711	0.3
196	Tidal flats	12,490	0.7
197	Tokositna silt loam, sloping and moderately steep	23,872	1.3
198	Tokositna silt loam, steep and sloping	7,653	0.4
199	Tokositna silt loam, undulating	4,402	0.2
200	Tokositna, hilly-Chunilna complex	38,776	2.2
201	Tokositna, undulating-Chunilna complex	42,457	2.4
202	Tsadaka-Talkeetna, cool complex, 5 to 25 percent slopes	3,411	0.2
203	Typic Cryaquents, 0 to 2 percent slopes	44,017	2.5
204	Typic Cryaquents, coastal, 0 to 2 percent slopes	34,818	2.0
205	Whitsol silt loam, 0 to 2 percent slopes	392	*
206	Whitsol silt loam, cool, sloping and moderately steep	8,167	0.5
207	Whitsol silt loam, cool, steep and sloping	596	*
208	Whitsol silt loam, silty substratum, 0 to 7 percent slopes	13,401	0.8
209	Whitsol silt loam, silty substratum, sloping and moderately steep	4,233	0.2
210	Whitsol silt loam, till substratum, sloping and moderately steep	1,647	0.1
211	Whitsol silt loam, till substratum, undulating	4,670	0.3
212	Yensus silt loam, 0 to 2 percent slopes	973	0.1
213	Yensus silt loam, sloping and moderately steep	4,080	0.2
214	Yensus silt loam, undulating	2,751	0.2
215	Yohn silt loam, 0 to 5 percent slopes	217	*
216	Yohn silt loam, rolling	4,797	0.3
217	Yohn-Deception complex, rolling	662	*

* See footnote at end of table.

TABLE 7--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
218	Yohn-Delyndia complex, hilly	978	0.1
219	Yohn-Flat Horn complex, rolling	1,010	0.1
W	Water	90,131	5.1
	Total	1,777,702	100.0

* Less than 0.1 percent.

TABLE 8--NONIRRIGATED LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability	Barley	Grass hay	Oats	Potatoes, Irish
		(BU)	(TONS)	(BU)	(CWT)
101: Benka	3E	55	3.0	65	160
102: Benka sloping	4E	50	2.75	60	150
Benka moderately steep	6E				
103: Benka	3E	55	3.0	65	160
104: Benka	3E	55	3.0	65	160
Liten	6E				
105: Bodenburg	3E	55	3.0	65	260
106: Bodenburg sloping	4E	45	3.0	50	240
Bodenburg moderately steep	6E		2.0		
107: Bodenburg steep	7E				
Bodenburg sloping	4E	45	3.0	50	240
108: Bodenburg	3E	55	3.0	65	260
109: Bodenburg silty	3E	55	3.0	65	260
110: Bodenburg silty, sloping	4E	45	3.0	50	240
Bodenburg silty, moderately steep	6E		2.0		
111: Bodenburg silty	3E	55	3.0	65	260
112: Bodenburg steep	7E				
Bodenburg sloping	4E	45	3.0	50	240
Jim steep	7E				
113: Chilligan	6E				
Cryaquepts	7W				
114: Chilligan	3E	50	2.0	55	160
Cryaquepts	7W				
115: Chunilna cool	6W				
116: Cryaquepts depressional	7W				
117: Cryods	7E				
118: Cryods cool	7E				
Niklason moderately wet	4W	55	3.0	65	240
Qeni	6W				
119: Cryods	6E				
Cryaquepts	7W				
120: Cryods low elevation	7E				
Cryochrepts	7E				
121: Cryods	7E				
122: Deception	6S	35	1.5	40	

TABLE 8--NONIRRIGATED LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Barley	Grass hay	Oats	Potatoes, Irish
		(BU)	(TONS)	(BU)	(CWT)
123: Deception sloping	6S	35	1.5	40	
Deception moderately steep	7E				
124: Deception steep	7E				
Deception sloping	6E		1.0		
125: Deception	6S	40	1.75	45	
126: Delyndia	4S	45	1.75	50	150
127: Delyndia	4S	45	1.75	50	150
Histosols	7W				
128: Disappoint	7W				
129: Eska sloping	4E	45	3.0	50	240
Eska moderately steep	6E				
130: Eska sloping	4E	45	3.0	50	240
Eska moderately steep	6E				
Jim	4E				
131: Estelle	4E	45	1.75	50	145
132: Estelle sloping	4E	45	1.75	50	145
Estelle moderately steep	6E		1.25		
133: Estelle steep	7E				
Estelle sloping	6E	40	1.75	45	
134: Estelle	3E	50	2.0	55	150
135: Estelle	6E	40	1.75	45	
Disappoint	7W				
136: Estelle	4E	45	1.75	50	145
Disappoint	7W				
137: Flat Horn	3E	50	2.0	55	160
138: Flat Horn	4E	45	1.75	50	150
139: Flat Horn sloping	4E	45	1.75	50	150
Flat Horn moderately steep	6E		1.25		
140: Goldcord	7E				
Tsadaka	6E				
141: Histosols	7W				
142: Histosols high elevation	7W				
143: Kalambach gently sloping	3E	50	2.5	60	220
Kalambach moderately steep	6E				
144: Kalambach steep	7E				
Kalambach sloping	6E		2.0		
145: Kalambach	3E	50	2.5	60	220
146: Kalambach	3E	50	2.5	60	220
Disappoint	7W				

TABLE 8--NONIRRIGATED LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Barley	Grass hay	Oats	Potatoes, Irish
		(BU)	(TONS)	(BU)	(CWT)
147: Kashwitna	3E	45	2.0	55	150
148: Kashwitna sloping	4E	45	1.75	50	145
Kashwitna moderately steep	6E		1.25		
149: Kashwitna	3E	45	2.0	55	150
150: Keba	3E				
151: Kichatna	6S	40	1.75	45	
152: Kichatna sloping	6S	40	1.75	45	
Kichatna moderately steep	6S		1.0		
153: Kichatna steep	7S				
Kichatna sloping	6S		1.0		
154: Kichatna	6S	40	1.75	45	
155: Kichatna	6S		1.0		
Deception	6E		1.0		
156: Kichatna steep	7S				
Deception sloping	6S	35	1.5	40	
Deception steep	7E				
157: Kichatna	6S		1.0		
Delyndia	4S	45	1.75	50	150
158: Kichatna	6S	40	1.75	45	
Delyndia	4S	45	1.75	50	150
159: Kidazqeni cool	6W				
Niklason cool	4W				
160: Kidazqeni	6W				
161: Kidazqeni moderately wet	6W				
Kidazqeni	6W				
162: Kidazqeni	6W				
Niklason	4W	50	3.0	60	220
163: Killey	5W				
Moose River	5W				
164: Knik	3E	50	2.5	60	220
165: Knik gently sloping	4E	45	2.5	50	180
Knik moderately steep	6E				
166: Knik steep	7E				
Knik sloping	4E	45	2.5	50	180
167: Knik	3E	50	2.5	60	220
168: Knik	6E		2.0		
Cryaquepts	7W				
169: Liten	6E				
170: Mine spoils	---				

TABLE 8--NONIRRIGATED LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Barley	Grass hay	Oats	Potatoes, Irish
		(BU)	(TONS)	(BU)	(CWT)
171: Nancy	3E	55	3.0	65	160
172: Nancy sloping	4E	50	2.75	60	150
Nancy moderately steep					
173: Nancy steep	7E				
Nancy sloping	4E	50	2.75	60	150
174: Nancy	3E	55	3.0	65	160
175: Nancy	3E	55	3.0	65	160
Cryaquepts	7W				
176: Nancy sloping	4E	50	2.75	60	150
Nancy moderately steep	6E				
Tokositna moderately steep	6E				
177: Nancy steep	7E				
Tokositna steep	7E				
Nancy sloping	6E	45	2.25	55	
178: Nancy	3E	55	3.0	65	160
Tokositna	3E				
179: Pits, gravel	---				
180: Psuyaah	6W				
Snowdance	6W				
181: Qeni cool	6W				
Niklavar cool	4W				
Cryods cold	6E				
182: Riverwash	---				
Niklavar	5W				
183: Rock outcrop	---				
Cryumbrepts	7E				
184: Siwash	6E				
Talkeetna cool	6E				
Snowdance	5W				
185: Susitna	3C	55	3.0	65	240
186: Susivar	4W	55	3.0	65	240
Moose River	5W				
187: Susivar	4W	55	3.0	65	240
Niklavar	4W	55	3.0	65	240
188: Talkeetna warm					
189: Talkeetna	6E				
Talkeetna thick surface	6E				
190: Talkeetna warm	6E				
Talkeetna thick surface	6E				
191: Talkeetna warm	7E				
Talkeetna thick surface	7E				

TABLE 8--NONIRRIGATED LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Barley	Grass hay	Oats	Potatoes, Irish
		(BU)	(TONS)	(BU)	(CWT)
192: Talkeetna low elevation	7E				
Deneka low elevation	6E				
193: Talkeetna warm	7E				
Talkeetna thick surface	7E				
Deneka	4S				
194: Talkeetna cool	6E				
Snowdance	6W				
195: Talkeetna cool	6E				
Tsadaka	6E				
Chunilna cool	6W				
196: Tidal flats	---				
197: Tokositna sloping	4E				
Tokositna moderately steep	6E				
198: Tokositna steep	7E				
Tokositna sloping	6E				
199: Tokositna	3E				
200: Tokositna	6E				
Chunilna	6W				
201: Tokositna	3E				
Chunilna	6W				
202: Tsadaka	6E				
203: Typic Cryaquents	7W				
204: Typic Cryaquents, coastal	7W				
205: Whitsol	3C	50	3.5	65	160
206: Whitsol cool, sloping	4E	55	3.0	65	
Whitsol cool, moderately steep	7E		2.25		
207: Whitsol cool, steep	7E		2.25		
Whitsol cool, sloping	6E	50	2.75	60	
208: Whitsol silty	3C	55	3.0	65	160
209: Whitsol silty, sloping	4E	55	3.0	65	
Whitsol silty, moderately steep	7E		2.25		
210: Whitsol till, sloping	4E	55	3.0	65	
Whitsol till, moderately steep	7E		2.25		
211: Whitsol till	3C	55	3.0	65	160
212: Yensus	3C	55	3.0	65	260
213: Yensus sloping	4E	50	3.0	50	240
Yensus moderately steep	6E		2.0		

TABLE 8--NONIRRIGATED LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Barley	Grass hay	Oats	Potatoes, Irish
		(BU)	(TONS)	(BU)	(CWT)
214: Yensus	3E	55	3.0	65	260
215: Yohn	3E	50	2.0	55	150
216: Yohn	4E	45	1.75	50	145
217: Yohn	4E	45	1.75	50	145
Deception	6S	35	1.5	40	
218: Yohn	6E		1.25		
Delyndia	4S		1.5		
219: Yohn	3E	50	2.0	55	150
Flat Horn	3E	50	2.0	55	160
W Water	---				

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION

(Absence of an entry indicates that data were not available.)

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
101: Benka	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
102: Benka sloping	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
Benka moderately steep	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
103: Benka	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
104: Benka	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
Liten	Sand dunes	---	American twinflower	--	11
			Bebb's willow	--	5
			Labrador tea ledum	--	7
			bluejoint reedgrass	--	5
			bunchberry dogwood	--	3
			common fireweed	--	6
			highbush cranberry	--	9
			lowbush cranberry	--	2
			prickly rose	--	5
			Overstory:		
			paper birch	--	47
			quaking aspen	--	20
			white spruce	--	10
105: Bodenburg	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
106: Bodenburg sloping	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
Bodenburg moderately steep	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
107: Bodenburg steep	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
Bodenburg sloping	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
108: Bodenburg	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
109: Bodenburg silty	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
110: Bodenburg silty, sloping	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
110: Bodenburg silty, moderately steep	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
111: Bodenburg silty	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
112: Bodenburg steep	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
Bodenburg sloping	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
Jim	Bedrock hills, 15-25 inch pz.	---	bluejoint reedgrass	--	13
			bunchberry dogwood	--	20
			common fireweed	--	1
			highbush cranberry	--	7
			lowbush cranberry	--	3
			oakfern	--	1
			prickly rose	--	2
			willow	--	3
			wintergreen	--	1
			Overstory:		
			paper birch	--	18
			white spruce	--	18

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
113: Chilligan	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
Cryaquepts	Drift deposits, very poorly drained	---	alder	--	11
			bluejoint reedgrass	--	24
			bunchberry dogwood	--	4
			devil's club	--	20
			oakfern	--	6
			prickly rose	--	3
			red elderberry	--	4
			rusty menziesia	--	8
			shield fern	--	5
			Overstory:		
			paper birch	--	24
			white spruce	--	16
114: Chilligan	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
Cryaquepts	Drift deposits, very poorly drained	---	alder	--	11
			bluejoint reedgrass	--	24
			bunchberry dogwood	--	4
			devil's club	--	20
			oakfern	--	6
			prickly rose	--	3
			red elderberry	--	4
			rusty menziesia	--	8
			shield fern	--	5
			Overstory:		
			paper birch	--	24
			white spruce	--	16
115: Chunilna cool	Mountain slopes, wet	4500	Sitka alder	60	36
			shield fern	10	20
			bluejoint reedgrass	8	8
			devil's club	5	15
			willow	5	11
			currant	3	2
			tall bluebells	3	1
			cowparsnip	2	1
			northern geranium	2	1

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
116: Cryaquepts depressional	Depressions	---	Labrador tea ledum	--	8
			black crowberry	--	1
			bluejoint reedgrass	--	1
			bog blueberry	--	4
			cloudberry	--	5
			diamondleaf willow	--	3
			horsetail	--	4
			lowbush cranberry	--	5
			Overstory:		
			black spruce	--	32
117: Cryods	Mountain slopes, cool	1900	willow	25	36
			false hellebore	10	6
			common fireweed	6	4
			Altai's fescue	6	12
			northern geranium	6	5
			bluejoint reedgrass	4	12
			Canadian burnet	4	6
			oakfern	2	12
	Mountain slopes	3700	Sitka alder	55	60
			bluejoint reedgrass	20	22
			shield fern	10	35
			common fireweed	7	4
			red currant	3	3
			oakfern	1	14
	Loamy slopes, cool	2500	bluejoint reedgrass	50	30
			common fireweed	12	9
			oakfern	5	8
			shield fern	5	10
			Canadian burnet	4	8
			Beauverd's spiraea	2	5
			false hellebore	2	8
118: Cryods cool	Stream terraces, cool	---	Beauverd's spiraea	--	9
			black crowberry	--	4
			bluejoint reedgrass	--	7
			bog blueberry	--	10
			bunchberry dogwood	--	6
			lowbush cranberry	--	1
			oakfern	--	10
			shrub birch	--	5
			willow	--	15
			Overstory:		
			white and/or black spruce	--	30
Niklason moderately wet	Stream terraces	2200	bluejoint reedgrass	45	15
			willow	25	27
			common fireweed	10	2
			Canadian burnet	4	6
			sedge	3	1
			Altai's fescue	2	2
			monkshood	1	3
			Overstory:		
			white spruce	--	21

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
118: Qeni	Stream terraces	2200	bluejoint reedgrass	45	15
			willow	25	27
			common fireweed	10	2
			Canadian burnet	4	6
			sedge	3	1
			Altai's fescue	2	2
			monkshood	1	3
			Overstory:		
			white spruce	--	21
119: Cryods	Alpine hummocks	300	bog blueberry	40	43
			black crowberry	20	32
			lowbush cranberry	10	10
			dwarf shrub birch	8	10
			Beauverd's spiraea	4	2
			Altai's fescue	3	10
			bluejoint reedgrass	1	2
			bunchberry dogwood	1	4
	Mountain slopes, cool	1900	willow	25	36
			false hellebore	10	6
			common fireweed	6	4
			Altai's fescue	6	12
			northern geranium	6	5
			bluejoint reedgrass	4	12
			Canadian burnet	4	6
			oakfern	2	12
Cryaquepts cool	Mountain slopes, drainages	2300	willow	65	37
			common ladyfern	6	29
			bluejoint reedgrass	4	8
			horsetail	4	10
			Canadian burnet	3	8
			sedge	3	3
			twisted stalk	3	1
			northern geranium	2	4
			oakfern	2	3
120: Cryods low elevation	Escarpments	---	--	--	--
Cryochrepts	Escarpments	---	--	--	--
121: Cryods	Till deposits, high elevation	2800	bluejoint reedgrass	37	20
			common fireweed	17	4
			shield fern	17	20
			Sitka alder	8	13
			oakfern	5	11
			five-leaf bramble	2	10
			Overstory:		
			paper birch	--	20
			white spruce	--	10
	Mountain slopes	3700	Sitka alder	55	60
			bluejoint reedgrass	20	22
			shield fern	10	35
			common fireweed	7	4
			red currant	3	3
			oakfern	1	14

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
121: Cryods cont'd	Loamy slopes	4300	bluejoint reedgrass	43	37
			false hellebore	20	10
			shield fern	13	15
			common fireweed	8	4
			Canadian burnet	1	2
			Beauverd's spiraea	1	10
			oakfern	1	10
122: Deception	Till deposits, thin surface	---	Bebb's willow	--	10
			Labrador tea ledum	--	3
			bunchberry dogwood	--	16
			lowbush cranberry	--	17
			prickly rose	--	4
			wintergreen	--	3
			Overstory:		
			paper birch	--	70
			quaking aspen	--	4
			white and/or black spruce	--	9
123: Deception sloping	Till deposits, thin surface	---	Bebb's willow	--	10
			Labrador tea ledum	--	3
			bunchberry dogwood	--	16
			lowbush cranberry	--	17
			prickly rose	--	4
			wintergreen	--	3
			Overstory:		
			paper birch	--	70
			quaking aspen	--	4
			white and/or black spruce	--	9
Deception moderately steep	Till deposits, thin surface	---	Bebb's willow	--	10
			Labrador tea ledum	--	3
			bunchberry dogwood	--	16
			lowbush cranberry	--	17
			prickly rose	--	4
			wintergreen	--	3
			Overstory:		
			paper birch	--	70
			quaking aspen	--	4
			white and/or black spruce	--	9
124: Deception steep	Till deposits, thin surface	---	Bebb's willow	--	10
			Labrador tea ledum	--	3
			bunchberry dogwood	--	16
			lowbush cranberry	--	17
			prickly rose	--	4
			wintergreen	--	3
			Overstory:		
			paper birch	--	70
			quaking aspen	--	4
			white and/or black spruce	--	9
Deception sloping	Till deposits, thin surface	---	Bebb's willow	--	10
			Labrador tea ledum	--	3
			bunchberry dogwood	--	16
			lowbush cranberry	--	17
			prickly rose	--	4
			wintergreen	--	3
			Overstory:		
			paper birch	--	70
			quaking aspen	--	4
			white and/or black spruce	--	9

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
125: Deception	Till deposits, thin surface	---	Bebb's willow	--	10
			Labrador tea ledum	--	3
			bunchberry dogwood	--	16
			lowbush cranberry	--	17
			prickly rose	--	4
			wintergreen	--	3
			Overstory:		
			paper birch	--	70
			quaking aspen	--	4
			white and/or black spruce	--	9
126: Delyndia	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
127: Delyndia	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
Histosols	Organic terrain	---	--	--	--
128: Disappoint	Drift deposits, very poorly drained	---	alder	--	11
			bluejoint reedgrass	--	24
			bunchberry dogwood	--	4
			devil's club	--	20
			oakfern	--	6
			prickly rose	--	3
			red elderberry	--	4
			rusty menziesia	--	8
			shield fern	--	5
			Overstory:		
			paper birch	--	24
			white spruce	--	16
129: Eska sloping	Silty slopes, cool	2600	bluejoint reedgrass	30	20
			common fireweed	15	4
			highbush cranberry	10	13
			oakfern	5	30
			prickly rose	5	2
			Sitka alder	5	4
			cowparsnip	3	1
			devil's club	3	2
			tall bluebells	3	1
			Overstory:		
			balsam poplar	--	5
			paper birch	--	18
			white spruce	--	15

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
129: Eska moderately steep	Silty slopes, cool	2600	bluejoint reedgrass	30	20
			common fireweed	15	4
			highbush cranberry	10	13
			oakfern	5	30
			prickly rose	5	2
			Sitka alder	5	4
			cowparsnip	3	1
			devil's club	3	2
			tall bluebells	3	1
			Overstory:		
			balsam poplar	--	5
			paper birch	--	18
			white spruce	--	15
130: Eska sloping	Silty slopes, cool	2600	bluejoint reedgrass	30	20
			common fireweed	15	4
			highbush cranberry	10	13
			oakfern	5	30
			prickly rose	5	2
			Sitka alder	5	4
			cowparsnip	3	1
			devil's club	3	2
			tall bluebells	3	1
			Overstory:		
			balsam poplar	--	5
			paper birch	--	18
			white spruce	--	15
Eska moderately steep	Silty slopes, cool	2600	bluejoint reedgrass	30	20
			common fireweed	15	4
			highbush cranberry	10	13
			oakfern	5	30
			prickly rose	5	2
			Sitka alder	5	4
			cowparsnip	3	1
			devil's club	3	2
			tall bluebells	3	1
			Overstory:		
			balsam poplar	--	5
			paper birch	--	18
			white spruce	--	15
Jim	Bedrock hills, 15-25 inch pz.	---	bluejoint reedgrass	--	13
			bunchberry dogwood	--	20
			common fireweed	--	1
			highbush cranberry	--	7
			lowbush cranberry	--	3
			oakfern	--	1
			prickly rose	--	2
			willow	--	3
			wintergreen	--	1
			Overstory:		
			paper birch	--	18
			white spruce	--	18

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
131: Estelle	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
132: Estelle sloping	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
Estelle moderately steep	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
133: Estelle steep	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
133: Estelle sloping	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
134: Estelle	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
135: Estelle	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
Disappoint	Drift deposits, very poorly drained	---	alder	--	11
			bluejoint reedgrass	--	24
			bunchberry dogwood	--	4
			devil's club	--	20
			oakfern	--	6
			prickly rose	--	3
			red elderberry	--	4
			rusty menziesia	--	8
			shield fern	--	5
			Overstory:		
			paper birch	--	24
			white spruce	--	16

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
136: Estelle	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
Disappoint	Drift deposits, very poorly drained	---	alder	--	11
			bluejoint reedgrass	--	24
			bunchberry dogwood	--	4
			devil's club	--	20
			oakfern	--	6
			prickly rose	--	3
			red elderberry	--	4
			rusty menziesia	--	8
			shield fern	--	5
			Overstory:		
			paper birch	--	24
			white spruce	--	16
137: Flat Horn	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
138: Flat Horn	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
139: Flat Horn sloping	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
139: Flat Horn moderately steep	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
140: Goldcord	Alpine ridges	250	alpine bearberry	30	18
			black crowberry	10	11
			bog blueberry	10	13
			dwarf shrub birch	10	10
			alpine sweet grass	8	2
			lowbush cranberry	5	3
Tsadaka	Alpine hummocks	300	bog blueberry	40	43
			black crowberry	20	32
			lowbush cranberry	10	10
			dwarf shrub birch	8	10
			Beauverd's spiraea	4	2
			Altai's fescue	3	10
			bluejoint reedgrass	1	2
			bunchberry dogwood	1	4
141: Histosols	Organic terrain	---	--	--	--
142: Histosols high elevation	Organic terrain, high elevation	---	--	--	--
143: Kalambach gently sloping	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
Kalambach moderately steep	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
144: Kalambach steep	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
Kalambach sloping	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
145: Kalambach	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
146: Kalambach	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
146: Disappoint	Drift deposits, very poorly drained	---	alder	--	11
			bluejoint reedgrass	--	24
			bunchberry dogwood	--	4
			devil's club	--	20
			oakfern	--	6
			prickly rose	--	3
			red elderberry	--	4
			rusty menziesia	--	8
			shield fern	--	5
			Overstory:		
			paper birch	--	24
			white spruce	--	16
147: Kashwitna	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
148: Kashwitna sloping	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
Kashwitna moderately steep	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
149: Kashwitna	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
150: Keba	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
151: Kichatna	Glaciofluvial deposits, thin surface	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
152: Kichatna sloping	Glaciofluvial deposits, thin surface	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
Kichatna moderately steep	Glaciofluvial deposits, thin surface	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
153: Kichatna steep	Glaciofluvial deposits, thin surface	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
153: Kichatna sloping	Glaciofluvial deposits, thin surface	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
154: Kichatna	Glaciofluvial deposits, thin surface	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
155: Kichatna	Glaciofluvial deposits, thin surface	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
Deception	Till deposits, thin surface	---	Bebb's willow	--	10
			Labrador tea ledum	--	3
			bunchberry dogwood	--	16
			lowbush cranberry	--	17
			prickly rose	--	4
			wintergreen	--	3
			Overstory:		
			paper birch	--	70
			quaking aspen	--	4
			white and/or black spruce	--	9
156: Kichatna	Glaciofluvial deposits, thin surface	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
156: Deception sloping	Till deposits, thin surface	---	Bebb's willow	--	10
			Labrador tea ledum	--	3
			bunchberry dogwood	--	16
			lowbush cranberry	--	17
			prickly rose	--	4
			wintergreen	--	3
			Overstory:		
			paper birch	--	70
			quaking aspen	--	4
			white and/or black spruce	--	9
Deception steep	Till deposits, thin surface	---	Bebb's willow	--	10
			Labrador tea ledum	--	3
			bunchberry dogwood	--	16
			lowbush cranberry	--	17
			prickly rose	--	4
			wintergreen	--	3
			Overstory:		
			paper birch	--	70
			quaking aspen	--	4
			white and/or black spruce	--	9
157: Kichatna	Glaciofluvial deposits, thin surface	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
Delyndia	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
158: Kichatna	Glaciofluvial deposits, thin surface	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
Delyndia	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
159: Kidazqeni cool	Fans	---	Beauverd's spiraea	--	11
			bluejoint reedgrass	--	21
			bog blueberry	--	5
			bunchberry dogwood	--	13
			clubmoss	--	3
			common fireweed	--	2
			five-leaf bramble	--	4
			shield fern	--	2
			Sitka alder	--	6
			Overstory:		
			paper birch	--	25
			white spruce	--	20
Niklason cool	Fans	---	Beauverd's spiraea	--	11
			bluejoint reedgrass	--	21
			bog blueberry	--	5
			bunchberry dogwood	--	13
			clubmoss	--	3
			common fireweed	--	2
			five-leaf bramble	--	4
			shield fern	--	2
			Sitka alder	--	6
			Overstory:		
			paper birch	--	25
			white spruce	--	20
160: Kidazqeni	Floodplain deposits	1000	bluejoint reedgrass	20	15
			alder	10	15
			devil's club	10	10
			prickly rose	6	8
			highbush cranberry	5	9
			shield fern	5	5
			horsetail	4	8
			oakfern	2	6
			bunchberry dogwood	1	5
			Overstory:		
			paper birch	--	30
			white spruce	--	20
			balsam poplar		
161: Kidazqeni moderately wet	Floodplain deposits, moderately wet	1000	bluejoint reedgrass	20	15
			alder	10	15
			devil's club	10	10
			prickly rose	6	8
			highbush cranberry	5	9
			shield fern	5	5
			horsetail	4	8
			oakfern	2	6
			bunchberry dogwood	1	5
			Overstory:		
			paper birch	--	30
			white spruce	--	20
			balsam poplar		

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
161: Kidazqeni	Floodplain deposits	1000	bluejoint reedgrass	20	15
			alder	10	15
			devil's club	10	10
			prickly rose	6	8
			highbush cranberry	5	9
			shield fern	5	5
			horsetail	4	8
			oakfern	2	6
			bunchberry dogwood	1	5
			Overstory:		
			paper birch	--	30
			white spruce	--	20
			balsam poplar		
162: Kidazqeni	Floodplain deposits	1000	bluejoint reedgrass	20	15
			alder	10	15
			devil's club	10	10
			prickly rose	6	8
			highbush cranberry	5	9
			shield fern	5	5
			horsetail	4	8
			oakfern	2	6
			bunchberry dogwood	1	5
			Overstory:		
			paper birch	--	30
			white spruce		
			balsam poplar	--	20
Niklason	Floodplain deposits	1000	bluejoint reedgrass	20	15
			alder	10	15
			devil's club	10	10
			prickly rose	6	8
			highbush cranberry	5	9
			shield fern	5	5
			horsetail	4	8
			oakfern	2	6
			bunchberry dogwood	1	5
			Overstory:		
			paper birch	--	30
			white spruce	--	20
			balsam poplar		
163: Killey	Alluvial bottoms, wet	---	alder	--	5
			bluejoint reedgrass	--	10
			devil's club	--	3
			horsetail	--	5
			rusty menziesia	--	8
			shield fern	--	10
			Overstory:		
			paper birch	--	25
			white spruce	--	25
Moose River	Alluvial bottoms, very wet	---	bluejoint reedgrass	--	15
			shrub birch	--	2
			bog blueberry	--	10
			diamondleaf willow	--	8
			marsh cinquefoil	--	10
			sedge	--	24
			thinleaf alder	--	40

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
164: Knik	Silty slopes, thin surface	2100	bluejoint reedgrass	36	40
			common fireweed	20	9
			oakfern	7	30
			highbush cranberry	6	7
			bunchberry dogwood	4	12
			prickly rose	4	3
			horsetail	3	12
			tall bluebells	3	3
			red currant	2	2
			Overstory:		
			balsam poplar	--	4
			paper birch	--	35
			white spruce	--	13
165: Knik gently sloping	Silty slopes, thin surface	2100	bluejoint reedgrass	36	40
			common fireweed	20	9
			oakfern	7	30
			highbush cranberry	6	7
			bunchberry dogwood	4	12
			prickly rose	4	3
			horsetail	3	12
			tall bluebells	3	3
			red currant	2	2
			Overstory:		
			balsam poplar	--	4
			paper birch	--	35
			white spruce	--	13
Knik moderately steep	Silty slopes, thin surface	2100	bluejoint reedgrass	36	40
			common fireweed	20	9
			oakfern	7	30
			highbush cranberry	6	7
			bunchberry dogwood	4	12
			prickly rose	4	3
			horsetail	3	12
			tall bluebells	3	3
			red currant	2	2
			Overstory:		
			balsam poplar	--	4
			paper birch	--	35
			white spruce	--	13
166: Knik steep	Silty slopes, thin surface	2100	bluejoint reedgrass	36	40
			common fireweed	20	9
			oakfern	7	30
			highbush cranberry	6	7
			bunchberry dogwood	4	12
			prickly rose	4	3
			horsetail	3	12
			tall bluebells	3	3
			red currant	2	2
			Overstory:		
			balsam poplar	--	4
			paper birch	--	35
			white spruce	--	13

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
166: Knik sloping	Silty slopes, thin surface	2100	bluejoint reedgrass	36	40
			common fireweed	20	9
			oakfern	7	30
			highbush cranberry	6	7
			bunchberry dogwood	4	12
			prickly rose	4	3
			horsetail	3	12
			tall bluebells	3	3
			red currant	2	2
			Overstory:		
			balsam poplar	--	4
			paper birch	--	35
			white spruce	--	13
167: Knik	Silty slopes, thin surface	2100	bluejoint reedgrass	36	40
			common fireweed	20	9
			oakfern	7	30
			highbush cranberry	6	7
			bunchberry dogwood	4	12
			prickly rose	4	3
			horsetail	3	12
			tall bluebells	3	3
			red currant	2	2
			Overstory:		
			balsam poplar	--	4
			paper birch	--	35
			white spruce	--	13
168: Knik	Silty slopes, thin surface	2100	bluejoint reedgrass	36	40
			common fireweed	20	9
			oakfern	7	30
			highbush cranberry	6	7
			bunchberry dogwood	4	12
			prickly rose	4	3
			horsetail	3	12
			tall bluebells	3	3
			red currant	2	2
			Overstory:		
			balsam poplar	--	4
			paper birch	--	35
			white spruce	--	13
Cryaquepts	Drift deposits, very poorly drained	---	alder	--	11
			bluejoint reedgrass	--	24
			bunchberry dogwood	--	4
			devil's club	--	20
			oakfern	--	6
			prickly rose	--	3
			red elderberry	--	4
			rusty menziesia	--	8
			shield fern	--	5
			Overstory:		
			paper birch	--	24
			white spruce	--	16

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
169: Liten	Sand dunes	---	American twinflower	--	11
			Bebb's willow	--	5
			Labrador tea ledum	--	7
			bluejoint reedgrass	--	5
			bunchberry dogwood	--	3
			common fireweed	--	6
			highbush cranberry	--	9
			lowbush cranberry	--	2
			prickly rose	--	5
			Overstory:		
			paper birch	--	47
			quaking aspen	--	20
			white spruce	--	10
170: Mine Spoils	(not described)				
171: Nancy	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
172: Nancy sloping	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
Nancy moderately steep	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
173: Nancy steep	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
Nancy sloping	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
174: Nancy	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
175: Nancy	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
175: Cryaquepts	Drift deposits, very poorly drained	---	alder	--	11
			bluejoint reedgrass	--	24
			bunchberry dogwood	--	4
			devil's club	--	20
			oakfern	--	6
			prickly rose	--	3
			red elderberry	--	4
			rusty menziesia	--	8
			shield fern	--	5
			Overstory:		
			paper birch	--	24
			white spruce	--	16
176: Nancy sloping	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
Nancy moderately steep	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
Tokositna moderately steep	Till deposits, 20-35 inch pz.	1800	shield fern	35	17
			bluejoint reedgrass	28	10
			Sitka alder	6	25
			ovalleaf blueberry	5	5
			devil's club	2	15
			bunchberry dogwood	2	5
			rusty menziesia	2	16
			Overstory:		
			paper birch	--	25
			white spruce	--	15
177: Nancy steep	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
177: Tokositna steep	Till deposits, 20-35 inch pz.	1800	shield fern	35	17
			bluejoint reedgrass	28	10
			Sitka alder	6	25
			ovalleaf blueberry	5	5
			devil's club	2	15
			bunchberry dogwood	2	5
			rusty menziesia	2	16
			Overstory:		
			paper birch	--	25
			white spruce	--	15
Nancy sloping	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
178: Nancy	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
Tokositna	Till deposits, 20-35 inch pz.	1800	shield fern	35	17
			bluejoint reedgrass	28	10
			Sitka alder	6	25
			ovalleaf blueberry	5	5
			devil's club	2	15
			bunchberry dogwood	2	5
			rusty menziesia	2	16
			Overstory:		
			paper birch	--	25
			white spruce	--	15
179: Gravel Pits	(not described)				
180: Psuyaah	Loamy slopes, wet	2500	bluejoint reedgrass	50	30
			common fireweed	12	9
			oakfern	5	8
			shield fern	5	10
			Canadian burnet	4	8
			Beauverd's spiraea	2	5
			false hellebore	2	8

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
180: Snowdance	Mountain slopes, drainages	2300	willow	65	37
			common ladyfern	6	29
			bluejoint reedgrass	4	8
			horsetail	4	10
			Canadian burnet	3	8
			sedge	3	3
			twisted stalk	3	1
			northern geranium	2	4
			oakfern	2	3
181: Qeni cool	Stream terraces, wet	2200	bluejoint reedgrass	26	18
			willow	25	20
			common fireweed	11	4
			sedge	7	3
			Canadian burnet	6	5
			Altai's fescue	5	12
			bunchberry dogwood	5	20
			monkshood	2	2
Niklavar cool	Stream terraces, wet	2200	bluejoint reedgrass	26	18
			willow	25	20
			common fireweed	11	4
			sedge	7	3
			Canadian burnet	6	5
			Altai's fescue	5	12
			bunchberry dogwood	5	20
			monkshood	2	2
Cryods cold	Loamy slopes, cool	2500	bluejoint reedgrass	50	30
			common fireweed	12	9
			oakfern	5	8
			shield fern	5	10
			Canadian burnet	4	8
			Beauverd's spiraea	2	5
			false hellebore	2	8
182: Niklavar	Floodplain deposits, moderately wet	1000	bluejoint reedgrass	20	15
			alder	10	15
			devil's club	10	10
			prickly rose	6	8
			highbush cranberry	5	9
			shield fern	5	5
			horsetail	4	8
			oakfern	2	6
			bunchberry dogwood	1	5
			Overstory:		
			paper birch	--	30
			white spruce	--	20
			balsam poplar		
Riverwash	(not described)				
183: Rock Outcrop	(not described)				
Cryumbrepts	Alpine terrain	---	---	--	--

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
184: Siwash	Alpine hummocks	300	bog blueberry	40	43
			black crowberry	20	32
			lowbush cranberry	10	10
			dwarf shrub birch	8	10
			Beauverd's spiraea	4	2
			Altai's fescue	3	10
			bluejoint reedgrass	1	2
			bunchberry dogwood	1	4
Talkeetna cool	Loamy slopes, cool	2500	bluejoint reedgrass	50	30
			common fireweed	12	9
			oakfern	5	8
			shield fern	5	10
			Canadian burnet	4	8
			Beauverd's spiraea	2	5
			false hellebore	2	8
Snowdance	Mountain slopes, drainages	2300	willow	65	37
			common ladyfern	6	29
			bluejoint reedgrass	4	8
			horsetail	4	10
			Canadian burnet	3	8
			sedge	3	3
			twisted stalk	3	1
			northern geranium	2	4
			oakfern	2	3
185: Susitna	Floodplain deposits	1000	bluejoint reedgrass	20	15
			alder	10	15
			devil's club	10	10
			prickly rose	6	8
			highbush cranberry	5	9
			shield fern	5	5
			horsetail	4	8
			oakfern	2	6
			bunchberry dogwood	1	5
			Overstory:		
			paper birch	--	30
			white spruce	--	20
			balsam poplar		
186: Susivar	Floodplain deposits, moderately wet	1000	bluejoint reedgrass	20	15
			alder	10	15
			devil's club	10	10
			prickly rose	6	8
			highbush cranberry	5	9
			shield fern	5	5
			horsetail	4	8
			oakfern	2	6
			bunchberry dogwood	1	5
			Overstory:		
			paper birch	--	30
			white spruce	--	20
			balsam poplar		
Moose River	Alluvial bottoms, very wet	---	bluejoint reedgrass	--	15
			shrub birch	--	2
			bog blueberry	--	10
			diamondleaf willow	--	8
			marsh cinquefoil	--	10
			sedge	--	24
			thinleaf alder	--	40

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
187: Susivar	Floodplain deposits, moderately wet	1000	bluejoint reedgrass	20	15
			alder	10	15
			devil's club	10	10
			prickly rose	6	8
			highbush cranberry	5	9
			shield fern	5	5
			horsetail	4	8
			oakfern	2	6
			bunchberry dogwood	1	5
			Overstory:		
			paper birch	--	30
			white spruce		
			balsam poplar	--	20
Niklavar	Floodplain deposits, moderately wet	1000	bluejoint reedgrass	20	15
			alder	10	15
			devil's club	10	10
			prickly rose	6	8
			highbush cranberry	5	9
			shield fern	5	5
			horsetail	4	8
			oakfern	2	6
			bunchberry dogwood	1	5
			Overstory:		
			paper birch	--	30
			white spruce	--	20
			balsam poplar		
188: Talkeetna warm	Till deposits, high elevation	2800	bluejoint reedgrass	37	20
			common fireweed	17	4
			shield fern	17	20
			Sitka alder	8	13
			oakfern	5	11
			five-leaf bramble	2	10
			Overstory:		
			paper birch	--	20
			white spruce	--	10
189: Talkeetna	Loamy slopes	4300	bluejoint reedgrass	43	37
			false hellebore	20	10
			shield fern	13	15
			common fireweed	8	4
			Canadian burnet	1	2
			Beauverd's spiraea	1	10
			oakfern	1	10
Talkeetna thick surface	Mountain slopes	3700	Sitka alder	55	60
			bluejoint reedgrass	20	22
			shield fern	10	35
			common fireweed	7	4
			red currant	3	3
			oakfern	1	14
190: Talkeetna warm	Till deposits, high elevation	2800	bluejoint reedgrass	37	20
			common fireweed	17	4
			shield fern	17	20
			Sitka alder	8	13
			oakfern	5	11
			five-leaf bramble	2	10
			Overstory:		
			paper birch	--	20
			white spruce	--	10

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
190: Talkeetna thick surface	Mountain slopes	3700	Sitka alder	55	60
			bluejoint reedgrass	20	22
			shield fern	10	35
			common fireweed	7	4
			red currant	3	3
			oakfern	1	14
191: Talkeetna warm	Till deposits, high elevation	2800	bluejoint reedgrass	37	20
			common fireweed	17	4
			shield fern	17	20
			Sitka alder	8	13
			oakfern	5	11
			five-leaf bramble	2	10
			Overstory:		
			paper birch	--	20
			white spruce	--	10
Talkeetna thick surface	Mountain slopes	3700	Sitka alder	55	60
			bluejoint reedgrass	20	22
			shield fern	10	35
			common fireweed	7	4
			red currant	3	3
			oakfern	1	14
192: Talkeetna low elevation	Till deposits, 20-35 inch pz.	1800	shield fern	35	17
			bluejoint reedgrass	28	10
			Sitka alder	6	25
			ovalleaf blueberry	5	5
			devil's club	2	15
			bunchberry dogwood	2	5
			rusty menziesia	2	16
			Overstory:		
			paper birch	--	25
			white spruce	--	15
Deneka low elevation	Bedrock hills, 20-35 inch pz.	2800	bluejoint reedgrass	37	20
			common fireweed	17	4
			shield fern	17	20
			Sitka alder	8	13
			oakfern	5	11
			five-leaf bramble	2	10
			Overstory:		
			paper birch	--	20
			white spruce	--	10
193: Talkeetna warm	Till deposits, high elevation	2800	bluejoint reedgrass	37	20
			common fireweed	17	4
			shield fern	17	20
			Sitka alder	8	13
			oakfern	5	11
			five-leaf bramble	2	10
			Overstory:		
			paper birch	--	20
			white spruce	--	10
Talkeetna thick surface	Mountain slopes	3700	Sitka alder	55	60
			bluejoint reedgrass	20	22
			shield fern	10	35
			common fireweed	7	4
			red currant	3	3
			oakfern	1	14

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
193: Deneka	Bedrock hills, high elevation	2800	bluejoint reedgrass	37	20
			common fireweed	17	4
			shield fern	17	20
			Sitka alder	8	13
			oakfern	5	11
			five-leaf bramble	2	10
			Overstory:		
			paper birch	--	20
			white spruce	--	10
194: Talkeetna cool	Loamy slopes, cool	2500	bluejoint reedgrass	50	30
			common fireweed	12	9
			oakfern	5	8
			shield fern	5	10
			Canadian burnet	4	8
			Beauverd's spiraea	2	5
			false hellebore	2	8
Snowdance	Mountain slopes, drainages	2300	willow	65	37
			common ladyfern	6	29
			bluejoint reedgrass	4	8
			horsetail	4	10
			Canadian burnet	3	8
			sedge	3	3
			twisted stalk	3	1
			northern geranium	2	4
			oakfern	2	3
195: Talkeetna cool	Loamy slopes, cool	2500	bluejoint reedgrass	50	30
			common fireweed	12	9
			oakfern	5	8
			shield fern	5	10
			Canadian burnet	4	8
			Beauverd's spiraea	2	5
			false hellebore	2	8
Tsadaka	Alpine hummocks	300	bog blueberry	40	43
			black crowberry	20	32
			lowbush cranberry	10	10
			dwarf shrub birch	8	10
			Beauverd's spiraea	4	2
			Altai's fescue	3	10
			bluejoint reedgrass	1	2
			bunchberry dogwood	1	4
Chunilna cool	Mountain slopes, wet	4500	Sitka alder	60	36
			shield fern	10	20
			bluejoint reedgrass	8	8
			devil's club	5	15
			willow	5	11
			currant	3	2
			tall bluebells	3	1
			cowparsnip	2	1
			northern geranium	2	1
196: Tidal Flats	(not described)				

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
197: Tokositna sloping	Till deposits, 20-35 inch pz.	1800	shield fern	35	17
			bluejoint reedgrass	28	10
			Sitka alder	6	25
			ovalleaf blueberry	5	5
			devil's club	2	15
			bunchberry dogwood	2	5
			rusty menziesia	2	16
			Overstory:		
			paper birch	--	25
			white spruce	--	15
Tokositna moderately steep	Till deposits, 20-35 inch pz.	1800	shield fern	35	17
			bluejoint reedgrass	28	10
			Sitka alder	6	25
			ovalleaf blueberry	5	5
			devil's club	2	15
			bunchberry dogwood	2	5
			rusty menziesia	2	16
			Overstory:		
			paper birch	--	25
			white spruce	--	15
198: Tokositna steep	Till deposits, 20-35 inch pz.	1800	shield fern	35	17
			bluejoint reedgrass	28	10
			Sitka alder	6	25
			ovalleaf blueberry	5	5
			devil's club	2	15
			bunchberry dogwood	2	5
			rusty menziesia	2	16
			Overstory:		
			paper birch	--	25
			white spruce	--	15
Tokositna sloping	Till deposits, 20-35 inch pz.	1800	shield fern	35	17
			bluejoint reedgrass	28	10
			Sitka alder	6	25
			ovalleaf blueberry	5	5
			devil's club	2	15
			bunchberry dogwood	2	5
			rusty menziesia	2	16
			Overstory:		
			paper birch	--	25
			white spruce	--	15
199: Tokositna	Till deposits, 20-35 inch pz.	1800	shield fern	35	17
			bluejoint reedgrass	28	10
			Sitka alder	6	25
			ovalleaf blueberry	5	5
			devil's club	2	15
			bunchberry dogwood	2	5
			rusty menziesia	2	16
			Overstory:		
			paper birch	--	25
			white spruce	--	15

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
200: Tokositna	Till deposits, 20-35 inch pz.	1800	shield fern	35	17
			bluejoint reedgrass	28	10
			Sitka alder	6	25
			ovalleaf blueberry	5	5
			devil's club	2	15
			bunchberry dogwood	2	5
			rusty menziesia	2	16
			Overstory:		
			paper birch	--	25
			white spruce	--	15
Chunilna	Drift deposits, very poorly drained	---	alder	--	11
			bluejoint reedgrass	--	24
			bunchberry dogwood	--	4
			devil's club	--	20
			oakfern	--	6
			prickly rose	--	3
			red elderberry	--	4
			rusty menziesia	--	8
			shield fern	--	5
			Overstory:		
			paper birch	--	24
			white spruce	--	16
201: Tokositna	Till deposits, 20-35 inch pz.	1800	shield fern	35	17
			bluejoint reedgrass	28	10
			Sitka alder	6	25
			ovalleaf blueberry	5	5
			devil's club	2	15
			bunchberry dogwood	2	5
			rusty menziesia	2	16
			Overstory:		
			paper birch	--	25
			white spruce	--	15
Chunilna	Drift deposits, very poorly drained	---	alder	--	11
			bluejoint reedgrass	--	24
			bunchberry dogwood	--	4
			devil's club	--	20
			oakfern	--	6
			prickly rose	--	3
			red elderberry	--	4
			rusty menziesia	--	8
			shield fern	--	5
			Overstory:		
			paper birch	--	24
			white spruce	--	16
202: Tsadaka	Alpine hummocks	300	bog blueberry	40	43
			black crowberry	20	32
			lowbush cranberry	10	10
			dwarf shrub birch	8	10
			Beauverd's spiraea	4	2
			Altai's fescue	3	10
			bluejoint reedgrass	1	2
			bunchberry dogwood	1	4

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
202: Talkeetna cool	Loamy slopes, cool	2500	bluejoint reedgrass	50	30
			common fireweed	12	9
			oakfern	5	8
			shield fern	5	10
			Canadian burnet	4	8
			Beauverd's spiraea	2	5
			false hellebore	2	8
203: Typic Cryaquents	Alluvial terrain, wet	---	--	--	--
204: Typic Cryaquents coastal	Tidal basin	---	--	--	--
205: Whitsol	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
206: Whitsol cool, sloping	Till deposits, high elevation	2800	bluejoint reedgrass	37	20
			common fireweed	17	4
			shield fern	17	20
			Sitka alder	8	13
			oakfern	5	11
			five-leaf bramble	2	10
			Overstory:		
			paper birch	--	20
			white spruce	--	10
Whitsol cool, moderately steep	Till deposits, high elevation	2800	bluejoint reedgrass	37	20
			common fireweed	17	4
			shield fern	17	20
			Sitka alder	8	13
			oakfern	5	11
			five-leaf bramble	2	10
			Overstory:		
			paper birch	--	20
			white spruce	--	10
207: Whitsol cool, steep	Till deposits, high elevation	2800	bluejoint reedgrass	37	20
			common fireweed	17	4
			shield fern	17	20
			Sitka alder	8	13
			oakfern	5	11
			five-leaf bramble	2	10
			Overstory:		
			paper birch	--	20
			white spruce	--	10

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
207: Whitsol cool, sloping	Till deposits, high elevation	2800	bluejoint reedgrass	37	20
			common fireweed	17	4
			shield fern	17	20
			Sitka alder	8	13
			oakfern	5	11
			five-leaf bramble	2	10
			Overstory:		
			paper birch	--	20
			white spruce	--	10
208: Whitsol silty	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
209: Whitsol silty, sloping	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
Whitsol silty, moderately steep	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
210: Whitsol till, sloping	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
210: Whitsol till, moderately steep	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
211: Whitsol till	Glaciofluvial deposits, 20-35 inch pz.	---	bluejoint reedgrass	--	6
			bunchberry dogwood	--	6
			devil's club	--	30
			highbush cranberry	--	9
			oakfern	--	7
			ovalleaf blueberry	--	4
			rusty menziesia	--	11
			shield fern	--	3
			Sitka alder	--	10
			Overstory:		
			paper birch	--	27
			white spruce	--	18
212: Yensus	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
213: Yensus sloping	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
Yensus moderately steep	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
214: Yensus	Silty slopes	3200	bluejoint reedgrass	32	40
			highbush cranberry	15	11
			common fireweed	13	4
			horsetail	8	35
			prickly rose	7	5
			oakfern	5	6
			red currant	4	9
			Overstory:		
			paper birch	--	35
			white spruce	--	25
215: Yohn	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
216: Yohn	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
217: Yohn	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
Deception	Till deposits, thin surface	---	Bebb's willow	--	10
			Labrador tea ledum	--	3
			bunchberry dogwood	--	16
			lowbush cranberry	--	17
			prickly rose	--	4
			wintergreen	--	3
			Overstory:		
			paper birch	--	70
			quaking aspen	--	4
			white and/or black spruce	--	9

TABLE 9--ECOLOGICAL SITES, PRODUCTIVITY, AND CHARACTERISTIC VEGETATION--Continued

Map symbol and soil name	Ecological site	Dry weight	Common plants in the potential natural plant community	Compo-sition	Canopy cover
		Lb./acre		Percent	Percent
218: Yohn	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
Delyndia	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
219: Yohn	Till deposits, 15-25 inch pz.	2400	bluejoint reedgrass	45	23
			oakfern	12	10
			horsetail	9	8
			common red raspberry	8	2
			highbush cranberry	5	9
			prickly rose	5	3
			devil's club	4	14
			shield fern	4	4
			Sitka alder	4	15
			Overstory:		
			paper birch	--	23
			white spruce	--	17
219: Flat Horn	Glaciofluvial deposits, 15-25 inch pz.	---	American twinflower	--	2
			Labrador tea ledum	--	11
			bluejoint reedgrass	--	1
			bunchberry dogwood	--	9
			common fireweed	--	1
			lowbush cranberry	--	13
			prickly rose	--	1
			Overstory:		
			paper birch	--	25
			white and/or black spruce	--	27
W Water	(not described)				

TABLE 10--SCIENTIFIC NAMES OF PLANTS MENTIONED IN THE TEXT AND TABLES

Common Name	Scientific Name
TREES	
balsam poplar	Populus balsamifera L.
black spruce	Picea mariana (P. Mill.) B.S.P.
paper birch	Betula papyrifera Marsh.
quaking aspen	Populus tremuloides Michx.
white spruce	Picea glauca (Moench) Voss
SHRUBS	
Barclay's willow	Salix barclayi Anderss.
Beauverd's spiraea	Spiraea beauverdiana auct. non Schneid.
Bebb's willow	Salix bebbiana Sarg.
Labrador tea ledum	Ledum groenlandicum Oeder
Sitka alder	Alnus sinuata (Regel) Rydb.
alder	Alnus Mill.
alpine bearberry	Arctostaphylos alpina (L.) Spreng.
black crowberry	Empetrum nigrum L.
bog blueberry	Vaccinium uliginosum L.
common red raspberry	Rubus idaeus L.
currant	Ribes L.
devil's club	Oplopanax horridus (Sm.) Torr. & Gray ex Miq.
diamondleaf willow	Salix planifolia Pursh
dwarf shrub birch	Betula nana L.
highbush cranberry	Viburnum edule (Michx.) Raf.
lowbush cranberry	Vaccinium vitis-idaea L.
ovalleaf blueberry	Vaccinium ovalifolium Sm.
prickly rose	Rosa acicularis Lindl.
red currant	Ribes triste Pallas
red elderberry	Sambucus racemosa L.
rusty menziesia	Menziesia ferruginea Sm.
shrub birch	Betula glandulosa Michx.
thinleaf alder	Alnus tenuifolia Nutt.
undergreen willow	Salix commutata Bebb
willow	Salix L.
FORBS	
American twinflower	Linnaea borealis L.
Canadian burnet	Sanguisorba canadensis L.
bunchberry dogwood	Cornus canadensis L.
cloudberry	Rubus chamaemorus L.
clubmoss	Lycopodium L.
common fireweed	Epilobium angustifolium L.
cowparsnip	Heracleum lanatum Michx.
false hellebore	Veratrum viride Ait.
five-leaf bramble	Rubus pedatus Sm.
horsetail	Equisetum L.
marsh cinquefoil	Potentilla palustris (L.) Scop.
monkshood	Aconitum delphiniifolium DC.
northern geranium	Geranium erianthum DC.
tall bluebells	Mertensia paniculata (Ait.) G. Don
twisted stalk	Streptopus amplexifolius (L.) DC.
wintergreen	Pyrola L.
FERNS	
common ladyfern	Athyrium filix-femina (L.) Roth
oakfern	Gymnocarpium dryopteris (L.) Newman
shield fern	Dryopteris dilatata auct. non (Hoffmann) Gray
GRASSES AND SEDGES	
Altai's fescue	Festuca altaica Trin.
alpine sweet grass	Hierochloe alpina (Sw. ex Willd.) Roemer & J.A. Schultes
bluejoint reedgrass	Calamagrostis canadensis (Michx.) Beauv.
sedge	Carex L.

TABLE 11--LIVESTOCK GRAZING MANAGEMENT

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
101:		
Benka	Moderate: too sandy, frost action.	Slight.
102*:		
Benka sloping	Moderate: too sandy, frost action, slope.	Moderate: slope.
Benka moderately steep	Severe: slope, too sandy, frost action.	Moderate: slope.
103:		
Benka	Moderate: too sandy, frost action.	Slight.
104*:		
Benka	Moderate: too sandy, frost action.	Moderate: slope.
Liten	Severe: slope, too sandy.	Moderate: slope.
105:		
Bodenburg	Moderate: frost action.	Slight.
106*:		
Bodenburg sloping	Moderate: frost action, slope.	Moderate: slope.
Bodenburg moderately steep	Severe: slope, frost action.	Moderate: slope.
107*:		
Bodenburg steep	Severe: slope, frost action.	Severe: slope.
Bodenburg sloping	Moderate: slope, frost action.	Severe: slope.
108:		
Bodenburg	Moderate: frost action.	Moderate: short steep slopes.
109:		
Bodenburg silty	Moderate: frost action.	Slight.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
110*:		
Bodenburg silty, sloping	Moderate: frost action, slope.	Moderate: slope.
Bodenburg silty, moderately steep	Severe: slope, frost action.	Moderate: slope.
111:		
Bodenburg silty	Moderate: frost action.	Moderate: short steep slopes.
112*:		
Bodenburg steep	Severe: slope, frost action.	Severe: slope.
Bodenburg sloping	Moderate: frost action, slope.	Severe: slope.
Jim	Severe: slope, frost action, shallow bedrock.	Severe: slope.
113*:		
Chilligan	Severe: slope, too sandy.	Moderate: slope, wet soils.
Cryaquepts	Severe: wetness, too cobbly, frost action.	Moderate: slope, wet soils.
114*:		
Chilligan	Moderate: too sandy.	Moderate: wet soils.
Cryaquepts	Severe: wetness, too cobbly, frost action.	Moderate: wet soils.
115:		
Chunilna cool	Severe: wetness, coarse fragments, frost action, slope.	Moderate: slope, dense brush, wet soils.
116*:		
Cryaquepts depressional	Severe: wetness, too cobbly, frost action.	Severe: wet soils.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
117*:		
Cryods----------	Severe: slope, too stony, frost action.	Very severe: slope, rock outcrops, drainages.
118*:		
Cryods cool----------	Moderate: coarse fragments, slope.	Moderate: slope, wet soils, brush thickets.
Niklason moderately--- wet	Severe: too sandy and cobbly.	Moderate: slope, wet soils, brush thickets.
Qeni----------	Severe: too sandy and cobbly, wetness.	Moderate: slope, wet soils, brush thickets.
119*:		
Cryods----------	Severe: slope, frost action, variable soil materials.	Moderate: slope, wet soils, dense brush.
Cryaquepts cool-------	Severe: wetness, frost action, slope, variable soil materials.	Moderate: slope, wet soils, dense brush.
120*:		
Cryods low elevation--	Severe: slope, too cobbly and gravelly.	Very severe: slope.
Cryochrepts----------	Severe: slope, too cobbly and gravelly.	Very severe: slope.
121*:		
Cryods----------	Severe: slope, too gravelly, frost action.	Very severe: slope, rock outcrops.
122:		
Deception----------	Moderate: too cobbly, slope.	Slight.
123*:		
Deception sloping-----	Moderate: too cobbly, slope.	Moderate: slope.
Deception moderately-- steep	Severe: slope, too cobbly.	Moderate: slope.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
124*:		
Deception steep-------	Severe: slope, too cobbly.	Severe: slope.
Deception sloping-----	Severe: too cobbly, slope.	Severe: slope.
125:		
Deception----------	Moderate: too cobbly.	Slight.
126:		
Delyndia----------	Severe: too sandy.	Slight.
127*:		
Delyndia----------	Severe: too sandy.	Very severe: wet soils, organic soils.
Histosols----------	Severe: wetness, organic soils.	Very severe: wet soils, organic soils.
128:		
Disappoint----------	Severe: wetness, too cobbly, slope, frost action.	Moderate: wet soils.
129*:		
Eska sloping----------	Moderate: frost action, slope.	Moderate: slope.
Eska moderately steep-	Severe: slope, frost action.	Moderate: slope.
130*:		
Eska sloping----------	Moderate: frost action, slope.	Moderate: slope, rock outcrops.
Eska moderately steep-	Severe: slope, frost action.	Moderate: slope, rock outcrops.
Jim----------	Severe: slope, shallow bedrock, frost action.	Moderate: slope, rock outcrops.
131:		
Estelle----------	Moderate: too cobbly, slope, frost action.	Moderate: slope.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
132*:		
Estelle sloping-------	Moderate: too cobbly, slope, frost action.	Moderate: slope.
Estelle moderately---- steep	Severe: slope, too cobbly, frost action.	Moderate: slope.
133*:		
Estelle steep---------	Severe: slope, too cobbly, frost action.	Severe: slope.
Estelle sloping-------	Moderate: too cobbly, slope, frost action.	Moderate: slope.
134:		
Estelle----------	Moderate: too cobbly, frost action.	Slight.
135*:		
Estelle----------	Severe: slope, too cobbly, frost action.	Moderate: slope, wet soils.
Disappoint----------	Severe: wetness, too cobbly, frost action.	Moderate: slope, wet soils.
136*:		
Estelle----------	Moderate: too cobbly, slope, frost action.	Moderate: slope, wet soils.
Disappoint----------	Severe: wetness, too cobbly, frost action.	Moderate: slope, wet soils.
137:		
Flat Horn----------	Moderate: too sandy.	Slight.
138:		
Flat Horn----------	Moderate: too sandy, slope.	Moderate: slope.
139*:		
Flat Horn sloping-----	Moderate: too sandy, slope.	Moderate: slope.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
139*: cont'd		
Flat Horn moderately--steep	Severe: slope, too sandy.	Moderate: slope.
140*:		
Goldcord----------	Severe: too cobbly, shallow bedrock, slope.	Moderate: slope, rock outcrops, poorly drained areas.
Tsadaka----------	Severe: slope, too cobbly, frost action.	Moderate: slope, rock outcrops, poorly drained areas.
141*:		
Histosols----------	Severe: wetness, organic soils.	Very severe: wet soils, organic soils.
142:		
Histosols high--------elevation	Severe: wetness, organic soils, frost action.	Very severe: wet soils, organic soils.
143*:		
Kalambach gently------sloping	Moderate: too gravelly, frost action.	Moderate: slope.
Kalambach moderately--steep	Severe: slope, too gravelly, frost action.	Moderate: slope.
144*:		
Kalambach sloping-----	Moderate: too gravelly, slope, frost action.	Severe: slope.
Kalambach steep-------	Severe: slope, too gravelly, frost action.	Severe: slope.
145:		
Kalambach----------	Moderate: too gravelly, frost action.	Slight.
146*:		
Kalambach----------	Moderate: too cobbly, frost action.	Moderate: wet soils.
Disappoint----------	Severe: wetness, too cobbly, frost action.	Moderate: wet soils.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
147:		
Kashwitna----------	Moderate: too gravelly, frost action.	Slight.
148*:		
Kashwitna sloping-----	Moderate: too gravelly, slope, frost action.	Moderate: slope.
Kashwitna moderately-- steep	Severe: slope, too gravelly, frost action.	Moderate: slope.
149:		
Kashwitna----------	Moderate: too gravelly, frost action.	Slight.
150:		
Keba----------	Moderate: too sandy.	Slight.
151:		
Kichatna----------	Severe: too gravelly.	Slight.
152*:		
Kichatna sloping------	Moderate: too gravelly, slope.	Moderate: slope.
Kichatna moderately--- steep	Severe: slope, too gravelly.	Moderate: slope.
153*:		
Kichatna steep--------	Severe: slope, too gravelly.	Severe: slope.
Kichatna sloping------	Moderate: too gravelly, slope.	Severe: slope.
154:		
Kichatna----------	Severe: too cobbly.	Slight.
155*:		
Kichatna----------	Severe: slope, too gravelly.	Moderate: slope.
Deception----------	Severe: slope, too cobbly.	Moderate: slope.
156*:		
Kichatna----------	Severe: too gravelly.	Severe: slope.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
156*: cont'd		
Deception sloping-----	Moderate: too cobbly, slope.	Severe: slope.
Deception steep-------	Severe: slope, too cobbly.	Severe: slope.
157*:		
Kichatna----------	Severe: slope, too gravelly.	Moderate: slope.
Delyndia----------	Severe: too sandy.	Moderate: slope.
158*:		
Kichatna----------	Severe: too gravelly.	Slight.
Delyndia----------	Severe: too sandy.	Slight.
159*:		
Kidazqeni cool--------	Severe: too gravelly, slope, flooding.	Moderate: short steep slopes, flooding.
Niklason cool---------	Severe: slope, too sandy and gravelly, flooding.	Moderate: short steep slopes, flooding.
160:		
Kidazqeni----------	Severe: too gravelly, flooding.	Moderate: dense brush, flooding, short steep slopes.
161*:		
Kidazqeni moderately-- wet	Severe: too gravelly, flooding.	Moderate: dense brush, flooding.
Kidazqeni----------	Severe: too gravelly, flooding.	Moderate: dense brush, flooding.
162*:		
Kidazqeni----------	Severe: too gravelly, flooding.	Moderate: wet soils, dense brush, short steep slopes, flooding.
Niklason----------	Severe: flooding, too sandy and gravelly.	Moderate: wet soils, dense brush, short steep slopes, flooding.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
163*:		
Killey----------	Severe: wetness, flooding, frost action.	Severe: wet soils.
Moose River----------	Severe: wetness, flooding, frost action.	Severe: wet soils.
164:		
Knik----------	Moderate: too gravelly, frost action.	Slight.
165*:		
Knik gently sloping---	Moderate: too gravelly, slope, frost action.	Moderate: slope.
Knik moderately steep-	Severe: slope, too gravelly, frost action.	Moderate: slope.
166*:		
Knik steep----------	Severe: slope, too gravelly, frost action.	Severe: slope.
Knik sloping----------	Moderate: too gravelly, slope, frost action.	Severe: slope.
167:		
Knik----------	Moderate: too gravelly, frost action.	Slight.
168*:		
Knik----------	Severe: slope, too gravelly, frost action.	Moderate: slope, wet soils.
Cryaquepts----------	Severe: wetness, too cobbly, frost action.	Moderate: slope, wet soils.
169:		
Liten----------	Severe: slope, too sandy.	Moderate: slope.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
171:		
Nancy	Moderate: too sandy, frost action.	Slight.
172*:		
Nancy sloping	Moderate: too sandy, slope, frost action.	Moderate: slope.
Nancy moderately steep	Severe: slope, too sandy, frost action.	Moderate: slope.
173*:		
Nancy steep	Severe: slope, too sandy, frost action.	Severe: slope.
Nancy sloping	Moderate: too sandy, slope, frost action.	Severe: slope.
174:		
Nancy	Moderate: too sandy, frost action.	Slight.
175*:		
Nancy	Moderate: too sandy, frost action.	Moderate: wet soils.
Cryaquepts	Severe: wetness, frost action.	Moderate: wet soils.
176*:		
Nancy sloping	Moderate: too sandy, slope, frost action.	Moderate: slope, dense brush.
Nancy moderately steep	Severe: slope, too sandy, frost action.	Moderate: slope, dense brush.
Tokositna	Severe: slope, frost action.	Moderate: slope, dense brush.
177*:		
Nancy steep	Severe: slope, too sandy, frost action.	Severe: slope, dense brush.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
177*: cont'd		
Tokositna----------	Severe: slope, frost action.	Severe: slope, dense brush.
Nancy sloping---------	Moderate: too sandy, slope, frost action.	Severe: slope, dense brush.
178*:		
Nancy----------	Moderate: too sandy, frost action.	Moderate: dense brush.
Tokositna----------	Moderate: frost action.	Moderate: dense brush.
180*:		
Psuyaah----------	Moderate: wetness, slope, frost action.	Moderate: slope, wet soils, dense brush.
Snowdance----------	Severe: wetness, slope, frost action.	Moderate: slope, wet soils, dense brush.
181*:		
Qeni cool----------	Severe: wetness, too sandy and cobbly.	Moderate: slope, low escarpments, poorly drained areas, flooding, channels.
Niklavar cool---------	Severe: wetness, flooding, frost action.	Moderate: slope, low escarpments, poorly drained areas, flooding, channels.
Cryods cold----------	Severe: slope, variable soil materials.	Moderate: slope, low escarpments, poorly drained areas, flooding, channels.
182*:		
Riverwash----------	Severe: flooding, wetness, river ice.	Moderate: channels, flooding, wet soils.
Niklavar----------	Severe: wetness, flooding, frost action.	Moderate: channels, flooding, wet soils.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
183*:		
Rock outcrop----------	Severe: slope, surface bedrock.	Very severe: slope, rock outcrops.
Cryumbrepts----------	Severe: slope, too cobbly, shallow bedrock.	Very severe: slope, rock outcrops.
184*:		
Siwash----------	Severe: slope, too gravelly, shallow bedrock, frost action.	Severe: slope, wet soils, dense brush, rock outcrops.
Talkeetna cool--------	Severe: slope, too gravelly, frost action.	Severe: slope, wet soils, dense brush, rock outcrops.
Snowdance----------	Moderate: wetness, frost action.	Severe: slope, wet soils, dense brush, rock outcrops.
185:		
Susitna----------	Moderate: too sandy.	Moderate: channels, poorly drained areas, dense brush.
186*:		
Susivar----------	Severe: wetness, flooding, frost action.	Severe: flooding, wet soils, dense brush.
Moose River----------	Severe: wetness, flooding, frost action.	Severe: flooding, wet soils, dense brush.
187*:		
Susivar----------	Severe: wetness, flooding, frost action.	Moderate: poorly drained or flooded areas, dense brush.
Niklavar----------	Severe: wetness, flooding, frost action.	Moderate: poorly drained or flooded areas, dense brush.
188:		
Talkeetna warm--------	Severe: slope, too gravelly, frost action.	Moderate: slope, brush thickets, poorly drained areas.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
189*:		
Talkeetna----------	Severe: slope, too gravelly, frost action.	Severe: slope, dense brush, poorly drained areas.
Talkeetna thick------- surface	Severe: slope, too gravelly, frost action.	Severe: slope, dense brush, poorly drained areas.
190*:		
Talkeetna warm--------	Severe: slope, too gravelly, frost action.	Moderate: slope, poorly drained areas, dense brush.
Talkeetna thick------- surface	Severe: slope, too gravelly, frost action.	Moderate: slope, poorly drained areas, dense brush.
191*:		
Talkeetna warm--------	Severe: slope, too gravelly, frost action.	Severe: slope, dense brush, poorly drained areas.
Talkeetna thick------- surface	Severe: slope, too gravelly, frost action.	Severe: slope, dense brush, poorly drained areas.
192*:		
Talkeetna low--------- elevation	Severe: slope, too gravelly, frost action.	Severe: slope, dense brush, rock outcrops.
Deneka low elevation--	Severe: slope, shallow bedrock, frost action.	Severe: slope, dense brush, rock outcrops.
193*:		
Talkeetna warm--------	Severe: slope, too gravelly, frost action.	Severe: slope, poorly drained areas, dense brush.
Talkeetna thick------- surface	Severe: slope, too gravelly, frost action.	Severe: slope, poorly drained areas, dense brush.
Deneka----------	Severe: slope, shallow bedrock, frost action.	Severe: slope, poorly drained areas, dense brush.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
194*:		
Talkeetna cool--------	Severe: slope, too gravelly, frost action.	Moderate: slope, wet soils, dense brush.
Snowdance----------	Moderate: wetness, slope, frost action.	Severe: slope, wet soils, dense brush.
195*:		
Talkeetna cool--------	Severe: slope, too gravelly, frost action.	Moderate: slope, drainages, dense brush, wet soils.
Tsadaka----------	Severe: slope, too cobbly, frost action.	Moderate: slope, drainages, dense brush, wet soils.
Chunilna cool---------	Severe: slope, coarse fragments, wetness, frost action.	Severe: slope, drainages, dense brush, wet soils.
197*:		
Tokositna sloping-----	Moderate: frost action, slope.	Moderate: slope, dense brush.
Tokositna moderately-- steep	Severe: slope, frost action.	Moderate: slope, dense brush.
198*:		
Tokositna steep-------	Severe: slope, frost action.	Severe: slope, dense brush.
Tokositna moderately-- steep	Moderate: frost action, slope.	Severe: slope, dense brush.
199:		
Tokositna----------	Moderate: frost action.	Moderate: dense brush.
200*:		
Tokositna----------	Severe: slope, frost action.	Moderate: slope, dense brush, wet soils.
Chunilna----------	Severe: wetness, frost action.	Moderate: slope, dense brush, wet soils.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
201*:		
Tokositna----------	Moderate: frost action, slope.	Moderate: dense brush, slope, wet soils.
Chunilna----------	Severe: wetness, frost action.	Moderate: dense brush, slope, wet soils.
202*:		
Tsadaka----------	Severe: slope, too cobbly, frost action.	Moderate: slope, poorly drained areas.
Talkeetna cool--------	Severe: slope, too gravelly, frost action.	Moderate: slope, poorly drained areas.
203*:		
Typic Cryaquents------	Severe: wetness, frost action.	Severe: wet soils.
204*:		
Typic Cryaquents------ coastal	Severe: too clayey, wetness, frost action.	Severe: wet soils.
205:		
Whitsol----------	Moderate: frost action.	Slight.
206*:		
Whitsol cool,--------- moderately steep	Severe: slope, frost action.	Moderate: slope.
Whitsol cool,--------- sloping	Moderate: frost action, slope.	Moderate: slope.
207*:		
Whitsol cool,--------- sloping	Moderate: frost action, slope.	Severe: slope.
Whitsol cool,--------- steep	severe: slope, frost action.	Severe: slope.
208:		
Whitsol silty---------	Moderate: frost action.	Slight.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
209*:		
Whitsol silty, sloping	Moderate: frost action, slope.	Moderate: slope.
Whitsol silty, moderately steep	Severe: slope, frost action.	Moderate: slope.
210*:		
Whitsol till, sloping	Moderate: frost action, slope.	Moderate: slope.
Whitsol till, moderately steep	Severe: slope, frost action.	Moderate: slope.
211:		
Whitsol till	Moderate: frost action, slope.	Slight.
212:		
Yensus	Moderate: frost action.	Slight.
213*:		
Yensus gently sloping	Moderate: frost action, slope.	Moderate: slope.
Yensus moderately steep	Severe: slope, frost action.	Moderate: slope.
214:		
Yensus	Moderate: frost action.	Slight.
215:		
Yohn	Moderate: too sandy.	Slight.
216:		
Yohn	Moderate: too sandy, slope.	Moderate: slope.
217*:		
Yohn	Moderate: too sandy, slope.	Moderate: slope.
Deception	Severe: too cobbly, slope.	Moderate: slope.
218*:		
Yohn	Severe: slope, too sandy.	Moderate: slope.

* See footnote at end of table

TABLE 11--LIVESTOCK GRAZING MANAGEMENT--Continued

Map symbol and soil name	Fencing limitation	Livestock distribution limitation
218*: cont'd		
Delyndia----------	Severe: slope, too sandy.	Moderate: slope.
219*:		
Yohn----------	Moderate: too sandy, slope.	Moderate: short steep slopes.
Flat Horn----------	Moderate: too sandy, slope.	Moderate: short steep slopes.

* See description of the map unit for composition and behavior characteristics of the map unit

TABLE 12--FORESTLAND PRODUCTIVITY

(Only map units with forested soils are listed. Absence of an entry indicates that data were not available. Base age for site index: white spruce--100 years breast height age; balsam poplar--50 years total age; quaking aspen--50 years total age; paper birch--50 years breast height age. Cubic feet is the annual volume increment at culmination age.)

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
101:				
Benka	White spruce	74	28	2
	Quaking aspen	53	44	3
	Paper birch	45	20	1
	Black spruce	---	---	---
102:				
Benka sloping	White spruce	74	28	2
	Quaking aspen	53	44	3
	Paper birch	45	20	1
	Black spruce	---	---	---
Benka moderately steep	White spruce	74	28	2
	Quaking aspen	53	44	3
	Paper birch	45	20	1
	Black spruce	---	---	---
103:				
Benka	White spruce	74	28	2
	Quaking aspen	53	44	3
	Paper birch	45	20	1
	Black spruce	---	---	---
104:				
Benka	White spruce	74	28	2
	Quaking aspen	53	44	3
	Paper birch	45	20	1
	Black spruce	---	---	---
Liten	White spruce	73	27	2
	Paper birch	57	35	2
	Quaking aspen	52	42	3
105:				
Bodenburg	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
106:				
Bodenburg sloping	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
Bodenburg moderately steep	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
107:				
Bodenburg steep	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
Bodenburg sloping	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
108:				
Bodenburg	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
109:				
Bodenburg silty	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
110:				
Bodenburg silty, sloping	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
Bodenburg silty, moderately steep	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
111:				
Bodenburg silty	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
112:				
Bodenburg steep	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
Bodenburg sloping	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
Jim	Balsam poplar	65	---	---
	White spruce	63	20	1
	Paper birch	---	---	---
	Quaking aspen	---	---	---
113:				
Chilligan	White spruce	69	24	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
113: cont'd				
Cryaquepts	White spruce	61	19	1
	Paper birch	49	24	2
	Black spruce	---	---	---
114:				
Chilligan	White spruce	69	24	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
Cryaquepts	White spruce	61	19	1
	Paper birch	49	24	2
	Black spruce	---	---	---
116:				
Cryaquepts depressional	Black spruce	---	---	---
	Paper birch	---	---	---
	Quaking aspen	---	---	---
	White spruce	---	---	---
117:				
Cryods	Balsam poplar	---	---	---
	Paper birch	---	---	---
	Quaking aspen	---	---	---
	White spruce	---	---	---
118:				
Cryods cool	Balsam poplar	---	---	---
	Black spruce	---	---	---
	White spruce	---	---	---
Niklason moderately wet	White spruce	58	17	1
120:				
Cryods low elevation	Balsam poplar	---	---	---
	Paper birch	---	---	---
	Quaking aspen	---	---	---
	White spruce	---	---	---
121:				
Cryods	Balsam poplar	---	---	---
	Paper birch	---	---	---
	Quaking aspen	---	---	---
	White spruce	---	---	---
122:				
Deception	White spruce	56	16	1
	Paper birch	46	21	1
	Black spruce	---	---	---
	Quaking aspen	---	---	---
123:				
Deception sloping	White spruce	56	16	1
	Paper birch	46	21	1
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Deception moderately steep	White spruce	56	16	1
	Paper birch	46	21	1
	Black spruce	---	---	---
	Quaking aspen	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
124:				
Deception steep	White spruce	56	16	1
	Paper birch	46	21	1
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Deception sloping	White spruce	56	16	1
	Paper birch	46	21	1
	Black spruce	---	---	---
	Quaking aspen	---	---	---
125:				
Deception	White spruce	56	16	1
	Paper birch	46	21	1
	Black spruce	---	---	---
	Quaking aspen	---	---	---
126:				
Delyndia	White spruce	69	24	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
127:				
Delyndia	White spruce	69	24	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
128:				
Disappoint	White spruce	61	19	1
	Paper birch	49	24	2
	Black spruce	---	---	---
129:				
Eska sloping	White spruce	69	24	2
	Paper birch	49	24	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
Eska moderately steep	White spruce	69	24	2
	Paper birch	49	24	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
130:				
Eska sloping	White spruce	69	24	2
	Paper birch	49	24	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
Eska moderately steep	White spruce	69	24	2
	Paper birch	49	24	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
Jim	Balsam poplar	65	---	---
	White spruce	63	20	1
	Paper birch	---	---	---
	Quaking aspen	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
131:				
Estelle	White spruce	75	29	2
	Paper birch	57	35	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
132:				
Estelle sloping	White spruce	75	29	2
	Paper birch	57	35	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Estelle moderately steep	White spruce	75	29	2
	Paper birch	57	35	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
133:				
Estelle steep	White spruce	75	29	2
	Paper birch	57	35	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Estelle sloping	White spruce	75	29	2
	Paper birch	57	35	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
134:				
Estelle	White spruce	75	29	2
	Paper birch	57	35	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
135:				
Estelle	White spruce	75	29	2
	Paper birch	57	35	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Disappoint	White spruce	61	19	1
	Paper birch	49	24	2
	Black spruce	---	---	---
136:				
Estelle	White spruce	75	29	2
	Paper birch	57	35	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Disappoint	White spruce	61	19	1
	Paper birch	49	24	2
	Black spruce	---	---	---
137:				
Flat Horn	White spruce	69	24	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Black spruce	---	---	---
	Quaking aspen	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
138:				
Flat Horn	White spruce	69	24	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Black spruce	---	---	---
	Quaking aspen	---	---	---
139:				
Flat Horn sloping	White spruce	69	24	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Flat Horn moderately steep	White spruce	69	24	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Black spruce	---	---	---
	Quaking aspen	---	---	---
143:				
Kalambach gently sloping	White spruce	63	20	1
	Paper birch	47	22	1
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
Kalambach moderately steep	White spruce	63	20	1
	Paper birch	47	22	1
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
144:				
Kalambach steep	White spruce	63	20	1
	Paper birch	47	22	1
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
Kalambach sloping	White spruce	63	20	1
	Paper birch	47	22	1
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
145:				
Kalambach	White spruce	63	20	1
	Paper birch	47	22	1
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
146:				
Kalambach	White spruce	63	20	1
	Paper birch	47	22	1
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
Disappoint	White spruce	61	19	1
	Paper birch	49	24	2
	Black spruce	---	---	---
147:				
Kashwitna	White spruce	69	24	2
	Quaking aspen	52	42	3
	Paper birch	50	25	2
	Black spruce	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
148:				
Kashwitna sloping	White spruce	69	24	2
	Quaking aspen	52	42	3
	Paper birch	50	25	2
	Black spruce	---	---	---
Kashwitna moderately steep	White spruce	69	24	2
	Quaking aspen	52	42	3
	Paper birch	50	25	2
	Black spruce	---	---	---
149:				
Kashwitna	White spruce	69	24	2
	Quaking aspen	52	42	3
	Paper birch	50	25	2
	Black spruce	---	---	---
150:				
Keba	White spruce	74	28	2
	Paper birch	55	32	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
151:				
Kichatna	White spruce	64	21	1
	Quaking aspen	45	29	2
	Paper birch	45	20	1
	Black spruce	---	---	---
152:				
Kichatna sloping	White spruce	64	21	1
	Quaking aspen	45	29	2
	Paper birch	45	20	1
	Black spruce	---	---	---
Kichatna moderately steep	White spruce	64	21	1
	Quaking aspen	45	29	2
	Paper birch	45	20	1
	Black spruce	---	---	---
153:				
Kichatna steep	White spruce	64	21	1
	Quaking aspen	45	29	2
	Paper birch	45	20	1
	Black spruce	---	---	---
Kichatna sloping	White spruce	64	21	1
	Quaking aspen	45	29	2
	Paper birch	45	20	1
	Black spruce	---	---	---
154:				
Kichatna	White spruce	64	21	1
	Quaking aspen	45	29	2
	Paper birch	45	20	1
	Black spruce	---	---	---
155:				
Kichatna	White spruce	64	21	1
	Quaking aspen	45	29	2
	Paper birch	45	20	1
	Black spruce	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
155: cont'd				
Deception	White spruce	56	16	1
	Paper birch	46	21	1
	Black spruce	---	---	---
	Quaking aspen	---	---	---
156:				
Kichatna	White spruce	64	21	1
	Quaking aspen	45	29	2
	Paper birch	45	20	1
	Black spruce	---	---	---
Deception sloping	White spruce	56	16	1
	Paper birch	46	21	1
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Deception steep	White spruce	56	16	1
	Paper birch	46	21	1
	Black spruce	---	---	---
	Quaking aspen	---	---	---
157:				
Kichatna	White spruce	64	21	1
	Quaking aspen	45	29	2
	Paper birch	45	20	1
	Black spruce	---	---	---
Delyndia	White spruce	69	24	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
158:				
Kichatna	White spruce	64	21	1
	Quaking aspen	45	29	2
	Paper birch	45	20	1
	Black spruce	---	---	---
Delyndia	White spruce	69	24	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
159:				
Kidazqeni cool	White spruce	64	21	1
	Paper birch	42	17	1
Niklason cool	White spruce	64	21	1
	Paper birch	42	17	1
	Balsam poplar	---	---	---
160:				
Kidazqeni	White spruce	70	25	2
	Balsam poplar	68	---	---
	Paper birch	46	21	1
161:				
Kidazqeni	White spruce	70	25	2
	Balsam poplar	68	---	---
	Paper birch	46	21	1

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
162:				
Kidazqeni	White spruce	70	25	2
	Balsam poplar	68	---	---
	Paper birch	46	21	1
Niklason	White spruce	72	26	2
	Balsam poplar	72	---	---
	Paper birch	47	22	1
163:				
Killey	White spruce	60	18	1
	Paper birch	42	17	1
	Balsam poplar	---	---	---
	Black spruce	---	---	---
164:				
Knik	White spruce	70	25	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
165:				
Knik gently sloping	White spruce	70	25	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
Knik moderately steep	White spruce	70	25	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
166:				
Knik steep	White spruce	70	25	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
Knik sloping	White spruce	70	25	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
167:				
Knik	White spruce	70	25	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
168:				
Knik	White spruce	70	25	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Quaking aspen	---	---	---
Cryaquepts	White spruce	61	19	1
	Paper birch	49	24	2
	Black spruce	---	---	---
169:				
Liten	White spruce	73	27	2
	Paper birch	57	35	2
	Quaking aspen	52	42	3

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
171:				
Nancy	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
172:				
Nancy sloping	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
Nancy moderately steep	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
173:				
Nancy steep	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
Nancy sloping	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
174:				
Nancy	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
175:				
Nancy	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
Cryaquepts	White spruce	61	19	1
	Paper birch	49	24	2
	Black spruce	---	---	---
176:				
Nancy sloping	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
Nancy moderately steep	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
Tokositna moderately steep	White spruce	72	26	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
177:				
Nancy steep	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
Tokositna steep	White spruce	72	26	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Nancy sloping	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
178:				
Nancy	White spruce	76	29	2
	Quaking aspen	53	44	3
	Paper birch	49	24	1
	Black spruce	---	---	---
Tokositna	White spruce	72	26	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
182:				
Niklavar	Balsam poplar	75	---	---
	White spruce	69	24	2
	Paper birch	43	18	1
185:				
Susitna	White spruce	73	27	2
	Balsam poplar	72	---	---
	Paper birch	48	23	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
186:				
Susivar	Balsam poplar	75	---	---
	White spruce	70	25	2
	Paper birch	44	19	1
187:				
Susivar	Balsam poplar	75	---	---
	White spruce	70	25	2
	Paper birch	44	19	1
Niklavar	Balsam poplar	75	---	---
	White spruce	69	24	2
	Paper birch	43	18	1
188:				
Talkeetna warm	White spruce	64	21	1
	Paper birch	45	20	1
	Balsam poplar	---	---	---
190:				
Talkeetna warm	White spruce	64	21	1
	Paper birch	45	20	1
	Balsam poplar	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
191:				
Talkeetna warm	White spruce	64	21	1
	Paper birch	45	20	1
	Balsam poplar	---	---	---
192:				
Talkeetna low elevation	White spruce	65	21	1
	Paper birch	50	25	2
	Balsam poplar	---	---	---
Deneka low elevation	White spruce	73	27	2
	Paper birch	44	19	1
193:				
Talkeetna warm	White spruce	64	21	1
	Paper birch	45	20	1
	Balsam poplar	---	---	---
Deneka	White spruce	64	21	1
	Paper birch	44	19	1
197:				
Tokositna sloping	White spruce	72	26	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Tokositna moderately steep	White spruce	72	26	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
198:				
Tokositna steep	White spruce	72	26	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Tokositna sloping	White spruce	72	26	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
199:				
Tokositna	White spruce	72	26	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
200:				
Tokositna	White spruce	72	26	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Chunilna	White spruce	61	19	1
	Paper birch	49	24	2
	Black spruce	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
201:				
Tokositna	White spruce	72	26	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Chunilna	White spruce	61	19	1
	Paper birch	49	24	2
	Black spruce	---	---	---
203:				
Typic Cryaquents	Balsam poplar	---	---	---
	Black spruce	---	---	---
	Paper birch	---	---	---
	White spruce	---	---	---
205:				
Whitsol	White spruce	69	24	2
	Quaking aspen	53	44	3
	Paper birch	50	25	2
	Black spruce	---	---	---
206:				
Whitsol cool, sloping	White spruce	64	21	1
	Paper birch	42	17	1
Whitsol cool, moderately steep	White spruce	64	21	1
	Paper birch	42	17	1
207:				
Whitsol cool, steep	White spruce	64	21	1
	Paper birch	42	17	1
Whitsol cool, sloping	White spruce	64	21	1
	Paper birch	42	17	1
208:				
Whitsol silty	White spruce	69	24	2
	Quaking aspen	53	44	3
	Paper birch	50	25	2
	Black spruce	---	---	---
209:				
Whitsol silty, sloping	White spruce	69	24	2
	Quaking aspen	53	44	3
	Paper birch	50	25	2
	Black spruce	---	---	---
Whitsol silty, moderately steep	White spruce	69	24	2
	Quaking aspen	53	44	3
	Paper birch	50	25	2
	Black spruce	---	---	---
210:				
Whitsol till, sloping	White spruce	69	24	2
	Quaking aspen	53	44	3
	Paper birch	50	25	2
	Black spruce	---	---	---
Whitsol till, moderately steep	White spruce	69	24	2
	Quaking aspen	53	44	3
	Paper birch	50	25	2
	Black spruce	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
211:				
Whitsol till	White spruce	69	24	2
	Quaking aspen	53	44	3
	Paper birch	50	25	2
	Black spruce	---	---	---
212:				
Yensus	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
213:				
Yensus sloping	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
Yensus moderately steep	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
214:				
Yensus	Balsam poplar	72	---	---
	White spruce	69	24	2
	Paper birch	45	20	1
	Quaking aspen	---	---	---
215:				
Yohn	White spruce	74	28	2
	Paper birch	55	32	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
216:				
Yohn	White spruce	74	28	2
	Paper birch	55	32	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
217:				
Yohn	White spruce	74	28	2
	Paper birch	55	32	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Deception	White spruce	56	16	1
	Paper birch	46	21	1
	Black spruce	---	---	---
	Quaking aspen	---	---	---
218:				
Yohn	White spruce	74	28	2
	Paper birch	55	32	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Delyndia	White spruce	69	24	2
	Paper birch	50	25	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---

TABLE 12--FORESTLAND PRODUCTIVITY--Continued

Map symbol and soil name	Common trees	Site index	Cubic feet	Productivity class
219:				
Yohn	White spruce	74	28	2
	Paper birch	55	32	2
	Black spruce	---	---	---
	Quaking aspen	---	---	---
Flat Horn	White spruce	69	24	2
	Paper birch	50	25	2
	Balsam poplar	---	---	---
	Black spruce	---	---	---
	Quaking aspen	---	---	---

TABLE 13--FORESTLAND MANAGEMENT

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that data were not available.)

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
101:						
Benka----------	2A	Slight	Moderate	Slight	Moderate	Severe
102:						
Benka sloping---------	2A	Slight	Moderate	Slight	Moderate	Severe
Benka moderately steep	2R	Moderate	Moderate	Slight	Moderate	Severe
103:						
Benka----------	2A	Slight	Moderate	Slight	Moderate	Severe
104:						
Benka----------	2A	Slight	Moderate	Slight	Moderate	Severe
Liten----------	2R	Moderate	Moderate	Moderate	Moderate	Slight
105:						
Bodenburg----------	2A	Slight	Moderate	Slight	Moderate	Severe
106:						
Bodenburg sloping-----	2A	Slight	Moderate	Slight	Moderate	Severe
Bodenburg moderately-- steep	2R	Moderate	Moderate	Slight	Moderate	Severe
107:						
Bodenburg steep-------	2R	Severe	Severe	Slight	Moderate	Severe
Bodenburg sloping-----	2A	Slight	Moderate	Slight	Moderate	Severe
108:						
Bodenburg----------	2A	Slight	Moderate	Slight	Moderate	Severe
109:						
Bodenburg silty-------	2A	Slight	Moderate	Slight	Moderate	Severe
110:						
Bodenburg silty,------ sloping	2A	Slight	Moderate	Slight	Moderate	Severe
Bodenburg silty,------ moderately steep	2R	Moderate	Moderate	Slight	Moderate	Severe
111:						
Bodenburg silty-------	2A	Slight	Moderate	Slight	Moderate	Severe
112:						
Bodenburg steep-------	2R	Severe	Severe	Slight	Moderate	Severe
Bodenburg sloping-----	2A	Slight	Moderate	Slight	Moderate	Severe
Jim----------	1R	Severe	Severe	Slight	Moderate	Severe
113:						
Chilligan----------	2R	Moderate	Moderate	Slight	Moderate	Moderate
Cryaquepts----------	1W	---	Severe	Severe	Severe	Severe

TABLE 13--FORESTLAND MANAGEMENT--Continued

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
114:						
Chilligan----------	2A	Slight	Moderate	Slight	Moderate	Moderate
Cryaquepts----------	1W	---	Severe	Severe	Severe	Severe
116:						
Cryaquepts---------- depressional	1W	---	Severe	Severe	Severe	Severe
117:						
Cryods----------	2R	---	Severe	Severe	Severe	Slight
118:						
Cryods cool----------	1A	---	Slight	Slight	Moderate	Moderate
Niklason moderately--- wet	1A	Slight	Slight	Slight	Moderate	Slight
120:						
Cryods low elevation--	2R	---	Severe	Severe	Severe	Slight
121:						
Cryods----------	1D	---	Severe	Moderate	Moderate	Moderate
122:						
Deception----------	1D	Slight	Moderate	Severe	Severe	Moderate
123:						
Deception sloping-----	1D	Slight	Moderate	Severe	Severe	Moderate
Deception moderately-- steep	1R	Moderate	Moderate	Severe	Severe	Moderate
124:						
Deception steep-------	1R	Severe	Severe	Severe	Severe	Moderate
Deception sloping-----	1R	Moderate	Moderate	Severe	Severe	Moderate
125:						
Deception----------	1D	Slight	Moderate	Severe	Severe	Moderate
126:						
Delyndia----------	2D	Slight	Moderate	Severe	Severe	Moderate
127:						
Delyndia----------	2D	Slight	Moderate	Severe	Severe	Moderate
128:						
Disappoint----------	1W	Slight	Severe	Severe	Severe	Severe
129:						
Eska sloping----------	2A	Slight	Moderate	Slight	Moderate	Severe
Eska moderately steep-	2R	Severe	Moderate	Slight	Moderate	Severe
130:						
Eska sloping----------	2A	Slight	Moderate	Slight	Moderate	Severe
Eska moderately steep-	2R	Severe	Moderate	Slight	Moderate	Severe
Jim----------	1R	Moderate	Moderate	Slight	Moderate	Severe

TABLE 13--FORESTLAND MANAGEMENT--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
131:						
Estelle----------	2A	Slight	Moderate	Slight	Moderate	Severe
132:						
Estelle sloping-------	2A	Slight	Moderate	Slight	Moderate	Severe
Estelle moderately---- steep	2R	Moderate	Moderate	Slight	Moderate	Severe
133:						
Estelle steep---------	2R	Severe	Severe	Slight	Moderate	Severe
Estelle sloping-------	2A	Slight	Moderate	Slight	Moderate	Severe
134:						
Estelle----------	2A	Slight	Moderate	Slight	Moderate	Severe
135:						
Estelle----------	2R	Moderate	Moderate	Slight	Moderate	Severe
Disappoint----------	1W	Slight	Severe	Severe	Severe	Severe
136:						
Estelle----------	2A	Slight	Moderate	Slight	Moderate	Severe
Disappoint----------	1W	Slight	Severe	Severe	Severe	Severe
137:						
Flat Horn----------	2A	Slight	Moderate	Slight	Moderate	Moderate
138:						
Flat Horn----------	2A	Slight	Moderate	Slight	Moderate	Moderate
139:						
Flat Horn sloping-----	2A	Slight	Moderate	Slight	Moderate	Moderate
Flat Horn moderately-- steep	2R	Moderate	Moderate	Slight	Moderate	Moderate
143:						
Kalambach gently------ sloping	1A	Slight	Moderate	Slight	Moderate	Severe
Kalambach moderately-- steep	1R	Moderate	Moderate	Slight	Moderate	Severe
144:						
Kalambach steep-------	1R	Severe	Severe	Slight	Moderate	Severe
Kalambach sloping-----	1A	Slight	Moderate	Slight	Moderate	Severe
145:						
Kalambach----------	1A	Slight	Moderate	Slight	Moderate	Severe
146:						
Kalambach----------	1A	Slight	Moderate	Slight	Moderate	Severe
Disappoint----------	1W	Slight	Severe	Severe	Severe	Severe
147:						
Kashwitna----------	2A	Slight	Moderate	Slight	Moderate	Moderate

TABLE 13--FORESTLAND MANAGEMENT--Continued

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
148:						
Kashwitna sloping-----	2A	Slight	Moderate	Slight	Moderate	Moderate
Kashwitna moderately-- steep	2R	Moderate	Moderate	Slight	Moderate	Moderate
149:						
Kashwitna----------	2A	Slight	Moderate	Slight	Moderate	Moderate
150:						
Keba----------	2A	Slight	Moderate	Slight	Moderate	Severe
151:						
Kichatna----------	1D	Slight	Moderate	Moderate	Moderate	Moderate
152:						
Kichatna sloping------	1D	Slight	Moderate	Moderate	Moderate	Moderate
Kichatna moderately--- steep	1R	Moderate	Moderate	Moderate	Moderate	Moderate
153:						
Kichatna steep--------	1R	Severe	Severe	Moderate	Moderate	Moderate
Kichatna sloping------	1R	Moderate	Moderate	Moderate	Moderate	Moderate
154:						
Kichatna----------	1D	Slight	Moderate	Moderate	Moderate	Moderate
155:						
Kichatna----------	1D	Slight	Moderate	Moderate	Moderate	Moderate
Deception----------	1R	Moderate	Moderate	Severe	Severe	Moderate
156:						
Kichatna----------	1R	Severe	Severe	Moderate	Moderate	Moderate
Deception sloping-----	1D	Slight	Moderate	Severe	Severe	Moderate
Deception steep-------	1R	Severe	Severe	Severe	Severe	Moderate
157:						
Kichatna----------	1R	Moderate	Moderate	Moderate	Moderate	Moderate
Delyndia----------	2D	Slight	Moderate	Severe	Severe	Moderate
158:						
Kichatna----------	1D	Slight	Moderate	Moderate	Moderate	Moderate
Delyndia----------	2D	Slight	Moderate	Severe	Severe	Moderate
159:						
Kidazqeni cool--------	1D	Slight	Slight	Severe	Moderate	Moderate
Niklason cool---------	1A	Slight	Slight	Slight	Moderate	Moderate
160:						
Kidazqeni----------	2D	Slight	Moderate	Severe	Moderate	Moderate
161:						
Kidazqeni----------	2D	Slight	Moderate	Severe	Moderate	Moderate

TABLE 13--FORESTLAND MANAGEMENT--Continued

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
162:						
Kidazqeni	2D	Slight	Moderate	Severe	Moderate	Moderate
Niklason	2A	Slight	Slight	Slight	Moderate	Moderate
163:						
Killey	1W	---	Severe	Severe	Severe	Severe
164:						
Knik	2D	Slight	Moderate	Moderate	Moderate	Severe
165:						
Knik gently sloping	2D	Slight	Moderate	Moderate	Moderate	Severe
Knik moderately steep	2R	Moderate	Moderate	Moderate	Moderate	Severe
166:						
Knik steep	2R	Severe	Severe	Moderate	Moderate	Severe
Knik sloping	2D	Slight	Moderate	Moderate	Moderate	Severe
167:						
Knik	2D	Slight	Moderate	Moderate	Moderate	Severe
168:						
Knik	2D	Slight	Moderate	Moderate	Moderate	Severe
Cryaquepts	1W	---	Severe	Severe	Severe	Severe
169:						
Liten	2R	Moderate	Moderate	Moderate	Moderate	Slight
171:						
Nancy	2A	Slight	Moderate	Slight	Moderate	Severe
172:						
Nancy sloping	2A	Slight	Moderate	Slight	Moderate	Severe
Nancy moderately steep	2R	Moderate	Moderate	Slight	Moderate	Severe
173:						
Nancy steep	2R	Severe	Severe	Slight	Moderate	Severe
Nancy sloping	2A	Slight	Moderate	Slight	Moderate	Severe
174:						
Nancy	2A	Slight	Moderate	Slight	Moderate	Severe
175:						
Nancy	2A	Slight	Moderate	Slight	Moderate	Severe
Cryaquepts	1W	---	Severe	Severe	Severe	Severe
176:						
Nancy sloping	2A	Slight	Moderate	Slight	Moderate	Severe
Nancy moderately steep	2R	Moderate	Moderate	Slight	Moderate	Severe
Tokositna moderately steep	2R	Moderate	Moderate	Slight	Moderate	Severe

TABLE 13--FORESTLAND MANAGEMENT--Continued

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
177:						
Nancy steep----------	2R	Severe	Severe	Slight	Moderate	Severe
Tokositna steep-------	2R	Severe	Severe	Slight	Moderate	Severe
Nancy sloping---------	2A	Slight	Moderate	Slight	Moderate	Severe
178:						
Nancy----------	2A	Slight	Moderate	Slight	Moderate	Severe
Tokositna----------	2A	Slight	Moderate	Slight	Moderate	Severe
182:						
Niklavar----------	2W	Slight	Moderate	Moderate	Moderate	Moderate
185:						
Susitna----------	2A	Slight	Slight	Slight	Moderate	Severe
186:						
Susivar----------	2W	Slight	Moderate	Slight	Moderate	Moderate
187:						
Susivar----------	2W	Slight	Moderate	Slight	Moderate	Moderate
Niklavar----------	2W	Slight	Moderate	Moderate	Moderate	Moderate
188:						
Talkeetna warm--------	1R	Moderate	Moderate	Slight	Moderate	Severe
190:						
Talkeetna warm--------	1R	Moderate	Moderate	Slight	Moderate	Severe
191:						
Talkeetna warm--------	1R	Moderate	Moderate	Slight	Moderate	Severe
192:						
Talkeetna low--------- elevation	1R	Severe	Severe	Slight	Moderate	Severe
Deneka low elevation--	2R	Moderate	Moderate	Moderate	Moderate	Severe
193:						
Talkeetna warm--------	1R	Moderate	Moderate	Slight	Moderate	Severe
Deneka----------	1D	Slight	Moderate	Moderate	Moderate	Severe
197:						
Tokositna sloping-----	2A	Slight	Moderate	Slight	Moderate	Severe
Tokositna moderately-- steep	2R	Moderate	Moderate	Slight	Moderate	Severe
198:						
Tokositna steep-------	2R	Severe	Severe	Slight	Moderate	Severe
Tokositna sloping-----	2A	Slight	Moderate	Slight	Moderate	Severe
199:						
Tokositna----------	2A	Slight	Moderate	Slight	Moderate	Severe
200:						
Tokositna----------	2R	Moderate	Moderate	Slight	Moderate	Severe

TABLE 13--FORESTLAND MANAGEMENT--Continued

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
200: cont'd						
Chunilna	1W	Slight	Severe	Severe	Severe	Severe
201:						
Tokositna	2A	Slight	Moderate	Slight	Moderate	Severe
Chunilna	1W	Slight	Severe	Severe	Severe	Severe
203:						
Typic Cryaquents	1W	---	Severe	Severe	Severe	Severe
205:						
Whitsol	2A	Slight	Moderate	Slight	Moderate	Severe
206:						
Whitsol cool, sloping	1A	Slight	Moderate	Slight	Moderate	Severe
Whitsol cool, moderately steep	1R	Moderate	Moderate	Slight	Moderate	Severe
207:						
Whitsol cool, steep	1R	Severe	Severe	Slight	Moderate	Severe
Whitsol cool, sloping	1A	Slight	Moderate	Slight	Moderate	Severe
208:						
Whitsol silty	2A	Slight	Moderate	Slight	Moderate	Severe
209:						
Whitsol silty, sloping	2A	Slight	Moderate	Slight	Moderate	Severe
Whitsol silty, moderately steep	2R	Moderate	Moderate	Slight	Moderate	Severe
210:						
Whitsol till, sloping	2A	Slight	Moderate	Slight	Moderate	Severe
Whitsol till, moderately steep	2R	Moderate	Moderate	Slight	Moderate	Severe
211:						
Whitsol till	2A	Slight	Moderate	Slight	Moderate	Severe
212:						
Yensus	2D	Slight	Moderate	Slight	Moderate	Severe
213:						
Yensus sloping	2D	Slight	Moderate	Slight	Moderate	Severe
Yensus moderately steep	2R	Moderate	Moderate	Slight	Moderate	Severe
214:						
Yensus	2D	Slight	Moderate	Slight	Moderate	Severe
215:						
Yohn	2A	Slight	Moderate	Slight	Moderate	Severe
216:						
Yohn	2A	Slight	Moderate	Slight	Moderate	Severe

TABLE 13--FORESTLAND MANAGEMENT--Continued

Map symbol and soil name	Ordination symbol	Management concerns				
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition
217:						
Yohn	2A	Slight	Moderate	Slight	Moderate	Severe
Deception	1D	Slight	Moderate	Severe	Severe	Moderate
218:						
Yohn	2R	Moderate	Moderate	Slight	Moderate	Severe
Delyndia	2R	Moderate	Moderate	Severe	Severe	Moderate
219:						
Yohn	2A	Slight	Moderate	Slight	Moderate	Severe
Flat Horn	2A	Slight	Moderate	Slight	Moderate	Moderate

TABLE 14--SOIL LIMITATIONS AND HAZARDS FOR UNSURFACED ROADS

(See text for a description of the limitations and hazards listed in this table.)

Map symbol and soil name	Limitations and hazards
101:	
Benka	Dusty when dry Low strength when wet Slippery when wet
102:	
Benka sloping	Dusty when dry Low strength when wet Slippery when wet
Benka moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
103:	
Benka	Dusty when dry Low strength when wet Slippery when wet
104:	
Benka	Dusty when dry Low strength when wet Slippery when wet
Liten	Dusty when dry Low strength when wet Slippery when wet Steep slope
105:	
Bodenburg	Dusty when dry Low strength when wet Slippery when wet
106:	
Bodenburg sloping	Dusty when dry Low strength when wet Slippery when wet
Bodenburg moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
107:	
Bodenburg steep	Very steep slope
Bodenburg sloping	Dusty when dry Low strength when wet Moderate slope Slippery when wet
108:	
Bodenburg	Dusty when dry Low strength when wet Slippery when wet

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
109:	
Bodenburg silty	Dusty when dry Low strength when wet Slippery when wet
110:	
Bodenburg silty, sloping	Dusty when dry Low strength when wet Slippery when wet
Bodenburg silty, moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
111:	
Bodenburg silty	Dusty when dry Low strength when wet Slippery when wet
112:	
Bodenburg steep	Very steep slope
Bodenburg sloping	Dusty when dry Low strength when wet Moderate slope Slippery when wet
Jim	Very steep slope
113:	
Chilligan	Dusty when dry Low strength when wet Slippery when wet Steep slope
Cryaquepts	Dusty when dry Slippery when wet Wetness
114:	
Chilligan	Dusty when dry Low strength when wet Slippery when wet
Cryaquepts	Dusty when dry Wetness
115:	
Chunilna cool	Dusty when dry Low strength when wet Moderate slope Slippery when wet Wetness
116:	
Cryaquepts depressional	Dusty when dry Wetness
117:	
Cryods	Very steep slope

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
118:	
Cryods cool	Dusty when dry Moderate slope Slippery when wet
Niklason moderately wet	Flooding Slippery when wet
Qeni	Dusty when dry Low strength when wet Slippery when wet
119:	
Cryods	Dusty when dry Steep slope
Cryaquepts cool	Dusty when dry Moderate slope Slippery when wet Wetness
120:	
Cryods low elevation	Very steep slope
Cryochrepts	Very steep slope
121:	
Cryods	Very steep slope
122:	
Deception	Dusty when dry Low strength when wet Moderate slope Slippery when wet
123:	
Deception sloping	Dusty when dry Low strength when wet Slippery when wet
Deception moderately steep	Dusty when dry Slippery when wet Steep slope
124:	
Deception steep	Very steep slope
Deception sloping	Dusty when dry Moderate slope Slippery when wet
125:	
Deception	Dusty when dry Low strength when wet Slippery when wet
126:	
Delyndia	Dusty when dry Low strength when wet Slippery when wet

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
127:	
Delyndia	Dusty when dry Low strength when wet Slippery when wet
Histosols	Wetness
128:	
Disappoint	Dusty when dry Slippery when wet Wetness
129:	
Eska sloping	Dusty when dry Low strength when wet Slippery when wet
Eska moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
130:	
Eska sloping	Dusty when dry Low strength when wet Slippery when wet
Eska moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
Jim	Dusty when dry Low strength when wet Slippery when wet Steep slope
131:	
Estelle	Dusty when dry Low strength when wet Moderate slope Slippery when wet
132:	
Estelle sloping	Dusty when dry Low strength when wet Slippery when wet
Estelle moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
133:	
Estelle steep	Very steep slope
Estelle sloping	Dusty when dry Low strength when wet Moderate slope Slippery when wet

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
134:	
Estelle	Dusty when dry Low strength when wet Slippery when wet
135:	
Estelle	Dusty when dry Low strength when wet Slippery when wet Steep slope
Disappoint	Dusty when dry Slippery when wet Wetness
136:	
Estelle	Dusty when dry Low strength when wet Moderate slope Slippery when wet
Disappoint	Dusty when dry Slippery when wet Wetness
137:	
Flat Horn	Dusty when dry Low strength when wet Slippery when wet
138:	
Flat Horn	Dusty when dry Low strength when wet Moderate slope Slippery when wet
139:	
Flat Horn sloping	Dusty when dry Slippery when wet
Flat Horn moderately steep	Dusty when dry Slippery when wet Steep slope
140:	
Goldcord	Slippery when wet Steep slope
Tsadaka	Dusty when dry Low strength when wet Moderate slope Slippery when wet
141:	
Histosols	Wetness
142:	
Histosols high elevation	Wetness

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
143:	
Kalambach gently sloping---------	Dusty when dry Low strength when wet Slippery when wet
Kalambach moderately steep-------	Dusty when dry Low strength when wet Slippery when wet Steep slope
144:	
Kalambach steep----------	Very steep slope
Kalambach sloping----------	Dusty when dry Low strength when wet Moderate slope Slippery when wet
145:	
Kalambach----------	Dusty when dry Low strength when wet Slippery when wet
146:	
Kalambach----------	Dusty when dry Low strength when wet Slippery when wet
Disappoint----------	Dusty when dry Slippery when wet Wetness
147:	
Kashwitna----------	Dusty when dry Low strength when wet Slippery when wet
148:	
Kashwitna sloping----------	Dusty when dry Low strength when wet Slippery when wet
Kashwitna moderately steep-------	Dusty when dry Low strength when wet Slippery when wet Steep slope
149:	
Kashwitna----------	Dusty when dry Low strength when wet Slippery when wet
150:	
Keba----------	Dusty when dry Low strength when wet Slippery when wet
151:	
Kichatna----------	Dusty when dry Low strength when wet Slippery when wet

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
152:	
Kichatna sloping	Dusty when dry Slippery when wet
Kichatna moderately steep	Dusty when dry Low strength when wet Moderate slope Slippery when wet
153:	
Kichatna steep	Very steep slope
Kichatna sloping	Dusty when dry Moderate slope Slippery when wet
154:	
Kichatna	Dusty when dry Low strength when wet Slippery when wet
155:	
Kichatna	Dusty when dry Low strength when wet Moderate slope Slippery when wet
Deception	Dusty when dry Moderate slope Slippery when wet
156:	
Kichatna	Very steep slope
Deception sloping	Dusty when dry Low strength when wet Moderate slope Slippery when wet
Deception steep	Very steep slope
157:	
Kichatna	Dusty when dry Low strength when wet Moderate slope Slippery when wet
Delyndia	Dusty when dry Low strength when wet Slippery when wet
158:	
Kichatna	Dusty when dry Low strength when wet Slippery when wet
Delyndia	Dusty when dry Low strength when wet Slippery when wet

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
159:	
Kidazqeni cool	Dusty when dry Flooding Slippery when wet
Niklason cool	Dusty when dry Flooding Low strength when wet Slippery when wet
160:	
Kidazqeni	Dusty when dry Slippery when wet
161:	
Kidazqeni moderately wet	Dusty when dry Flooding Slippery when wet
Kidazqeni	Dusty when dry Flooding Slippery when wet
162:	
Kidazqeni	Dusty when dry Flooding Slippery when wet
Niklason	Dusty when dry Flooding Slippery when wet
163:	
Killey	Dusty when dry Flooding Slippery when wet Wetness
Moose River	Flooding Slippery when wet Wetness
164:	
Knik	Dusty when dry Low strength when wet Slippery when wet
165:	
Knik gently sloping	Dusty when dry Low strength when wet Slippery when wet
Knik moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
166:	
Knik steep	Very steep slope

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
166: cont'd	
Knik sloping	Dusty when dry Low strength when wet Moderate slope Slippery when wet
167:	
Knik	Dusty when dry Low strength when wet Slippery when wet
168:	
Knik	Dusty when dry Moderate slope Slippery when wet
Cryaquepts	Dusty when dry Slippery when wet Wetness
169:	
Liten	Dusty when dry Low strength when dry Slippery when wet Steep slope
170:	
Mine spoils	Nonsoil material
171:	
Nancy	Dusty when dry Low strength when wet Slippery when wet
172:	
Nancy sloping	Dusty when dry Low strength when wet Slippery when wet
Nancy moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
173:	
Nancy steep	Very steep slope
Nancy sloping	Dusty when dry Low strength when wet Moderate slope Slippery when wet
174:	
Nancy	Dusty when dry Low strength when wet Slippery when wet
175:	
Nancy	Dusty when dry Low strength when wet Slippery when wet

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
175: cont'd	
Cryaquepts	Dusty when dry Slippery when wet Wetness
176:	
Nancy sloping	Dusty when dry Low strength when wet Slippery when wet
Nancy moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
Tokositna moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
177:	
Nancy steep	Very steep slope
Tokositna steep	Very steep slope
Nancy sloping	Dusty when dry Low strength when wet Moderate slope Slippery when wet
178:	
Nancy	Dusty when dry Low strength when wet Slippery when wet
Tokositna	Dusty when dry Low strength when wet Slippery when wet
179:	
Pits, gravel	Nonsoil material
180:	
Psuyaah	Dusty when dry Low strength when wet Moderate slope Slippery when wet Wetness
Snowdance	Dusty when dry Low strength when wet Moderate slope Slippery when wet Wetness
181:	
Qeni cool	Dusty when dry Low strength when wet Slippery when wet

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
181: cont'd	
Niklavar cool	Flooding Slippery when wet Wetness
Cryods cold	Dusty when dry Moderate slope Slippery when wet
182:	
Riverwash	Nonsoil material
Niklavar	Flooding Slippery when wet Wetness
183:	
Rock outcrop	Nonsoil material
Cryumbrepts	Areas of rock outcrop Very steep slope
184:	
Siwash	Dusty when dry Slippery when wet Steep slope
Talkeetna cool	Dusty when dry Low strength when wet Moderate slope Slippery when wet
Snowdance	Dusty when dry Low strength when wet Slippery when wet Wetness
185:	
Susitna	Dusty when dry Low strength when wet Slippery when wet
186:	
Susivar	Flooding Slippery when wet
Moose River	Dusty when dry Flooding Slippery when wet Wetness
187:	
Susivar	Flooding Low strength when wet Slippery when wet
Niklavar	Flooding Low strength when wet Slippery when wet Wetness

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
188:	
Talkeetna warm----------	Dusty when dry Low strength when wet Slippery when wet Steep slope
189:	
Talkeetna----------	Dusty when dry Low strength when wet Slippery when wet Steep slope
Talkeetna thick surface----------	Dusty when dry Low strength when wet Slippery when wet Steep slope
190:	
Talkeetna warm----------	Dusty when dry Low strength when wet Slippery when wet Steep slope
Talkeetna thick surface----------	Dusty when dry Low strength when wet Slippery when wet Steep slope
191:	
Talkeetna warm----------	Dusty when dry Low strength when wet Slippery when wet Steep slope
Talkeetna thick surface----------	Dusty when dry Low strength when wet Slippery when wet Steep slope
192:	
Talkeetna low elevation----------	Very steep slope
Deneka low elevation----------	Dusty when dry Low strength when wet Slippery when wet Steep slope
193:	
Talkeetna warm----------	Very steep slope
Talkeetna thick surface----------	Very steep slope
Deneka----------	Dusty when dry Low strength when wet Moderate slope Slippery when wet

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
194:	
Talkeetna cool	Dusty when dry Low strength when wet Moderate slope Slippery when wet
Snowdance	Dusty when dry Low strength when wet Moderate slope Slippery when wet Wetness
195:	
Talkeetna cool	Dusty when dry Low strength when wet Slippery when wet Steep slope
Tsadaka	Dusty when dry Low strength when wet Slippery when wet Steep slope
Chunilna cool	Dusty when dry Low strength when wet Moderate slope Slippery when wet Wetness
196:	
Tidal flats	Nonsoil material
197:	
Tokositna sloping	Dusty when dry Low strength when wet Slippery when wet
Tokositna moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
198:	
Tokositna steep	Very steep slope
Tokositna sloping	Dusty when dry Low strength when wet Moderate slope Slippery when wet
199:	
Tokositna	Dusty when dry Low strength when wet Slippery when wet
200:	
Tokositna	Dusty when dry Low strength when wet Slippery when wet Steep slope

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
200: cont'd	
Chunilna	Dusty when dry Low strength when wet Slippery when wet Wetness
201:	
Tokositna	Dusty when dry Low strength when wet Slippery when wet
Chunilna	Dusty when dry Low strength when wet Slippery when wet Wetness
202:	
Tsadaka	Dusty when dry Low strength when wet Moderate slope Slippery when wet
Talkeetna cool	Dusty when dry Low strength when wet Moderate slope Slippery when wet
203:	
Typic Cryaquents	Flooding Slippery when wet Wetness
204:	
Typic Cryaquents, coastal	Dusty when dry Flooding Slippery when wet Wetness
205:	
Whitsol	Dusty when dry Low strength when wet Slippery when wet
206:	
Whitsol cool, sloping	Dusty when dry Low strength when wet Slippery when wet
Whitsol cool, moderately steep	Dusty when dry Low strength when wet Slippery when wet Steep slope
207:	
Whitsol cool, steep	Very steep slope
Whitsol cool, sloping	Dusty when dry Low strength when wet Moderate slope Slippery when wet

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
208:	
Whitsol silty----------	Dusty when dry Low strength when wet Slippery when wet
209:	
Whitsol silty, sloping----------	Dusty when dry Low strength when wet Slippery when wet
Whitsol silty, moderately steep--	Dusty when dry Low strength when wet Slippery when wet Steep slope
210:	
Whitsol till, sloping----------	Dusty when dry Low strength when wet Slippery when wet
Whitsol till, moderately steep---	Dusty when dry Low strength when wet Slippery when wet Steep slope
211:	
Whitsol till----------	Dusty when dry Low strength when wet Slippery when wet
212:	
Yensus----------	Dusty when dry Low strength when wet Slippery when wet
213:	
Yensus sloping----------	Dusty when dry Low strength when wet Slippery when wet
Yensus moderately steep----------	Dusty when dry Low strength when wet Slippery when wet Steep slope
214:	
Yensus----------	Dusty when dry Low strength when wet Slippery when wet
215:	
Yohn----------	Dusty when dry Low strength when wet Slippery when wet
216:	
Yohn----------	Dusty when dry Low strength when wet Moderate slope Slippery when wet

TABLE 14--SOIL LIMITATIONS AND HAZARDS
FOR UNSURFACED ROADS--Continued

Map symbol and soil name	Limitations and hazards
217:	
Yohn	Dusty when dry Low strength when wet Moderate slope Slippery when wet
Deception	Dusty when dry Low strength when wet Moderate slope Slippery when wet
218:	
Yohn	Dusty when dry Low strength when wet Moderate slope Slippery when wet
Delyndia	Dusty when dry Low strength when dry Moderate slope Slippery when wet
219:	
Yohn	Dusty when dry Low strength when wet Slippery when wet
Flat Horn	Dusty when dry Slippery when wet
W:	
Water	On-site required

TABLE 15--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated.)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
101:				
Benka	Slight	Slight	Slight	Slight.
102*:				
Benka sloping	Slight	Slight	Severe: slope.	Slight.
Benka moderately steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
103:				
Benka	Slight	Slight	Moderate: slope.	Slight.
104*:				
Benka	Slight	Slight	Moderate: slope.	Slight.
Liten	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
105:				
Bodenburg	Slight	Slight	Slight	Slight.
106*:				
Bodenburg sloping	Slight	Slight	Severe: slope.	Slight.
Bodenburg moderately steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
107*:				
Bodenburg steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Bodenburg sloping	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
108:				
Bodenburg	Slight	Slight	Moderate: slope.	Slight.
109:				
Bodenburg silty	Slight	Slight	Slight	Slight.
110*:				
Bodenburg silty, sloping	Slight	Slight	Severe: slope.	Slight.
Bodenburg silty, moderately steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
111:				
Bodenburg silty	Slight	Slight	Moderate: slope.	Slight.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
112*:				
Bodenburg steep------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Bodenburg sloping----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Jim----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
113*:				
Chilligan----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Cryaquepts----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
114*:				
Chilligan----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
Cryaquepts----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
115:				
Chunilna cool--------	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness, erodes easily.
116*:				
Cryaquepts---------- depressional	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
117*:				
Cryods----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
118*:				
Cryods cool----------	---	---	---	---
Niklason moderately-- wet	Severe: flooding.	Slight----------	Moderate: slope, flooding.	Slight.
Qeni----------	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
119*:				
Cryods----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Cryaquepts cool------	Severe: wetness.	Severe: wetness.	Severe: slope.	Severe: wetness, erodes easily.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
120*:				
Cryods low elevation-	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Cryochrepts----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
121*:				
Cryods----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
122:				
Deception----------	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
123*:				
Deception sloping----	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Deception moderately- steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
124*:				
Deception steep------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Deception sloping----	Severe: slope.	Severe: slope.	Severe: slope.	Slight.
125:				
Deception----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
126:				
Delyndia----------	Slight----------	Slight----------	Moderate: slope.	Slight.
127*:				
Delyndia----------	Slight----------	Slight----------	Slight----------	Slight.
Histosols----------	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
128:				
Disappoint----------	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: large stones, slope, wetness.	Severe: large stones, wetness.
129*:				
Eska sloping---------	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Eska moderately steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
130*:				
Eska sloping---------	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Eska moderately steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Jim----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
131:				
Estelle----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
132*:				
Estelle sloping------	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Estelle moderately--- steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
133*:				
Estelle steep--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Estelle sloping------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
134:				
Estelle----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
135*:				
Estelle----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Disappoint----------	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: large stones, wetness.	Severe: large stones, wetness.
136*:				
Estelle----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
Disappoint----------	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: large stones, wetness.	Severe: large stones, wetness.
137:				
Flat Horn----------	Slight----------	Slight----------	Moderate: slope.	Slight.
138:				
Flat Horn----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
139*:				
Flat Horn sloping----	Slight----------	Slight----------	Severe: slope.	Slight.
Flat Horn moderately-steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
140*:				
Goldcord----------	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: large stones.
Tsadaka----------	Severe: slope, cemented pan.	Severe: slope, cemented pan.	Severe: slope, cemented pan.	Severe: erodes easily.
141*:				
Histosols----------	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
142*:				
Histosols high------- elevation	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
143*:				
Kalambach gently----- sloping	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Kalambach moderately-steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
144*:				
Kalambach steep------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Kalambach sloping----	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
145:				
Kalambach----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
146*:				
Kalambach----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
Disappoint----------	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.
147:				
Kashwitna----------	Slight----------	Slight----------	Slight----------	Slight.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
148*:				
Kashwitna sloping----	Slight----------	Slight----------	Severe: slope.	Slight.
Kashwitna moderately-steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
149:				
Kashwitna----------	Slight----------	Slight----------	Moderate: slope.	Slight.
150:				
Keba----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
151:				
Kichatna----------	Slight----------	Slight----------	Slight----------	Slight.
152*:				
Kichatna sloping-----	Slight----------	Slight----------	Severe: slope.	Slight.
Kichatna moderately--steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
153*:				
Kichatna steep-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Kichatna sloping-----	Severe: slope.	Severe: slope.	Severe: slope.	Slight.
154:				
Kichatna----------	Slight----------	Slight----------	Moderate: slope.	Slight.
155*:				
Kichatna----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Deception----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
156*:				
Kichatna steep-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Deception sloping----	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
Deception steep------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
157*:				
Kichatna----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
157*: cont'd				
Delyndia	Slight	Slight	Severe: slope.	Slight.
158*:				
Kichatna	Slight	Slight	Moderate: slope.	Slight.
Delyndia	Slight	Slight	Moderate: slope.	Slight.
159*:				
Kidazqeni cool	Severe: flooding.	Moderate: slope.	Severe: slope.	Slight.
Niklason cool	Severe: flooding.	Moderate: slope.	Severe: slope.	Slight.
160:				
Kidazqeni	Severe: flooding.	Slight	Slight	Slight.
161*:				
Kidazqeni moderately-wet	Severe: flooding.	Slight	Moderate: flooding.	Slight.
Kidazqeni	Severe: flooding.	Slight	Moderate: flooding.	Slight.
162*:				
Kidazqeni	Severe: flooding.	Slight	Moderate: flooding.	Slight.
Niklason	Severe: flooding.	Slight	Moderate: flooding.	Slight.
163*:				
Killey	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Moose River	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
164:				
Knik	Slight	Slight	Slight	Slight.
165*:				
Knik gently sloping	Slight	Slight	Severe: slope.	Slight.
Knik moderately steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
166*:				
Knik steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
166*: cont'd				
Knik sloping---------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
167:				
Knik----------	Slight----------	Slight----------	Moderate: slope.	Slight.
168*:				
Knik----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Cryaquepts----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
169:				
Liten----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
170*:				
Mine spoils.				
171:				
Nancy----------	Slight----------	Slight----------	Slight----------	Slight.
172*:				
Nancy sloping--------	Slight----------	Slight----------	Severe: slope.	Slight.
Nancy moderately----- steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
173*:				
Nancy steep----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Nancy sloping--------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
174:				
Nancy----------	Slight----------	Slight----------	Moderate: slope.	Slight.
175*:				
Nancy----------	Slight----------	Slight----------	Moderate: slope.	Slight.
Cryaquepts----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
176*:				
Nancy sloping--------	Slight----------	Slight----------	Severe: slope.	Slight.
Nancy moderately----- steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Tokositna moderately- steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
177*:				
Nancy steep----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Tokositna steep------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Nancy sloping--------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
178*:				
Nancy----------	Slight----------	Slight----------	Moderate: slope.	Slight.
Tokositna----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
179*:				
Pits, gravel.				
180*:				
Psuyaah----------	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness, erodes easily.
Snowdance----------	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness, erodes easily.
181*:				
Qeni cool----------	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Niklavar cool--------	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Cryods cold----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
182*:				
Riverwash.				
Niklavar----------	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.
183*:				
Rock outcrop.				
Cryumbrepts----------	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope, large stones.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
184*:				
Siwash	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Talkeetna cool	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Snowdance	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.
185:				
Susitna	Severe: flooding.	Slight	Slight	Slight.
186*:				
Susivar	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.
Moose River	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
187*:				
Susivar	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.
Niklavar	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
188:				
Talkeetna warm	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
189*:				
Talkeetna	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Talkeetna thick surface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
190*:				
Talkeetna warm	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Talkeetna thick surface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
191*:				
Talkeetna warm	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
191*: cont'd				
Talkeetna thick------ surface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
192*:				
Talkeetna low ------- elevation	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Deneka low elevation-	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
193*:				
Talkeetna warm-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Talkeetna thick------ surface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Deneka----------	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
194*:				
Talkeetna cool-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Snowdance----------	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness, erodes easily.
195*:				
Talkeetna cool-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Tsadaka----------	Severe: slope, cemented pan.	Severe: slope, cemented pan.	Severe: slope, cemented pan.	Severe: erodes easily.
Chunilna cool--------	Severe: slope, wetness.	Severe: slope, wetness.	Severe: slope, wetness.	Severe: wetness, erodes easily.
196*:				
Tidal flats.				
197*:				
Tokositna sloping----	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Tokositna moderately- steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
198*:				
Tokositna steep------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
198*: cont'd				
Tokositna sloping----	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
199:				
Tokositna----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
200*:				
Tokositna----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Chunilna----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
201*:				
Tokositna----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
Chunilna----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
202*:				
Tsadaka----------	Severe: slope, cemented pan.	Severe: slope, cemented pan.	Severe: slope, cemented pan.	Severe: erodes easily.
Talkeetna cool-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
203*:				
Typic Cryaquents-----	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.
204*:				
Typic Cryaquents,---- coastal	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, erodes easily.
205:				
Whitsol----------	Slight----------	Slight----------	Slight----------	Slight.
206*:				
Whitsol cool, sloping	Slight----------	Slight----------	Severe: slope.	Slight.
Whitsol cool,-------- moderately steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
207*:				
Whitsol cool, steep--	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.
Whitsol cool, sloping	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
208:				
Whitsol silty--------	Slight----------	Slight----------	Moderate: slope.	Slight.
209*:				
Whitsol silty,------- sloping	Slight----------	Slight----------	Severe: slope.	Slight.
Whitsol silty,------- moderately steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
210*:				
Whitsol till, sloping	Slight----------	Slight----------	Severe: slope.	Slight.
Whitsol till,-------- moderately steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
211:				
Whitsol till---------	Slight----------	Slight----------	Severe: slope.	Slight.
212:				
Yensus----------	Slight----------	Slight----------	Slight----------	Slight.
213*:				
Yensus sloping-------	Slight----------	Slight----------	Severe: slope.	Slight.
Yensus moderately---- steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
214:				
Yensus----------	Slight----------	Slight----------	Moderate: slope.	Slight.
215:				
Yohn----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
216:				
Yohn----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.
217*:				
Yohn----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
Deception----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight.
218*:				
Yohn----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Delyndia----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.

* See footnote at end of table.

TABLE 15--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
219*:				
Yohn----------	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Flat Horn----------	Slight----------	Slight----------	Severe: slope.	Slight.
W*:				
Water.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the glossary. See text for definitions of "slight," " moderate," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for on-site investigation.)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
101:					
Benka----------	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
102*:					
Benka sloping------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Benka moderately--- steep	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
103:					
Benka----------	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
104*:					
Benka----------	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Liten----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
105:					
Bodenburg----------	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight----------	Fair: thin layer.
106*:					
Bodenburg sloping--	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Slight----------	Fair: thin layer.
Bodenburg---------- moderately steep	Severe: slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope, thin layer.
107*:					
Bodenburg steep----	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Bodenburg sloping--	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope, thin layer.
108:					
Bodenburg----------	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight----------	Fair: thin layer.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
109:					
Bodenburg silty----	Moderate: percs slowly.	Moderate: seepage.	Slight----------	Slight----------	Good.
110*:					
Bodenburg silty,--- sloping	Moderate: percs slowly, slope.	Severe: slope.	Slight----------	Slight----------	Good.
Bodenburg silty,--- moderately steep	Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
111:					
Bodenburg silty----	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
112*:					
Bodenburg steep----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Bodenburg sloping--	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Jim----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
113*:					
Chilligan----------	Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Cryaquepts---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, thin layer.
114*:					
Chilligan----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
Cryaquepts---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, thin layer.
115:					
Chunilna cool------	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
116*:					
Cryaquepts--------- depressiona	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, thin layer.
117*:					
Cryods----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
118*:					
Cryods cool--------	---	Severe: slope.	---	---	---
Niklason---------- moderately wet	Severe: flooding, wetness.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, too sandy, small stones.
Qeni----------	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
119*:					
Cryods----------	Severe: depth to rock, wetness, slope.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, wetness, slope.	Poor: depth to rock, slope.
Cryaquepts cool----	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, thin layer.
120*:					
Cryods low--------- elevation	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Cryochrepts--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
121*:					
Cryods----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
122:					
Deception----------	Moderate: percs slowly.	Severe: slope.	Moderate: large stones.	Slight----------	Poor: small stones.
123*:					
Deception sloping--	Moderate: percs slowly, slope.	Severe: slope.	Moderate: large stones.	Slight----------	Poor: small stones.
Deception---------- moderately steep	Severe: slope.	Severe: slope.	Moderate: large stones.	Moderate: slope.	Poor: small stones.
124*:					
Deception steep----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Deception sloping--	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
125:					
Deception----------	Moderate: percs slowly.	Moderate: slope, large stones, seepage.	Moderate: large stones.	Slight----------	Poor: small stones.
126:					
Delyndia----------	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
127*:					
Delyndia----------	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Histosols----------	Severe: ponding.	Severe: seepage, excess humus.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
128:					
Disappoint---------	Severe: wetness.	Severe: wetness, large stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
129*:					
Eska sloping-------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: large stones.	Slight----------	Poor: small stones.
Eska moderately---- steep	Severe: slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
130*:					
Eska sloping-------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: large stones.	Slight----------	Poor: small stones.
Eska moderately---- steep	Severe: slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
Jim----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
131:					
Estelle----------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
132*:					
Estelle sloping----	Moderate: percs slowly, slope.	Severe: slope.	Moderate: large stones.	Slight----------	Poor: small stones.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
132*:					
Estelle moderately-steep	Severe: slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
133*:					
Estelle steep------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Estelle sloping----	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
134:					
Estelle----------	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: large stones.	Slight----------	Poor: small stones.
135*:					
Estelle----------	Severe: slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
Disappoint---------	Severe: wetness.	Severe: wetness, large stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
136*:					
Estelle----------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
Disappoint---------	Severe: wetness.	Severe: wetness, large stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
137:					
Flat Horn----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
138:					
Flat Horn----------	Moderate: percs slowly, slope.	Severe: slope.	Slight----------	Slight----------	Good.
139*:					
Flat Horn sloping--	Moderate: percs slowly, slope.	Severe: slope.	Slight----------	Slight----------	Good.
Flat Horn---------- moderately steep	Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
140*:					
Goldcord----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
140*: cont'd					
Tsadaka----------	Severe: cemented pan, slope.	Severe: cemented pan, slope.	Severe: slope.	Severe: cemented pan, slope.	Poor: cemented pan, small stones, slope.
141*:					
Histosols----------	Severe: ponding.	Severe: seepage, excess humus.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
142*:					
Histosols high----- elevation	Severe: ponding.	Severe: seepage, excess humus.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
143*:					
Kalambach gently--- sloping	Moderate: percs slowly, slope.	Moderate: slope, seepage.	Moderate: large stones.	Slight----------	Poor: small stones.
Kalambach---------- moderately steep	Severe: slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
144*:					
Kalambach steep----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Kalambach sloping--	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
145:					
Kalambach----------	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: large stones.	Slight----------	Poor: small stones.
146*:					
Kalambach----------	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: large stones.	Slight----------	Poor: small stones.
Disappoint---------	Severe: wetness.	Severe: wetness, large stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
147:					
Kashwitna----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
148*:					
Kashwitna sloping--	Moderate: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Kashwitna---------- moderately steep	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
149:					
Kashwitna----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
150:					
Keba----------	Moderate: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
151:					
Kichatna----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
152*:					
Kichatna sloping---	Moderate: poor filter, slope.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Kichatna---------- moderately steep	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
153*:					
Kichatna steep-----	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Kichatna sloping---	Moderate: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
154:					
Kichatna----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
155*:					
Kichatna----------	Moderate: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
155*: cont'd					
Deception----------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
156*:					
Kichatna steep-----	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Deception sloping--	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
Deception steep----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
157*:					
Kichatna----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Delyndia----------	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
158*:					
Kichatna----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Delyndia----------	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
159*:					
Kidazqeni cool-----	Severe: flooding.	Severe: seepage, flooding, slope.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy, small stones.
Niklason cool------	Severe: flooding.	Severe: seepage, flooding, slope.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy, small stones.
160:					
Kidazqeni----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
161*:					
Kidazqeni---------- moderately wet	Severe: flooding, wetness.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, too sandy, small stones.
Kidazqeni----------	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy, small stones.
162*:					
Kidazqeni----------	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy, small stones.
Niklason----------	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy, small stones.
163*:					
Killey----------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: too sandy, wetness.
Moose River--------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
164:					
Knik----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
165*:					
Knik gently sloping	Moderate: poor filter, slope.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Knik moderately---- steep	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
166*:					
Knik steep---------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Knik sloping-------	Moderate: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
167:					
Knik----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
168*:					
Knik----------	Moderate: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Cryaquepts---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, thin layer.
169:					
Liten----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
170*:					
Mine spoils.					
171:					
Nancy----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
172*:					
Nancy sloping------	Moderate: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Nancy moderately--- steep	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
173*:					
Nancy steep--------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Nancy sloping------	Moderate: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
174:					
Nancy----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
175*:					
Nancy----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Cryaquepts---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, thin layer.
176*:					
Nancy sloping------	Moderate: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Nancy moderately--- steep	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Tokositna---------- moderately steep	Severe: slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
177*:					
Nancy steep--------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Tokositna steep----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Nancy sloping------	Moderate: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
178*:					
Nancy----------	Moderate: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Tokositna----------	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: large stones.	Slight----------	Poor: small stones.
179*:					
Pits, gravel.					
180*:					
Psuyaah----------	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
180*: cont'd					
Snowdance----------	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
181*:					
Qeni cool----------	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
Niklavar cool------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
Cryods cold--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
182*:					
Riverwash.					
Niklavar----------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
183*:					
Rock outcrop.					
Cryumbrepts--------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
184*:					
Siwash----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Talkeetna cool-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Snowdance----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
185:					
Susitna----------	Moderate: flooding, percs slowly.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Fair: thin layer, too sandy.
186*:					
Susivar----------	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
186*: cont'd					
Moose River--------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
187*:					
Susivar----------	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
Niklavar----------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
188:					
Talkeetna warm-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
189*:					
Talkeetna----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Talkeetna thick---- surface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
190*, 191*:					
Talkeetna warm-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Talkeetna thick---- surface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
192*:					
Talkeetna low ----- elevation	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Deneka low--------- elevation	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
193*:					
Talkeetna warm-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Talkeetna thick---- surface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
193*: cont'd					
Deneka----------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
194*:					
Talkeetna cool-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Snowdance----------	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
195*:					
Talkeetna cool-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Tsadaka----------	Severe: cemented pan, slope.	Severe: cemented pan, slope.	Severe: slope.	Severe: cemented pan, slope.	Poor: cemented pan, small stones, slope.
Chunilna cool------	Severe: wetness, slope.	Severe: slope, wetness.	Severe: wetness, slope.	Severe: wetness, slope.	Poor: small stones, slope, wetness.
196*:					
Tidal flats.					
197*:					
Tokositna sloping--	Moderate: percs slowly, slope.	Severe: slope.	Moderate: large stones.	Slight----------	Poor: small stones.
Tokositna---------- moderately steep	Severe: slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
198*:					
Tokositna steep----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Tokositna sloping--	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
199:					
Tokositna----------	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: large stones.	Slight----------	Poor: small stones.
200*:					
Tokositna----------	Severe: slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
200*: cont'd					
Chunilna----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
201*:					
Tokositna----------	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: large stones.	Slight----------	Poor: small stones.
Chunilna----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
202*:					
Tsadaka----------	Severe: cemented pan, slope.	Severe: cemented pan, slope.	Severe: slope.	Severe: cemented pan, slope.	Poor: cemented pan, small stones, slope.
Talkeetna cool-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
203*:					
Typic Cryaquents---	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness, thin layer.
204*:					
Typic Cryaquents,-- coastal	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness, thin layer.
205:					
Whitsol----------	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight----------	Fair: thin layer.
206*:					
Whitsol cool,------ sloping	Moderate: percs slowly, slope.	Severe: slope.	Slight----------	Slight----------	Good.
Whitsol cool,------ moderately steep	Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
207*:					
Whitsol cool, steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Whitsol cool,------ sloping	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
208:					
Whitsol silty------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
209*:					
Whitsol silty, sloping	Moderate: percs slowly, slope.	Severe: slope.	Slight	Slight	Good.
Whitsol silty, moderately steep	Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
210*:					
Whitsol till, sloping	Moderate: percs slowly, slope.	Severe: slope.	Slight	Slight	Fair: thin layer.
Whitsol till, moderately steep	Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: thin layer, slope.
211:					
Whitsol till	Moderate: percs slowly, slope.	Moderate: slope, seepage.	Moderate: slope.	Moderate: slope.	Fair: thin layer, slope.
212:					
Yensus	Moderate: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
213*:					
Yensus sloping	Moderate: poor filter, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
Yensus moderately steep	Severe: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
214:					
Yensus	Moderate: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: thin layer.
215:					
Yohn	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: large stones.	Slight	Poor: small stones.
216:					
Yohn	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
217*:					
Yohn	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
Deception	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.

* See footnote at end of table.

TABLE 16--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
218*:					
Yohn----------	Severe: slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
Delyndia----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
219*:					
Yohn----------	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: large stones.	Slight----------	Poor: small stones.
Flat Horn----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
W*:					
Water.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for on-site investigation.)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
101:					
Benka----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Severe: frost action.
102*:					
Benka sloping----	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Benka moderately-steep	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
103:					
Benka----------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
104*:					
Benka----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Severe: frost action.
Liten----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
105:					
Bodenburg--------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Severe: frost action.
106*:					
Bodenburg sloping	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Bodenburg-------- moderately steep	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
107*:					
Bodenburg steep--	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Bodenburg sloping	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
108:					
Bodenburg--------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
109:					
Bodenburg silty--	Slight----------	Slight----------	Slight----------	Slight----------	Severe: frost action.
110*:					
Bodenburg silty,-sloping	Slight----------	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
110*: cont'd					
Bodenburg silty,- moderately steep	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
111:					
Bodenburg silty--	Slight----------	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
112*:					
Bodenburg steep--	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Bodenburg sloping	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
Jim----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, frost action.
113*:					
Chilligan--------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
Cryaquepts-------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
114*:					
Chilligan--------	Slight----------	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Cryaquepts-------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
115:					
Chunilna cool----	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness, frost action.
116*:					
Cryaquepts------- depressional	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
117*:					
Cryods----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, frost action.
118*:					
Cryods cool------	---	---	---	Severe: slope.	Severe: frost action.
Niklason--------- moderately wet	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
118*: cont'd					
Qeni----------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Moderate: wetness, flooding.
119*:					
Cryods----------	Severe: depth to rock, wetness, slope.	Severe: slope.	Severe: wetness, depth to rock, slope.	Severe: slope.	Severe: slope, frost action.
Cryaquepts cool--	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
120*:					
Cryods low------- elevation	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cryochrepts------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
121*:					
Cryods----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
122:					
Deception--------	Moderate: large stones, dense layer.	Moderate: large stones.	Moderate: large stones.	Severe: slope.	Moderate: frost action, large stones.
123*:					
Deception sloping	Moderate: large stones, dense layer.	Moderate: large stones.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: frost action, large stones.
Deception-------- moderately steep	Moderate: slope, large stones, dense layer.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: frost action, slope, large stones.
124*:					
Deception steep--	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Deception sloping	Moderate: large stones, dense layer, slope.	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: slope.	Moderate: frost action, large stones, slope.
125:					
Deception--------	Moderate: large stones, dense layer.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: frost action, large stones.
126:					
Delyndia---------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
127*:					
Delyndia---------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
Histosols--------	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, frost action, low strength.
128:					
Disappoint-------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
129*:					
Eska sloping-----	Moderate: dense layer.	Slight----------	Moderate: large stones.	Moderate: slope.	Severe: frost action.
Eska moderately-- steep	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
130*:					
Eska sloping-----	Moderate: dense layer.	Slight----------	Moderate: large stones.	Moderate: slope.	Severe: frost action.
Eska moderately-- steep	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
Jim----------	Severe: depth to rock, slope.	Moderate: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Severe: frost action.
131:					
Estelle----------	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
132*:					
Estelle sloping--	Moderate: dense layer.	Slight----------	Moderate: large stones.	Moderate: slope.	Severe: frost action.
Estelle---------- moderately steep	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
133*:					
Estelle steep----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Estelle sloping--	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
134:					
Estelle----------	Moderate: dense layer.	Slight----------	Moderate: large stones.	Slight----------	Severe: frost action.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
135*:					
Estelle----------	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
Disappoint-------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
136*:					
Estelle----------	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
Disappoint-------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
137:					
Flat Horn--------	Slight----------	Slight----------	Slight----------	Slight----------	Moderate: frost action.
138:					
Flat Horn--------	Slight----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
139*:					
Flat Horn sloping	Slight----------	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.
Flat Horn-------- moderately steep	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
140*:					
Goldcord---------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Tsadaka----------	Severe: cemented pan, slope.	Severe: slope.	Severe: cemented pan, slope.	Severe: slope.	Severe: slope, frost action.
141*:					
Histosols--------	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, frost action, low strength.
142*:					
Histosols high--- elevation	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, frost action, low strength.
143*:					
Kalambach gently- sloping	Moderate: dense layer.	Slight----------	Moderate: large stones.	Moderate: slope.	Moderate: frost action.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
143*: cont'd					
Kalambach-------- moderately steep	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action.
144*:					
Kalambach steep--	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kalambach sloping	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action.
145:					
Kalambach--------	Moderate: dense layer.	Slight----------	Moderate: large stones.	Moderate: slope.	Moderate: frost action.
146*:					
Kalambach--------	Moderate: dense layer.	Slight----------	Moderate: large stones.	Moderate: slope.	Moderate: frost action.
Disappoint-------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
147:					
Kashwitna--------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Severe: frost action.
148*:					
Kashwitna sloping	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Kashwitna-------- moderately steep	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
149:					
Kashwitna--------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
150:					
Keba----------	Slight----------	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
151:					
Kichatna---------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
152*:					
Kichatna sloping-	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.
Kichatna--------- moderately steep	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
153*:					
Kichatna steep---	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
153*: cont'd					
Kichatna sloping-	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
154:					
Kichatna---------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.
155*:					
Kichatna---------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Deception--------	Moderate: slope, dense layer, large stones.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.
156*:					
Kichatna steep---	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Deception sloping	Moderate: large stones, slope, dense layer.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.
Deception steep--	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
157*:					
Kichatna---------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Delyndia---------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.
158*:					
Kichatna---------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
Delyndia---------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
159*:					
Kidazqeni cool---	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Severe: flooding.
Niklason cool----	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Severe: flooding.
160:					
Kidazqeni--------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
161*:					
Kidazqeni-------- moderately wet	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
161*: cont'd					
Kidazqeni--------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
162*:					
Kidazqeni--------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Niklason---------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
163*:					
Killey----------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.
Moose River------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.
164:					
Knik----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Severe: frost action.
165*:					
Knik gently------ sloping	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Knik moderately-- steep	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
166*:					
Knik steep-------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Knik sloping-----	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
167:					
Knik----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Severe: frost action.
168*:					
Knik----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
Cryaquepts-------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
169:					
Liten----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
170*:					
Mine spoils.					

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
171:					
Nancy----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Severe: frost action.
172*:					
Nancy sloping----	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Nancy moderately-steep	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
173*:					
Nancy steep------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Nancy sloping----	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
174:					
Nancy----------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
175*:					
Nancy----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Severe: frost action.
Cryaquepts-------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
176*:					
Nancy sloping----	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Nancy moderately-steep	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
Tokositna-------- moderately steep	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
177*:					
Nancy steep------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Tokositna steep--	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Nancy sloping----	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
178*:					
Nancy----------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Tokositna--------	Moderate: dense layer.	Slight----------	Moderate: large stones.	Moderate: slope.	Severe: frost action.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
179*: Pits, gravel.					
180*:					
Psuyaah----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness, frost action.
Snowdance--------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness, frost action.
181*:					
Qeni cool--------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Moderate: wetness, flooding.
Niklavar cool----	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.
Cryods cold------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
182*: Riverwash.					
Niklavar---------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.
183*: Rock outcrop.					
Cryumbrepts------	Severe: large stones, slope.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope, large stones.	Severe: large stones, slope.
184*:					
Siwash----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope, frost action.
Talkeetna cool---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Snowdance--------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
185:					
Susitna----------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
186*:					
Susivar----------	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.
Moose River------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.
187*:					
Susivar----------	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.
Niklavar---------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.
188:					
Talkeetna warm---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
189*:					
Talkeetna--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Talkeetna thick-- surface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
190*, 191*:					
Talkeetna warm---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Talkeetna thick-- surface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
192*:					
Talkeetna low---- elevation	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Deneka low------- elevation	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope, frost action.
193*:					
Talkeetna warm---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Talkeetna thick-- surface	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
193*: cont'd					
Deneka----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, frost action.
194*:					
Talkeetna cool---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Snowdance--------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness, frost action.
195*:					
Talkeetna cool---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Tsadaka----------	Severe: cemented pan, slope.	Severe: slope.	Severe: cemented pan, slope.	Severe: slope.	Severe: slope, frost action.
Chunilna cool----	Severe: wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope, frost action.
196*: Tidal flats.					
197*:					
Tokositna sloping	Moderate: dense layer.	Slight----------	Moderate: large stones.	Moderate: slope.	Severe: frost action.
Tokositna-------- moderately steep	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: slope, frost action.
198*:					
Tokositna steep--	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Tokositna sloping	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
199:					
Tokositna--------	Moderate: dense layer.	Slight----------	Moderate: large stones.	Moderate: slope.	Severe: frost action.
200*:					
Tokositna--------	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: slope, frost action.
Chunilna---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
201*:					
Tokositna--------	Moderate: dense layer.	Slight----------	Moderate: large stones.	Moderate: slope.	Severe: frost action.
Chunilna---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.
202*:					
Tsadaka----------	Severe: cemented pan, slope.	Severe: slope.	Severe: cemented pan, slope.	Severe: slope.	Severe: slope, frost action.
Talkeetna cool---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
203*:					
Typic Cryaquents-	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.
204*:					
Typic Cryaquents- coastal	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.
205:					
Whitsol----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Severe: frost action.
206*:					
Whitsol cool,---- sloping	Slight----------	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Whitsol cool,---- moderately steep	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
207*:					
Whitsol cool,---- steep	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Whitsol cool,---- sloping	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
208:					
Whitsol silty----	Slight----------	Slight----------	Slight----------	Slight----------	Severe: frost action.
209*:					
Whitsol silty,--- sloping	Slight----------	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Whitsol silty,--- moderately steep	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
210*:					
Whitsol till,---- sloping	Moderate: dense layer.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Whitsol till,---- moderately steep	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
211:					
Whitsol till-----	Moderate: dense layer.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
212:					
Yensus ----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Severe: frost action.
213*:					
Yensus sloping---	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
Yensus---------- moderately steep	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
214:					
Yensus----------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Severe: frost action.
215:					
Yohn----------	Moderate: dense layer.	Slight----------	Moderate: large stones.	Slight----------	Severe: frost action.
216:					
Yohn----------	Moderate: dense layer, slope.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
217*:					
Yohn----------	Moderate: dense layer, slope.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
Deception--------	Moderate: dense layer, large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, frost action, large stones.
218*:					
Yohn----------	Moderate: slope, dense layer.	Moderate: slope.	Moderate: slope, large stones.	Severe: slope.	Severe: frost action.
Delyndia---------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
219*:					
Yohn----------	Moderate: dense layer, slope.	Moderate: slope.	Moderate: slope, large stones.	Moderate: slope.	Severe: frost action.

*See footnote at end of table.

TABLE 17--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
219*: cont'd					
Flat Horn--------	Moderate: slope.	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.
W*:					
Water.					

*See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for on-site investigation.)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
101:				
Benka	Fair: frost action.	Probable	Improbable: too sandy.	Poor: thin layer, too sandy.
102*:				
Benka sloping	Fair: frost action.	Probable	Improbable: too sandy.	Poor: thin layer, too sandy.
Benka moderately steep	Fair: frost action.	Probable	Improbable: too sandy.	Poor: thin layer, too sandy.
103:				
Benka	Fair: frost action.	Probable	Improbable: too sandy.	Poor: thin layer, too sandy.
104*:				
Benka	Fair: frost action.	Probable	Improbable: too sandy.	Poor: thin layer, too sandy.
Liten	Good	Probable	Improbable: too sandy.	Poor: too sandy.
105:				
Bodenburg	Poor: frost action.	Probable	Probable	Poor: area reclaim.
106*:				
Bodenburg sloping	Poor: frost action.	Probable	Probable	Poor: area reclaim.
Bodenburg moderately steep	Poor: frost action.	Probable	Probable	Poor: area reclaim.
107*:				
Bodenburg steep	Poor: frost action, slope.	Probable	Probable	Poor: area reclaim, slope.
Bodenburg sloping	Poor: frost action.	Probable	Probable	Poor: area reclaim.
108:				
Bodenburg	Poor: frost action.	Probable	Probable	Poor: area reclaim.
109:				
Bodenburg silty	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
110*:				
Bodenburg silty, sloping	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
Bodenburg silty, moderately steep	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
111:				
Bodenburg silty	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
112*:				
Bodenburg steep	Poor: frost action, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Bodenburg sloping	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
Jim	Poor: depth to rock, frost action.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
113*:				
Chilligan	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
Cryaquepts	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
114*:				
Chilligan	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
Cryaquepts	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
115:				
Chunilna cool	Poor: wetness, frost action.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
116*:				
Cryaquepts depressional	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
117*:				
Cryods	Poor: slope.	---	---	Poor: slope.
118*:				
Cryods cool	---	---	---	---
Niklason moderately wet	Fair: frost action.	Probable	Probable	Poor: too sandy, small stones, area reclaim.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
118*: cont'd				
Qeni----------	Fair: wetness.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
119*:				
Cryods----------	Poor: slope.	---	---	Poor: slope.
Cryaquepts cool------	Poor: wetness.	---	---	Poor: wetness.
120*:				
Cryods low elevation-	Poor: slope.	---	---	Poor: slope
Cryochrepts----------	Poor: slope.	---	---	Poor: slope.
121*:				
Cryods----------	Poor: slope.	---	---	Poor: slope.
122:				
Deception----------	Fair: large stones, frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
123*:				
Deception sloping----	Fair: large stones, frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Deception moderately- steep	Fair: large stones, frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
124*:				
Deception steep------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Deception sloping----	Fair: large stones, frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
125:				
Deception----------	Fair: large stones, frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
126:				
Delyndia----------	Good----------	Probable----------	Improbable: too sandy.	Poor: too sandy.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
127*:				
Delyndia	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Histosols	Poor: low strength, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
128:				
Disappoint	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
129*:				
Eska sloping	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Eska moderately steep	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
130*:				
Eska sloping	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Eska moderately steep	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Jim	Poor: depth to rock, frost action.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock.
131:				
Estelle	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
132*:				
Estelle sloping	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Estelle moderately steep	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
133*:				
Estelle steep	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Estelle sloping	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
134:				
Estelle----------	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
135*:				
Estelle----------	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Disappoint----------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
136*:				
Estelle----------	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Disappoint----------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
137, 138:				
Flat Horn----------	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
139*:				
Flat Horn sloping----	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
Flat Horn moderately-steep	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
140*:				
Goldcord----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Tsadaka----------	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, area reclaim, small stones.
141*:				
Histosols----------	Poor: low strength, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
142*:				
Histosols high-------elevation	Poor: low strength, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
143*:				
Kalambach gently-----sloping	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
143*: cont'd				
Kalambach moderately-steep	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
144*:				
Kalambach steep------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Kalambach sloping----	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
145:				
Kalambach----------	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
146*:				
Kalambach----------	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Disappoint----------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
147:				
Kashwitna----------	Fair: frost action.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
148*:				
Kashwitna sloping----	Fair: frost action.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
Kashwitna moderately-steep	Fair: frost action.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
149:				
Kashwitna----------	Fair: frost action.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
150:				
Keba----------	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
151:				
Kichatna	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
152*:				
Kichatna sloping	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Kichatna moderately-- steep	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
153*:				
Kichatna steep	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, slope.
Kichatna sloping	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
154:				
Kichatna	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
155*:				
Kichatna	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Deception	Fair: large stones, frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
156*:				
Kichatna steep	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, slope.
Deception sloping	Fair: large stones, frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Deception steep	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
157*:				
Kichatna moderately-- steep	Good----------	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
Delyndia gently------ sloping	Good----------	Probable----------	Improbable: too sandy.	Poor: too sandy, small stones.
158*:				
Kichatna----------	Good----------	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
Delyndia----------	Good----------	Probable----------	Improbable: too sandy.	Poor: too sandy, small stones.
159*:				
Kidazqeni cool-------	Good----------	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
Niklason cool--------	Fair: frost action.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
160:				
Kidazqeni----------	Good----------	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
161*:				
Kidazqeni moderately- wet	Good----------	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
Kidazqeni----------	Good----------	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
162*:				
Kidazqeni----------	Good----------	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
Niklason----------	Fair: frost action.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
163*:				
Killey	Poor: wetness.	Probable	Probable	Poor: too sandy, area reclaim, wetness.
Moose River	Poor: wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
164:				
Knik	Fair: frost action.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
165*:				
Knik gently sloping	Fair: frost action.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Knik moderately steep	Fair: frost action.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
166*:				
Knik steep	Poor: slope.	Probable	Probable	Poor: too sandy, small stones, slope.
Knik sloping	Fair: frost action.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
167:				
Knik	Fair: frost action.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
168*:				
Knik	Fair: frost action.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Cryaquepts	Poor: wetness.	---	---	Poor: wetness.
169:				
Liten	Good	Probable	Improbable: too sandy.	Poor: too sandy.
170*:				
Mine spoils.				

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
171:				
Nancy	Fair: frost action.	Probable	Probable	Poor: small stones, area reclaim, too sandy.
172*:				
Nancy sloping	Fair: frost action.	Probable	Probable	Poor: small stones, area reclaim, too sandy.
Nancy moderately steep	Fair: frost action.	Probable	Probable	Poor: small stones, area reclaim, too sandy.
173*:				
Nancy steep	Poor: slope.	Probable	Probable	Poor: small stones, too sandy, slope.
Nancy sloping	Fair: frost action.	Probable	Probable	Poor: small stones, area reclaim. too sandy.
174:				
Nancy	Fair: frost action.	Probable	Probable	Poor: small stones, area reclaim. too sandy.
175*:				
Nancy	Fair: frost action.	Probable	Probable	Poor: small stones, area reclaim. too sandy.
Cryaquepts	Poor: wetness.	---	---	Poor: wetness.
176*:				
Nancy sloping	Fair: frost action.	Probable	Probable	Poor: small stones, area reclaim, too sandy.
Nancy moderately steep	Fair: frost action.	Probable	Probable	Poor: small stones, area reclaim, too sandy.
Tokositna moderately steep	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
177*:				
Nancy steep----------	Poor: slope.	Probable----------	Probable----------	Poor: small stones, too sandy, slope.
Tokositna steep------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Nancy sloping--------	Fair: frost action.	Probable----------	Probable----------	Poor: small stones, area reclaim, too sandy.
178*:				
Nancy----------	Fair: frost action.	Probable----------	Probable----------	Poor: small stones, area reclaim, too sandy.
Tokositna----------	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
179*:				
Pits, gravel.				
180*:				
Psuyaah----------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
Snowdance----------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
181*:				
Qeni cool----------	Fair: wetness.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
Niklavar cool--------	Fair: wetness, frost action.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
Cryods cold----------	---	---	---	---
182*:				
Riverwash.				
Niklavar----------	Fair: wetness, frost action.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
183*:				
Rock outcrop.				
Cryumbrepts----------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones, slope.
184*:				
Siwash----------	Poor: depth to rock, frost action.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Talkeetna cool-------	Fair: slope, frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Snowdance----------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
185:				
Susitna----------	Poor: frost action.	Probable----------	Probable----------	Fair: too sandy, small stones, area reclaim.
186*:				
Susivar----------	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
Moose River----------	Poor: wetness, frost action.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
187*:				
Susivar----------	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
Niklavar----------	Fair: wetness, frost action.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
188:				
Talkeetna warm-------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
189*:				
Talkeetna----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
189*: cont'd				
Talkeetna thick------ surface	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
190*:				
Talkeetna warm-------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Talkeetna thick------ surface	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
191*:				
Talkeetna warm-------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Talkeetna thick------ surface	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
192*:				
Talkeetna low-------- elevation	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Deneka low elevation-	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
193*:				
Talkeetna warm-------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Talkeetna thick------ surface	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Deneka----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
194*:				
Talkeetna cool-------	Fair: slope, frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
194*: cont'd				
Snowdance----------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
195*:				
Talkeetna cool-------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Tsadaka----------	Poor: slope, cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, slope, small stones.
Chunilna cool--------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
196*:				
Tidal flats.				
197*:				
Tokositna sloping----	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Tokositna moderately-steep	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
198*:				
Tokositna steep------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Tokositna sloping----	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
199:				
Tokositna----------	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
200*:				
Tokositna----------	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Chunilna----------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.

*See footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
201*:				
Tokositna----------	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Chunilna----------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
202*:				
Tsadaka----------	Poor: cemented pan.	Improbable: excess fines.	Improbable: excess fines.	Poor: cemented pan, slope, small stones.
Talkeetna cool-------	Fair: slope, frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
203*:				
Typic Cryaquents-----	Poor: wetness.	---	---	Poor: wetness.
204*:				
Typic Cryaquents,---- coastal	Poor: wetness, frost action.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
205:				
Whitsol----------	Poor: frost action.	Probable----------	Probable----------	Poor: area reclaim.
206*:				
Whitsol cool, sloping	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
Whitsol cool,-------- moderately steep	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
207*:				
Whitsol cool, steep--	Poor: slope, frost action.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Whitsol cool, sloping	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
208:				
Whitsol silty--------	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
209*:				
Whitsol silty,------- sloping	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
Whitsol silty,------- moderately steep	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.

*See Footnote at end of table.

TABLE 18--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
210*:				
Whitsol till, sloping	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Whitsol till, moderately steep	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
211:				
Whitsol till	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
212:				
Yensus	Fair: frost action.	Probable	Probable	Poor: area reclaim.
213*:				
Yensus sloping	Fair: frost action.	Probable	Probable	Poor: area reclaim.
Yensus moderately steep	Fair: frost action.	Probable	Probable	Poor: area reclaim.
214:				
Yensus	Fair: frost action.	Probable	Probable	Poor: area reclaim.
215, 216:				
Yohn	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
217*:				
Yohn	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Deception	Fair: large stones, frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
218*:				
Yohn	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Delyndia	Good	Probable	Improbable: too sandy.	Poor: too sandy, small stones.
219*:				
Yohn	Fair: frost action, dense layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Flat Horn	Poor: frost action.	Improbable: excess fines.	Improbable: excess fines.	Good.
W*:				
Water.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
101:											
Benka--------	0-2	Silt loam--------	ML, MH	A-5	0	100	95-100	90-100	70-85	40-60	NP-5
	2-27	Silt loam, very fine sandy loam.	ML, MH	A-5	0	100	95-100	90-100	70-85	40-60	NP-5
	27-60	Stratified coarse sand to fine sand.	SP, SP-SM, SM	A-2, A-3	0-5	90-100	80-90	65-80	0-20	---	NP
102*:											
Benka-------- sloping	0-2	Silt loam--------	ML, MH	A-5	0	100	95-100	90-100	70-85	40-60	NP-5
	2-27	Silt loam, very fine sandy loam.	ML, MH	A-5	0	100	95-100	90-100	70-85	40-60	NP-5
	27-60	Stratified coarse sand to fine sand.	SP, SP-SM, SM	A-2, A-3	0-5	90-100	80-90	65-80	0-20	---	NP
Benka-------- moderately steep	0-2	Silt loam--------	ML, MH	A-5	0	100	95-100	90-100	70-85	40-60	NP-5
	2-27	Silt loam, very fine sandy loam.	ML, MH	A-5	0	100	95-100	90-100	70-85	40-60	NP-5
	27-60	Stratified coarse sand to fine sand.	SP, SP-SM, SM	A-2, A-3	0-5	90-100	80-90	65-80	0-20	---	NP
103:											
Benka--------	0-2	Silt loam--------	ML, MH	A-5	0	100	95-100	90-100	70-85	40-60	NP-5
	2-27	Silt loam, very fine sandy loam.	ML, MH	A-5	0	100	95-100	90-100	70-85	40-60	NP-5
	27-60	Stratified coarse sand to fine sand.	SP, SP-SM, SM	A-2, A-3	0-5	90-100	80-90	65-80	0-20	---	NP
104*:											
Benka--------	0-2	Silt loam--------	ML, MH	A-5	0	100	95-100	90-100	70-85	40-60	NP-5
	2-27	Silt loam, very fine sandy loam.	ML, MH	A-5	0	100	95-100	90-100	70-85	40-60	NP-5
	27-60	Stratified coarse sand to fine sand.	SP, SP-SM, SM	A-2, A-3	0-5	90-100	80-90	65-80	0-20	---	NP
Liten--------	0-2	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	65-80	35-45	NP-5
	2-4	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	90-100	65-80	35-45	NP-5
	4-6	Sandy loam, fine sandy loam, loamy fine sand.	SM	A-4, A-2	0	100	95-100	60-80	20-45	0-15	NP-5
	6-60	Sand, fine sand.	SP-SM, SM	A-2, A-3	0	100	95-100	75-90	5-15	---	NP
105:											
Bodenburg----	0-3	Silt loam--------	ML	A-5, A-4	0	100	95-100	90-100	70-85	35-45	NP-5
	3-53	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
105:											
Bodenburg---- cont'd	53-60	Very gravelly loamy coarse sand, extremely gravelly coarse sand.	GP-GM, GM	A-1	10-30	35-55	25-45	10-30	5-15	---	NP
106*:											
Bodenburg---- sloping	0-3	Silt loam--------	ML	A-5, A-4	0	100	95-100	90-100	70-85	35-45	NP-5
	3-53	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
	53-60	Very gravelly loamy coarse sand, extremely gravelly coarse sand.	GP-GM, GM	A-1	10-30	35-55	25-45	10-30	5-15	---	NP
Bodenburg---- moderately steep	0-3	Silt loam--------	ML	A-5, A-4	0	100	95-100	90-100	70-85	35-45	NP-5
	3-53	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
	53-60	Very gravelly loamy coarse sand, extremely gravelly coarse sand.	GP-GM, GM	A-1	10-30	35-55	25-45	10-30	5-15	---	NP
107*:											
Bodenburg---- steep	0-3	Silt loam--------	ML	A-5, A-4	0	100	95-100	90-100	70-85	35-45	NP-5
	3-53	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
	53-60	Very gravelly loamy coarse sand, extremely gravelly coarse sand.	GP-GM, GM	A-1	10-30	35-55	25-45	10-30	5-15	---	NP
Bodenburg---- sloping	0-3	Silt loam--------	ML	A-5, A-4	0	100	95-100	90-100	70-85	35-45	NP-5
	3-53	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
	53-60	Very gravelly loamy coarse sand, extremely gravelly coarse sand.	GP-GM, GM	A-1	10-30	35-55	25-45	10-30	5-15	---	NP
108:											
Bodenburg----	0-3	Silt loam--------	ML	A-5, A-4	0	100	95-100	90-100	70-85	35-45	NP-5
	3-53	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
	53-60	Very gravelly loamy coarse sand, extremely gravelly coarse sand.	GP-GM, GM	A-1	10-30	35-55	25-45	10-30	5-15	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
109:											
Bodenburg---- silty	0-5	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
	5-60	Very fine sandy loam, silt loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
110*:											
Bodenburg---- silty, sloping	0-5	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
	5-60	Very fine sandy loam, silt loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
Bodenburg---- silty, moderately steep	0-5	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
	5-60	Very fine sandy loam, silt loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
111:											
Bodenburg---- silty	0-5	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
	5-60	Very fine sandy loam, silt loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
112*:											
Bodenburg---- steep	0-5	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
	5-60	Very fine sandy loam, silt loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
Bodenburg---- sloping	0-5	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
	5-60	Very fine sandy loam, silt loam.	ML	A-4, A-5	0	100	95-100	90-100	70-85	35-45	NP-5
Jim----------	0-2	Silt loam--------	ML	A-5, A-4	0	100	100	90-100	80-90	35-45	NP-5
	2-26	Silt loam--------	ML	A-4	0	100	95-100	85-100	75-90	35-45	NP-5
	26-30	Weathered bedrock	---	---	---	---	---	---	---	---	---
113*:											
Chilligan----	0-1	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	1-24	Silt loam, very fine sandy loam, loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	24-60	Stratified fine sand to silty clay loam.	SM	A-2, A-4	0	90-100	75-100	60-90	25-50	25-40	NP-5
Cryaquepts---	0-4	Mucky silt loam	MH, OH	A-5	0-30	85-100	70-100	55-90	50-80	70-85	NP-10
	4-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
114*:											
Chilligan----	0-1	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	1-24	Silt loam, very fine sandy loam, loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	24-60	Stratified fine sand to silty clay loam.	SM	A-2, A-4	0	90-100	75-100	60-90	25-50	25-40	NP-5
Cryaquepts---	0-2	Mucky silt loam	MH, OH	A-5	0-30	85-100	70-100	55-90	50-80	70-85	NP-10
	2-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
115:											
Chunilna----- cool	0-4	Mucky silt loam	MH, OH	A-5	0	95-100	95-100	90-100	70-80	70-85	NP-5
	4-14	Silt loam, loam	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	14-60	Very gravelly loam, very gravelly sandy loam, very cobbly loam.	GM, SM	A-1, A-2	0-30	30-70	20-50	15-40	10-30	---	NP
116*:											
Cryaquepts--- depressional	0-2	Mucky silt loam	MH, OH	A-5	0-30	85-100	70-100	55-90	50-80	70-85	NP-10
	2-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
117*:											
Cryods-------	0-3	Silt loam--------	SM, ML, MH	A-4, A-5	0-25	90-100	80-100	65-90	40-70	35-60	NP-5
	3-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
118*:											
Cryods cool--	0-10	Silt loam--------	SM, ML, MH	A-4, A-5	0-25	90-100	80-100	65-90	40-70	35-60	NP-5
	10-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
Niklason----- moderately wet	0-4	Fine sandy loam	SM	A-2, A-4	0	100	95-100	65-80	25-40	---	NP
	4-25	Stratified silt loam to very fine sand.	SM	A-4	0	90-100	90-100	70-85	35-50	---	NP
	25-60	Very gravelly sand, extremely gravelly sand.	GP, SP	A-1	15-30	50-65	25-50	10-25	0-5	---	NP
Qeni---------	0-3	Silt loam--------	MH, ML	A-5, A-4	0	95-100	90-100	85-90	65-75	40-60	NP-10
	3-8	Fine sandy loam	SM	A-4	0	90-100	85-100	70-85	35-50	---	NP
	8-60	Extremely gravelly coarse sand, very gravelly sand.	GP, SP	A-1	15-25	50-65	25-50	10-25	0-5	---	NP
119*:											
Cryods-------	0-2	Silt loam--------	SM, ML, MH	A-4, A-5	0-25	90-100	80-100	65-90	40-70	35-60	NP-5
	2-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
Cryaquepts--- cool	0-4	Mucky silt loam	MH, OH	A-5	0-30	85-100	70-100	55-90	50-80	70-85	NP-10
	4-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
120*:											
Cryods low--- elevation	0-2	Silt loam--------	SM, ML, MH	A-4, A-5	0-25	90-100	80-100	65-90	40-70	35-60	NP-5
	2-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
Cryochrepts--	0-4	Silt loam--------	ML	A-5, A-4	0	90-100	90-95	80-90	70-80	25-45	NP-10
	4-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
121*:											
Cryods-------	0-3	Silt loam--------	SM, ML, MH	A-4, A-5	0-25	90-100	80-100	65-90	40-70	35-60	NP-5
	3-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
122:											
Deception----	0-1	Silt loam--------	ML	A-5	0	95-100	95-100	85-100	65-90	40-50	NP-5

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
122:											
Deception---- cont'd	1-5	Silt loam, loam, very fine sandy loam.	ML	A-5	0-5	95-100	85-100	85-100	65-90	40-50	NP-5
	5-60	Very cobbly loam, very gravelly loam, very cobbly sandy loam.	GM, SM	A-2, A-1	0-30	45-65	35-55	20-45	15-35	---	NP
123*:											
Deception---- sloping	0-1	Silt loam--------	ML	A-5	0	95-100	95-100	85-100	65-90	40-50	NP-5
	1-5	Silt loam, loam, very fine sandy loam.	ML	A-5	0-5	95-100	85-100	85-100	65-90	40-50	NP-5
	5-60	Very cobbly loam, very gravelly loam, very cobbly sandy loam.	GM, SM	A-2, A-1	0-30	45-65	35-55	20-45	15-35	---	NP
Deception---- moderately steep	0-1	Silt loam--------	ML	A-5	0	95-100	95-100	85-100	65-90	40-50	NP-5
	1-5	Silt loam, loam, very fine sandy loam.	ML	A-5	0-5	95-100	85-100	85-100	65-90	40-50	NP-5
	5-60	Very cobbly loam, very gravelly loam, very cobbly sandy loam.	GM, SM	A-2, A-1	0-30	45-65	35-55	20-45	15-35	---	NP
124*:											
Deception---- steep	0-1	Silt loam--------	ML	A-5	0	95-100	95-100	85-100	65-90	40-50	NP-5
	1-5	Silt loam, loam, very fine sandy loam.	ML	A-5	0-5	95-100	85-100	85-100	65-90	40-50	NP-5
	5-60	Very cobbly loam, very gravelly loam, very cobbly sandy loam.	GM, SM	A-2, A-1	0-30	45-65	35-55	20-45	15-35	---	NP
Deception---- sloping	0-1	Silt loam--------	ML	A-5	0	95-100	95-100	85-100	65-90	40-50	NP-5
	1-5	Silt loam, loam, very fine sandy loam.	ML	A-5	0-5	95-100	85-100	85-100	65-90	40-50	NP-5
	5-60	Very cobbly loam, very gravelly loam, very cobbly sandy loam.	GM, SM	A-2, A-1	0-30	45-65	35-55	20-45	15-35	---	NP
125:											
Deception----	0-1	Silt loam--------	ML	A-5	0	95-100	95-100	85-100	65-90	40-50	NP-5
	1-5	Silt loam, loam, very fine sandy loam.	ML	A-5	0-5	95-100	85-100	85-100	65-90	40-50	NP-5

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
125:											
Deception---- cont'd	5-60	Very cobbly loam, very gravelly loam, very cobbly sandy loam.	GM, SM	A-2, A-1	0-30	45-65	35-55	20-45	15-35	---	NP
126:											
Delyndia-----	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-4	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	4-60	Stratified loamy sand to gravelly coarse sand.	SM, SP, SP-SM	A-2, A-3	0-10	90-100	65-95	50-80	0-20	---	NP
127*:											
Delyndia-----	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-4	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	4-60	Stratified loamy sand to gravelly coarse sand.	SM, SP, SP-SM	A-2, A-3	0-10	90-100	65-95	50-80	0-20	---	NP
Histosols----	0-28	Peat----------	PT	A-8	0-10	90-100	75-100	---	---	---	NP
	28-60	Variable---------	---	---	---	---	---	---	---	---	---
128:											
Disappoint---	0-4	Very cobbly silt loam.	GM, SM, MH, OH	A-5	15-55	70-95	50-90	45-80	35-70	70-85	NP-10
	4-13	Very cobbly silt loam, cobbly silt loam.	GM, SM, ML	A-5	15-55	70-95	50-90	45-80	35-70	35-50	NP-10
	13-41	Loam, gravelly silt loam, sandy loam.	SM, ML	A-4, A-2	5-15	85-90	65-85	40-70	30-60	---	NP
	41-60	Very gravelly sandy loam, very cobbly loam, gravelly silt loam.	GM, SM	A-1, A-2, A-4	5-25	65-80	45-70	25-55	20-50	---	NP
129*:											
Eska sloping-	0-3	Silt loam--------	ML	A-4, A-5	0	100	95-100	85-95	70-90	35-45	NP-5
	3-25	Silt loam, very fine sandy loam, loam.	ML	A-4, A-5	0	100	95-100	80-90	65-85	35-45	NP-5
	25-60	Very gravelly sandy loam, very cobbly loam, very gravelly loam.	GM, SM	A-1, A-2	15-25	50-70	40-55	20-45	15-35	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
129*: cont'd											
Eska--------- moderately steep	0-3	Silt loam--------	ML	A-4, A-5	0	100	95-100	85-95	70-90	35-45	NP-5
	3-25	Silt loam, very fine sandy loam, loam.	ML	A-4, A-5	0	100	95-100	80-90	65-85	35-45	NP-5
	25-60	Very gravelly sandy loam, very cobbly loam, very gravelly loam.	GM, SM	A-1, A-2	15-25	50-70	40-55	20-45	15-35	---	NP
130*:											
Eska sloping-	0-3	Silt loam--------	ML	A-4, A-5	0	100	95-100	85-95	70-90	35-45	NP-5
	3-25	Silt loam, very fine sandy loam, loam.	ML	A-4, A-5	0	100	95-100	80-90	65-85	35-45	NP-5
	25-60	Very gravelly sandy loam, very cobbly loam, very gravelly loam.	GM, SM	A-1, A-2	15-25	50-70	40-55	20-45	15-35	---	NP
Eska--------- moderately steep	0-3	Silt loam--------	ML	A-4, A-5	0	100	95-100	85-95	70-90	35-45	NP-5
	3-25	Silt loam, very fine sandy loam, loam.	ML	A-4, A-5	0	100	95-100	80-90	65-85	35-45	NP-5
	25-60	Very gravelly sandy loam, very cobbly loam, very gravelly loam.	GM, SM	A-1, A-2	15-25	50-70	40-55	20-45	15-35	---	NP
Jim----------	0-2	Silt loam--------	ML	A-5, A-4	0	100	100	90-100	80-90	35-45	NP-5
	2-26	Silt loam--------	ML	A-4	0	100	95-100	85-100	75-90	35-45	NP-5
	26-30	Weathered bedrock	---	---	---	---	---	---	---	---	---
131:											
Estelle------	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	85-100	65-90	40-60	NP-5
	2-16	Silt loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	85-100	60-75	40-60	NP-5
	16-60	Very cobbly loam, very gravelly loam, very gravelly sandy loam.	GM, SM	A-1, A-2	0-35	45-65	30-50	20-45	15-35	---	NP
132*:											
Estelle------ sloping	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	85-100	65-90	40-60	NP-5
	2-16	Silt loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	85-100	60-75	40-60	NP-5
	16-60	Very cobbly loam, very gravelly loam, very gravelly sandy loam.	GM, SM	A-1, A-2	0-35	45-65	30-50	20-45	15-35	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
132*: cont'd											
Estelle------ moderately steep	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	85-100	65-90	40-60	NP-5
	2-16	Silt loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	85-100	60-75	40-60	NP-5
	16-60	Very cobbly loam, very gravelly loam, very gravelly sandy loam.	GM, SM	A-1, A-2	0-35	45-65	30-50	20-45	15-35	---	NP
133*:											
Estelle------ steep	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	85-100	65-90	40-60	NP-5
	2-16	Silt loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	85-100	60-75	40-60	NP-5
	16-60	Very cobbly loam, very gravelly loam, very gravelly sandy loam.	GM, SM	A-1, A-2	0-35	45-65	30-50	20-45	15-35	---	NP
Estelle------ sloping	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	85-100	65-90	40-60	NP-5
	2-16	Silt loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	85-100	60-75	40-60	NP-5
	16-60	Very cobbly loam, very gravelly loam, very gravelly sandy loam.	GM, SM	A-1, A-2	0-35	45-65	30-50	20-45	15-35	---	NP
134:											
Estelle------	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	85-100	65-90	40-60	NP-5
	2-16	Silt loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	85-100	60-75	40-60	NP-5
	16-60	Very cobbly loam, very gravelly loam, very gravelly sandy loam.	GM, SM	A-1, A-2	0-35	45-65	30-50	20-45	15-35	---	NP
135*, 136*:											
Estelle------	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	85-100	65-90	40-60	NP-5
	2-16	Silt loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	85-100	60-75	40-60	NP-5
	16-60	Very cobbly loam, very gravelly loam, very gravelly sandy loam.	GM, SM	A-1, A-2	0-35	45-65	30-50	20-45	15-35	---	NP
Disappoint---	0-4	Very cobbly silt loam.	GM, SM, MH, OH	A-5	15-55	70-95	50-90	45-80	35-70	70-85	NP-10
	4-13	Very cobbly silt loam, cobbly silt loam.	GM, SM, ML	A-5	15-55	70-95	50-90	45-80	35-70	35-50	NP-10
	13-41	Loam, gravelly silt loam, sandy loam.	SM, ML	A-4, A-2	5-15	85-90	65-85	40-70	30-60	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
135*, 136*:											
Disappoint--- cont'd	41-60	Very gravelly sandy loam, very cobbly loam, gravelly silt loam.	GM, SM	A-1, A-2, A-4	5-25	65-80	45-70	25-55	20-50	---	NP
137, 138:											
Flat Horn----	0-2	Silt loam--------	ML	A-5	0	90-100	85-100	75-95	65-85	40-50	NP-10
	2-9	Silt loam--------	ML	A-4	0	90-100	85-100	75-95	65-85	30-40	NP-10
	9-60	Stratified fine sand to silt.	ML, SM	A-4, A-2	0	90-100	75-95	50-90	30-55	---	NP
139*:											
Flat Horn---- sloping	0-2	Silt loam--------	ML	A-5	0	90-100	85-100	75-95	65-85	40-50	NP-10
	2-9	Silt loam--------	ML	A-4	0	90-100	85-100	75-95	65-85	30-40	NP-10
	9-60	Stratified fine sand to silt.	ML, SM	A-4, A-2	0	90-100	75-95	50-90	30-55	---	NP
Flat Horn---- moderately steep	0-2	Silt loam--------	ML	A-5	0	90-100	85-100	75-95	65-85	40-50	NP-10
	2-9	Silt loam--------	ML	A-4	0	90-100	85-100	75-95	65-85	30-40	NP-10
	9-60	Stratified fine sand to silt.	ML, SM	A-4, A-2	0	90-100	75-95	50-90	30-55	---	NP
140*:											
Goldcord-----	0-8	Very cobbly sandy loam.	SM	A-1, A-2	15-25	70-80	40-55	25-40	15-30	---	NP
	8-19	Very cobbly sandy loam, very gravelly sandy loam.	SM	A-1, A-2	15-25	70-80	40-55	25-40	15-30	---	NP
	19-23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tsadaka------	0-5	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	75-90	40-60	NP-5
	5-15	Silt loam, loam, fine sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-80	40-60	NP-5
	15-26	Very cobbly sandy loam, very gravelly sandy loam, extremely gravelly loam.	SM	A-1, A-2	15-25	70-80	40-55	25-40	15-30	---	NP
	26-60	Very cobbly sandy loam, very gravelly sandy loam, extremely gravelly loam.	SM	A-1, A-2	15-25	70-80	40-55	25-40	15-30	---	NP
141*:											
Histosols----	0-28	Peat----------	PT	A-8	0-10	90-100	75-100	---	---	---	NP
	28-60	Variable---------	---	---	---	---	---	---	---	---	---
142*:											
Histosols---- high elevation	0-28	Peat----------	PT	A-8	0-10	90-100	75-100	---	---	---	NP
	28-60	Variable---------	---	---	---	---	---	---	---	---	---

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
143*:											
Kalambach---- gently sloping	0-6	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	65-85	35-45	NP-5
	6-16	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	65-85	40-50	NP-5
	16-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam.	GM	A-1, A-2	5-35	50-60	40-50	25-45	15-35	---	NP
Kalambach---- moderately steep	0-6	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	65-85	35-45	NP-5
	6-16	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	65-85	40-50	NP-5
	16-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam.	GM	A-1, A-2	5-35	50-60	40-50	25-45	15-35	---	NP
144*:											
Kalambach---- steep	0-6	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	65-85	35-45	NP-5
	6-21	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	65-85	40-50	NP-5
	21-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam.	GM	A-1, A-2	5-35	50-60	40-50	25-45	15-35	---	NP
Kalambach---- sloping	0-6	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	65-85	35-45	NP-5
	6-21	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	65-85	40-50	NP-5
	21-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam.	GM	A-1, A-2	5-35	50-60	40-50	25-45	15-35	---	NP
145:											
Kalambach----	0-6	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	65-85	35-45	NP-5
	6-21	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	65-85	40-50	NP-5
	21-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam.	GM	A-1, A-2	5-35	50-60	40-50	25-45	15-35	---	NP
146*:											
Kalambach----	0-6	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	65-85	35-45	NP-5
	6-21	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	65-85	40-50	NP-5
	21-60	Very gravelly sandy loam, very gravelly loam, very cobbly loam.	GM	A-1, A-2	5-35	50-60	40-50	25-45	15-35	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
146*: cont'd											
Disappoint---	0-4	Mucky silt loam	MH, OH	A-5	0-5	95-100	90-100	90-100	70-80	70-85	NP-10
	4-13	Very cobbly silt loam, cobbly silt loam.	GM, SM, ML	A-5	15-55	70-95	50-90	45-80	35-70	35-50	NP-10
	13-41	Loam, gravelly silt loam, sandy loam.	SM, ML	A-4, A-2	5-15	85-90	65-85	40-70	30-60	---	NP
	41-60	Very gravelly sandy loam, very cobbly loam, gravelly silt loam.	GM, SM	A-1, A-2, A-4	5-25	65-80	45-70	25-55	20-50	---	NP
147:											
Kashwitna----	0-2	Silt loam--------	ML	A-5	0	100	100	90-100	75-85	40-50	NP-10
	2-18	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	18-60	Very gravelly sand.	SP-SM, GP-GM	A-1	15-30	40-65	35-50	20-35	5-10	---	NP
148*:											
Kashwitna---- sloping	0-2	Silt loam--------	ML	A-5	0	100	100	90-100	75-85	40-50	NP-10
	2-18	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	18-60	Very gravelly sand.	SP-SM, GP-GM	A-1	15-30	40-65	35-50	20-35	5-10	---	NP
Kashwitna---- moderately steep	0-2	Silt loam--------	ML	A-5	0	100	100	90-100	75-85	40-50	NP-10
	2-18	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	18-60	Very gravelly sand.	SP-SM, GP-GM	A-1	15-30	40-65	35-50	20-35	5-10	---	NP
149:											
Kashwitna---	0-2	Silt loam--------	ML	A-5	0	100	100	90-100	75-85	40-50	NP-10
	2-18	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	18-60	Very gravelly sand.	SP-SM, GP-GM	A-1	15-30	40-65	35-50	20-35	5-10	---	NP
150:											
Keba---------	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	65-85	40-50	NP-5
	2-6	Silt loam--------	ML	A-5	0	100	95-100	90-100	65-85	40-50	NP-5
	6-60	Loam, gravelly silty clay loam, silt loam.	CL	A-6, A-7	0-10	80-100	75-95	65-85	55-75	30-45	10-25
151:											
Kichatna-----	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-9	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	9-60	Very gravelly loamy coarse sand, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-20	35-60	25-50	10-30	5-15	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
152*:											
Kichatna sloping	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-9	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	9-60	Very gravelly loamy coarse sand, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-20	35-60	25-50	10-30	5-15	---	NP
Kichatna----- moderately steep	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-9	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	9-60	Very gravelly loamy coarse sand, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-20	35-60	25-50	10-30	5-15	---	NP
153*:											
Kichatna----- steep	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-9	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	9-60	Very gravelly loamy coarse sand, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-20	35-60	25-50	10-30	5-15	---	NP
Kichatna----- sloping	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-9	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	9-60	Very gravelly loamy coarse sand, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-20	35-60	25-50	10-30	5-15	---	NP
154:											
Kichatna-----	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-9	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	9-60	Very gravelly loamy coarse sand, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-20	35-60	25-50	10-30	5-15	---	NP
155*:											
Kichatna-----	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-9	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	9-60	Very gravelly loamy coarse sand, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-20	35-60	25-50	10-30	5-15	---	NP
Deception----	0-1	Silt loam--------	ML	A-5	0	95-100	95-100	85-100	65-90	40-50	NP-5
	1-5	Silt loam, loam, very fine sandy loam.	ML	A-5	0-5	95-100	85-100	85-100	65-90	40-50	NP-5

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
155*:											
Deception---- cont'd	5-60	Very cobbly loam, very gravelly loam, very cobbly sandy loam.	GM, SM	A-2, A-1	0-30	45-65	35-55	20-45	15-35	---	NP
156*:											
Kichatna----- steep	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-9	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	9-60	Very gravelly loamy coarse sand, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-20	35-60	25-50	10-30	5-15	---	NP
Deception---- sloping	0-1	Silt loam--------	ML	A-5	0	95-100	95-100	85-100	65-90	40-50	NP-5
	1-5	Silt loam, loam, very fine sandy loam.	ML	A-5	0-5	95-100	85-100	85-100	65-90	40-50	NP-5
	5-60	Very cobbly loam, very gravelly loam, very cobbly sandy loam.	GM, SM	A-2, A-1	0-30	45-65	35-55	20-45	15-35	---	NP
Deception---- steep	0-1	Silt loam--------	ML	A-5	0	95-100	95-100	85-100	65-90	40-50	NP-5
	1-5	Silt loam, loam, very fine sandy loam.	ML	A-5	0-5	95-100	85-100	85-100	65-90	40-50	NP-5
	5-60	Very cobbly loam, very gravelly loam, very cobbly sandy loam.	GM, SM	A-2, A-1	0-30	45-65	35-55	20-45	15-35	---	NP
157*, 158*:											
Kichatna-----	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-9	Silt loam, very fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	9-60	Very gravelly loamy coarse sand, extremely gravelly sand.	GP-GM, GM, SP-SM, SM	A-1	0-20	35-60	25-50	10-30	5-15	---	NP
Delyndia-----	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-4	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	4-60	Stratified loamy sand to gravelly coarse sand.	SM, SP, SP-SM	A-2, A-3	0-10	90-100	65-95	50-80	0-20	---	NP
159*:											
Kidazqeni---- cool	0-2	Very fine sandy loam.	ML	A-4	0	95-100	90-100	85-90	65-75	25-35	NP-10

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
159*:											
Kidazqeni---- Cool-cont'd	2-8	Stratified sand to silt.	SM	A-4	0	90-100	85-100	70-85	35-50	---	NP
	8-60	Extremely gravelly coarse sand, very gravelly sand.	GP, SP	A-1	15-25	50-65	25-50	10-25	0-5	---	NP
Niklason----- cool	0-4	Silt loam--------	ML	A-4	0	100	95-100	85-100	65-80	25-35	NP-10
	4-21	Stratified silt loam to sand.	SM	A-4	0	90-100	90-100	70-85	35-50	---	NP
	21-60	Very gravelly sand, extremely gravelly sand.	GP, SP	A-1	15-30	50-65	25-50	10-25	0-5	---	NP
160:											
Kidazqeni----	0-2	Silt loam--------	ML	A-4	0	95-100	90-100	85-90	65-75	25-35	NP-10
	2-8	Stratified sand to silt loam.	SM	A-4	0	90-100	85-100	75-85	35-50	---	---
	8-60	Extremely gravelly coarse sand, very gravelly sand.	GP, SP	A-1	15-25	50-65	25-50	10-25	0-5	---	---
161*:											
Kidazqeni---- moderately wet	0-2	Very fine sandy loam.	ML	A-4	0	95-100	90-100	85-90	65-75	25-35	NP-10
	2-8	Stratified sand to silt.	SM	A-4	0	90-100	85-100	70-85	35-50	---	NP
	8-60	Extremely gravelly coarse sand, very gravelly sand.	GP, SP	A-1	15-25	50-65	25-50	10-25	0-5	---	NP
Kidazqeni----	0-2	Very fine sandy loam.	ML	A-4	0	95-100	90-100	85-90	65-75	25-35	NP-10
	2-8	Stratified sand to silt.	SM	A-4	0	90-100	85-100	70-85	35-50	---	NP
	8-60	Extremely gravelly coarse sand, very gravelly sand.	GP, SP	A-1	15-25	50-65	25-50	10-25	0-5	---	NP
162*:											
Kidazqeni----	0-2	Very fine sandy loam.	ML	A-4	0	95-100	90-100	85-90	65-75	25-35	NP-10
	2-8	Stratified sand to silt.	SM	A-4	0	90-100	85-100	70-85	35-50	---	NP
	8-60	Extremely gravelly coarse sand, very gravelly sand.	GP, SP	A-1	15-25	50-65	25-50	10-25	0-5	---	NP
Niklason-----	0-4	Silt loam--------	ML	A-4	0	100	95-100	85-100	65-80	25-35	NP-10
	4-21	Stratified silt loam to sand.	SM	A-4	0	90-100	90-100	70-85	35-50	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
162*:											
Niklason----- cont'd	21-60	Very gravelly sand, extremely gravelly sand.	GP, SP	A-1	15-30	50-65	25-50	10-25	0-5	---	NP
163*:											
Killey-------	0-3	Silt loam--------	ML	A-4	0	100	100	90-100	70-90	30-35	NP-5
	3-36	Stratified silt loam to fine sand.	SM	A-2, A-4	0	100	90-100	70-80	30-45	---	NP
	36-60	Very gravelly sand, very gravelly coarse sand.	SP, SP-SM	A-1	5-15	60-70	30-50	15-30	0-10	---	NP
Moose River--	0-2	Fine sandy loam	SM	A-4	0	100	90-100	70-100	35-50	---	NP
	2-29	Stratified silt loam to fine sand.	SM	A-2, A-4	0-5	85-100	75-85	60-75	30-40	---	NP
	29-60	Stratified cobbly coarse sand to sand.	SP-SM	A-1	15-30	60-80	40-70	20-40	5-10	---	NP
164:											
Knik --------	0-12	Silt loam--------	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	12-18	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	18-60	Extremely gravelly sand, very gravelly coarse sand.	GP-GM, GM, SP-SM, SM	A-1	10-30	40-65	30-50	10-35	5-15	---	NP
165*:											
Knik gently-- sloping	0-12	Silt loam--------	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	12-18	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	18-60	Extremely gravelly sand, very gravelly coarse sand.	GP-GM, GM, SP-SM, SM	A-1	10-30	40-65	30-50	10-35	5-15	---	NP
Knik--------- moderately steep	0-12	Silt loam--------	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	12-18	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	18-60	Extremely gravelly sand, very gravelly coarse sand.	GP-GM, GM, SP-SM, SM	A-1	10-30	40-65	30-50	10-35	5-15	---	NP
166*:											
Knik steep---	0-12	Silt loam--------	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	12-18	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	18-60	Extremely gravelly sand, very gravelly coarse sand.	GP-GM, GM, SP-SM, SM	A-1	10-30	40-65	30-50	10-35	5-15	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
166*: cont'd											
Knik sloping-	0-7	Silt loam--------	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	7-18	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	18-60	Extremely gravelly sand, very gravelly coarse sand.	GP-GM, GM, SP-SM, SM	A-1	10-30	40-65	30-50	10-35	5-15	---	NP
167:											
Knik---------	0-12	Silt loam--------	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	12-18	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	18-60	Extremely gravelly sand, very gravelly coarse sand.	GP-GM, GM, SP-SM, SM	A-1	10-30	40-65	30-50	10-35	5-15	---	NP
168*:											
Knik---------	0-2	Silt loam--------	ML	A-4, A-5	0	95-100	95-100	85-100	65-90	35-45	NP-10
	2-60	Extremely gravelly sand, very gravelly coarse sand.	GP-GM, GM, SP-SM, SM	A-1	10-30	40-65	30-50	10-35	5-15	---	NP
Cryaquepts---	0-4	Mucky silt loam	MH, OH	A-5	0-30	85-100	70-100	55-90	50-80	70-85	NP-10
	4-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
169:											
Liten--------	0-2	Silt loam--------	ML	A-4, A-5	0	100	95-100	90-100	65-80	35-45	NP-5
	2-4	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	90-100	65-80	35-45	NP-5
	4-6	Sandy loam, fine sandy loam, loamy fine sand.	SM	A-4, A-2	0	100	95-100	60-80	20-45	0-15	NP-5
	6-60	Sand, fine sand	SP-SM, SM	A-2, A-3	0	100	95-100	75-90	5-15	---	NP
170*: Mine spoils.											
171:											
Nancy--------	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP
172*:											
Nancy-------- sloping	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
172*: cont'd											
Nancy-------- moderately steep	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP
173*:											
Nancy steep--	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP
Nancy-------- sloping	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP
174:											
Nancy--------	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP
175*:											
Nancy--------	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP
Cryaquepts---	0-4	Silt loam--------	MH, OH	A-5	0-30	85-100	70-100	55-90	50-80	70-85	NP-10
	4-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
176*:											
Nancy-------- sloping	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP
Nancy-------- moderately steep	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP
Tokositna---- moderately steep	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	2-28	Silt loam, very fine sandy loam, sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-70	40-60	NP-5

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
176*:											
Tokositna---- moderately steep-cont'd	28-60	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	SM, GM	A-1, A-2	15-25	45-65	30-50	20-45	15-35	---	NP
177*:											
Nancy steep--	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP
Tokositna---- steep	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	2-28	Silt loam, very fine sandy loam, sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-70	40-60	NP-5
	28-60	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	SM, GM	A-1, A-2	15-25	45-65	30-50	20-45	15-35	---	NP
Nancy-------- sloping	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP
178*:											
Nancy--------	0-3	Silt loam--------	ML, MH	A-5	0	100	100	90-100	75-85	40-60	NP-5
	3-24	Silt loam, very fine sandy loam.	ML	A-5	0	100	90-95	80-95	65-80	40-50	NP-10
	24-60	Sand and gravel	SP-SM, GP-GM	A-1	15-30	50-65	35-50	20-35	5-10	---	NP
Tokositna----	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	2-28	Silt loam, very fine sandy loam, sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-70	40-60	NP-5
	28-60	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	SM, GM	A-1, A-2	15-25	45-65	30-50	20-45	15-35	---	NP
179*:											
Pits, gravel.											
180*:											
Psuyaah------	0-6	Silt loam--------	ML, MH	A-5	0	95-100	95-100	85-100	70-80	40-60	NP-5
	6-15	Silt loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	15-21	Loam, gravelly loam, cobbly sandy loam.	ML, SM	A-4, A-2	0-15	85-95	75-95	45-65	30-60	15-20	NP-5

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
180*:											
Psuyaah------ cont'd	21-60	Very gravelly sandy loam, very cobbly loam.	GM, SM	A-1, A-2	10-45	55-85	45-75	30-50	15-35	15-20	NP-5
Snowdance----	0-5	Mucky silt loam	MH, OH	A-5	0	95-100	95-100	90-100	70-80	70-90	NP-5
	5-16	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	80-90	40-60	NP-5
	16-60	Very gravelly sandy loam, very cobbly sandy loam, very cobbly loam.	SM, GM	A-1, A-2	0-30	30-70	20-50	15-40	10-30	---	NP
181*:											
Qeni cool----	0-3	Very fine sandy loam.	MH, ML	A-5, A-4	0	95-100	90-100	85-90	65-75	40-60	NP-10
	3-8	Fine sandy loam	SM	A-4	0	90-100	85-100	70-85	35-50	---	NP
	8-60	Extremely gravelly coarse sand, very gravelly sand.	GP, SP	A-1	15-25	50-65	25-50	10-25	0-5	---	NP
Niklavar cool	0-4	Fine sandy loam	ML	A-4	0	100	95-100	90-95	60-75	25-35	NP-10
	4-30	Stratified sand to silt.	SM	A-2, A-4	0	100	95-100	80-90	30-50	---	NP
	30-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, SP	A-1	15-25	50-65	25-50	10-25	0-5	---	NP
Cryods cold--	0-5	Silt loam--------	SM, ML, MH	A-4, A-5	0-25	90-100	80-100	65-90	40-70	35-60	NP-5
	5-60	Variable---------	---	---	0-25	70-100	40-100	---	---	---	---
182*:											
Riverwash.											
Niklavar-----	0-1	Loamy fine sand	SM	A-2, A-4	0	100	95-100	80-90	20-40	---	NP
	1-30	Stratified sand to silt.	SM	A-2, A-4	0	100	95-100	80-90	30-50	---	NP
	30-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, SP	A-1	15-25	50-65	25-50	10-25	0-5	---	NP
183*:											
Rock outcrop.											
Cryumbrepts--	0-6	Very cobbly sandy loam.	SM	A-1, A-2	15-25	70-80	40-55	25-40	15-30	---	NP
	6-60	Variable---------	---	---	---	---	---	---	---	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
184*:											
Siwash-------	0-1	Silt loam--------	ML, MH	A-5	0	95-100	95-100	85-100	65-90	40-60	NP-5
	1-11	Silt loam, fine sandy loam, loam.	SM, MH	A-5	0	95-100	90-100	80-90	45-65	50-60	NP-5
	11-17	Very gravelly sandy loam, very cobbly loam, very gravelly loam.	GM	A-1, A-2	5-35	40-60	30-50	20-45	15-35	---	NP
	17-21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Talkeetna---- cool	0-4	Silt loam--------	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	4-15	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	15-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP
Snowdance----	0-5	Mucky silt loam	MH, OH	A-5	0	95-100	95-100	90-100	70-80	70-90	NP-5
	5-16	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	80-90	40-60	NP-5
	16-60	Very gravelly sandy loam, very cobbly sandy loam, very cobbly loam.	SM, GM	A-1, A-2	0-30	30-70	20-50	15-40	10-30	---	NP
185:											
Susitna------	0-3	Silt loam--------	ML	A-4	0	100	100	90-100	75-85	---	NP
	3-45	Stratified silt loam to loamy fine sand.	SM	A-4, A-2	0	100	90-100	70-80	30-45	---	NP
	45-60	Very gravelly sand.	GP, SP	A-1	5-10	40-55	30-50	15-25	0-5	---	NP
186*:											
Susivar------	0-3	Fine sandy loam	ML	A-4	0	100	95-100	90-95	60-75	25-35	NP-10
	3-60	Stratified silt to sand.	SM	A-2, A-4	0	100	95-100	80-90	30-50	---	NP
Moose River--	0-2	Silt loam--------	ML	A-4	0	100	100	90-100	70-90	30-35	NP-5
	2-34	Stratified silt loam to fine sand.	SM	A-2, A-4	0-5	85-100	75-85	60-75	30-40	---	NP
	34-60	Stratified cobbly coarse sand to sand.	SP-SM	A-1	15-30	60-80	40-70	20-40	5-10	---	NP
187*:											
Susivar------	0-3	Fine sandy loam	ML	A-4	0	100	95-100	90-95	60-75	25-35	NP-10
	3-60	Stratified silt to sand.	SM	A-2, A-4	0	100	95-100	80-90	30-50	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
187*: cont'd											
Niklavar-----	0-4	Fine sandy loam	ML	A-4	0	100	95-100	90-95	60-75	25-35	NP-10
	4-30	Stratified sand to silt.	SM	A-2, A-4	0	100	95-100	80-90	30-50	---	NP
	30-60	Very gravelly coarse sand, extremely gravelly coarse sand, very cobbly sand.	GP, SP	A-1	15-25	50-65	25-50	10-25	0-5	---	NP
188:											
Talkeetna---- warm	0-8	Very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	8-23	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	23-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP
189*:											
Talkeetna----	0-15	Silt loam--------	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	15-19	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	19-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP
Talkeetna---- thick surface	0-11	Silt loam--------	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	11-21	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	21-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP
190*, 191*:											
Talkeetna---- warm	0-4	Silt loam--------	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	4-15	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	15-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
190*, 191*: cont'd											
Talkeetna---- thick surface	0-4	Silt loam--------	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	4-15	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	15-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP
192*:											
Talkeetna low elevation	0-4	Silt loam--------	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	4-15	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	15-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP
Deneka low--- elevation	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	2-17	Silt loam, fine sandy loam, sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-70	40-60	NP-5
	17-20	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	GM	A-1, A-2	15-25	45-60	35-55	25-40	15-30	---	NP
	20-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
193*:											
Talkeetna---- warm	0-4	Silt loam--------	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	4-15	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	15-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP
Talkeetna---- thick surface	0-4	Silt loam--------	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	4-15	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	15-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
193*: cont'd											
Deneka-------	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	2-17	Silt loam, fine sandy loam, sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-70	40-60	NP-5
	17-20	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	GM	A-1, A-2	15-25	45-60	35-55	25-40	15-30	---	NP
	20-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
194*:											
Talkeetna---- cool	0-2	Silt loam--------	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	2-18	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	18-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP
Snowdance----	0-5	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	5-16	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	80-90	40-60	NP-5
	16-60	Very gravelly sandy loam, very cobbly sandy loam, very cobbly loam.	SM, GM	A-1, A-2	0-30	30-70	20-50	15-40	10-30	---	NP
195*:											
Talkeetna---- cool	0-4	Silt loam--------	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	4-15	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	15-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP
Tsadaka------	0-5	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	75-90	40-60	NP-5
	5-15	Silt loam, loam, fine sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-80	40-60	NP-5
	15-26	Very cobbly sandy loam, very gravelly sandy loam, extremely gravelly loam.	SM	A-1, A-2	15-25	70-80	40-55	25-40	15-30	---	NP
	26-60	Very cobbly sandy loam, very gravelly sandy loam, extremely gravelly loam.	SM	A-1, A-2	15-25	70-80	40-55	25-40	15-30	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
195*: cont'd											
Chunilna cool	0-2	Mucky silt loam	MH, OH	A-5	0	95-100	95-100	90-100	70-80	70-85	NP-5
	2-19	Silt loam, loam	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	19-60	Very gravelly loam, very gravelly sandy loam, very cobbly loam.	GM, SM	A-1, A-2	0-30	30-70	20-50	15-40	10-30	---	NP
196*: Tidal flats.											
197*:											
Tokositna---- sloping	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	2-28	Silt loam, very fine sandy loam, sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-70	40-60	NP-5
	28-60	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	SM, GM	A-1, A-2	15-25	45-65	30-50	20-45	15-35	---	NP
Tokositna---- moderately steep	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	2-28	Silt loam, very fine sandy loam, sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-70	40-60	NP-5
	28-60	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	SM, GM	A-1, A-2	15-25	45-65	30-50	20-45	15-35	---	NP
198*:											
Tokositna---- steep	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	2-28	Silt loam, very fine sandy loam, sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-70	40-60	NP-5
	28-60	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	SM, GM	A-1, A-2	15-25	45-65	30-50	20-45	15-35	---	NP
Tokositna---- sloping	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	2-28	Silt loam, very fine sandy loam, sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-70	40-60	NP-5
	28-60	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	SM, GM	A-1, A-2	15-25	45-65	30-50	20-45	15-35	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
199:											
Tokositna----	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	2-28	Silt loam, very fine sandy loam, sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-70	40-60	NP-5
	28-60	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	SM, GM	A-1, A-2	15-25	45-65	30-50	20-45	15-35	---	NP
200*, 201*:											
Tokositna----	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	2-28	Silt loam, very fine sandy loam, sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-70	40-60	NP-5
	28-60	Very cobbly sandy loam, very cobbly loam, very gravelly loam.	SM, GM	A-1, A-2	15-25	45-65	30-50	20-45	15-35	---	NP
Chunilna-----	0-4	Mucky silt loam	MH, OH	A-5	0	95-100	95-100	90-100	70-80	70-85	NP-5
	4-14	Silt loam, loam	ML, MH	A-5	0	95-100	95-100	90-100	70-80	40-60	NP-5
	14-60	Very gravelly loam, very gravelly sandy loam, very cobbly loam.	GM, SM	A-1, A-2	0-30	30-70	20-50	15-40	10-30	---	NP
202*:											
Tsadaka------	0-5	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-100	75-90	40-60	NP-5
	5-15	Silt loam, loam, fine sandy loam.	ML, MH	A-5	0-5	90-100	90-95	80-90	60-80	40-60	NP-5
	15-26	Very cobbly sandy loam, very gravelly sandy loam, extremely gravelly loam.	SM	A-1, A-2	15-25	70-80	40-55	25-40	15-30	---	NP
	26-60	Very cobbly sandy loam, very gravelly sandy loam, extremely gravelly loam.	SM	A-1, A-2	15-25	70-80	40-55	25-40	15-30	---	NP
Talkeetna---- cool	0-1	Silt loam--------	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	1-15	Silt loam, loam, very fine sandy loam.	ML, MH	A-5	0-5	95-100	95-100	90-100	70-80	40-60	NP-5
	15-60	Very gravelly sandy loam, very cobbly sandy loam, very gravelly loam.	GM, SM	A-1, A-2	15-30	30-70	20-50	15-40	10-30	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
203*:											
Typic-------- Cryaquents	0-8	Fine sandy loam	ML, SM	A-4	0-30	90-100	80-100	65-85	40-60	25-35	NP-10
	8-60	Variable---------	---	---	0-30	70-100	40-100	---	---	---	---
204*:											
Typic-------- Cryaquents, coastal	0-4	Silt loam--------	ML, SM	A-4	0-30	90-100	80-100	65-85	40-60	25-35	NP-10
	4-60	Variable---------	---	---	0-30	70-100	40-100	---	---	---	---
205:											
Whitsol------	0-34	Silt loam--------	ML, MH	A-5	0	100	100	95-100	70-90	40-60	NP-5
	34-44	Silt loam, very fine sandy loam.	ML, MH	A-5	0	100	100	80-90	65-80	40-60	NP-10
	44-60	Very gravelly coarse sand.	SP, GP	A-1	5-25	45-55	35-50	20-40	0-5	---	NP
206*:											
Whitsol cool, sloping	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	2-27	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	27-60	Stratified silt loam to sand.	SM	A-4	0	95-100	90-95	85-95	35-50	25-35	NP-10
Whitsol cool, moderately steep	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	2-27	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	27-60	Stratified silt loam to sand.	SM	A-4	0	95-100	90-95	85-95	35-50	25-35	NP-10
207*:											
Whitsol cool, steep	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	2-27	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	27-60	Stratified silt loam to sand.	SM	A-4	0	95-100	90-95	85-95	35-50	25-35	NP-10
Whitsol cool, sloping	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	2-27	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	27-60	Stratified silt loam to sand.	SM	A-4	0	95-100	90-95	85-95	35-50	25-35	NP-10
208:											
Whitsol silty	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	2-27	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	27-60	Stratified silt loam to sand.	SM	A-4	0	95-100	90-95	85-95	35-50	25-35	NP-10
209*:											
Whitsol------ silty, sloping	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	2-27	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	27-60	Stratified silt loam to sand.	SM	A-4	0	95-100	90-95	85-95	35-50	25-35	NP-10
Whitsol------ silty, moderately steep	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	2-27	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	27-60	Stratified silt loam to sand.	SM	A-4	0	95-100	90-95	85-95	35-50	25-35	NP-10

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
210*:											
Whitsol till, sloping	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	2-26	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	26-55	Stratified silt loam to sand.	SM	A-4	0	95-100	90-95	85-90	35-50	25-35	NP-10
	55-60	Very gravelly loam, very cobbly loam, very gravelly sandy loam.	GM, SM	A-1, A-2	15-25	45-65	35-60	20-45	15-35	---	NP
Whitsol till, moderately steep	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	2-26	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	26-55	Stratified silt loam to sand.	SM	A-4	0	95-100	90-95	85-90	35-50	25-35	NP-10
	55-60	Very gravelly loam, very cobbly loam, very gravelly sandy loam.	GM, SM	A-1, A-2	15-25	45-65	35-60	20-45	15-35	---	NP
211:											
Whitsol till-	0-2	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	2-26	Silt loam--------	ML, MH	A-5	0	95-100	95-100	90-95	70-80	40-60	NP-5
	26-55	Stratified silt loam to sand.	SM	A-4	0	95-100	90-95	85-90	35-50	25-35	NP-10
	55-60	Very gravelly loam, very cobbly loam, very gravelly sandy loam.	GM, SM	A-1, A-2	15-25	45-65	35-60	20-45	15-35	---	NP
212:											
Yensus-------	0-2	Silt loam--------	ML	A-4, A-5	0	100	95-100	85-100	65-90	35-45	NP-10
	2-36	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	85-100	65-90	35-45	NP-10
	36-60	Extremely gravelly coarse sand, very gravelly sand.	GP-GM, GM, SM	A-1	10-30	40-65	30-55	10-35	5-15	---	NP
213*:											
Yensus------- sloping	0-2	Silt loam--------	ML	A-4, A-5	0	100	95-100	85-100	65-90	35-45	NP-10
	2-36	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	85-100	65-90	35-45	NP-10
	36-60	Extremely gravelly coarse sand, very gravelly sand.	GP-GM, GM, SM	A-1	10-30	40-65	30-55	10-35	5-15	---	NP
Yensus------- moderately steep	0-2	Silt loam--------	ML	A-4, A-5	0	100	95-100	85-100	65-90	35-45	NP-10
	2-36	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	85-100	65-90	35-45	NP-10
	36-60	Extremely gravelly coarse sand, very gravelly sand.	GP-GM, GM, SM	A-1	10-30	40-65	30-55	10-35	5-15	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
214:											
Yensus-------	0-2	Silt loam--------	ML	A-4, A-5	0	100	95-100	85-100	65-90	35-45	NP-10
	2-36	Silt loam, very fine sandy loam.	ML	A-4, A-5	0	100	95-100	85-100	65-90	35-45	NP-10
	36-60	Extremely gravelly coarse sand, very gravelly sand.	GP-GM, GM, SM	A-1	10-30	40-65	30-55	10-35	5-15	---	NP
215, 216:											
Yohn---------	0-7	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-80	40-50	NP-10
	7-32	Stratified fine sand to silt.	SM	A-4, A-2	0-5	100	95-100	85-100	25-45	30-40	NP-5
	32-60	Very gravelly loam, very cobbly loam, very gravelly sandy loam.	GM, SM	A-2, A-1	0-30	50-70	35-60	20-45	15-35	---	NP
217*:											
Yohn---------	0-7	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-80	40-50	NP-10
	7-32	Stratified fine sand to silt.	SM	A-4, A-2	0-5	100	95-100	85-100	25-45	30-40	NP-5
	32-60	Very gravelly loam, very cobbly loam, very gravelly sandy loam.	GM, SM	A-2, A-1	0-30	50-70	35-60	20-45	15-35	---	NP
Deception----	0-1	Silt loam--------	ML	A-5	0	95-100	95-100	85-100	65-90	40-50	NP-5
	1-5	Silt loam, loam, very fine sandy loam.	ML	A-5	0-5	95-100	85-100	85-100	65-90	40-50	NP-5
	5-60	Very cobbly loam, very gravelly loam, very cobbly sandy loam.	GM, SM	A-2, A-1	0-30	45-65	35-55	20-45	15-35	---	NP
218*:											
Yohn---------	0-7	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-80	40-50	NP-10
	7-32	Stratified fine sand to silt.	SM	A-4, A-2	0-5	100	95-100	85-100	25-45	30-40	NP-5
	32-60	Very gravelly loam, very cobbly loam, very gravelly sandy loam.	GM, SM	A-2, A-1	0-30	50-70	35-60	20-45	15-35	---	NP
Delyndia-----	0-2	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	2-4	Silt loam, very fine sandy loam, fine sandy loam.	ML	A-5	0	100	95-100	90-100	70-85	40-50	NP-5
	4-60	Stratified loamy sand to gravelly coarse sand.	SM, SP, SP-SM	A-2, A-3	0-10	90-100	65-95	50-80	0-20	---	NP

*See footnote at end of table.

TABLE 19--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
219*:											
Yohn---------	0-7	Silt loam--------	ML	A-5	0	100	95-100	90-100	70-80	40-50	NP-10
	7-32	Stratified fine sand to silt.	SM	A-4, A-2	0-5	100	95-100	85-100	25-45	30-40	NP-5
	32-60	Very gravelly loam, very cobbly loam, very gravelly sandy loam.	GM, SM	A-2, A-1	0-30	50-70	35-60	20-45	15-35	---	NP
Flat Horn----	0-2	Silt loam--------	ML	A-5	0	90-100	85-100	75-95	65-85	40-50	NP-10
	2-9	Silt loam--------	ML	A-4	0	90-100	85-100	75-95	65-85	30-40	NP-10
	9-60	Stratified fine sand to silt.	ML, SM	A-4, A-2	0	90-100	75-95	50-90	30-55	---	NP
W*:											
Water.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
101:											
Benka--------	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	5-10
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	5.1-6.0	Low-------	0.43			
	27-60	0-5	1.30-1.45	2.0-6.0	0.04-0.08	5.6-6.5	Low-------	0.05			
102*:											
Benka sloping	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	5-10
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	5.1-6.0	Low-------	0.43			
	27-60	0-5	1.30-1.45	2.0-6.0	0.04-0.08	5.6-6.5	Low-------	0.05			
Benka-------- moderately steep	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	5-10
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	5.1-6.0	Low-------	0.43			
	27-60	0-5	1.30-1.45	2.0-6.0	0.04-0.08	5.6-6.5	Low-------	0.05			
103:											
Benka--------	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	5-10
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	5.1-6.0	Low-------	0.43			
	27-60	0-5	1.30-1.45	2.0-6.0	0.04-0.08	5.6-6.5	Low-------	0.05			
104*:											
Benka--------	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	5-10
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	5.1-6.0	Low-------	0.43			
	27-60	0-5	1.30-1.45	2.0-6.0	0.04-0.08	5.6-6.5	Low-------	0.05			
Liten--------	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-4	0-10	1.10-1.25	0.6-2.0	0.30-0.32	5.1-6.0	Low-------	0.43			
	4-6	0-10	1.20-1.40	0.6-2.0	0.15-0.17	5.1-6.0	Low-------	0.24			
	6-60	0-5	1.20-1.40	6.0-20	0.05-0.07	5.6-6.5	Low-------	0.05			
105:											
Bodenburg----	0-3	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	3	1	4-8
	3-53	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
	53-60	0-2	1.50-1.60	6.0-20	0.02-0.04	6.1-7.3	Low-------	0.10			
106*:											
Bodenburg---- sloping	0-3	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	3	1	4-8
	3-53	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
	53-60	0-2	1.50-1.60	6.0-20	0.02-0.04	6.1-7.3	Low-------	0.10			
Bodenburg---- moderately steep	0-3	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	3	1	4-8
	3-53	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
	53-60	0-2	1.50-1.60	6.0-20	0.02-0.04	6.1-7.3	Low-------	0.10			
107*:											
Bodenburg---- steep	0-3	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	3	1	4-8
	3-53	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
	53-60	0-2	1.50-1.60	6.0-20	0.02-0.04	6.1-7.3	Low-------	0.10			
Bodenburg---- sloping	0-3	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	3	1	4-8
	3-53	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
	53-60	0-2	1.50-1.60	6.0-20	0.02-0.04	6.1-7.3	Low-------	0.10			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
108:											
Bodenburg----	0-3	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	3	1	4-8
	3-53	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
	53-60	0-2	1.50-1.60	6.0-20	0.02-0.04	6.1-7.3	Low-------	0.10			
109:											
Bodenburg---- silty	0-5	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	5	1	4-8
	5-60	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
110*:											
Bodenburg---- silty, sloping	0-5	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	5	1	4-8
	5-60	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
Bodenburg---- silty, moderately steep	0-5	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	5	1	4-8
	5-60	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
111:											
Bodenburg---- silty	0-5	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	5	1	4-8
	5-60	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
112*:											
Bodenburg---- steep	0-5	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	5	1	4-8
	5-60	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
Bodenburg---- sloping	0-5	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	5	1	4-8
	5-60	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
Jim----------	0-2	0-5	0.90-1.10	0.6-2.0	0.28-0.30	5.1-6.0	Low-------	0.37	2	1	4-8
	2-26	0-5	0.90-1.10	0.6-2.0	0.28-0.30	5.1-6.0	Low-------	0.43			
	26-30	---	---	---	---	---	----------	----			
113*:											
Chilligan----	0-1	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	5-10
	1-24	0-10	0.75-0.90	0.6-2.0	0.30-0.32	5.1-6.0	Low-------	0.43			
	24-60	5-15	1.15-1.30	0.2-0.6	0.16-0.19	5.6-6.5	Low-------	0.24			
Cryaquepts---	0-4	0-10	0.70-1.25	0.6-2.0	0.26-0.34	4.5-5.5	Low-------	0.37	5	8	5-12
	4-60	---	1.10-1.80	0.2-20	0.05-0.30	5.1-6.5	----------	----			
114*:											
Chilligan----	0-1	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	5-10
	1-24	0-10	0.75-0.90	0.6-2.0	0.30-0.32	5.1-6.0	Low-------	0.43			
	24-60	5-15	1.15-1.30	0.2-0.6	0.16-0.19	5.6-6.5	Low-------	0.24			
Cryaquepts---	0-2	0-10	0.70-1.25	0.6-2.0	0.26-0.34	4.5-5.5	Low-------	0.37	5	8	5-12
	2-60	---	1.10-1.80	0.2-20	0.05-0.30	5.1-6.5	----------	----			
115:											
Chunilna cool	0-4	0-10	0.75-0.90	0.6-2.0	0.34-0.36	4.5-5.5	Low-------	0.37	1	8	8-12
	4-14	0-10	0.75-0.90	0.6-2.0	0.32-0.34	4.5-5.5	Low-------	0.43			
	14-60	0-10	1.60-1.80	0.2-0.6	0.06-0.08	5.1-6.0	Low-------	0.17			
116*:											
Cryaquepts-- depressional	0-2	0-10	0.70-1.25	0.6-2.0	0.26-0.34	4.5-5.5	Low-------	0.37	5	8	5-12
	2-60	---	1.10-1.80	0.2-20	0.05-0.30	5.1-6.5	----------	---			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
117*:											
Cryods-------	0-3	0-10	0.75-1.20	0.6-6.0	0.22-0.36	4.5-6.5	Low-------	0.37	3	1	2-10
	3-60	---	---	---	---	4.5-6.5	Low-------	----			
118*:											
Cryods cool--	0-10	0-10	0.75-1.20	0.6-6.0	0.22-0.36	4.5-6.5	Low-------	0.37	3	1	2-10
	10-60	---	---	---	---	4.5-6.5	Low-------	----			
Niklason----- moderately wet	0-4	0-10	0.70-0.80	2.0-6.0	0.15-0.18	4.5-5.5	Low-------	0.20	2	3	2-4
	4-25	0-5	0.90-1.00	2.0-6.0	0.15-0.18	5.1-6.0	Low-------	0.37			
	25-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.1-6.0	Low-------	0.05			
Qeni---------	0-3	0-10	0.75-0.90	0.6-2.0	0.26-0.30	4.5-5.0	Low-------	0.37	5	1	2-5
	3-8	0-10	0.90-1.00	2.0-6.0	0.10-0.15	5.1-6.0	Low-------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low-------	0.02			
119*:											
Cryods-------	0-2	0-10	0.75-1.20	0.6-6.0	0.22-0.36	4.5-6.5	Low-------	0.37	3	1	2-10
	2-60	---	---	---	---	4.5-6.5	Low-------	----			
Cryaquepts--- cool	0-4	0-10	0.70-1.25	0.6-2.0	0.26-0.34	4.5-5.5	Low-------	0.37	5	8	5-12
	4-60	---	1.10-1.80	0.2-20	0.05-0.30	5.1-6.5	----------	----			
120*:											
Cryods low--- elevation	0-2	0-10	0.75-1.20	0.6-6.0	0.22-0.36	4.5-6.5	Low-------	0.37	3	1	2-10
	2-60	---	---	---	---	4.5-6.5	Low-------	----			
Cryochrepts--	0-4	0-10	1.10-1.25	0.6-2.0	0.26-0.36	5.6-6.5	Low-------	0.37	5	1	2-5
	4-60	---	1.10-1.80	---	---	5.6-7.3	Low-------	----			
121*:											
Cryods-------	0-3	0-10	0.75-1.20	0.6-6.0	0.22-0.36	4.5-6.5	Low-------	0.37	3	1	2-10
	3-60	---	---	---	---	4.5-6.5	Low-------	----			
122:											
Deception----	0-1	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	1-5	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37			
	5-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
123*:											
Deception---- sloping	0-1	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	1-5	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37			
	5-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
Deception---- moderately steep	0-1	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	1-5	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37			
	5-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
124*:											
Deception---- steep	0-1	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	1-5	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37			
	5-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
Deception---- sloping	0-1	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	1-5	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37			
	5-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
125:											
Deception----	0-1	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	1-5	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37			
	5-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
126:											
Delyndia-----	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-4	0-10	1.10-1.25	0.6-2.0	0.28-0.30	5.1-6.0	Low-------	0.43			
	4-60	0-5	1.40-1.60	2.0-6.0	0.06-0.08	5.6-7.3	Low-------	0.05			
127*:											
Delyndia-----	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-4	0-10	1.10-1.25	0.6-2.0	0.28-0.30	5.1-6.0	Low-------	0.43			
	4-60	0-5	1.40-1.60	2.0-6.0	0.06-0.08	5.6-7.3	Low-------	0.05			
Histosols----	0-28	0-3	0.10-0.15	2.0-6.0	0.32-0.35	3.6-5.5	Low-------	0.05	5	8	70-90
	28-60	---	---	---	---	---	----------	----			
128:											
Disappoint---	0-4	0-10	1.10-1.25	0.6-2.0	0.20-0.24	4.5-5.5	Low-------	0.24	5	8	8-12
	4-13	0-10	1.10-1.25	0.6-2.0	0.20-0.24	4.5-5.5	Low-------	0.24			
	13-41	5-15	1.60-1.80	0.2-0.6	0.16-0.20	4.5-6.0	Low-------	0.17			
	41-60	5-10	1.60-1.80	0.2-0.6	0.09-0.12	5.1-6.0	Low-------	0.10			
129*:											
Eska sloping-	0-3	0-10	1.10-1.25	0.6-2.0	0.26-0.28	5.6-6.0	Low-------	0.37	2	1	4-8
	3-25	0-10	1.10-1.25	0.6-2.0	0.26-0.28	5.6-6.0	Low-------	0.43			
	25-60	5-10	1.60-1.80	0.2-2.0	0.03-0.04	5.6-6.5	Low-------	0.10			
Eska---------	0-3	0-10	1.10-1.25	0.6-2.0	0.26-0.28	5.6-6.0	Low-------	0.37	2	1	4-8
moderately	3-25	0-10	1.10-1.25	0.6-2.0	0.26-0.28	5.6-6.0	Low-------	0.43			
steep	25-60	5-10	1.60-1.80	0.2-2.0	0.03-0.04	5.6-6.5	Low-------	0.10			
130*:											
Eska sloping-	0-3	0-10	1.10-1.25	0.6-2.0	0.26-0.28	5.6-6.0	Low-------	0.37	2	1	4-8
	3-25	0-10	1.10-1.25	0.6-2.0	0.26-0.28	5.6-6.0	Low-------	0.43			
	25-60	5-10	1.60-1.80	0.2-2.0	0.03-0.04	5.6-6.5	Low-------	0.10			
Eska---------	0-3	0-10	1.10-1.25	0.6-2.0	0.26-0.28	5.6-6.0	Low-------	0.37	2	1	4-8
moderately	3-25	0-10	1.10-1.25	0.6-2.0	0.26-0.28	5.6-6.0	Low-------	0.43			
steep	25-60	5-10	1.60-1.80	0.2-2.0	0.03-0.04	5.6-6.5	Low-------	0.10			
Jim----------	0-2	0-5	0.90-1.10	0.6-2.0	0.28-0.30	5.1-6.0	Low-------	0.37	2	1	4-8
	2-26	0-5	0.90-1.10	0.6-2.0	0.28-0.30	5.1-6.0	Low-------	0.43			
	26-30	---	---	---	---	---	----------	----			
131:											
Estelle------	0-2	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.1-5.5	Low-------	0.37	1	1	4-8
	2-16	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.6-6.0	Low-------	0.43			
	16-60	0-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
132*:											
Estelle------	0-2	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.1-5.5	Low-------	0.37	1	1	4-8
sloping	2-16	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.6-6.0	Low-------	0.43			
	16-60	0-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
132*: cont'd											
Estelle------	0-2	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.1-5.5	Low-------	0.37	1	1	4-8
moderately	2-16	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.6-6.0	Low-------	0.43			
steep	16-60	0-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
133*:											
Estelle steep	0-2	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.1-5.5	Low-------	0.37	1	1	4-8
	2-16	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.6-6.0	Low-------	0.43			
	16-60	0-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
Estelle------	0-2	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.1-5.5	Low-------	0.37	1	1	4-8
sloping	2-16	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.6-6.0	Low-------	0.43			
	16-60	0-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
134:											
Estelle------	0-2	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.1-5.5	Low-------	0.37	1	1	4-8
	2-16	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.6-6.0	Low-------	0.43			
	16-60	0-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
135*, 136*:											
Estelle------	0-2	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.1-5.5	Low-------	0.37	1	1	4-8
	2-16	0-10	1.00-1.20	0.6-2.0	0.30-0.34	5.6-6.0	Low-------	0.43			
	16-60	0-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
Disappoint---	0-4	0-10	1.10-1.25	0.6-2.0	0.20-0.24	4.5-5.5	Low-------	0.24	5	8	8-12
	4-13	0-10	1.10-1.25	0.6-2.0	0.20-0.24	4.5-5.5	Low-------	0.24			
	13-41	5-15	1.60-1.80	0.2-0.6	0.16-0.20	4.5-6.0	Low-------	0.17			
	41-60	5-10	1.60-1.80	0.2-0.6	0.09-0.12	5.1-6.0	Low-------	0.10			
137, 138:											
Flat Horn----	0-2	0-5	0.70-0.80	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-9	0-5	0.70-0.80	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	9-60	0-5	1.10-1.20	0.6-2.0	0.14-0.16	5.1-6.0	Low-------	0.17			
139*:											
Flat Horn----	0-2	0-5	0.70-0.80	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
sloping	2-9	0-5	0.70-0.80	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	9-60	0-5	1.10-1.20	0.6-2.0	0.14-0.16	5.1-6.0	Low-------	0.17			
Flat Horn----	0-2	0-5	0.70-0.80	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
moderately	2-9	0-5	0.70-0.80	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
steep	9-60	0-5	1.10-1.20	0.6-2.0	0.14-0.16	5.1-6.0	Low-------	0.17			
140*:											
Goldcord-----	0-8	0-5	1.60-1.80	0.6-2.0	0.08-0.12	4.5-5.5	Low-------	0.15	1	8	5-10
	8-19	0-5	1.60-1.80	0.6-2.0	0.08-0.12	5.1-6.0	Low-------	0.15			
	19-23	---	---	---	---	---	----------	----			
Tsadaka------	0-5	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-4.4	Low-------	0.37	1	1	5-10
	5-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	4.5-5.0	Low-------	0.43			
	15-26	0-5	1.70-1.90	0.06-0.2	0.06-0.08	5.1-6.0	Low-------	0.10			
	26-60	0-5	1.70-1.90	0.2-2.0	0.06-0.08	5.1-6.0	Low-------	0.10			
141*:											
Histosols----	0-28	0-3	0.10-0.15	2.0-6.0	0.32-0.35	3.6-5.5	Low-------	0.05	5	8	70-90
	28-60	---	---	---	---	---	----------	----			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
142*:											
Histosols---- high elevation	0-28	0-3	0.10-0.15	2.0-6.0	0.32-0.35	3.6-5.5	Low-------	0.05	5	8	70-90
	28-60	---	---	---	---	---	----------	----			
143*:											
Kalambach---- gently sloping	0-6	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	2	1	4-8
	6-16	0-10	1.10-1.25	0.6-2.0	0.28-0.30	5.6-6.5	Low-------	0.43			
	16-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
Kalambach---- moderately steep	0-6	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	2	1	4-8
	6-16	0-10	1.10-1.25	0.6-2.0	0.28-0.30	5.6-6.5	Low-------	0.43			
	16-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
144*:											
Kalambach---- steep	0-6	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	2	1	4-8
	6-21	0-10	1.10-1.25	0.6-2.0	0.28-0.30	5.6-6.5	Low-------	0.43			
	21-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
Kalambach---- sloping	0-6	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	2	1	4-8
	6-21	0-10	1.10-1.25	0.6-2.0	0.28-0.30	5.6-6.5	Low-------	0.43			
	21-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
145:											
Kalambach----	0-6	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	2	1	4-8
	6-21	0-10	1.10-1.25	0.6-2.0	0.28-0.30	5.6-6.5	Low-------	0.43			
	21-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
146*:											
Kalambach----	0-6	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	2	1	4-8
	6-21	0-10	1.10-1.25	0.6-2.0	0.28-0.30	5.6-6.5	Low-------	0.43			
	21-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
Disappoint---	0-4	0-10	0.90-1.10	0.6-2.0	0.28-0.32	4.5-5.5	Low-------	0.24	5	8	8-12
	4-13	0-10	1.10-1.25	0.6-2.0	0.20-0.24	4.5-5.5	Low-------	0.24			
	13-41	5-15	1.60-1.80	0.2-0.6	0.16-0.20	4.5-6.0	Low-------	0.17			
	41-60	5-10	1.60-1.80	0.2-0.6	0.09-0.12	5.1-6.0	Low-------	0.10			
147:											
Kashwitna----	0-2	0-10	0.80-0.90	0.6-2.0	0.30-0.32	3.6-5.5	Low-------	0.37	1	1	2-6
	2-18	0-10	0.80-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	18-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
148*:											
Kashwitna---- sloping	0-2	0-10	0.80-0.90	0.6-2.0	0.30-0.32	3.6-5.5	Low-------	0.37	1	1	2-6
	2-18	0-10	0.80-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	18-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
Kashwitna---- moderately steep	0-2	0-10	0.80-0.90	0.6-2.0	0.30-0.32	3.6-5.5	Low-------	0.37	1	1	2-6
	2-18	0-10	0.80-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	18-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
149:											
Kashwitna----	0-2	0-10	0.80-0.90	0.6-2.0	0.30-0.32	3.6-5.5	Low-------	0.37	1	1	2-6
	2-18	0-10	0.80-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	18-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
150:											
Keba---------	0-2	0-10	1.00-1.20	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-6	0-10	1.00-1.20	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37			
	6-60	20-35	1.60-1.80	0.2-0.6	0.24-0.28	5.6-7.3	Low-------	0.49			
151:											
Kichatna-----	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-9	0-10	1.10-1.25	0.6-2.0	0.30-0.32	5.6-6.5	Low-------	0.43			
	9-60	0-2	1.50-1.60	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.05			
152*:											
Kichatna----- sloping	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-9	0-10	1.10-1.25	0.6-2.0	0.30-0.32	5.6-6.5	Low-------	0.43			
	9-60	0-2	1.50-1.60	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.05			
Kichatna----- moderately steep	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-9	0-10	1.10-1.25	0.6-2.0	0.30-0.32	5.6-6.5	Low-------	0.43			
	9-60	0-2	1.50-1.60	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.05			
153*:											
Kichatna----- steep	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-9	0-10	1.10-1.25	0.6-2.0	0.30-0.32	5.6-6.5	Low-------	0.43			
	9-60	0-2	1.50-1.60	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.05			
Kichatna----- sloping	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-9	0-10	1.10-1.25	0.6-2.0	0.30-0.32	5.6-6.5	Low-------	0.43			
	9-60	0-2	1.50-1.60	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.05			
154:											
Kichatna-----	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-9	0-10	1.10-1.25	0.6-2.0	0.30-0.32	5.6-6.5	Low-------	0.43			
	9-60	0-2	1.50-1.60	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.05			
155*:											
Kichatna-----	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-9	0-10	1.10-1.25	0.6-2.0	0.30-0.32	5.6-6.5	Low-------	0.43			
	9-60	0-2	1.50-1.60	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.05			
Deception----	0-1	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	1-5	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37			
	5-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
156*:											
Kichatna----- steep	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-9	0-10	1.10-1.25	0.6-2.0	0.30-0.32	5.6-6.5	Low-------	0.43			
	9-60	0-2	1.50-1.60	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.05			
Deception---- sloping	0-1	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	1-5	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37			
	5-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			
Deception---- steep	0-1	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	1-5	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37			
	5-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
157*, 158*:											
Kichatna-----	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-9	0-10	1.10-1.25	0.6-2.0	0.30-0.32	5.6-6.5	Low-------	0.43			
	9-60	0-2	1.50-1.60	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.05			
Delyndia-----	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-4	0-10	1.10-1.25	0.6-2.0	0.28-0.30	5.1-6.0	Low-------	0.43			
	4-60	0-5	1.40-1.60	2.0-6.0	0.06-0.08	5.6-7.3	Low-------	0.05			
159*:											
Kidazqeni---- cool	0-2	0-10	0.80-0.90	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37	5	1	2-5
	2-8	0-10	0.90-1.00	2.0-6.0	0.10-0.15	5.1-6.0	Low-------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low-------	0.02			
Niklason cool	0-4	0-10	0.80-1.00	0.6-2.0	0.23-0.25	4.5-5.5	Low-------	0.37	2	2	2-4
	4-21	0-5	0.90-1.10	2.0-6.0	0.15-0.18	5.1-6.0	Low-------	0.37			
	21-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.1-6.0	Low-------	0.05			
160:											
Kidazqeni----	0-2	0-10	0.80-0.90	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37	5	1	2-5
	2-8	0-10	0.90-1.00	2.0-6.0	0.10-0.15	5.1-6.0	Low-------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low-------	0.02			
161*:											
Kidazqeni---- moderately wet	0-2	0-10	0.80-0.90	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37	5	1	2-5
	2-8	0-10	0.90-1.00	2.0-6.0	0.10-0.15	5.1-6.0	Low-------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low-------	0.02			
Kidazqeni----	0-2	0-10	0.80-0.90	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37	5	1	2-5
	2-8	0-10	0.90-1.00	2.0-6.0	0.10-0.15	5.1-6.0	Low-------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low-------	0.02			
162*:											
Kidazqeni----	0-2	0-10	0.80-0.90	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37	5	1	2-5
	2-8	0-10	0.90-1.00	2.0-6.0	0.10-0.15	5.1-6.0	Low-------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low-------	0.02			
Niklason-----	0-4	0-10	0.80-1.00	0.6-2.0	0.23-0.25	4.5-5.5	Low-------	0.37	2	2	2-4
	4-21	0-5	0.90-1.10	2.0-6.0	0.15-0.18	5.1-6.0	Low-------	0.37			
	21-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.1-6.0	Low-------	0.05			
163*:											
Killey-------	0-3	5-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.37	2	8	2-4
	3-36	0-5	0.90-1.00	0.6-2.0	0.17-0.20	4.5-5.5	Low-------	0.28			
	36-60	0-5	1.50-1.60	6.0-20	0.02-0.04	4.5-5.5	Low-------	0.05			
Moose River--	0-2	0-5	0.90-1.00	0.6-2.0	0.15-0.17	5.6-6.5	Low-------	0.28	2	8	3-6
	2-29	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.6-6.5	Low-------	0.28			
	29-60	0-5	1.40-1.50	2.0-6.0	0.04-0.06	5.6-6.5	Low-------	0.10			
164:											
Knik---------	0-12	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.37	1	1	4-8
	12-18	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.43			
	18-60	0-5	1.50-1.70	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.10			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
165*:											
Knik gently-- sloping	0-12	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.37	1	1	4-8
	12-18	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.43			
	18-60	0-5	1.50-1.70	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.10			
Knik--------- moderately steep	0-12	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.37	1	1	4-8
	12-18	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.43			
	18-60	0-5	1.50-1.70	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.10			
166*:											
Knik steep---	0-12	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.37	1	1	4-8
	12-18	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.43			
	18-60	0-5	1.50-1.70	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.10			
Knik sloping-	0-7	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.37	1	1	4-8
	7-18	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.43			
	18-60	0-5	1.50-1.70	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.10			
167:											
Knik---------	0-12	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.37	1	1	4-8
	12-18	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.43			
	18-60	0-5	1.50-1.70	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.10			
168*:											
Knik---------	0-2	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.1-6.0	Low-------	0.37	1	1	4-8
	2-60	0-5	1.50-1.70	6.0-20	0.02-0.04	5.6-7.3	Low-------	0.10			
Cryaquepts---	0-4	0-10	0.70-1.25	0.6-2.0	0.26-0.34	4.5-5.5	Low-------	0.37	5	8	5-12
	4-60	---	1.10-1.80	0.2-20	0.05-0.30	5.1-6.5	----------	----			
169:											
Liten---------	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-4	0-10	1.10-1.25	0.6-2.0	0.30-0.32	5.1-6.0	Low-------	0.43			
	4-6	0-10	1.20-1.40	0.6-2.0	0.15-0.17	5.1-6.0	Low-------	0.24			
	6-60	0-5	1.20-1.40	6.0-20	0.05-0.07	5.6-6.5	Low-------	0.05			
170*:											
Mine spoils.											
171:											
Nancy---------	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
172*:											
Nancy sloping-	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
Nancy--------- moderately steep	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
173*:											
Nancy steep---	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
173*: cont'd											
Nancy sloping-	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
174:											
Nancy---------	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
175*:											
Nancy---------	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
Cryaquepts----	0-4	0-10	0.70-1.25	0.6-2.0	0.26-0.34	4.5-5.5	Low-------	0.37	5	8	5-12
	4-60	---	1.10-1.80	0.2-20	0.05-0.30	5.1-6.5	----------	----			
176*:											
Nancy sloping-	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
Nancy---------	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
moderately	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
steep	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
Tokositna-----	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.0	Low-------	0.37	2	1	5-10
moderately	2-28	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.5	Low-------	0.43			
steep	28-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	5.6-6.5	Low-------	0.10			
177*:											
Nancy steep---	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
Tokositna-----	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.0	Low-------	0.37	2	1	5-10
steep	2-28	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.5	Low-------	0.43			
	28-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	5.6-6.5	Low-------	0.10			
Nancy sloping-	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
178*:											
Nancy---------	0-3	0-10	0.80-0.90	0.6-2.0	0.30-0.34	3.6-5.5	Low-------	0.37	2	1	2-6
	3-24	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.43			
	24-60	0-5	1.50-1.60	6.0-20	0.03-0.05	4.5-5.5	Low-------	0.05			
Tokositna-----	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.0	Low-------	0.37	2	1	5-10
	2-28	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.5	Low-------	0.43			
	28-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	5.6-6.5	Low-------	0.10			
179*:											
Pits, gravel.											

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
180*:											
Psuyaah-------	0-6	0-10	0.85-0.95	0.6-2.0	0.32-0.36	5.1-6.0	Low-------	0.37	1	1	4-8
	6-15	0-10	0.85-0.95	0.6-2.0	0.32-0.36	5.1-6.0	Low-------	0.43			
	15-21	0-5	1.30-1.40	0.2-0.6	0.12-0.15	5.1-6.0	Low-------	0.17			
	21-60	0-5	1.60-1.80	0.2-0.6	0.05-0.07	5.6-6.5	Low-------	0.10			
Snowdance-----	0-5	0-10	0.75-0.90	0.6-2.0	0.34-0.36	4.5-5.5	Low-------	0.37	1	1	10-15
	5-16	0-10	0.75-0.90	0.6-2.0	0.32-0.34	4.5-5.5	Low-------	0.43			
	16-60	0-10	1.60-1.80	0.2-0.6	0.06-0.08	5.1-6.0	Low-------	0.10			
181*:											
Qeni cool-----	0-3	0-10	0.75-0.90	0.6-2.0	0.26-0.30	4.5-5.0	Low-------	0.37	5	1	2-5
	3-8	0-10	0.90-1.00	2.0-6.0	0.10-0.15	5.1-6.0	Low-------	0.24			
	8-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low-------	0.02			
Niklavar cool-	0-4	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37	2	2	2-5
	4-30	0-10	1.10-1.25	0.6-2.0	0.10-0.15	5.6-6.5	Low-------	0.24			
	30-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low-------	0.02			
Cryods cold---	0-5	0-10	0.75-1.20	0.6-6.0	0.22-0.36	4.5-6.5	Low-------	0.37	3	1	2-10
	5-60	---	---	---	---	4.5-6.5	Low-------	----			
182*:											
Riverwash.											
Niklavar------	0-1	0-10	1.10-1.25	0.6-2.0	0.10-0.15	5.1-6.0	Low-------	0.24	2	2	2-5
	1-30	0-10	1.10-1.25	0.6-2.0	0.10-0.15	5.6-6.5	Low-------	0.24			
	30-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low-------	0.02			
183*:											
Rock outcrop.											
Cryumbrepts---	0-6	0-5	1.30-1.60	0.6-2.0	0.08-0.12	4.5-5.5	Low-------	0.15	3	8	5-10
	6-60	0-10	---	0.2-20	---	5.1-6.0	Low-------	----			
184*:											
Siwash--------	0-1	0-10	0.75-0.90	0.6-2.0	0.32-0.36	4.5-5.0	Low-------	0.37	1	1	5-10
	1-11	0-10	0.75-0.90	0.6-2.0	0.32-0.36	4.5-5.0	Low-------	0.32			
	11-17	0-10	1.60-1.80	0.2-0.6	0.06-0.08	5.6-6.5	Low-------	0.10			
	17-21	---	---	---	---	---	----------	----			
Talkeetna cool	0-4	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	4-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	15-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			
Snowdance-----	0-5	0-10	0.75-0.90	0.6-2.0	0.34-0.36	4.5-5.5	Low-------	0.37	1	1	10-15
	5-16	0-10	0.75-0.90	0.6-2.0	0.32-0.34	4.5-5.5	Low-------	0.43			
	16-60	0-10	1.60-1.80	0.2-0.6	0.06-0.08	5.1-6.0	Low-------	0.10			
185:											
Susitna-------	0-3	0-10	0.80-0.90	0.6-2.0	0.25-0.27	4.5-5.5	Low-------	0.37	3	2	2-5
	3-45	0-10	0.90-1.00	0.6-2.0	0.15-0.17	5.1-6.0	Low-------	0.37			
	45-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.1-6.0	Low-------	0.05			
186*:											
Susivar-------	0-3	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37	5	2	2-5
	3-60	0-10	1.10-1.25	0.6-2.0	0.10-0.15	5.1-6.0	Low-------	0.24			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
186*:											
Moose River---	0-2	5-10	0.80-0.90	0.6-2.0	0.25-0.27	5.6-6.5	Low-------	0.37	2	8	3-6
	2-34	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.6-6.5	Low-------	0.28			
	34-60	0-5	1.40-1.50	2.0-6.0	0.04-0.06	5.6-6.5	Low-------	0.10			
187*:											
Susivar-------	0-3	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37	5	2	2-5
	3-60	0-10	1.10-1.25	0.6-2.0	0.10-0.15	5.1-6.0	Low-------	0.24			
Niklavar------	0-4	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37	2	2	2-5
	4-30	0-10	1.10-1.25	0.6-2.0	0.10-0.15	5.6-6.5	Low-------	0.24			
	30-60	0-5	1.50-1.60	6.0-20	0.02-0.04	5.6-6.5	Low-------	0.02			
188:											
Talkeetna warm	0-8	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	8-23	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	23-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			
189*:											
Talkeetna-----	0-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	15-19	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	19-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			
Talkeetna----- thick surface	0-11	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	11-21	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	21-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			
190*, 191*:											
Talkeetna warm	0-4	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	4-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	15-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			
Talkeetna----- thick surface	0-4	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	4-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	15-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			
192*:											
Talkeetna low-elevation	0-4	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	4-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	15-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			
Deneka low---- elevation	0-2	0-10	0.70-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	2-17	0-10	0.70-0.90	0.6-2.0	0.30-0.32	3.6-5.0	Low-------	0.43			
	17-20	5-10	1.60-1.80	0.2-2.0	0.06-0.08	5.1-6.0	Low-------	0.10			
	20-24	---	---	---	---	---	----------	----			
193*:											
Talkeetna warm	0-4	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	4-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	15-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			
Talkeetna----- thick surface	0-4	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	4-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	15-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
193*: cont'd											
Deneka--------	0-2	0-10	0.70-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	2-17	0-10	0.70-0.90	0.6-2.0	0.30-0.32	3.6-5.0	Low-------	0.43			
	17-20	5-10	1.60-1.80	0.2-2.0	0.06-0.08	5.1-6.0	Low-------	0.10			
	20-24	---	---	---	---	---	----------	----			
194*:											
Talkeetna cool	0-2	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	2-18	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	18-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			
Snowdance-----	0-5	0-10	0.75-0.90	0.6-2.0	0.32-0.34	4.5-5.5	Low-------	0.37	1	1	5-10
	5-16	0-10	0.75-0.90	0.6-2.0	0.32-0.34	4.5-5.5	Low-------	0.43			
	16-60	0-10	1.60-1.80	0.2-0.6	0.06-0.08	5.1-6.0	Low-------	0.10			
195*:											
Talkeetna cool	0-4	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	4-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	15-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			
Tsadaka-------	0-5	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-4.4	Low-------	0.37	1	1	5-10
	5-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	4.5-5.0	Low-------	0.43			
	15-26	0-5	1.70-1.90	0.06-0.2	0.06-0.08	5.1-6.0	Low-------	0.10			
	26-60	0-5	1.70-1.90	0.2-2.0	0.06-0.08	5.1-6.0	Low-------	0.10			
Chunilna cool-	0-2	0-10	0.75-0.90	0.6-2.0	0.34-0.36	4.5-5.5	Low-------	0.37	1	8	8-12
	2-19	0-10	0.75-0.90	0.6-2.0	0.32-0.34	4.5-5.5	Low-------	0.43			
	19-60	0-10	1.60-1.80	0.2-0.6	0.06-0.08	5.1-6.0	Low-------	0.17			
196*:											
Tidal flats.											
197*:											
Tokositna-----	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.0	Low-------	0.37	2	1	5-10
sloping	2-28	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.5	Low-------	0.43			
	28-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	5.6-6.5	Low-------	0.10			
Tokositna-----	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.0	Low-------	0.37	2	1	5-10
moderately	2-28	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.5	Low-------	0.43			
steep	28-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	5.6-6.5	Low-------	0.10			
198*:											
Tokositna-----	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.0	Low-------	0.37	2	1	5-10
steep	2-28	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.5	Low-------	0.43			
	28-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	5.6-6.5	Low-------	0.10			
Tokositna-----	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.0	Low-------	0.37	2	1	5-10
sloping	2-28	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.5	Low-------	0.43			
	28-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	5.6-6.5	Low-------	0.10			
199:											
Tokositna-----	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.0	Low-------	0.37	2	1	5-10
	2-28	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.5	Low-------	0.43			
	28-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	5.6-6.5	Low-------	0.10			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
200*, 201*:											
Tokositna-----	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.0	Low-------	0.37	2	1	5-10
	2-28	0-10	0.75-0.90	0.6-2.0	0.30-0.34	4.5-5.5	Low-------	0.43			
	28-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	5.6-6.5	Low-------	0.10			
Chunilna------	0-4	0-10	0.75-0.90	0.6-2.0	0.34-0.36	4.5-5.5	Low-------	0.37	1	8	8-12
	4-14	0-10	0.75-0.90	0.6-2.0	0.32-0.34	4.5-5.5	Low-------	0.43			
	14-60	0-10	1.60-1.80	0.2-0.6	0.06-0.08	5.1-6.0	Low-------	0.17			
202*:											
Tsadaka-------	0-5	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-4.4	Low-------	0.37	1	1	5-10
	5-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	4.5-5.0	Low-------	0.43			
	15-26	0-5	1.70-1.90	0.06-0.2	0.06-0.08	5.1-6.0	Low-------	0.10			
	26-60	0-5	1.70-1.90	0.2-2.0	0.06-0.08	5.1-6.0	Low-------	0.10			
Talkeetna cool	0-1	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.37	1	1	5-10
	1-15	0-10	0.75-0.90	0.6-2.0	0.32-0.36	3.6-5.0	Low-------	0.43			
	15-60	0-5	1.60-1.80	0.2-2.0	0.06-0.08	4.5-5.5	Low-------	0.10			
203*:											
Typic---------	0-8	0-28	1.10-1.25	0.2-2.0	0.26-0.30	4.5-6.5	Low-------	0.37	5	2	2-5
Cryaquents	8-60	---	1.10-1.60	0.2-6.0	0.05-0.30	5.1-6.5	Low-------	----			
204*:											
Typic---------	0-4	0-28	1.10-1.25	0.2-2.0	0.26-0.30	4.5-6.5	Low-------	0.37	5	2	2-5
Cryaquents, coastal	4-60	---	1.10-1.60	0.2-6.0	0.05-0.30	5.1-6.5	Low-------	----			
205:											
Whitsol-------	0-34	5-10	0.70-0.80	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	3	1	4-8
	34-44	5-10	0.60-0.70	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	44-60	0-3	1.30-1.40	6.0-20	0.02-0.03	5.1-6.0	Low-------	0.10			
206*:											
Whitsol cool,- sloping	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.0	Low-------	0.37	5	1	4-8
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	27-60	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.1-6.0	Low-------	0.32			
Whitsol cool,- moderately steep	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.0	Low-------	0.37	5	1	4-8
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	27-60	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.1-6.0	Low-------	0.32			
207*:											
Whitsol cool,- steep	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.0	Low-------	0.37	5	1	4-8
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	27-60	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.1-6.0	Low-------	0.32			
Whitsol cool,- sloping	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.0	Low-------	0.37	5	1	4-8
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	27-60	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.1-6.0	Low-------	0.32			
208:											
Whitsol silty-	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.0	Low-------	0.37	5	1	4-8
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	27-60	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.1-6.0	Low-------	0.32			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
209*:											
Whitsol silty, sloping	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.0	Low-------	0.37	5	1	4-8
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	27-60	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.1-6.0	Low-------	0.32			
Whitsol silty, moderately steep	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.0	Low-------	0.37	5	1	4-8
	2-27	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	27-60	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.1-6.0	Low-------	0.32			
210*:											
Whitsol till,- sloping	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.0	Low-------	0.37	3	1	4-8
	2-26	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	26-55	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.1-6.0	Low-------	0.32			
	55-60	0-10	1.60-1.80	0.2-2.0	0.06-0.08	5.1-6.0	Low-------	0.17			
Whitsol till,- moderately steep	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.0	Low-------	0.37	3	1	4-8
	2-26	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	26-55	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.1-6.0	Low-------	0.32			
	55-60	0-10	1.60-1.80	0.2-2.0	0.06-0.08	5.1-6.0	Low-------	0.17			
211:											
Whitsol till--	0-2	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.0	Low-------	0.37	3	1	4-8
	2-26	0-10	0.75-0.90	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	26-55	0-5	0.90-1.00	0.6-2.0	0.17-0.20	5.1-6.0	Low-------	0.32			
	55-60	0-10	1.60-1.80	0.2-2.0	0.06-0.08	5.1-6.0	Low-------	0.17			
212:											
Yensus--------	0-2	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	2	1	4-8
	2-36	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
	36-60	0-5	1.50-1.80	6.0-20	0.02-0.04	6.1-7.3	Low-------	0.05			
213*:											
Yensus sloping	0-2	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	2	1	4-8
	2-36	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
	36-60	0-5	1.50-1.80	6.0-20	0.02-0.04	6.1-7.3	Low-------	0.05			
Yensus-------- moderately steep	0-2	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	2	1	4-8
	2-36	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
	36-60	0-5	1.50-1.80	6.0-20	0.02-0.04	6.1-7.3	Low-------	0.05			
214:											
Yensus--------	0-2	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.37	2	1	4-8
	2-36	0-10	1.10-1.25	0.6-2.0	0.28-0.34	5.6-6.5	Low-------	0.43			
	36-60	0-5	1.50-1.80	6.0-20	0.02-0.04	6.1-7.3	Low-------	0.05			
215, 216:											
Yohn----------	0-7	5-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-5.5	Low-------	0.37	2	1	4-8
	7-32	5-10	1.10-1.25	0.6-2.0	0.17-0.20	5.1-6.5	Low-------	0.37			
	32-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	5.6-7.3	Low-------	0.17			
217*:											
Yohn----------	0-7	5-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-5.5	Low-------	0.37	2	1	4-8
	7-32	5-10	1.10-1.25	0.6-2.0	0.17-0.20	5.1-6.5	Low-------	0.37			
	32-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	5.6-7.3	Low-------	0.17			
Deception-----	0-1	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	1-5	0-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-6.0	Low-------	0.37			
	5-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	6.1-7.3	Low-------	0.17			

*See footnote at end of table.

TABLE 20--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH					Pct
218*:											
Yohn----------	0-7	5-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-5.5	Low-------	0.37	2	1	4-8
	7-32	5-10	1.10-1.25	0.6-2.0	0.17-0.20	5.1-6.5	Low-------	0.37			
	32-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	5.6-7.3	Low-------	0.17			
Delyndia------	0-2	0-10	1.10-1.25	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-4	0-10	1.10-1.25	0.6-2.0	0.28-0.30	5.1-6.0	Low-------	0.43			
	4-60	0-5	1.40-1.60	2.0-6.0	0.06-0.08	5.6-7.3	Low-------	0.05			
219*:											
Yohn----------	0-7	5-10	1.10-1.25	0.6-2.0	0.26-0.30	5.1-5.5	Low-------	0.37	2	1	4-8
	7-32	5-10	1.10-1.25	0.6-2.0	0.17-0.20	5.1-6.5	Low-------	0.37			
	32-60	5-10	1.60-1.80	0.2-2.0	0.09-0.12	5.6-7.3	Low-------	0.17			
Flat Horn-----	0-2	0-5	0.70-0.80	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.37	5	1	4-8
	2-9	0-5	0.70-0.80	0.6-2.0	0.30-0.32	4.5-5.5	Low-------	0.43			
	9-60	0-5	1.10-1.20	0.6-2.0	0.14-0.16	5.1-6.0	Low-------	0.17			
W*:											
Water.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 21--PHYSICAL ANALYSES FOR SELECTED SOILS

(A dash indicates that the material was not detected. A blank indicates that a determination was not made. TR indicates a trace amount of the element.)

Soil name (map unit), sample number, and location	Horizon	Depth	Particle-size distribution: Sand: Very coarse 2.0-1.0 mm	Coarse 1.0-0.5 mm	Medium 0.5-0.25 mm	Fine 0.25-0.1 mm	Very fine 0.1-0.05 mm	Total 2.0-0.05 mm	Silt 0.05-0.002 mm	Clay <0.002 mm	Water content: 1/3 bar	15 bar	Water retention	Bulk density: 1/3 bar	Oven-dry
		In	Pct								Pct(wt)			g/cc	
Bodenburg (109)															
S89AK-170-001	Oe	4-0										32.2			
61° 34' 52'' N Lat.	A	0-4	0.1	0.4	1.0	4.3	28.4	34.2	60.3	5.5		13.5			
149° 4' 27'' W Long.	AC	4-10	0.1	0.3	0.5	3.9	26.2	31.0	63.9	5.1	37.3	9.3	0.23	0.91	0.94
	C/Bw	10-21	TR	TR	0.1	3.2	23.4	26.7	68.4	4.9	25.1	6.2	0.19	1.11	1.12
	Bw/C1	21-32	TR	0.1	0.4	3.7	28.3	32.5	63.9	3.6	26.4	6.0	0.20	1.14	1.15
	Bw/C2	32-47	--	TR	0.3	3.2	22.2	25.7	71.6	2.7	30.3	6.1	0.23	1.09	1.11
	Bw/C3	47-56	0.1	0.6	3.1	12.9	29.2	45.9	51.1	3.0	21.2	5.4	0.18	1.27	1.30
	2C	56-63	20.4	36.6	26.4	6.9	2.0	92.3	5.6	2.1		2.1			
Deception (123)															
S89AK-170-008	Oe	3-0										92.1			
61° 32' 00'' N Lat.	E	0-3	5.5	1.0	1.0	3.5	9.9	20.9	72.5	6.6	43.0	8.9	0.27	0.85	0.93
149° 37' 00'' W Long.	Bs	3-6	0.4	0.8	3.0	14.1	21.5	39.8	57.2	3.0	39.0	13.2	0.18	0.76	0.78
	Eb	6-8	1.1	1.6	2.8	7.2	18.1	30.8	64.9	4.3	24.2	9.4	0.13	1.00	1.01
	Bsb	8-9	3.4	5.6	10.7	14.5	9.1	43.3	52.2	4.5	32.8	10.6	0.16	0.91	1.08
	2Bsb	9-11	10.6	11.1	14.4	16.2	16.1	68.4	27.7	3.9		10.3			
	2BCb	11-20	10.0	12.3	14.8	16.6	12.8	66.5	31.0	2.5		4.5			
	2C	20-39	5.1	8.9	13.0	17.9	14.9	59.8	34.6	5.6		2.9			
Estelle (132)															
S89AK-170-006	Oi	3-0										125.9			
61° 21' 30'' N Lat.	AE	0-2	11.1	2.4	3.0	7.8	17.5	41.8	54.0	4.2		13.6			
149° 58' 00" W Long.	Bs1	2-4	0.3	0.7	2.3	8.4	25.6	37.3	59.7	3.0	55.9	19.6	0.20	0.72	0.83
	Bs2	4-6	0.6	1.1	2.6	8.5	25.4	38.2	57.9	3.9	47.7	13.1	0.27	0.90	1.00
	Eb	6-7	0.1	0.3	0.9	8.1	18.2	27.6	66.2	6.2		8.5			
	Bs/Eb	7-12	0.2	0.6	2.7	10.1	26.9	40.5	54.6	4.9	47.6	12.7	0.21	0.75	0.82
	Bsb	12-17	0.1	0.2	1.3	8.2	31.5	41.3	58.0	0.7	38.8	11.2	0.21	0.91	1.02
	BCb	17-22	2.3	1.9	2.4	5.3	34.1	46.0	52.9	1.1	20.1	5.2	0.15	1.21	1.25
	2C	22-39	8.1	11.9	16.0	18.0	13.9	67.9	29.3	2.8	10.0	2.7	0.07	1.52	1.54
Kashwitna (147)															
S89AK-170-005	Oe	3-0										94.8			
61° 24' 16'' N Lat.	E/A	0-1	5.6	1.6	2.0	9.9	18.3	37.4	59.1	3.5	62.0	14.8	0.31	0.68	0.75
150° 5' 00'' W. Long.	Bs1	1-4	0.3	0.7	2.2	10.4	18.1	31.7	64.7	3.6	88.3	19.0	0.44	0.66	0.92
	Bs2	4-8	0.5	0.8	2.2	7.9	16.3	27.7	65.5	6.8	56.3	13.8	0.30	0.82	0.83
	Bsb	10-12	0.6	1.0	1.5	5.8	10.7	19.6	75.5	4.9		8.3			
	BCb	12-15	3.3	3.8	5.3	6.1	10.9	29.4	69.1	1.5	37.3	4.5	0.29	1.03	1.11
	2BCb1	15-18	14.0	26.7	21.3	11.4	7.2	80.6	18.0	1.4		2.5			
	2BCb2	18-39	14.3	29.7	38.2	11.0	2.8	96.0	4.0	TR		1.6			
Kichatna (151)															
S89AK-170-004	Oe	3-0										47.6			
61° 38' 5'' N Lat.	E	0-3	0.4	0.7	1.4	5.3	17.7	25.5	69.4	5.1	65.2	9.2	0.37	0.72	0.84
149° 28' 30'' W Long.	Bs	3-6	1.2	2.1	3.7	7.2	18.7	32.9	62.9	4.2	60.8	15.5	0.26	0.69	0.78
	Bsb	7-9	1.1	2.1	2.9	5.3	21.6	33.0	63.3	3.7	37.1	10.7	0.22	0.98	1.03
	2BCb	9-16	11.4	20.0	25.0	14.3	4.8	75.5	22.4	2.1		5.4			
	2C	16-39	24.5	31.9	25.3	13.1	2.1	96.9	2.3	0.8		2.1			

TABLE 21--PHYSICAL ANALYSES FOR SELECTED SOILS--Continued

Soil name (map unit), sample number, and location	Horizon	Depth	Particle-size distribution: Sand: Very coarse 2.0-1.0 mm	Coarse 1.0-0.5 mm	Medium 0.5-0.25 mm	Fine 0.25-0.1 mm	Very fine 0.1-0.05 mm	Total 2.0-0.05 mm	Silt 0.05-0.002 mm	Clay <0.002 mm	Water content: 1/3 bar	15 bar	Water retention	Bulk density: 1/3 bar	Oven-dry
		In	----Pct----								----Pct(wt)----			--g/cc--	
Knik (164)															
S89AK-170-003	Oe	3-0										75.8			
61° 37' 2'' N Lat.	A	0-2	3.2	2.5	2.7	5.9	9.5	23.8	72.2	4.0		16.3			
149° 22' 5'' W Long.	AE	2-7	0.1	0.5	0.9	3.3	13.2	18.0	75.3	6.7	54.9	16.1	0.34	0.82	0.91
	Bw	7-14	1.2	2.8	4.7	6.1	5.7	20.5	73.9	5.6	45.6	12.1	0.23	0.78	0.90
	2BC	14-20	13.8	23.4	25.9	9.9	5.9	78.9	18.7	2.4		4.8			
	2C1	20-24	12.4	29.4	41.2	10.2	2.1	95.3	3.6	1.1		2.9			
	2C2	24-26	1.3	6.9	47.3	35.8	5.6	96.9	2.4	0.7		2.3			
	2C3	26-39	29.6	32.6	26.0	7.2	1.4	96.8	2.7	0.5		1.7			
Liten (169)															
S89AK-170-007	Oe	1-0										36.9			
61° 23' 00'' N Lat.	E	0-2	0.3	0.5	1.2	8.9	11.2	22.1	69.8	8.1		7.4			
149° 50' 40'' W Long.	Bs	2-4	0.1	0.5	6.4	36.5	10.2	53.7	36.3	10.0	46.0		0.33	0.93	0.95
	2Bs	4-8	TR	0.1	9.4	60.9	16.1	86.5	11.2	2.3					
	2BC1	8-13	TR	0.1	9.5	70.2	16.2	96.0	3.6	0.4					
	2BC2	13-21		2.0	24.1	66.1	8.1	98.5	0.1	1.4					
	2C	21-55	--	0.2	16.2	70.9	11.1	98.4	0.4	1.2					
Nancy (171)															
S87AK-170-001	Oe	0-2										54.9			
62° 18' 42'' N Lat.	E	2-4	0.9	2.9	3.4	11.8	20.1	39.1	56.1	4.8	58.3	9.2		0.75	0.78
150° 25' 36'' W Long.	Bhs	4-6	0.3	0.9	2.6	16.8	24.2	44.8	49.9	5.3		24.0			
	Bs1	6-7	--	0.4	2.8	20.1	23.4	46.7	49.9	3.4	40.4	13.5	0.14	0.78	0.83
	Bs2	7-11	0.4	0.8	3.7	17.6	22.0	44.5	51.5	4.0	41.3	12.0	0.17	0.83	0.89
	Eb	11-13	1.2	1.6	3.2	5.5	8.9	20.4	71.9	7.7	59.4	8.8	0.38	0.91	0.92
	Bsb	13-17	1.9	2.7	6.4	9.5	11.8	32.3	62.9	4.8	51.9	17.6	0.17	0.81	0.85
	2BCb	17-23	10.7	16.7	18.7	11.5	7.6	65.3	31.6	3.1	36.0	5.4	0.17	1.00	1.05
	2C	23-35	10.0	30.9	41.1	12.7	2.0	96.7	1.6	1.7		1.8			
Talkeetna (191)															
S89AK-170-009	Oe	4-0										134.3			
62° 15' 00" N Lat.	A	0-3	19.0	13.8	9.1	10.4	18.7	71.0	22.7	6.3		48.8			
150° 2' 00'' W Long.	E	3-6	7.3	1.9	1.5	11.0	23.9	45.6	52.0	2.4	63.6	10.2	0.41	0.77	0.81
	Bhs	6-10	1.1	2.3	3.2	20.8	20.7	48.1	48.9	3.0	33.2	33.4		0.88	0.93
	Bs1	10-13	1.2	2.9	4.7	16.1	19.9	44.8	49.3	5.9	30.1	49.8	0.21	0.42	0.60
	Bs2	13-17	0.8	2.3	4.8	13.5	21.4	42.8	52.8	4.4	84.8	31.0	0.13	0.56	0.70
	Eb	17-19	1.0	1.4	3.9	11.1	13.1	30.5	62.3	7.2	59.5	16.0	0.24	0.72	0.79
	Bsb	19-26	1.7	5.6	11.2	17.5	12.3	48.3	47.4	4.3		18.9			
	2BCb	26-34	13.3	13.6	18.8	19.7	11.6	77.0	20.3	2.7		3.9			
	2C	34-45	13.3	16.0	17.8	18.0	11.5	76.7	20.9	2.4		3.5			
Yensus (213)															
S89AK-170-002	Oe	3-0										28.7			
61° 36' 42'' N Lat.	A	0-3	0.1	0.5	1.2	2.7	19.4	23.9	72.1	4.0	57.9	14.9	0.30	0.70	0.84
149° 8' 42'' W Long.	AC	3-6	TR	0.1	0.2	1.0	17.2	18.5	75.9	5.6	38.3	8.4	0.27	0.94	1.04
	C/Bw	6-13	TR	TR	0.2	1.5	16.2	17.9	77.1	5.0	31.8	6.3	0.25	1.06	1.09
	Bw/C	13-21	TR	TR	0.1	3.3	20.1	23.5	73.2	3.3	30.9	7.5	0.21	0.97	0.97
	Bwb	21-29	0.3	0.6	0.8	0.1	16.1	17.9	77.6	4.5		8.4			
	Bsb	29-35	4.5	5.4	5.2	4.5	13.9	33.5	59.7	6.8		6.4			
	2BCb	35-39	13.0	25.7	26.1	15.5	5.7	86.0	12.3	1.7		2.8			
	2C	39-51	16.1	38.0	32.2	8.8	2.1	97.2	2.4	0.4		1.6			

TABLE 22--CHEMICAL ANALYSES FOR SELECTED SOILS

(A dash indicates that the material was not detected. A blank indicates that a determination was not made. TR indicates a trace amount of the element.)

Soil name (map unit), sample number, and location	Horizon	Depth	Cation-exchange capacity		pH		Organic carbon	Total nitrogen	Extractable acidity	Extractable bases				Acid exalate extractable		Citrate-dithionite extractable		Phosphorus retention
			Sum of cations	Ammonium acetate	CaCl 0.01M 1:2	H20 1:1				Ca	Mg	K	Na	Fe	Al	Fe	Al	
		In	----Meq/100g----				Pct	Pct	Meq/100 g	----Meq/100 g----				-Meq/100 g-		-Meq/100 g-		Pct
Bodenburg (109)																		
589AK-170-001	Oe	4-0	59.1	41.0	5.4	6.2	13.05	0.598	23.0	28.1	6.5	1.3	0.2					
61°34'52"N Lat.	A	0-4	39.7	26.6	4.7	5.3	4.10		21.6	14.7	2.8	0.5	0.1	0.52	0.26	0.88	0.19	44
149°4'27" W	AC	4-10	32.0	21.3	5.2	5.9	5.93		14.9	13.9	2.9	0.2	0.1	0.72	0.30	1.07	0.24	45
Long.	C/Bw	10-21	18.4	11.6	5.5	6.0	1.67		8.2	8.5	1.5	TR	0.1	0.81	0.30	1.05	0.23	31
	Bw/C1	21-32	19.3	11.9	5.8	6.1	1.14		7.9	9.3	1.9	TR	0.2	1.09	0.44	1.36	0.29	35
	Bw/C2	32-47	18.1	10.0	5.9	6.5	1.19		9.0	7.6	1.3	0.1	0.1	1.26	0.61	1.55	0.39	49
	Bw/C3	47-56	15.4	9.9	5.8	6.4	0.33		6.6	7.3	1.3	0.1	0.1	0.77	0.43	1.25	0.26	33
	2C	56.63	47.2	5.0	6.0	6.6	0.18		42.6	3.6	0.8	0.1	0.1	0.24	0.10	0.70	0.08	17
Deception (123)																		
S89AK-170-008	Oe	3-0	103.0	70.4	4.9	5.4	38.94	1.569	53.9	35.3	9.2	4.1	0.5					
61°32'00"N Lat.	E	0-3	30.0	24.3	3.9	4.6	6.82		23.8	4.6	1.3	0.2	0.1	0.46	0.22	0.62	0.17	40
149°37'00"W	Bs	3-6	25.5	13.6	5.5	6.1	2.19		21.9	2.6	0.8`	0.1	0.1	2.33	2.18	2.78	0.88	87
Long.	Eb	6-8	18.4	10.6	5.4	5.9	1.60		15.1	2.2	0.9	0.1	0.1	1.27	1.40	1.58	0.45	77
	Bsb	8-9	21.3	12.6	5.5	6.1	1.21		18.5	1.8	0.8	0.1	0.1	1.95	2.07	2.96	0.69	93
	2Bsb	9-11	22.4	12.1	5.6	5.9	1.26		19.0	2.5	0.6	0.1	0.1	2.10	2.21	2.92	0.81	88
	2BCb	11-20	8.7	4.4	5.5	5.8	0.39		7.6	0.5	0.4	--	0.2	0.40	1.01	0.80	0.27	58
	2C	20-39	6.0	3.8	5.2	5.8	0.27		4.9	0.7	0.3	--	0.1	0.24	0.44	0.53	0.16	35
Estelle (132)																		
S89AK-170-006	Oi	3-0	95.3	67.7	4.5	5.2	44.64	1.637	56.6	28.0	7.4	3.0	0.3					
61°21'30"N Lat.	AE	0-2	35.0	26.0	4.1	4.6	9.00		2.69	5.6	2.0	0.3	0.2	0.37	0.18	0.50	0.12	31
149°58'00"W	Bs1	2-4	58.1	39.7	4.4	4.9	7.24		53.5	3.3	1.0	0.1	0.1	2.39	1.83	3.57	1.67	89
Long.	Bs2	4-6	36.8	20.2	4.7	5.1	5.06		34.6	1.6	0.5	TR	0.1	1.90	1.51	2.18	1.14	88
	Eb	6-7	22.3	13.2	4.6	5.2	3.97		20.1	1.5	0.5	0.1	0.1	0.96	0.56	1.04	0.41	50
	Bs/Eb	7-12	32.5	17.0	4.9	5.1	3.31		30.9	1.2	0.3	--	0.1	2.10	2.02	2.40	1.19	87
	Bsb	12-17	31.6	15.7	4.8	5.4	2.05		29.6	1.5	0.4	--	0.1	1.60	1.68	2.12	1.04	85
	BCb	17-22	16.2	7.3	4.8	5.3	0.90		14.8	1.0	0.3	--	0.1	0.57	0.89	0.89	0.46	52
	2C	22-39	5.8	3.5	5.0	5.6	0.25		4.9	0.5	0.2	TR	0.2	0.30	0.33	0.55	0.16	28
Kashwitna (147)																		
S89AK-170-005	Oe	3-0	116.2	99.2	4.0	5.0	6.16	1.855	69.8	35.6	8.2	2.2	0.4					
61°24'16"N Lat.	E/A	0-1	42.6	34.9	4.0	4.3	9.97		35.4	6.1	0.8	0.1	0.2	0.55	0.36	0.72	0.31	54
150°5'00"W	Bs1	1-4	41.0	24.2	4.9	5.5	4.73		37.9	2.7	0.3	TR	0.1	2.08	2.49	2.34	1.47	95
Long.	Bs2	4-8	25.2	13.5	5.2	5.6	2.86		24.0	1.0	0.1	TR	0.1	1.94	2.12	2.33	0.90	93
	Bsb	10-12	15.6	10.0	5.0	5.8	0.81		14.3	0.9	0.3	--	0.1	1.41	1.02	1.96	0.48	66
	BCb	12-15	12.7	6.0	5.1	5.6	0.54		11.5	0.8	0.3	--	0.1	0.66	0.95	1.00	0.24	50
	2BCb1	15-18	14.1	3.7	5.2	5.9	0.25		13.3	0.5	0.2	--	0.1	0.33	0.52	0.57	0.16	34
	2BCb2	18-39	2.9	2.3	5.1	5.7			2.2	0.5	0.1	--	0.1	0.23	0.24	0.38	0.10	16
Kichatna (151)																		
S89AK-170-004	Oe	3-0	57.0	66.1	4.6	5.8	25.60	1.136	25.1	23.4	6.0	2.1	0.4					
61°38'5"N Lat.	E	0-3	29.1	24.2	4.3	4.9	8.40		26.6	1.8	0.5	0.1	0.1	1.29	0.50	1.36	0.43	61
149°28'30"W	Bs	3-6	39.8	23.7	4.7	5.2	3.85		37.5	1.7	0.4	0.1	0.1	2.93	2.08	3.88	1.51	89
Long.	Bsb	7-9	25.5	14.7	4.7	5.1	2.58		24.6	0.6	0.2	TR	0.1	1.65	1.60	2.51	0.97	81
	2BCb	9-16	16.5	8.9	4.9	5.3	1.09		15.5	0.9	0.1	--	TR	0.75	1.33	0.92	0.47	70
	2C	16-39	5.4	3.7	5.1	5.5	0.36		4.6	0.6	0.1	0.1	TR	0.21	0.35	0.49	0.18	20

TABLE 22—CHEMICAL ANALYSES FOR SELECTED SOILS--Continued

Soil name (map unit), sample number, and location	Horizon	Depth	Cation-exchange capacity: Sum of cations	Cation-exchange capacity: Ammonium acetate	pH: CaCl 0.01M 1:2	pH: H20 1:1	Organic carbon	Total nitrogen	Extractable acidity	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: K	Extractable bases: Na	Acid exalate extractable: Fe	Acid exalate extractable: Al	Citrate-dithionite extractable: Fe	Citrate-dithionite extractable: Al	Phosphorus retention
		In	----Meq/100g----				Pct	Pct	Meq/100 g	----Meq/100 g----				-Meq/100 g-		-Meq/100 g-		Pct
Knik (164)																		
S89AK-170-003	Oe	3-0	79.5	65.5	4.7	5.6	29.30	1.182	40.4	25.6	9.8	3.2	0.5					
61°37'2"N Lat.	A	0-2	44.7	34.1	4.0	5.2	13.44		37.0	5.7	1.7	0.3	TR	0.85	0.29	1.16	0.30	53
149°22'5"W	AE	2-7	24.9	15.6	4.8	5.3	4.76		20.4	3.5	0.8	0.1	0.1	1.69	0.53	1.86	0.45	64
Long.	Bw	7-14	27.7	16.9	4.9	5.4	2.16		23.6	3.2	0.8	TR	0.1	2.59	1.34	2.94	0.88	81
	2BC	14-20	11.9	8.5	5.2	5.9	0.74		9.4	2.0	0.5	TR	TR	0.48	0.97	0.81	0.29	52
	2C1	20-24	6.4	4.3	5.3	5.9	0.32		5.0	1.0	0.3	TR	TR	0.22	0.45	0.53	0.16	31
	2C2	24-26	7.4	4.3	5.2	5.9	0.37		5.9	1.2	0.3	TR	TR	0.27	0.44	0.71	0.16	26
	2C3	26-39	4.9	3.8	5.3	5.8	0.23		3.1	1.4	0.3	0.1	TR			0.51	0.08	14
Liten (169)																		
S89AK-170-007	Oe	1-0	64.4	53.5	5.7	6.5	31.78	0.629	17.3	38.1	6.7	1.9	0.4					
61°23'00"N Lat.	E	0-2	24.4	19.6	4.3	5.0	3.16		17.2	5.7	1.2	0.2	0.1	0.68	0.19	0.66	0.11	33
149°50'40"W	Bs	2-4	20.9	10.4	5.3	5.8	1.44		18.8	1.4	0.4	0.2	0.1	1.75	1.54	2.02	0.54	77
Long.	2Bs	4-8	13.3	6.9	5.5	5.9	0.56		11.4	1.2	0.4	0.2	0.1	1.17	1.11	1.51	0.34	61
	2BC1	8-13	9.6	3.7	5.6	6.1	0.26		8.1	0.9	0.3	0.2	0.1	0.48	0.59	0.72	0.14	33
	2BC2	13-21	5.1	3.3	5.5	6.1	0.22		3.0	1.5	0.3	0.2	0.1	0.38	0.26	0.60	0.07	17
	2C	21-55	4.6	3.1	5.4	6.0	0.17		2.6	1.5	0.3	0.1	0.1	0.37	0.20	0.60	0.03	17
Nancy (171)																		
S87AK-170-001	Oe	0-2	86.8	60.5	3.8	4.5	26.35	0.933	70.6	10.6	3.3	1.9	0.4	0.51	0.53	0.69	0.43	47
62°18'42"N Lat.	E	2-4	27.7	22.0	3.7	4.5	6.91	0.193	25.4	1.4	0.4	0.3	0.2	0.34	0.17	0.41	0.19	41
150°25'36"W	Bhs	4-6	72.1	54.1	4.3	4.9	9.82	0.353	69.2	2.2	0.3	0.2	0.2	1.66	2.25	2.08	1.98	99
Long.	Bs1	6-7	46.1	24.8	4.7	5.1	4.65	0.192	44.2	1.4	0.2	0.1	0.2	1.32	3.32	1.56	1.50	96
	Bs2	7-11	36.2	17.7	4.8	5.3	3.51		34.9	1.0	0.1	0.1	0.1	1.15	2.19	1.64	1.10	94
	Eb	11-13	21.9	13.2	4.7	5.4	2.22		20.6	0.8	0.2	0.1	0.1	0.90	1.02	1.73	0.51	76
	Bsb	13-17	48.5	26.5	5.0	5.3	3.76		47.2	1.0	0.1	0.1	0.1	1.68	4.01	2.60	1.48	97
	2BCb	17-23	15.6	8.6	5.0	5.5	1.06		15.0	0.5	0.1	TR	TR	0.41	1.42	0.64	0.49	65
	2C	23-35	5.0	3.0	5.2	5.6	0.25		4.6	0.3	0.1	TR	TR	0.13	0.37	0.34	0.15	25
Talkeetna (191)																		
S89AK-170-009	Oe	4.0	138.1	109.8	3.7	4.4	55.05	2.762	108.4	19.4	7.3	2.4	0.5					
62°15'00"N Lat.	A	0.3	128.0	31.7	2.9	3.6	47.75		117.6	7.7	2.1	0.5	0.1	0.21	0.16	0.42	0.18	23
150°2'00"W	E	3-6	24.7	16.4	3.4	4.0	8.11		23.3	0.8	0.4	0.1	0.1	0.16	0.06	0.26	0.05	23
Long.	Bhs	6-10	94.7	93.8	3.4	4.4	17.38		91.2	2.5	0.7	0.1	0.1	1.52	1.17	1.72	1.28	87
	Bs1	10-13	140.7	119.4	3.9	4.8	20.72		138.0	2.1	0.4	0.1	0.1	2.33	3.37	2.57	3.92	96
	Bs2	13-17	79.1	71.6	4.3	5.0	11.91		77.4	1.1	0.4	0.1	0.1	1.69	3.42	1.91	3.37	97
	Eb	17-19	39.2	21.5	4.4	4.9	4.94		38.5	0.4	0.2	--	0.1	0.83	1.51	1.07	1.28	91
	Bsb	19-26	55.0	34.6	4.5	5.1	4.86		54.1	0.6	0.2	--	0.1	1.69	3.49	2.14	3.26	97
	2BCb	26-34	12.6	6.9	4.7	5.0	0.75		11.4	0.9	0.1	--	0.2	0.30	0.63	0.60	0.46	54
	2C	34-45	10.4	5.4	4.9	5.2	0.53		9.4	0.9	TR	--	0.1	0.20	0.74	0.36	0.38	44
Yensus (213)																		
S89AK-170-002	Oe	3-0	61.7	46.9	5.2	6.2	0.39	0.746	27.3	26.3	6.3	1.5	0.3					
61°36'42"N Lat.	A	0-3	41.5	27.7	4.9	6.2	8.88		24.0	13.9	3.2	0.3	0.1	0.72	0.29	1.00	0.24	38
149°8'52" W	AC	3-6	22.5	14.1	5.3	5.9	2.49		12.4	8.2	1.7	0.1	0.1	1.11	0.41	1.30	0.30	39
Long.	C/Bw	6-13	18.1	12.3	5.7	6.3	1.85		7.7	8.6	1.6	TR	0.1	1.00	0.31	1.29	0.30	38
	Bw/C	13-21	22.5	13.7	5.7	6.3	1.90		11.5	8.8	2.0	TR	0.2	1.10	0.53	1.40	0.39	47
	Bwb	21-29	22.6	13.3	5.9	6.5	1.17		11.9	8.6	1.8	0.2	0.1	1.72	0.72	2.01	0.47	55
	Bsb	29-35	18.0	11.7	5.9	6.4	0.62		7.9	7.6	2.3	TR	0.2	1.25	0.50	1.83	0.31	37
	2BCb	35-39	8.3	4.7	6.0	6.4	0.30		4.5	2.8	0.8	TR	0.2	0.49	0.43	0.72	0.21	20
	2C	39-51	3.9	3.3	5.9	6.3	0.11		1.4	1.7	0.6	TR	0.2	0.14	0.17	0.44	0.13	14

TABLE 23--SOIL FEATURES

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
101:							
Benka	>60	---	0-0	---	High	High	High.
102*:							
Benka sloping	>60	---	0-0	---	High	High	High.
Benka moderately steep	>60	---	0-0	---	High	High	High.
103:							
Benka	>60	---	0-0	---	High	High	High.
104*:							
Benka	>60	---	0-0	---	High	High	High.
Liten	>60	---	0-0	---	Low	High	High.
105:							
Bodenburg	>60	---	0-0	---	High	Moderate	Moderate.
106*:							
Bodenburg sloping	>60	---	0-0	---	High	Moderate	Moderate.
Bodenburg moderately steep	>60	---	0-0	---	High	Moderate	Moderate.
107*:							
Bodenburg steep	>60	---	0-0	---	High	Moderate	Moderate.
Bodenburg sloping	>60	---	0-0	---	High	Moderate	Moderate.
108:							
Bodenburg	>60	---	0-0	---	High	Moderate	Moderate.
109:							
Bodenburg silty	>60	---	0-0	---	High	Moderate	Moderate.
110*:							
Bodenburg silty, sloping	>60	---	0-0	---	High	Moderate	Moderate.
Bodenburg silty, moderately steep	>60	---	0-0	---	High	Moderate	Moderate.
111:							
Bodenburg silty	>60	---	0-0	---	High	Moderate	Moderate.
112*:							
Bodenburg steep	>60	---	0-0	---	High	Moderate	Moderate.
Bodenburg sloping	>60	---	0-0	---	High	Moderate	Moderate.
Jim	20-40	Hard	0-0	---	High	Moderate	Moderate.

*See footnote at end of table.

TABLE 23--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
113*, 114*:							
Chilligan	>60	---	0-0	---	High	High	High.
Cryaquepts	>60	---	0-0	---	High	High	High.
115:							
Chunilna cool	>60	---	0-0	---	High	High	High.
116*:							
Cryaquepts depressional	>60	---	---	---	High	High	High.
117*:							
Cryods	20-60	Hard	0-0	---	High	High	High.
118*:							
Cryods cool	>60	---	0-0	---	High	High	High.
Niklason moderately wet	>60	---	0-0	---	Moderate	Moderate	Moderate.
Qeni	>60	---	0-0	---	Low	High	High.
119*:							
Cryods	20-60	Hard	0-0	---	High	High	High.
Cryaquepts cool	>60	---	---	---	High	High	High.
120*:							
Cryods low elevation	>60	---	0-0	---	High	High	High.
Cryochrepts	>60	---	0-0	---	Moderate	Moderate	Moderate.
121*:							
Cryods	20-60	Hard	0-0	---	High	High	High.
122:							
Deception	>60	---	0-0	---	Moderate	High	High.
123*:							
Deception sloping	>60	---	0-0	---	Moderate	High	High.
Deception moderately steep	>60	---	0-0	---	Moderate	High	High.
124*:							
Deception steep	>60	---	0-0	---	Moderate	High	High.
Deception sloping	>60	---	0-0	---	Moderate	High	High.
125:							
Deception	>60	---	0-0	---	Moderate	High	High.
126:							
Delyndia	>60	---	0-0	---	Low	High	High.
127*:							
Delyndia	>60	---	0-0	---	Low	High	High.
Histosols	>60	---	6-12	6-60	High	High	High.

*See footnote at end of table.

TABLE 23--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
128:							
Disappoint	>60	---	0-0	---	High	High	High.
129*:							
Eska sloping	>60	---	0-0	---	High	Moderate	Moderate.
Eska moderately steep	>60	---	0-0	---	High	Moderate	Moderate.
130*:							
Eska sloping	>60	---	0-0	---	High	Moderate	Moderate.
Eska moderately steep	>60	---	0-0	---	High	Moderate	Moderate.
Jim	20-40	Hard	0-0	---	High	Moderate	Moderate.
131:							
Estelle	>60	---	0-0	---	High	Moderate	Moderate.
132*:							
Estelle sloping	>60	---	0-0	---	High	Moderate	Moderate.
Estelle moderately steep	>60	---	0-0	---	High	Moderate	Moderate.
133*:							
Estelle steep	>60	---	0-0	---	High	Moderate	Moderate.
Estelle sloping	>60	---	0-0	---	High	Moderate	Moderate.
134:							
Estelle	>60	---	0-0	---	High	Moderate	Moderate.
135*, 136*:							
Estelle	>60	---	0-0	---	High	Moderate	Moderate.
Disappoint	>60	---	0-0	---	High	High	High.
137, 138:							
Flat Horn	>60	---	0-0	---	Moderate	High	High.
139*:							
Flat Horn sloping	>60	---	0-0	---	Moderate	High	High.
Flat Horn moderately steep	>60	---	0-0	---	Moderate	High	High.
140*:							
Goldcord	10-20	Hard	0-0	---	Moderate	High	High.
Tsadaka	>60	---	0-0	---	High	High	High.
141*:							
Histosols	>60	---	6-12	6-60	High	High	High.
142*:							
Histosols high elevation	>60	---	6-12	6-60	High	High	High.

*See footnote at end of table.

TABLE 23--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
143*:							
Kalambach gently-------sloping	>60	---	0-0	---	High-----------	Moderate-------	Moderate.
Kalambach moderately---steep	>60	---	0-0	---	High-----------	Moderate-------	Moderate.
144*:							
Kalambach steep--------	>60	---	0-0	---	High-----------	Moderate-------	Moderate.
Kalambach sloping------	>60	---	0-0	---	High-----------	Moderate-------	Moderate.
145:							
Kalambach----------	>60	---	0-0	---	High-----------	Moderate-------	Moderate.
146*:							
Kalambach----------	>60	---	0-0	---	High-----------	Moderate-------	Moderate.
Disappoint----------	>60	---	0-0	---	High-----------	High-----------	High.
147:							
Kashwitna----------	>60	---	0-0	---	High-----------	High-----------	High.
148*:							
Kashwitna sloping------	>60	---	0-0	---	High-----------	High-----------	High.
Kashwitna moderately---steep	>60	---	0-0	---	High-----------	High-----------	High.
149:							
Kashwitna----------	>60	---	0-0	---	High-----------	High-----------	High.
150:							
Keba----------	>60	---	0-0	---	High-----------	High-----------	High.
151:							
Kichatna----------	>60	---	0-0	---	Low----------	High-----------	High.
152*:							
Kichatna sloping-------	>60	---	0-0	---	Low----------	High-----------	High.
Kichatna moderately----steep	>60	---	0-0	---	Low----------	High-----------	High.
153*:							
Kichatna steep---------	>60	---	0-0	---	Low----------	High-----------	High.
Kichatna sloping-------	>60	---	0-0	---	Low----------	High-----------	High.
154:							
Kichatna----------	>60	---	0-0	---	Low----------	High-----------	High.
155*:							
Kichatna----------	>60	---	0-0	---	Low----------	High-----------	High.
Deception----------	>60	---	0-0	---	Moderate-------	High-----------	High.

*See footnote at end of table.

TABLE 23--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
156*:							
Kichatna steep	>60	---	0-0	---	Low	High	High.
Deception sloping	>60	---	0-0	---	Moderate	High	High.
Deception steep	>60	---	0-0	---	Moderate	High	High.
157*, 158*:							
Kichatna	>60	---	0-0	---	Low	High	High.
Delyndia	>60	---	0-0	---	Low	High	High.
159*:							
Kidazqeni cool	>60	---	0-0	---	Low	Moderate	Moderate.
Niklason cool	>60	---	0-0	---	Moderate	High	High.
160:							
Kidazqeni	>60	---	0-0	---	Low	Moderate	Moderate.
161*:							
Kidazqeni moderately wet	>60	---	0-0	---	Low	Moderate	Moderate.
Kidazqeni	>60	---	0-0	---	Low	Moderate	Moderate.
162*:							
Kidazqeni	>60	---	0-0	---	Low	Moderate	Moderate.
Niklason	>60	---	0-0	---	Moderate	High	High.
163*:							
Killey	>60	---	---	---	High	High	High.
Moose River	>60	---	---	---	High	Moderate	Moderate.
164:							
Knik	>60	---	0-0	---	High	Moderate	Moderate.
165*:							
Knik gently sloping	>60	---	0-0	---	High	Moderate	Moderate.
Knik moderately steep	>60	---	0-0	---	High	Moderate	Moderate.
166*:							
Knik steep	>60	---	0-0	---	High	Moderate	Moderate.
Knik sloping	>60	---	0-0	---	High	Moderate	Moderate.
167:							
Knik	>60	---	0-0	---	High	Moderate	Moderate.
168*:							
Knik	>60	---	0-0	---	High	Moderate	Moderate.
Cryaquepts	>60	---	0-0	---	High	High	High.

*See footnote at end of table.

TABLE 23--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
169:							
Liten	>60	---	0-0	---	Low	High	High.
170*:							
Mine spoils.							
171:							
Nancy	>60	---	0-0	---	High	High	High.
172*:							
Nancy sloping	>60	---	0-0	---	High	High	High.
Nancy moderately steep	>60	---	0-0	---	High	High	High.
173*:							
Nancy steep	>60	---	0-0	---	High	High	High.
Nancy sloping	>60	---	0-0	---	High	High	High.
174:							
Nancy	>60	---	0-0	---	High	High	High.
175*:							
Nancy	>60	---	0-0	---	High	High	High.
Cryaquepts	>60	---	0-0	---	High	High	High.
176*:							
Nancy sloping	>60	---	0-0	---	High	High	High.
Nancy moderately steep	>60	---	0-0	---	High	High	High.
Tokositna moderately steep	>60	---	0-0	---	High	High	High.
177*:							
Nancy steep	>60	---	0-0	---	High	High	High.
Tokositna steep	>60	---	0-0	---	High	High	High.
Nancy sloping	>60	---	0-0	---	High	High	High.
178*:							
Nancy	>60	---	0-0	---	High	High	High.
Tokositna	>60	---	0-0	---	High	High	High.
179*:							
Pits, gravel.							
180*:							
Psuyaah	>60	---	0-0	---	High	Moderate	Moderate.
Snowdance	>60	---	0-0	---	High	High	High.
181*:							
Qeni cool	>60	---	0-0	---	Low	High	High.

*See footnote at end of table.

TABLE 23--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
181*: cont'd							
Niklavar cool----------	>60	---	0-0	---	High----------	Moderate-------	Moderate.
Cryods cold----------	20-60	Hard	0-0	---	High----------	High----------	High.
182*:							
Riverwash.							
Niklavar----------	>60	---	0-0	---	High----------	Moderate-------	Moderate.
183*:							
Rock outcrop.							
Cryumbrepts----------	10-72	Hard	0-0	---	Moderate-------	High----------	High.
184*:							
Siwash----------	9-20	Hard	0-0	---	High----------	High----------	High.
Talkeetna cool---------	>60	---	0-0	---	High----------	High----------	High.
Snowdance----------	>60	---	0-0	---	High----------	High----------	High.
185:							
Susitna----------	>60	---	0-0	---	Moderate-------	High----------	High.
186*:							
Susivar----------	>60	---	0-0	---	High----------	Moderate-------	Moderate.
Moose River----------	>60	---	---	---	High----------	Moderate-------	Moderate.
187*:							
Susivar----------	>60	---	0-0	---	High----------	Moderate-------	Moderate.
Niklavar----------	>60	---	0-0	---	High----------	Moderate-------	Moderate.
188:							
Talkeetna warm---------	>60	---	0-0	---	High----------	High----------	High.
189*:							
Talkeetna----------	>60	---	0-0	---	High----------	High----------	High.
Talkeetna thick surface	>60	---	0-0	---	High----------	High----------	High.
190*, 191*:							
Talkeetna warm---------	>60	---	0-0	---	High----------	High----------	High.
Talkeetna thick surface	>60	---	0-0	---	High----------	High----------	High.
192*:							
Talkeetna low elevation	>60	---	0-0	---	High----------	High----------	High.
Deneka low elevation---	10-20	Hard	0-0	---	High----------	High----------	High.
193*:							
Talkeetna warm---------	>60	---	0-0	---	High----------	High----------	High.
Talkeetna thick surface	>60	---	0-0	---	High----------	High----------	High.

*See footnote at end of table.

TABLE 23--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
193*: cont'd							
Deneka	10-20	Hard	0-0	---	High	High	High.
194*:							
Talkeetna cool	>60	---	0-0	---	High	High	High.
Snowdance	>60	---	0-0	---	High	High	High.
195*:							
Talkeetna cool	>60	---	0-0	---	High	High	High.
Tsadaka	>60	---	0-0	---	High	High	High.
Chunilna cool	>60	---	0-0	---	High	High	High.
196*:							
Tidal flats.							
197*:							
Tokositna sloping	>60	---	0-0	---	High	High	High.
Tokositna moderately steep	>60	---	0-0	---	High	High	High.
198*:							
Tokositna steep	>60	---	0-0	---	High	High	High.
Tokositna sloping	>60	---	0-0	---	High	High	High.
199:							
Tokositna	>60	---	0-0	---	High	High	High.
200*, 201*:							
Tokositna	>60	---	0-0	---	High	High	High.
Chunilna	>60	---	0-0	---	High	High	High.
202*:							
Tsadaka	>60	---	0-0	---	High	High	High.
Talkeetna cool	>60	---	0-0	---	High	High	High.
203*:							
Typic Cryaquents	>60	---	---	---	High	Moderate	Moderate.
204*:							
Typic Cryaquents, coastal	>60	---	---	---	High	Moderate	Moderate.
205:							
Whitsol	>60	---	0-0	---	High	High	High.
206*:							
Whitsol cool, sloping	>60	---	0-0	---	High	High	High.
Whitsol cool, moderately steep	>60	---	0-0	---	High	High	High.

*See footnote at end of table.

TABLE 23--SOIL FEATURES--Continued

Map symbol and soil name	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
207*:							
Whitsol cool, steep----	>60	---	0-0	---	High----------	High----------	High.
Whitsol cool, sloping--	>60	---	0-0	---	High----------	High----------	High.
208:							
Whitsol silty----------	>60	---	0-0	---	High----------	High----------	High.
209*:							
Whitsol silty, sloping-	>60	---	0-0	---	High----------	High----------	High.
Whitsol silty,--------- moderately steep	>60	---	0-0	---	High----------	High----------	High.
210*:							
Whitsol till, sloping--	>60	---	0-0	---	High----------	High----------	High.
Whitsol till,---------- moderately steep	>60	---	0-0	---	High----------	High----------	High.
211:							
Whitsol till----------	>60	---	0-0	---	High----------	High----------	High.
212:							
Yensus----------	>60	---	0-0	---	High----------	Moderate-------	Moderate.
213*:							
Yensus sloping---------	>60	---	0-0	---	High----------	Moderate-------	Moderate.
Yensus moderately steep	>60	---	0-0	---	High----------	Moderate-------	Moderate.
214:							
Yensus----------	>60	---	0-0	---	High----------	Moderate-------	Moderate.
215, 216:							
Yohn----------	>60	---	0-0	---	High----------	High----------	Moderate.
217*:							
Yohn----------	>60	---	0-0	---	High----------	High----------	Moderate.
Deception----------	>60	---	0-0	---	Moderate-------	High----------	High.
218*:							
Yohn----------	>60	---	0-0	---	High----------	High----------	Moderate.
Delyndia----------	>60	---	0-0	---	Low----------	High----------	High.
219*:							
Yohn----------	>60	---	0-0	---	High----------	High----------	Moderate.
Flat Horn----------	>60	---	0-0	---	Moderate-------	High----------	High.
W*:							
Water.							

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 24--HYDRIC SOILS LIST

MAP UNITS WITH HYDRIC COMPONENTS

(Map units are listed in alpha-numeric order by map unit symbol. The "Hydric soils criteria" columns indicate the conditions that caused the map unit component to be classified as "Hydric" or "Non-Hydric". These criteria are defined in "Hydric Soils of the United States" [USDA Miscellaneous Publication No. 1491, June, 1991]. The "FSA criteria" columns contain information needed for the Food Security Act determinations required by Section 512.11(h)(4) of the National Food Security Manual [August, 1991]. See the "Hydric Soils Criteria" endnote to determine the meaning of these columns. Spot symbols are footnoted at the end of the table.)

Map symbol Map unit name	Component(C)/ Inclusion(I)	Hydric	Local landform	Hydric criteria code	Hydric soils criteria			FSA criteria & information	
					Meets saturation criteria	Meets flooding criteria	Meets ponding criteria	Natural condition of soil	Needs on-site
113:									
Chilligan, hilly-Cryaquepts complex	CHILLIGAN (C)	No							
	CRYAQUEPTS (C)	Yes	Depression	2B3	Yes	No	No	Wooded	Yes
	Estelle soils (I)	No							
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Steeper soils (I)	No							
114:									
Chilligan, undulating-Cryaquepts complex	CHILLIGAN (C)	No							
	CRYAQUEPTS (C)	Yes	Depression	2B3	Yes	No	No	Wooded	Yes
	Estelle soils (I)	No							
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Steeper soils (I)	No							
115:									
Chunilna mucky silt loam, cool, 5 to 20 percent slopes	CHUNILNA, COOL (C)	Yes	Mountain Slope	2B3	Yes	No	No	Neither	Yes
	Shallow soils over bedrock (I)	No							
	Steeper soils (I)	No							
	Talkeetna, warm soils (I)	No							
116:									
Cryaquepts, depressional, 0 to 7 percent slopes	CRYAQUEPTS, DEPRESSIONAL (C)	Yes	Depression	2B3	Yes	No	No	Wooded	Yes
	Steeper soils (I)	No							
	Well drained soils (I)	No							
119:									
Cryods and Cryaquepts, cool, 0 to 35 percent slopes	CRYODS (C)	No							
	CRYAQUEPTS, COOL (C)	Yes	Depression	2B3	Yes	No	No	Neither	Yes
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Steeper soils (I)	No							
	Talkeetna soils (I)	No							
127:									
Delyndia-Histosols complex, 0 to 3 percent slopes	DELYNDIA (C)	No							
	HISTOSOLS (C)	Yes	Depression	1	No	No	No	Neither	No
	Cryaquept soils in depressions (I)	Yes	Depression	1	No	No	No	Wooded	Yes
	Kichatna soils (I)	No							
	Steeper soils (I)	No							

TABLE 24--HYDRIC SOILS LIST--Continued
MAP UNITS WITH HYDRIC COMPONENTS

Map symbol Map unit name	Component(C)/ Inclusion(I)	Hydric	Local landform	Hydric criteria code	Hydric soils criteria: Meets saturation criteria	Hydric soils criteria: Meets flooding criteria	Hydric soils criteria: Meets ponding criteria	FSA criteria & information: Natural condition of soil	FSA criteria & information: Needs on-site
128:									
Disappoint very cobbly mucky silt loam, 0 to 12 percent slopes	DISAPPOINT (C)	Yes	Depression	2B3	Yes	No	No	Wooded	Yes
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Steeper soils (I)	No							
	Well drained soils (I)	No							
135:									
Estelle, hilly-Disappoint complex	ESTELLE (C)	No							
	DISAPPOINT (C)	Yes	Depression	2B3	Yes	No	No	Wooded	Yes
	Deception soils (I)	No							
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Steeper soils (I)	No							
	Surface stones (I)	No							
136:									
Estelle, undulating-Disappoint complex	ESTELLE (C)	No							
	DISAPPOINT (C)	Yes	Depression	2B3	Yes	No	No	Wooded	Yes
	Deception soils (I)	No	Plain						
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Steeper soils (I)	No							
	Surface stones (I)	No							
141:									
Histosols	HISTOSOLS (C)	Yes	Depression	1	No	No	No	Neither	No
	Well drained mineral soils (I)	No							
142:									
Histosols, high elevation	HISTOSOLS, HIGH ELEVATION (C)	Yes	Depression	---	---	---	---	Neither	No
	Well drained mineral soils (I)	No							
146:									
Kalamback-Disappoint complex, 0 to 10 percent slopes	KALAMBACH (C)	No							
	DISAPPOINT (C)	Yes	Depression	2B3	Yes	No	No	Wooded	Yes
	Steeper soils (I)	No							
	Surface boulders (I)	No							
163:									
Killey and Moose River soils, 0 to 2 percent slopes	KILLEY (C)	Yes	Flood Plain	2B3	Yes	No	No	Wooded	Yes
	MOOSE RIVER (C)	Yes	Flood Plain	2B3	Yes	No	No	Neither	Yes
	Frequently flooded soils (I)	Yes	Flood Plain	4	No	Yes	No	Neither	Yes
	Kidazqeni soils (I)	No							
	Steeper soils (I)	No							
	Well drained soils on terraces (I)	No							

TABLE 24--HYDRIC SOILS LIST--Continued
MAP UNITS WITH HYDRIC COMPONENTS

Map symbol Map unit name	Component(C)/ Inclusion(I)	Hydric	Local landform	Hydric criteria code	Hydric soils criteria: Meets saturation criteria	Hydric soils criteria: Meets flooding criteria	Hydric soils criteria: Meets ponding criteria	FSA criteria & information: Natural condition of soil	FSA criteria & information: Needs on-site
168:									
Knik-Cryaquepts complex, 0 to 25 percent slopes	KNIK (C)	No							
	CRYAQUEPTS (C)	Yes	Depression	2B3	Yes	No	No	Wooded	Yes
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Steeper soils (I)	No							
175:									
Nancy-Cryaquepts complex, 0 to 5 percent slopes	NANCY (C)	No							
	CRYAQUEPTS (C)	Yes	Depression	2B3	Yes	No	No	Wooded	Yes
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Kichatna soils (I)	No							
	Steeper soils (I)	No							
180:									
Psuyaah-Snowdance complex, 5 to 20 percent slopes	PSUYAAH (C)	Yes	Mountain Slope	2B3	Yes	No	No	Neither	Yes
	SNOWDANCE (C)	Yes	Depression	2B3	Yes	No	No	Neither	Yes
	Deception soils (I)	No							
	Flooded soils in drainages (I)	Yes	Drainageway	4	No	Yes	No	Neither	Yes
	Steeper soils (I)	No							
181:									
Qeni, cool-Niklavar, cool-Cryods, cold complex, 0 to 25 percent slopes	QENI, COOL (C)	No							
	NIKLAVAR, COOL (C)	Yes	Flood Plain	2B3	Yes	No	No	Wooded	Yes
	CRYODS, COLD (C)	No							
	Cryaquepts in depressions (I)	Yes	Depression	2B3	Yes	No	No	Neither	Yes
	Frequently flooded soils (I)	Yes	Flood Plain	4	No	Yes	No	Neither	No
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Steeper soils (I)	No							
182:									
Riverwash and Niklavar soils, 0 to 2 percent slopes	RIVERWASH (C)	Unranked							
	NIKLAVAR (C)	Yes	---	---	---	---	---	---	---
	Better drained soils (I)	No							
	Frequently flooded soils (I)	Yes	Flood Plain	4	No	Yes	No	Neither	Yes
	River channels (I)	No							
	Steeper soils (I)	No							
184:									
Siwash-Talkeetna, cool-Snowdance association, 0 to 30 percent slopes	SIWASH (C)	No							
	TALKEETNA, COOL (C)	No							
	SNOWDANCE (C)	Yes	Depression	2B3	Yes	No	No	Neither	Yes
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Rock outcrops and boulders (I)	No							
	Shallow soils over bedrock (I)	No							
	Steeper soils (I)	No							

TABLE 24--HYDRIC SOILS LIST--Continued
MAP UNITS WITH HYDRIC COMPONENTS

Map symbol Map unit name	Component(C)/ Inclusion(I)	Hydric	Local landform	Hydric criteria code	Hydric soils criteria: Meets saturation criteria	Hydric soils criteria: Meets flooding criteria	Hydric soils criteria: Meets ponding criteria	FSA criteria & information: Natural condition of soil	FSA criteria & information: Needs on-site
186:									
Susivar-Moose River complex, 0 to 2 percent slopes	SUSIVAR (C)	No							
	MOOSE RIVER (C)	Yes	Flood Plain	2B3	Yes	No	No	Neither	No
	Kidazqeni soils (I)	No	Flood Plain						
	Riverwash (I)	No							
	Steeper soils (I)	No							
	Susitna soils (I)	No							
187:									
Susivar and Niklavar fine sandy loams	SUSIVAR (C)	No							
	NIKLAVAR (C)	Yes	Flood Plain	2B3	Yes	No	No	Wooded	Yes
	Frequently flooded soils (I)	Yes	Flood Plain	4	No	Yes	No	Neither	Yes
	Kidazqeni soils (I)	No							
	Riverwash and river channels (I)	No							
194:									
Talkeetna, cool-Snowdance complex, 5 to 25 percent slopes	TALKEETNA, COOL (C)	No							
	SNOWDANCE (C)	Yes	Depression	2B3	Yes	No	No	Neither	Yes
	Psuyaah soils in depressions (I)	Yes	Depression	2B3	Yes	No	No	Neither	Yes
	Steeper soils (I)	No							
195:									
Talkeetna, cool-Tsadaka-Chunilna, cool complex, 10 to 35 percent slopes	TALKEETNA, COOL (C)	No							
	TSADAKA (C)	No							
	CHUNILNA, COOL (C)	Yes	Depression	2B3	Yes	No	No	Neither	Yes
	Frequently flooded soils (I)	Yes	Depression	4	No	Yes	No	Wooded	Yes
	Rock outcrops (I)	No							
	Steeper soils (I)	No							
200:									
Tokositna, hilly-Chunilna complex	TOKOSITNA (C)	No							
	CHUNILNA (C)	Yes	Depression	2B3	Yes	No	No	Wooded	Yes
	Deception soils (I)	No							
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Steeper soils (I)	No							
	Surface stones (I)	No							
201:									
Tokositna, undulating-Chunilna complex	TOKOSITNA (C)	No							
	CHUNILNA (C)	Yes	Depression	2B3	Yes	No	No	Wooded	Yes
	Deception soils (I)	No							
	Histosols soils in depressions (I)	Yes	Depression	1	No	No	No	Neither	No
	Steeper soils (I)	No							
	Surface stones (I)	No							
203:									
Typic Cryaquents, 0 to 2 percent slopes	TYPIC CRYAQUENTS (C)	Yes	Flood Plain	2B3	Yes	No	No	Wooded	Yes
	Nonflooded soils (I)	No							
	Well drained soils (I)	No							

TABLE 24--HYDRIC SOILS LIST--Continued
MAP UNITS WITH HYDRIC COMPONENTS

Map symbol Map unit name	Component(C)/ Inclusion(I)	Hydric	Local landform	Hydric criteria code	Hydric soils criteria			FSA criteria & information	
					Meets saturation criteria	Meets flooding criteria	Meets ponding criteria	Natural condition of soil	Needs on-site
204: Typic Cryaquents, coastal, 0 to 2 percent slopes	TYPIC CRYAQUENTS, COASTAL (C)	Yes	Tidal Flat	2B3	Yes	No	No	Neither	No
	Tidal flats (I)	No							
	Water (I)	No							

FOOTNOTE: There may be small areas of included soils or miscellaneous areas that are significant to use and management of the soil, yet are too small to delineate on the soil map at the map's original scale. These may be designated as spot symbols and are defined in the published Soil Survey Report or the USDA-NRCS Technical Guide, Part II.

ENDNOTE: HYDRIC SOILS CRITERIA CODES AND DEFINITIONS

1. All Histosols, except Folists, or
2. Soils in Aquic suborder, Aquic subgroup, Albolls suborder, Salorthids great group, Pell great group of Vertisols, Pachic subgroup, or Cumulic subgroups that are:
   a. somewhat poorly drained and have a frequently occurring water table less than 0.5 feet from the surface for a significant period (usually 14 consecutive days or more) during the growing season, or
   b. poorly drained or very poorly drained and have either:
      (1) a frequently occurring water table less than 0.5 feet from the surface for a significant period (usually 14 consecutive days or more) during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 inches; or for other soils,
      (2) a frequently occurring water table less than 1.0 feet from the surface for a significant period (usually 14 consecutive days or more) during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within 20 inches; or
      (3) a frequently occurring water table less than 1.5 feet from the surface for a significant period (usually 14 consecutive days or more) during the growing season if permeability is less than 6.0 in/hr in any layers within 20 inches; or
3. Soils that are frequently ponded for long or very long duration during the growing season, or
4. Soils that are frequently flooded for long or very long duration during the growing season.

TABLE 25--WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
101:							
Benka	B	None	---	---	>6.0	---	---
102*:							
Benka sloping	B	None	---	---	>6.0	---	---
Benka moderately steep	B	None	---	---	>6.0	---	---
103:							
Benka	B	None	---	---	>6.0	---	---
104*:							
Benka	B	None	---	---	>6.0	---	---
Liten	A	None	---	---	>6.0	---	---
105:							
Bodenburg	B	None	---	---	>6.0	---	---
106*:							
Bodenburg sloping	B	None	---	---	>6.0	---	---
Bodenburg moderately steep	B	None	---	---	>6.0	---	---
107*:							
Bodenburg steep	B	None	---	---	>6.0	---	---
Bodenburg sloping	B	None	---	---	>6.0	---	---
108:							
Bodenburg	B	None	---	---	>6.0	---	---
109:							
Bodenburg silty	B	None	---	---	>6.0	---	---
110*:							
Bodenburg silty, sloping	B	None	---	---	>6.0	---	---
Bodenburg silty, moderately steep	B	None	---	---	>6.0	---	---
111:							
Bodenburg silty	B	None	---	---	>6.0	---	---
112*:							
Bodenburg steep	B	None	---	---	>6.0	---	---
Bodenburg sloping	B	None	---	---	>6.0	---	---

*See footnote at end of table.

TABLE 25--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
112*: cont'd							
Jim	C	None	---	---	>6.0	---	---
113*, 114*:							
Chilligan	B	None	---	---	>6.0	---	---
Cryaquepts	D	None	---	---	0-1.5	Apparent	Apr-Nov
115:							
Chunilna cool	D	None	---	---	0-1.5	Perched	Apr-Nov
116*:							
Cryaquepts depressional	D	None	---	---	0-1.5	Apparent	Apr-Nov
117*:							
Cryods	B	None	---	---	>6.0	---	
118*:							
Cryods cool	B	None	---	---	>6.0	---	
Niklason moderately wet	B	Occasional	Brief	Apr-Oct	3.5-5.0	Apparent	Apr-Oct
Qeni	C	Rare	---	---	1.0-3.0	Apparent	Apr-Oct
119*:							
Cryods	C	None	---	---	2.0-6.0	Apparent	Apr-Nov
Cryaquepts cool	D	None	---	---	0-1.5	Apparent	Apr-Nov
120*:							
Cryods low elevation	B	None	---	---	>6.0	---	---
Cryochrepts	B	None	---	---	>6.0	---	---
121*:							
Cryods	B	None	---	---	>6.0	---	---
122:							
Deception	B	None	---	---	>6.0	---	---
123*:							
Deception sloping	B	None	---	---	>6.0	---	---
Deception moderately steep	B	None	---	---	>6.0	---	---
124*:							
Deception steep	B	None	---	---	>6.0	---	---
Deception sloping	B	None	---	---	>6.0	---	---
125:							
Deception	B	None	---	---	>6.0	---	---
126:							
Delyndia	A	None	---	---	>6.0	---	---

*See footnote at end of table.

TABLE 25--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
127*:							
Delyndia	A	None	---	---	>6.0	---	---
Histosols	D	None	---	---	+.5-1.0	Apparent	Apr-Nov
128:							
Disappoint	D	None	---	---	0-1.5	Perched	Apr-Nov
129*:							
Eska sloping	B	None	---	---	>6.0	---	---
Eska moderately steep	B	None	---	---	>6.0	---	---
130*:							
Eska sloping	B	None	---	---	>6.0	---	---
Eska moderately steep	B	None	---	---	>6.0	---	---
Jim	C	None	---	---	>6.0	---	---
131:							
Estelle	B	None	---	---	>6.0	---	---
132*:							
Estelle sloping	B	None	---	---	>6.0	---	---
Estelle moderately steep	B	None	---	---	>6.0	---	---
133*:							
Estelle steep	B	None	---	---	>6.0	---	---
Estelle sloping	B	None	---	---	>6.0	---	---
134:							
Estelle	B	None	---	---	>6.0	---	---
135*, 136*:							
Estelle	B	None	---	---	>6.0	---	---
Disappoint	D	None	---	---	0-1.5	Perched	Apr-Nov
137, 138:							
Flat Horn	B	None	---	---	>6.0	---	---
139*:							
Flat Horn sloping	B	None	---	---	>6.0	---	---
Flat Horn moderately steep	B	None	---	---	>6.0	---	---
140*:							
Goldcord	D	None	---	---	>6.0	---	---
Tsadaka	B	None	---	---	>6.0	---	---
141*:							
Histosols	D	None	---	---	+.5-1.0	Apparent	Apr-Nov

*See footnote at end of table.

TABLE 25--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
142*:							
Histosols high elevation	D	None	---	---	+.5-1.0	Apparent	Apr-Nov
143*:							
Kalambach gently sloping	B	None	---	---	>6.0	---	---
Kalambach moderately steep	B	None	---	---	>6.0	---	---
144*:							
Kalambach steep	B	None	---	---	>6.0	---	---
Kalambach sloping	B	None	---	---	>6.0	---	---
145:							
Kalambach	B	None	---	---	>6.0	---	---
146*:							
Kalambach	B	None	---	---	>6.0	---	---
Disappoint	D	None	---	---	0-1.5	Perched	Apr-Nov
147:							
Kashwitna	B	None	---	---	>6.0	---	---
148*:							
Kashwitna sloping	B	None	---	---	>6.0	---	---
Kashwitna moderately steep	B	None	---	---	>6.0	---	---
149:							
Kashwitna	B	None	---	---	>6.0	---	---
150:							
Keba	B	None	---	---	>6.0	---	---
151:							
Kichatna	A	None	---	---	>6.0	---	---
152*:							
Kichatna sloping	A	None	---	---	>6.0	---	---
Kichatna moderately steep	A	None	---	---	>6.0	---	---
153*:							
Kichatna steep	A	None	---	---	>6.0	---	---
Kichatna sloping	A	None	---	---	>6.0	---	---
154:							
Kichatna	A	None	---	---	>6.0	---	---
155*:							
Kichatna	A	None	---	---	>6.0	---	---

*See footnote at end of table.

TABLE 25--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
155*: cont'd							
Deception	B	None	---	---	>6.0	---	---
156*:							
Kichatna steep	A	None	---	---	>6.0	---	---
Deception sloping	B	None	---	---	>6.0	---	---
Deception steep	B	None	---	---	>6.0	---	---
157*, 158*:							
Kichatna	A	None	---	---	>6.0	---	---
Delyndia	A	None	---	---	>6.0	---	---
159*:							
Kidazqeni cool	A	Occasional	Brief	Apr-Oct	>6.0	---	---
Niklason cool	B	Occasional	Brief	Apr-Oct	>6.0	---	---
160:							
Kidazqeni	A	Rare	---	---	>6.0	---	---
161*:							
Kidazqeni moderately wet	A	Occasional	Brief	Apr-Oct	3.5-5.0	Apparent	Apr-Oct
Kidazqeni	A	Occasional	Brief	Apr-Oct	>6.0	---	---
162*:							
Kidazqeni	A	Occasional	Brief	Apr-Oct	>6.0	---	---
Niklason	B	Occasional	Brief	Apr-Oct	>6.0	---	---
163*:							
Killey	D	Occasional	Brief	Apr-Oct	0-1.5	Apparent	Apr-Oct
Moose River	D	Occasional	Brief	Apr-Oct	0-1.5	Apparent	Apr-Oct
164:							
Knik	B	None	---	---	>6.0	---	---
165*:							
Knik gently sloping	B	None	---	---	>6.0	---	---
Knik moderately steep	B	None	---	---	>6.0	---	---
166*:							
Knik steep	B	None	---	---	>6.0	---	---
Knik sloping	B	None	---	---	>6.0	---	---
167:							
Knik	B	None	---	---	>6.0	---	---
168*:							
Knik	B	None	---	---	>6.0	---	---

*See footnote at end of table.

TABLE 25--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
168*: cont'd							
Cryaquepts	D	None	---	---	0-1.5	Apparent	Apr-Nov
169:							
Liten	A	None	---	---	>6.0	---	---
170*:							
Mine spoils.							
171:							
Nancy	B	None	---	---	>6.0	---	---
172*:							
Nancy sloping	B	None	---	---	>6.0	---	---
Nancy moderately steep	B	None	---	---	>6.0	---	---
173*:							
Nancy steep	B	None	---	---	>6.0	---	---
Nancy sloping	B	None	---	---	>6.0	---	---
174:							
Nancy	B	None	---	---	>6.0	---	---
175*:							
Nancy	B	None	---	---	>6.0	---	---
Cryaquepts	D	None	---	---	0-1.5	Apparent	Apr-Nov
176*:							
Nancy sloping	B	None	---	---	>6.0	---	---
Nancy moderately steep	B	None	---	---	>6.0	---	---
Tokositna moderately steep	B	None	---	---	>6.0	---	---
177*:							
Nancy steep	B	None	---	---	>6.0	---	---
Tokositna steep	B	None	---	---	>6.0	---	---
Nancy sloping	B	None	---	---	>6.0	---	---
178*:							
Nancy	B	None	---	---	>6.0	---	---
Tokositna	B	None	---	---	>6.0	---	---
179*:							
Pits, gravel.							
180*:							
Psuyaah	C	None	---	---	0.5-2.0	Perched	Apr-Nov
Snowdance	D	None	---	---	0-1.5	Perched	Apr-Nov

*See footnote at end of table.

TABLE 25--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
181*:							
Qeni cool	C	Rare	---	---	1.0-3.0	Apparent	Apr-Oct
Niklavar cool	D	Occasional	Brief to long	Apr-Oct	1.0-2.0	Apparent	Apr-Oct
Cryods cold	B	None	---	---	2.0-6.0	Apparent	Apr-Nov
182*:							
Riverwash.							
Niklavar	D	Frequent	Brief to long	Apr-Oct	1.0-2.0	Apparent	Apr-Oct
183*:							
Rock outcrop.							
Cryumbrepts	D	None	---	---	>6.0	---	---
184*:							
Siwash	D	None	---	---	>6.0	---	---
Talkeetna cool	B	None	---	---	>6.0	---	---
Snowdance	D	None	---	---	0-1.5	Perched	Apr-Nov
185:							
Susitna	B	Rare	---	---	>6.0	---	---
186*:							
Susivar	C	Occasional	Brief to long	Apr-Oct	1.5-3.0	Apparent	Apr-Oct
Moose River	D	Occasional	Brief to long	Apr-Oct	0-1.5	Apparent	Apr-Oct
187*:							
Susivar	C	Occasional	Brief to long	Apr-Oct	1.5-3.0	Apparent	Apr-Oct
Niklavar	D	Occasional	Brief to long	Apr-Oct	1.0-2.0	Apparent	Apr-Oct
188:							
Talkeetna warm	B	None	---	---	>6.0	---	---
189*:							
Talkeetna	B	None	---	---	>6.0	---	---
Talkeetna thick surface	B	None	---	---	>6.0	---	---
190*, 191*:							
Talkeetna warm	B	None	---	---	>6.0	---	---
Talkeetna thick surface	B	None	---	---	>6.0	---	---
192*:							
Talkeetna low elevation	B	None	---	---	>6.0	---	---
Deneka low elevation	D	None	---	---	>6.0	---	---
193*:							
Talkeetna warm	B	None	---	---	>6.0	---	---

*See footnote at end of table.

TABLE 25--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
193*: cont'd							
Talkeetna thick surface	B	None----------	---	---	>6.0	---	---
Deneka----------	D	None----------	---	---	>6.0	---	---
194*:							
Talkeetna cool---------	B	None----------	---	---	>6.0	---	---
Snowdance----------	D	None----------	---	---	0-1.5	Perched	Apr-Nov
195*:							
Talkeetna cool---------	B	None----------	---	---	>6.0	---	---
Tsadaka----------	B	None----------	---	---	>6.0	---	---
Chunilna cool----------	D	None----------	---	---	0-1.5	Perched	Apr-Nov
196*:							
Tidal flats.							
197*:							
Tokositna sloping------	B	None----------	---	---	>6.0	---	---
Tokositna moderately--- steep	B	None----------	---	---	>6.0	---	---
198*:							
Tokositna steep--------	B	None----------	---	---	>6.0	---	---
Tokositna sloping------	B	None----------	---	---	>6.0	---	---
199:							
Tokositna----------	B	None----------	---	---	>6.0	---	---
200*, 201*:							
Tokositna----------	B	None----------	---	---	>6.0	---	---
Chunilna----------	D	None----------	---	---	0-1.5	Perched	Apr-Nov
202*:							
Tsadaka----------	B	None----------	---	---	>6.0	---	---
Talkeetna cool---------	B	None----------	---	---	>6.0	---	---
203*:							
Typic Cryaquents-------	D	Occasional------	Brief---------	Apr-Oct	0-1.5	Apparent	Apr-Oct
204*:							
Typic Cryaquents,------ coastal	D	Frequent--------	Brief---------	Apr-Oct	0-1.5	Apparent	Apr-Oct
205:							
Whitsol----------	B	None----------	---	---	>6.0	---	---
206*:							
Whitsol cool, sloping--	B	None----------	---	---	>6.0	---	---

*See footnote at end of table.

TABLE 25--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
206*: cont'd							
Whitsol cool, moderately steep	B	None	---	---	>6.0	---	---
207*:							
Whitsol cool, steep	B	None	---	---	>6.0	---	---
Whitsol cool, sloping	B	None	---	---	>6.0	---	---
208:							
Whitsol silty	B	None	---	---	>6.0	---	---
209*:							
Whitsol silty, sloping	B	None	---	---	>6.0	---	---
Whitsol silty, moderately steep	B	None	---	---	>6.0	---	---
210*:							
Whitsol till, sloping	B	None	---	---	>6.0	---	---
Whitsol till, moderately steep	B	None	---	---	>6.0	---	---
211:							
Whitsol till	B	None	---	---	>6.0	---	---
212:							
Yensus	B	None	---	---	>6.0	---	---
213*:							
Yensus sloping	B	None	---	---	>6.0	---	---
Yensus moderately steep	B	None	---	---	>6.0	---	---
214:							
Yensus	B	None	---	---	>6.0	---	---
215, 216:							
Yohn	B	None	---	---	>6.0	---	---
217*:							
Yohn	B	None	---	---	>6.0	---	---
Deception	B	None	---	---	>6.0	---	---
218*:							
Yohn	B	None	---	---	>6.0	---	---
Delyndia	A	None	---	---	>6.0	---	---
219*:							
Yohn	B	None	---	---	>6.0	---	---
Flat Horn	B	None	---	---	>6.0	---	---
W*:							
Water.							

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 26--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Benka	Medial over sandy or sandy-skeletal, mixed Andic Haplocryods
Bodenburg	Coarse-silty, mixed Typic Cryochrepts
Chilligan	Medial over loamy, mixed Andic Haplocryods
Chunilna	Medial over loamy-skeletal, mixed Typic Cryaquands
Cryaquepts	Cryaquepts
Cryochrepts	Cryochrepts
Cryods	Cryods
Cryumbrepts	Cryumbrepts
Deception	Loamy-skeletal, mixed Typic Haplocryods
Delyndia	Sandy, mixed Typic Haplocryods
Deneka	Medial over loamy-skeletal, mixed Lithic Humicryods
Disappoint	Coarse-loamy, mixed, nonacid Humic Cryaquepts
Eska	Coarse-silty, mixed Typic Cryochrepts
Estelle	Medial over loamy-skeletal, mixed Andic Haplocryods
Flat Horn	Coarse-loamy, mixed Typic Haplocryods
Goldcord	Loamy-skeletal, mixed Lithic Cryumbrepts
Histosols	Histosols
Jim	Coarse-silty, mixed, nonacid Typic Cryorthents
Kalambach	Coarse-loamy, mixed Typic Cryochrepts
Kashwitna	Medial over sandy or sandy-skeletal, mixed Andic Haplocryods
Keba	Fine-loamy, mixed Typic Haplocryods
Kichatna	Sandy-skeletal, mixed Typic Haplocryods
Kidazqeni	Sandy-skeletal, mixed Typic Cryofluvents
Killey	Coarse-loamy over sandy or sandy-skeletal, mixed, acid Typic Cryaquents
Knik	Coarse-silty over sandy or sandy-skeletal, mixed Typic Cryochrepts
Liten	Sandy, mixed Typic Haplocryods
Moose River	Coarse-loamy, mixed, nonacid Typic Cryaquents
Nancy	Medial over sandy or sandy-skeletal, mixed Andic Haplocryods
Niklason	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid Typic Cryofluvents
Niklavar	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid Typic Cryaquents
Psuyaah	Medial over loamy-skeletal, mixed Typic Vitricryands
Qeni	Sandy-skeletal, mixed Oxyaquic Cryochrepts
Siwash	Loamy-skeletal, mixed Lithic Humicryods
Snowdance	Medial over loamy-skeletal, mixed Typic Cryaquands
Susitna	Coarse-loamy, mixed, nonacid Typic Cryofluvents
Susivar	Coarse-loamy, mixed, nonacid Typic Cryaquents
Talkeetna	Medial over loamy-skeletal, mixed Andic Humicryods
Tokositna	Medial over loamy-skeletal, mixed Andic Haplocryods
Tsadaka	Medial over loamy-skeletal, mixed, ortstein Humic Duricryods
Typic Cryaquents	Typic Cryaquents
Whitsol	Medial over loamy, mixed Andic Haplocryods
Yensus	Coarse-silty over sandy or sandy-skeletal, mixed Typic Cryochrepts
Yohn	Coarse-loamy, mixed Typic Haplocryods

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