File

ENVIRONMENTAL ASSESSMENT

LOWER PLUM CREEK WATERSHED
Caldwell and Hays Counties, Texas

AUTHORITY FOR MEASURE

Installation of this project constitutes an administrative action. Federal assistance will be provided by the Watershed Protection and Flood Prevention Act (PL-566, 83rd Congress, 68 Stat. 666) as amended.

SPONSORING LOCAL ORGANIZATIONS

Hays-Caldwell-Travis Soil and Water Conservation District
Plum Creek Conservation District

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INTRODUCTION

This environmental assessment concerns the installation of five floodwater retarding structures and critical area treatment on 1,150 acres of severely eroding lands within the Lower Plum Creek watershed. These are remaining project measures which have not been installed as part of the plan for providing watershed protection and flood prevention for the watershed.

The Lower Plum Creek watershed plan was completed in August 1960 by the sponsoring local organizations with technical assistance from the Soil Conservation Service. The project was approved for operations on June 29, 1961. Technical assistance for application of land treatment has been provided and a total of 10 floodwater retarding structures (Nos. 23, 24, 26, 27, 28, 29, 31, 34, 37, and 38) have been installed. Five structures (Nos. 25, 32, 33, 35, and 36 remain to be installed. Technical assistance and cost-share funds are to be provided for application of the critical area treatment on the 1,150 acres of eroding lands. The locations of the floodwater retarding structures are shown on the project map, Appendix A.

ENVIRONMENTAL SETTING

Lower Plum Creek Watershed is located in Caldwell and Hays Counties with most of the drainage area located primarily in Caldwell County. The watershed comprises a total area of 152,900 acres of the lower portion of Plum Creek. Plum Creek is a tributary of the San Marcos River within the Guadalupe River Basin of Texas.

The watershed lies in a rural setting. Lockhart and Luling with populations of 7,020 and 4,585 respectively, are the largest towns. Small towns and community centers in the watershed are Dale, population 126; Maxwell, population 185; and McMahan, population 125. Lockhart State Park lies about 2 miles southwest of Lockhart on the Clear Fork of Plum Creek. The park covers 257 acres and provides facilities such as camping, picnicking, swimming, and golf.

The climate in the watershed is humid subtropical with hot summers. Tropical Maritime air masses predominate throughout the spring, summer, and fall months. Modified Polar air masses exert a considerable influence during the winter months and provide a continental type of climate, characterized by large day-to-day variations in temperature. Mean annual total precipitation is 32.65 inches. Peak rainfall, the result of thundershowers, occurs in late spring and early summer. A secondary peak occurs in early fall. The prevailing winds at Luling are southerly throughout the year. The mean length of the warm season (freeze free period) is 275 days.

The topography of the watershed ranges from nearly level along the alluvial valley to gently rolling in the upland areas. Elevations range from 700 feet to 320 feet above mean sea level.

Geologic outcrops in the watershed are comprised of Eocene, Pleistocene, and Recent age sedimentary deposits. The Midway and Wilcox groups and the Carrizo Sand are of Eocene age. The Midway group is composed of the Wills Point and Kincaid formations. These formations are mostly massive, poorly bedded, silty, and sandy clay containing glauconite in some horizons. The Wilcox group is mostly mudstone containing sandstone, ironstone concretions, lignite, and glauconite. Generally, the Carrizo sand is

a medium to coarse-grained, poorly sorted, thick-bedded, friable, non-calcareous sandstone. Pleistocene sediment in the watershed is fluviatile terrace deposits of gravel, sand, silt, and clay. The Leona Formation is included in these strata. Recent alluvial flood plain sediment is present along Plum Creek and most of its tributaries.

Oil production has been an important enterprise in Caldwell County since the first discovery in 1922. Twenty-four fields have been developed since that time with nine no longer producing oil.

Other mineral resources in the watershed are lignite, gravel, sand, and clay. Near-surface potential lignite deposits may occur in the central portion of the watershed and deep-basin lignite deposits may occur in the lower portion (Appendix C). The lignite resources have not been developed at present.

The gravel occurs as terrace deposits in the upper and central portions of the watershed. These deposits are being utilized locally and are also an important ground water aquifer for shallow wells and for permanent spring flow. The sand and clay deposits are not being utilized.

The watershed lies within the Blackland Prairies area and the Claypan Area. Soils of the Blackland Prairies cover the central and western portions and the Claypan Area covers the eastern portion. Five distinctive soil associations occur with four of these in the Blackland Prairie area and one in the Claypan Area (USDA, 1978). These soil associations listed in their respective order from the largest area to smallest area and their general description are as follows:

Crockett-Heiden association: Deep, calcareous to noncalcareous, loamy to clayey soils over shaly clay loams and clays on nearly level to moderately steep upland areas of the Blackland Prairies.

Branyon-Lewisville association: Deep, calcareous, clayey soils over clays and clay loams on nearly level high upland terraces of the Blackland Prairies.

Demond-Palilo-Silstad association: Deep, noncalcareous, sandy soils over clays, sandy clay loams, and fine sandy loams on gently sloping and undulating uplands of the Claypan Area.

Heiden-Houston Black association: Deep, calcareous clayey soils over clays on nearly level to moderately steep and undulating uplands of the Blackland Prairies.

Trinity association: Deep, calcareous, clayey soils over clays on nearly level bottomlands and flood plains of the Blackland Prairies.

About 32 percent of the soils are classified as prime farmland. The most extensive area of prime farmland in the uplands is found in the soils of the Branyon-Lewisville association. The Trinity association comprises more than 16,000 acres of flood plain soils which are subject to overflows. Flooding of these soils varies from frequent to infrequent during the normal crop season. About 3,500 acres of these soils which flood at infrequent intervals are classified as prime farmland. Lesser areas of prime farmland are found in the other soil associations.

The watershed lies within two vegetative areas, the Blackland Prairies and the Claypan Area as recognized and described by Gould (1962). The Blackland Prairies cover the western and central portions of the watershed and the Claypan Area the eastern part.

According to Gould, the predominant original grasses of the Blackland Prairies vegetative area were little bluestem, big bluestem, Indiangrass, switchgrass, Canada wildrye, sideoats grama, tall dropseed, and Texas wintergrass. Numerous other grasses occur in the natural plant community but less frequently or in smaller amounts.

In its pristine condition the Blackland Prairie is an almost treeless plain, with no more than a five to ten percent woody plant canopy. Elm and hackberry trees occur along streams. Live oak trees and occasional motts dot the landscape and are widely spaced throughout the tall grass prairie.

An abundance of palatable forbs and legumes add color to the area and variety to the diet of foraging animals and birds. Some of these forbs and legumes include Maximillian sunflower, englemanndaisy, Penstemon sp., half shrub sundrop, bundleflower, yellow neptunia, prairie clover, tickclover, western indigo, and other forbs and legumes in minor amounts.

The Claypan Area vegetation is described by Gould as a post oak savannah characterized by climax grasses such as little bluestem, Indiangrass, switchgrass, purpletop, silver bluestem, Texas wintergrass and species of Uniola. The overstory primarily is post oak and blackjack oak. Many other brush and weedy species are also common. Some invading plants are red lovegrass, broomsedge bluestem, splitbeard bluestem, yankeeweed, bullnettle, greenbrier, yaupon, smutgrass, and western ragweed.

Since the turn of the nineteenth century, most original plant ecosystems have been destroyed or in some way altered by man through misuse and by conversion of the lands to other land uses.

Intensive tillage for production of cotton, grain sorghum, and other row crops on much of the rolling uplands without application of conservation land treatment resulted in significant soil erosion. As economic and other prohibitive factors caused farming operations to become unfeasible, the formerly cultivated lands were invaded by noxious woody, weedy plants such as mesquite, winged elm, honeylocust, Texas grama, tumblegrass, western ragweed, croton, annual broomweed, snow-on-the-prairie, and many other composites.

Much of this formerly cultivated land has since been reclaimed either through the establishment of tame pasture grasses such as common and coastal Bermudagrass, weeping lovegrass, or by natural plant succession coupled with proper grazing techniques and noxious plant control favoring native vegetative improvement and production. It is anticipated that the long range trend of reestablishing and reclaiming these lands will continue.

The land use in the watershed at time of watershed plan development was 38 percent cropland, 15 percent pastureland, 25 percent rangeland, 20 percent woodland and 2 percent miscellaneous. Land use on the flood plain was 36 percent cropland, 53 percent pastureland, 9 percent woods and 2 percent miscellaneous. The overall land use at the present time (1979) is estimated to be 15 percent cropland, 23 percent pastureland, 60 percent rangeland, and 2 percent miscellaneous. The flood plain land use is estimated 5 percent cropland, 84 percent pastureland, 9 percent savannah and 2 percent miscellaneous.

There has been a significant trend to convert cropland to pastureland in the past decade. Future trends would be difficult to predict due to changing agricultural prices and demands for land near metropolitan areas for investment and other uses.

Ground water occurs in most parts of the watershed except the western portion lying southwest from Lockhart (Texas Water Development Board, 1966). An extensive area of terrace deposits on upper Clear Fork Plum Creek contains shallow ground water and contributes permanent spring flow into Clear Fork Plum Creek. Shallow to deep ground water occurs in sand aquifers of the Wilcox group and the Carrizo Sand Formation across the remainder of the watershed.

Perennial flow conditions occur on lower Plum Creek and the Clear Fork Plum Creek tributary. During periods of drought, Plum Creek has stopped flowing at the gaging station near Luling. Permanent water remains in some of the deeper potholes. Clear Fork Plum Creek usually continues to flow even during drought from springs originating from the terrace gravels of the Leona Formation. Other streams and tributaries have ephemeral to intermittent flow conditions.

Daily chemical water quality records are maintained at the U.S. Geological Survey station Number 08173000 on lower Plum Creek near Luling. The period of daily record of water quality at this station date back to October 1967. Recorded extremes during this period for specific conductance are a maximum daily of 6,210 micromhos and minimum daily of 148 micromhos. Extremes recorded for temperature are a maximum daily of 35°C and minimum daily of 4°C. Dissolved chloride ranges from low values of 10 mg/l during good flows to highs of slightly over 200 mg/l during periods of low flows. The values for sodium range from 10 mg/l to about 150 mg/l.

Generally the chemical quality reflects a good quality hard water.

There are no serious sources of water pollution from agriculture other than sediment produced from remaining untreated critically eroding areas. Agricultural activities are generally not as intensive as in the past and conservation treatment has helped to improve water quality in the watershed.

Wetlands that occur include only Type V (inland open fresh water) that occur in farm ponds and existing surface water in sediment pools of the structural measures that have been installed in the watershed.

Fisheries resources in the watershed include the farm ponds, the sediment pools of existing structures, Plum Creek and Clear Fork of Plum Creek. Perennial flow conditions in Plum Creek provide a limited stream fishery resource in the lower reach. Fish species present include warm water species such as bluegill, bass, green sunfish, bullhead catfish, channel catfish, and various forage species. Public access to Plum Creek is available at County road crossings. Fishing is utilized mostly by local residents of the watershed.

There are approximately 3,000 farm ponds in the watershed which provide an additional fishery resource. A majority of these ponds have been stocked with largemouth bass, sunfish, and channel catfish and are managed for fish production. The quality of fishing in these ponds varies depending upon the interest and level of management practiced by pond owners. Factors limiting fisheries production include undesirable infestations of aquatic vegetation and unbalanced population of predator to prey species resulting from lack of proper fish pond management.

The principal game animals which are the most abundant in the watershed are fox squirrels, mourning dove, and bobwhite quail. Big game species such as whitetail deer and wild turkey occur but their populations are low over most of the watershed. Census population surveys by the Texas Parks and Wildlife Department in 1969 indicated that Caldwell County had a deer population of one deer to 58 acres, fair to good quail populations, and a population of one squirrel to 3.4 acres (Texas Parks and Wildlife Department, 1970). Other animals which are common to the watershed include rabbits, coyotes, skunks, foxes, opossum, rodents, and various species of amphibians and reptiles. Migratory species are primarily waterfowl, doves, and various nongame passerine species. Waterfowl populations are limited due to lack of quality wetlands in the watershed. Farm ponds provide resting areas but only limited feeding areas for waterfowl.

Limiting factors for wildlife populations in the vicinity of the floodwater retarding structures are the quality and the lack of diversity in mast producing trees and the amount of wooded habitat. Most of the woody vegetation occurs along the stream drainageways and varies from post to pole size timber. Dominant woody overstory species in the bottomland are elm, hackberry, pecan, and ash. Principal understory species include hawthorn, yaupon, greenbrier, and bumelia. Upland woody species include post oak, blackjack oak, cedar, and mesquite. Post oak and blackjack oak are most abundant trees in the southeast part of the watershed.

Habitat for open land species is comprised mostly of rangeland, pastureland and smaller amounts of cropland. Much of the abandoned cropland has been allowed to revert back to rangeland consisting of many food producing grasses, forbs, and shrubs. This vegetation provides favorable feeding and cover requirements for quail, doves, and rabbits.

There are three wildlife species listed in the Federal Register as endangered that may occur in the vicinity of the watershed. These three species are the American alligator, Fountain darter, and the Texas blind salamander. Notice of review (proposed) plant species which may occur in the watershed are wild mercury (Argythamnia aphorides), milkvine (Matelea edwardensis), and rock daisy (Perityle lindheimeri). Critical habitat has not been listed for the watershed.

There are no serious sources of air pollution from agricultural activities in the watershed. Lockhart and Luling are the largest urban areas with pollutants limited to those normally associated with towns serving the needs of an agricultural area. Odors associated with petroleum production occur in and near the oil fields.

The visual quality of the watershed area is considered average because there is no dominant land form and vegetative diversity is limited. It is composed of agricultural lands consisting of grassland and cropland with bands of mixed hardwoods along the mainstream courses in the central and western areas and mixed open grasslands and wooded lands in the eastern part.

The economy of the watershed is primarily agricultural with the production of livestock and the production of crops such as grain sorghum, cotton and wheat the most important. There are 667 farm and ranch operating units in the watershed. The average size of these units is about 250 acres.

Archeologically Caldwell County which encompasses most of the watershed area is relatively unknown. Only 17 sites for the county are recorded in the files at the Texas Archeological Research Laboratory at the University of Texas, Austin. An areal survey and the collection of some artifacts was done by Ray B. Reinhardt along the West Fork of Plum Creek and portions of

Plum Creek. In 1967 excavations were conducted at the Cochran Site (41CW3) near Martindale uncovering a late prehistoric burial of a child (Scarborough 1967).

Of the four stages into which the cultural evolution of central Texas is divided, only the Archaic and Neo-American (Suhm, Krieger and Jelks 1954:99-110) are well represented at the recorded sites. There may have been a Paleo-Indian component at one site (41CW9) as a Plainview projectile point (Suhm and Jelks 1962:239) was found there. This site is on an unnamed tributary of Dry Creek about 11 kilometers southeast of Lockhart. It would be expected that archeological sites might be found along the larger streams such as the San Marcos River and Plum Creek. Sites could also be expected along the small tributaries if there were resources such as lithic materials, vegetable and animal products available for exploitation by the semi-nomadic hunting and gathering populations who existed in the central Texas area from about 12,000 years ago till the 17th century. Tribes of the Tonkawa confederacy probably inhabited central and south central Texas in the 18th and 19th centuries (Newcomb 1961:133-134) and (Webb 1952b:788). In the summer of 1840 the Comanche Indians began a sweep down the Guadalupe valley to the coast burning the plundering settlements. They had started a retreat from Linnville when they were overtaken by Texas Rangers and volunteers near Lockhart. The Battle of Plum Creek was fought August 12, 1840 and ended in a decisive defeat for the Comanches (Webb 1952b:287).

PROJECT FORMULATION

INTRODUCTION

The Lower Plum Creek watershed project was planned for the purpose of watershed protection on the lands of the watershed, flood protection for the agricultural flood plain lands, and the development of municipal and recreational water.

The measures considered and included for the project were accelerated technical assistance for the application of land treatment measures on the watershed, floodwater retarding structures and channel modification for flood protection and a multiple-purpose structure for municipal and recreational storage.

PROJECT GOALS

The following project objectives were initially considered by the sponsors for development of the project:

1. Application of all land treatment measures needed to achieve watershed protection, flood prevention, and sediment control.

2. Obtain a 70 to 80 percent reduction in average annual flood damage.

3. Investigate the possibility of developing a multiple-purpose reservoir for municipal and recreational use by the City of Lockhart.

4. Investigate the possibilities for recharge of the Leona Formation aquifer.

5. Inform the sponsors of structure sites in which additional storage could be developed for irrigation water.

The plan developed for the watershed provided accelerated technical assistance for achieving the goals of watershed protection, the installation of floodwater retarding structures and channel modification for achieving the goals for reduction of average annual floodwater damages, and the installation of a multiple-purpose structure for municipal and recreational water storage. Recharge of the Leona aquifer was not practical and no interest for storage of irrigation water was found.

Supplements were made to the original plan to include a floodwater retarding structure for urban protection to the City of Luling. The plan was also supplemented to delete the multiple-purpose structure for municipal and recreational water since the City of Lockhart has developed another source for municipal water supply and no longer had an interest in developing recreational storage.

As mandated by NEPA and the environmental executive orders, the remaining planned project measures not yet installed were reviewed for their effects on the environment. The sponsors reviewed the beneficial and adverse impacts of the originally planned channel modification work for Lower Plum Creek. In view of the diminished need for a high level of protection of the flood plain which had undergone a significant change in land use from cropland to grassland and the magnitude of the possible adverse impacts to Plum Creek, it was determined that an acceptable level of protection would be provided to the flood plain by installation of the system of floodwater retarding structures and deleting the the channel work.

The remaining planned project measures consist of technical assistance and cost-share funds for the application of critical area treatment on 1,150 acres of eroding lands and the installation of floodwater retarding structure Nos. 25, 32, 33, 35, and 36.

ADVERSE IMPACTS

The adverse impacts which cannot be avoided by installation of the remaining project measures are summarized below. A more complete discussion of all impacts is given in the ENVIRONMENTAL IMPACTS section.

1. Require the utilization of 75 acres of prime farmland for construction of the dams and sediment pools and cause frequent temporary inundations on

2. Require inundation of 1.8 miles of perennial stream.

3. Require the destruction of 149 acres of moderate quality woody habitat by the dams and sediment pools of the structures.

4. Result in the inundation of 90 acres of poor condition rangeland and 29 acres of improved pastureland and 101 acres of moderate quality woody habitat.

5. Result in the clearing of up to 25 acres of individual woody plants and scattered woody vegetation occurring throughout the formerly cultivated critically eroding lands to be treated.

ALTERNATIVES

The alternatives that are available are described below. Only the most significant environmental, economic, and social impacts are discussed.

Alternative 1 - Alternative 1 consists of foregoing the installation of the remaining project measures.

This alternative would forego the remaining flood damage reductions that are to be provided to the flood plain and large areas of prime farmland on Lower Plum Creek. The treatment of 1,150 acres of critically eroding areas would continue to be delayed and erosion and sediment production would continue into the future. Some of these areas would eventually be treated under the ongoing programs, a portion would become reasonably well stabilized within the distant future by natural processes and the remaining areas would experience increased erosional growth and increased destruction of existing resources.

The adverse impacts resulting from the losses of small tracts of prime farmland and woody habitat identified with completion of the project would be avoided.

Alternative 2 - Alternative 2 consists of applying the critical area treatment and foregoing the installation of the remaining five floodwater retarding structures.

This alternative would achieve the critical erosion stabilization objectives. It would forego the additional flood damage reduction benefits and the protection of large areas of prime farmland that would be provided by the remaining floodwater retarding structures. It would also avoid the adverse impacts of commitment of small tracts of prime farmland and the woody habitat identified for installing the floodwater retarding structures.

Alternative 3 - Alternative 3 consists of applying the critical area treatment and installing the remaining five floodwater retarding structures.

This alternative is the selected plan and would achieve the critical erosion stabilization objectives and the flood damage reduction goals on the flood plain and to the extensive areas of prime farmland on the flood plain. Small tracts of prime farmland, areas of woody habitat and various land uses would be committed for installation of the structures.

Other Alternatives - Other alternatives including such actions as moving the structures to avoid involvement of areas of concern such as prime farmland, habitat, or improvements were studied during the planning stage and in a continuing review process by the sponsors in obtaining the landrights needed for installation of the project measures.

PLAN SELECTION

Alternative 1 would avoid the commitment of resources to the structural measures but would not achieve the goals for critical erosion stabilization and the goals for flood damage reduction to the flood plain and extensive areas of prime farmland. Alternative 2 would achieve the sponsors' goals for stabilization of critical erosion areas and would avoid the commitment of the small tracts of prime farmland and woody habitat for installation of the structures. However, this alternative would not meet the project goals for providing additional flood protection to the flood plain and the extensive tracts of prime farmland.

Alternative 3 would meet the sponsors' goal for critical erosion stabilization and flood protection to the flood plain and to the extensive areas of prime farmland. Loss of the small tracts of prime farmland will be offset by the flood protection provided for the extensive tracts prime farmland. The loss of woody habitat (mainly of value as cover) will not be critical because of abundance in the area. Lost food values will be offset by the higher value plantings that are to be made. Habitat values will also be enhanced by management practices which the sponsors will encourage the landowners to apply at these structure sites.

PLANNED PROJECT

LAND TREATMENT

Remaining land treatment to be applied consists of critical area treatment to be applied on 1,150 acres of eroding lands. Accelerated technical assistance and PL-566 funds on a cost-share basis are to be provided. The application of the critical area treatment for stabilizing the critical source areas will be planned by the landowner on whose land it is to be accomplished. The treatment may involve clearing, shaping, preparation for vegetation, mulching, fertilizing, vegetating, fencing, and installation of appurtenant grade stabilization structures such as pipe drops, drop inlets, formless concrete chutes, diversions, and small embankments.

The vegetation to be established will include trees, shrubs, vines, grasses, and legumes as appropriate at each of the erosional sites.

STRUCTURAL MEASURES

Five floodwater retarding structures, site Nos. 25, 32, 33, 35, and 36, remain to be installed (see project map, Appendix A). These structures will have planned capacity for accumulation of 2,430 acre-feet of sediment (50-year life) and for the temporary detention of 13,416 acre-feet of floodwater. The drainage area to be controlled is 30,432 acres (47.55 square miles). Appendix B contains preliminary design data for the structures.

The structures will consist of vegetated earthen embankments with concrete principal spillways and vegetated earthen embankments. The principal spillways will be the drop inlet type with cantilever outlets. The inlets will be ungated

to operate automatically upon the inflow of runoff. Initially, 843 acre-feet of water are to be impounded in the sediment pools. This water will submerge the borrow areas used for construction of the embankments. The volumes of water stored will not exceed the volume of sediment estimated to be deposited in a 50-year period and will not exceed the volume permitted by state law. Provision will also be made to allow release of the water impounded in the sediment pool to permit performance of maintenance and if necessary, to avoid encroachment on prior downstream water rights.

The emergency spillways and the embankments will be vegetated with a sod forming vegetation such as bermudagrass or medio bluestem for protection against erosion. Other odd areas around the structure will be overseeded with plants having wildlife food value. Fences will be constructed around these areas to permit management of the vegetated areas.

The sponsors will acquire all landrights needed for installation of the floodwater retarding structures. Installation and operation of the structures will involve county roads at three sites, some electric lines to farmsteads, pipelines at two sites, and an abandoned homesite at one site. The sponsoring local organization is responsible for any modifications or changes that may be required for these existing improvements.

Means will be taken to avoid creation of conditions which could increase populations of noxious vectors which could affect public health conditions. Prevention and control measures will be implemented, if needed.

PROJECT COSTS

The estimated cost of application of the critical area treatment, providing accelerated technical assistance, and installing the floodwater retarding structures is as follows:

Installation Cost Item	Estimated Cost (Dollars) - 1978 Price Base		
	PL-566 Funds	Other	Total
Critical Area Stabilization	276,000	69,000	345,000
Accelerated Technical Assistance	75,000	--	75,000
Floodwater Retarding Str. Nos. 25, 32, 33, 35, and 36	1,822,500	297,700	2,120,200

ENVIRONMENTAL IMPACTS

FLOODING

The area of flood plain identified during project planning is 16,239 acres. Of this area 13,520 acres lie downstream from the planned and the installed floodwater retarding structural measures. About 9,200 acres lie downstream from the 5 remaining planned structures.

The average annual area flooded was 16,474 acres before any project measures were installed. The principal damage is to agricultural crop and pasture damage with lesser damages to other agricultural properties and to nonagricultural facilities such as roads, bridges, railroads, urban, petroleum, and Lockhart State Park.

Impacts

Installation of the 5 remaining structures will reduce flooding on about 9,200 acres of floodplain lying downstream from the structures. These structures in combination with the land treatment and the structures already installed will reduce the average annual area flooded by 38 percent and reduce floodwater damages by 55 percent. Approximately 350 land users owning flood plain land ranging from 5 up to 400 acres in size will be benefited by these measures.

EROSION AND SEDIMENTATION

Erosion rates and sedimentation were moderate to severe at the time of plan development prior to 1960 due to inadequate conservation treatment on the land and the high amount of cultivation on steeply sloping lands. Gross erosion from all sources averaged nearly 10 tons per acre annually (ranges from less than one ton to more than 25 tons) in the watershed and accelerated overbank sedimentation was physically damaging 3,335 acres of flood plain lands. Sedimentation was also filling the streams and existing ponds and reservoirs at accelerated rates.

Accelerated technical assistance provided in the plan to supplement the ongoing program for technical assistance has resulted in the application of treatment measures on more than 50 percent of the watershed lands. An estimated 40 percent of the land is now adequately protected. Erosion rates in the watershed now average considerably less than 5 tons per acre annually. However, severe erosion is still occurring on about 1,150 acres of old gully systems scattered throughout the old, eroded, steep soils areas of the watershed where erosion is still occurring at rates in excess of 10.0 tons per acre annually.

Impacts

The critical area treatment measures will stabilize the erosion on about 1,150 acres of land and reduce the soil losses to less than 5 tons per acre. The deterioration of this resource will be stopped and vegetation established. Sediment loads to streams and reservoirs will be reduced and water quality improved. The sediment pools of the 5 floodwater retarding structures will provide 2,430 acre-feet of capacity for trapping of sediment produced from 30,432 acres of agricultural land.

PRIME FARMLAND

Prime farmland occurs on the upland areas surrounding all of the structure sites and on the Plum Creek flood plain downstream from the structures. Approximately 2,800 acres of flood plain land meeting the definition of prime farmland have been surveyed on the flood plain downstream from the floodwater retarding structures (USDA, 1978).

Impacts

Installation of the structures will provide direct flood protection to 2,800 acres of prime farmland. These structures in addition to the structures already installed will provide sufficient reductions in flooding for the classification of an estimated additional 2,500 acres of open pastureland and cropland as prime farmland.

The dams and emergency spillways at 3 structures will require the use of about 19 acres of prime farmland. The sediment pools will inundate another 56 acres and the floodwater in the detention pools will inundate 374 acres of prime farmland. Approximately 200 acres of this area lies in the upper fringes of the detention pools and will not prevent its continued classification as prime farmland. None of the affected prime farmland is presently being cultivated.

LAND USE

The upland soils and the flood plain soils in the vicinity of the structures were extensively cultivated in the past but are now mainly in rangeland and improved pastureland. Significant areas of cropland still remain near structure site Nos. 35 and 36.

Impacts

Installation of the structures is not expected to cause any shifts in land use of the flood plain. The sediment pools of the structures will convert about 90 acres of open rangeland, 101 acres of brushy rangeland, and 29 acres of improved pasture to surface water. Another 96 acres of improved pastureland, 38 acres of open rangeland, and 48 acres of brushy rangeland which are to be utilized for the dams and emergency spillways will be vegetated with grassy vegetation. Land use on 1,319 acres of land in the detention pools is not expected to change significantly from its present use.

STREAMS

Clear Fork of Plum Creek at structure site No. 35 has perennial flow conditions. Perennial flow conditions also exist in the mainstem of Plum Creek. Ephemeral flow conditions exist at and in the vicinities of the other structure site locations.

Impacts

Installation of structure No. 35 will result in the inundation of 1.8 miles of perennial stream. The other structures will inundate 5 miles of ephemeral streams.

WATER QUALITY

Water quality in streams of the watershed is not seriously affected by pollutants other than sediment derived from critical eroding areas and the low levels of sediment derived from all agriculturally used lands.

Impacts

The sediment pool of the structures will be effective in trapping more than 80 percent of the sediment produced within the 30,432 acres of drainage area controlled. The critical area treatment will help stabilize and reduce erosion on the steep severely eroded, old gullied lands to acceptable soil loss rates of less than 5 tons per acre annually. This will improve the quality of water in streams.

GROUND WATER

The measures remaining to be installed will not affect ground water resources or soil water tables.

WETLANDS

The only wetlands occurring in the vicinity of the structure sites are open water (Type V Wetlands) associated with several small farm ponds located in the pool areas of the planned structures.

Impacts

The impoundment of water in the sediment pools will create about 220 acres of Type V Wetlands (inland open fresh water). Several small farm ponds in the detention pools will be subject to infrequent inundations when the structures function according to their designed capacity.

FISH AND WILDLIFE

A limited stream fishery resource occurs in Clear Fork of Plum Creek in the vicinity of structure No. 35. Stream flow conditions in the other four structures are ephemeral and do not support a permanent fishery resource. The terrestrial wildlife habitat is comprised of upland and bottomland habitat. Upland habitat is the dominant habitat which includes open rangeland, wooded rangeland, improved pasture and small amounts of cropland. Bottomland habitat occurs primarily along the flood plain of Lower Plum Creek and its tributaries. Habitat at the critical eroding areas consists mainly of open rangeland with the occurrance of scattered brush species.

Impacts

The sediment pools of structure Nos. 25, 32, 33, 35, and 36 will commit about 220 acres of land to water areas. Of the 220 acres total, 101 acres of moderate quality wooded habitat, 29 acres of improved pasture, and 90 acres of rangeland will be affected. The 220 acres of aquatic habitat created by the sediment pool will provide additional fishery habitat, waterfowl resting areas and watering areas for livestock and wildlife. Approximately 1.8 miles of perennial flow streams will be changed to a lentic environment.

About 1,319 acres of land will be subject to temporary inundation in the detention pools. Of the 1,319 acres, 307 acres are in wooded habitat, 446 acres are in improved pasture, 79 acres are in cropland, and 487 are in rangeland. No significant change in habitat value is anticipated in the detention pools. Two small farm ponds in the detention pools will be subject to occasional inundation.

Installation of critical area treatment measures may result in removal of up to about 25 acres of scattered woody species which consist mostly of mesquite and smaller amounts of elm, hackberry, and live oak during the shaping of these gullied areas. Most of the better quality woody species such as liveoak will be left undisturbed except where removal is absolutely necessary. These gullied areas will be shaped and replanted to seed producing grasses, vines, shrubs, and trees which provide food and cover for many wildlife species. Additional diversity of habitat and edge effect will be created in these treated areas which will improve habitat for wildlife species.

The stabilization of the eroding gullied areas will reduce the amount of sediment that is presently being deposited into Plum Creek and improve the aquatic habitat.

THREATENED AND ENDANGERED SPECIES

There are no listed or proposed endangered species or critical habitat that occur within the planned construction areas. The planned project action will not affect any endangered or threatened species.

MINERAL RESOURCES

Mineral resources in the vicinities of the planned structure sites consist of the possibility of thin deposits of gravel at structure site No. 35, petroleum production near structure site No. 25 and the potential for deep basin deposits of lignite under structure site Nos. 25, 32, and 33 (Appendix C).

The thicker deposits of gravels in the Leona Formation have been and are being utilized for production of gravel. No gravels have been produced at structure site No. 35 as the deposits appear to be very limited. One oil well occurs at the upper edge of the detention pool at structure site No. 25. No development of lignite resources has occurred and none of the structures is located on any potential near-surface mineable deposits.

Impacts

The upper abutment areas of the embankment for structure site No. 35 may involve an insignificant amount of gravelly materials. The temporary inundation of water in the detention pool of structure site No. 25 will not affect the operation of the oil well located near the edge of this pool. Petroleum pipelines at structure site Nos. will need to be modified by the sponsors and the owners before these structures can be installed.

The potential deep-basin lignite resources in the vicinity of structure site Nos. 25, 32, and 33 would probably be developed by in-situ methods. Such recovery

methods could result in subsidence of the land areas surrounding the structures and possible structural damages to the dams and foundations. If such developments become a reality, repairs through methods such as grouting could be utilized to restore the integrity of the structures and foundations.

SOCIAL AND ECONOMIC

Agriculture is the most important economic activity in the watershed with agribusiness, varied manufacturing enterprises and petroleum activities important in Lockhart and Luling. Approximately 65 percent of the agricultural income is from livestock with cotton and grains being the leading crops.

There are 667 agricultural operating units in the project area, of which 535 are cooperators with the conservation program of the Hays-Caldwell-Travis Soil and Water Conservation District. Minority and women land users comprise 40 of these operating units with 30 being cooperators with the district programs.

A total of 350 land users operate flood plain lands lying downstream from the planned and the installed project measures. The size of these holdings range from 5 acres to 400 acres.

Impacts

Application of the critical area treatment will stabilize critical erosion on approximately 1,150 acres of land and restore the productivity of land areas that are being damaged and destroyed by erosion.

Installation of the remaining five floodwater retarding structures will provide flood damage reductions to approximately 9,200 acres of productive agricultural

flood plain land. This will benefit slightly over 65 percent or about 235 land users. The minority land users will be benefited to the same degree as their nonminority neighbors.

HISTORICAL AND ARCHEOLOGICAL RESOURCES

No archeological surveys have been performed at the remaining five structures. There is a recorded archeological site (41CW7) in the area to be affected by floodwater retarding structure 35. The Reinhardt survey lists several sites along the West Fork of Plum Creek but the information is not specific enough to ascertain if any of the sites will be affected by floodwater retarding structure 36. The M.A. Withers House is listed on the National Register of Historic Places but will not be affected by the proposed project. Before any construction is begun the Soil Conservation Service will have an archeological/historical survey performed on the remaining structures to insure the protection, preservation or mitigation of any cultural resources discovered.

AIR QUALITY

There are no serious air polluting activities within the watershed which affect the overall air quality. Some odors associated with petroleum production are prevalent at and in the vicinity of the producing oil fields.

Impacts

Construction of the structures and application of the critical area treatment will result in minor increase in pollutants from operation of equipment during installation. Noise from this activity will be of short-term nuisance confined to a sparsely populated rural area.

VISUAL RESOURCES

Visual resource quality of the watershed is average in a homogenous agricultural setting.

Impacts

The structures are located in an area that will avoid adverse impacts on the landscape. The embankments and emergency spillways will be vegetated with a grassy vegetation which is similar to the existing landscape. The critical area treatment will vegetate and stabilize unsightly gullied lands.

SHORT-TERM VS. LONG-TERM PRODUCTIVITY

There will be some minor short-term losses to the environment as well as the gains. The structures will protect prime farmland on the flood plain of the mainstem of Plum Creek and the tributaries. The critical area treatment will help stabilize land that is being destroyed by continued erosion. The land is primarily in agricultural use and it is anticipated that this area will remain an important agricultural area in the future. The project measures will enhance the agricultural environment and productivity.

COMMITMENT OF RESOURCES

Installation of the structures will require the commitment of 182 acres of land for the dams and emergency spillways, 220 acres for the sediment pools, and 1,319 acres for the detention pools. The land in the detention pools can continue to be used for its present agricultural uses but use will be restricted on the dams and emergency spillways. The critical area treatment will not require long-term commitment of resources.

The labor, materials, energy and capital expenditures for installation and operation of the measures will also be irreversibly and irretrievably committed.

CONSULTATION WITH APPROPRIATE AGENCIES AND OTHERS

The project for Plum Creek watershed was developed through an orderly process consisting of application for assistance by the sponsors, field examination, public hearing, public meetings, and field level review of the completed plan prior to its approval for operations on June 29, 1961.

In October and November 1979, the project measures remaining to be installed were reviewed in accordance with SCS guidelines for compliance with NEPA rules and environmental executive orders and an environmental assessment was prepared.

On December 10-12, 1979, the remaining measures and possible impacts on fish and wildlife resources were reviewed by the Fish and Wildlife Service and the Texas Parks and Wildlife Department. No significant adverse impacts to these resources were identified. The minor losses identified have been offset by mitigation measures included with the structural measures.

On October 10, 1979, consultation in accordance with Section 7 of the Endangered Species Act was requested with the Fish and Wildlife Service. The requested information was supplied on November 1, 1979, and the biologic assessment finding no effects on any critical habitat, listed species, or proposed species was completed December 14, 1979.

On October 24, 1979, the Caldwell County Historical Commission Chairman, Mr. Donaly E. Brice reviewed the location of the remaining measures and did not identify any local historical sites which might be affected by the project. There are no sites listed on the National Register of Historic Places that will be affected by the structures.

In December 1979 an interagency field trip was made to Lower Plum Creek watershed with the Texas Parks and Wildlife Department and the U.S. Fish and Wildlife Service to review wildlife resources and impacts of the remaining project measures. On March 27, 1980, the U.S. Fish and Wildlife Service responded with the following recommendations for the remaining project measures:

1. Deepening the sediment pools and lowering the spillway ports on Sites 25, 33 and 35 would reduce the impacts by reducing the amount of clearing required.
2. Fence woody habitat adjacent to the dam and spillway areas on Site 33.
3. Fence woody habitat in the detention pool on Sites 25, 35 and 36.
4. Management to include selective clearing, disking and planting of selected wildlife plants in the mesquite woodland on Site 36 to improve wildlife habitat.
5. Recommended that native grasses and shrubs also be used in addition to medio bluestem for multiuse plants on the critical area treatment sites.

On June 17, 1980, the sponsors (Board of Directors of Plum Creek Conservation District) reviewed and discussed these recommendations in relationship to the commitments already made. The Board agreed to work with the landowners involved to encourage them to participate with the Board in carrying out these recommendations.

After archeological/historical surveys are made on the remaining structures, the Texas State Historic Preservation Officer will be consulted for concurrence with the results of the surveys.

LIST OF PREPARERS

This environmental assessment was prepared with data obtained from several sources. These sources include information which was developed during project planning by the economist, geologist, hydrologist, engineers and soil conservationist, data from published sources listed in the Bibliography, existing records and information in the files, additional field studies, and information developed by a special environmental evaluation team in October 1974. The environmental evaluation team of 1974 consisted of Frank Sprague, biologist; Herb Senne, range conservationist; Leroy Werchan, soil scientist; and James Taylor, district conservationist.

The preparers of this environmental assessment were Nancy Cole, archeologist; Oon Goins, biologist; James Taylor, district conservationist; and Lemund Goerdel, environmental assessment team leader.

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APPENDIX A
PROJECT MAP

APPENDIX B

OATA FOR FLOOOWATER RETAROING STRUCTURES
Lower Plum Creek Watershed, Texas

Item	Unit	Structure Number 25	32	33	35	36
Orainage Area	Sq.Mi.	5.12	4.55	5.15	1/18.20	14.53
Storage Capacity						
Sediment Pool (200 Ac. or less)	Ac.Ft.	199	146	110	194	194
Sediment Reserve Below Riser	Ac.Ft.	47	-	-	679	504
Sediment in Oetention Pool	Ac.Ft.	54	24	27	97	155
Floodwater	Ac.Ft.	1,406	1,298	1,538	4,951	4,223
Total	Ac.Ft.	1,706	1,468	1,675	5,921	5,076
Surface Area						
Sediment Pool 2/	Acre	68	40	30	142	134
Floodwater Pool	Acre	229	178	188	480	475
Volume of Fill	Cu.Yd.	152,300	136,500	138,800	344,700	235,100
Elevation Top of Oam	Foot	457.9	417.9	428.2	546.3	471.3
Maximum Height of Oam	Foot	25	31	40	51	37
Emergency Spillway						
Crest Elevation	Foot	453.0	413.0	423.5	539.6	465.5
Bottom Width	Foot	230	120	100	600	300
Type	-	Veg.	Veg.	Veg.	Veg.	Veg.
Percent Chance of Use 3/	-	3.64	3.69	3.08	3.26	3.10
Average Curve No. - Condition II		81	66	58	88	79
Emergency Spillway Hydrograph						
Storm Rainfall (6-Hour) 4/	Inch	7.05	7.10	7.05	6.44	6.56
Storm Runoff	Inch	4.85	3.28	2.45	5.05	4.19
Velocity of Flow (Vc) 5/	Ft./Sec.	1.6	0	0	1.4	0
Discharge Rate 6/	c.f.s.	443	0	0	1,040	0
Maximum Water Surface Elevation 6/	Foot	454.2	-	-	540.8	-
Freeboard Hydrograph						
Storm Rainfall(6-Hour) 7/	Inch	17.26	17.38	17.26	15.78	16.06
Storm Runoff	Inch	14.72	12.43	10.85	14.24	13.26
Velocity of Flow (Vc) 8/	Ft./Sec.	9.3	9.4	9.2	10.8	9.5
Oischarge Rate 6/	c.f.s.	5,808	3,171	2,448	24,370	8,162
Maximum Water Surface Elev. 6/	Foot	457.9	417.9	428.2	546.3	471.3
Principal Spillway						
Capacity - (Maximum)	c.f.s.	32	29	32	230	128
Capacity Equivalents						
Sediment Volume (200 Ac. or less)	Inch	0.73	0.60	0.40	0.20	0.25
Sediment Reserve Volume Below Riser	Inch	0.17	-	-	0.70	0.65
Sediment in Oetention Pool	Inch	0.20	0.10	0.10	0.10	0.20
Oetention Volume	Inch	5.15	5.35	5.60	5.10	5.45
Spillway Storage	Inch	4.85	4.30	3.75	4.05	4.75
Class of Structure	-	A	A	A	A	A

1/ Excluding the area from which runoff is controlled by other structures.
2/ Surface area to the top of the riser.
3/ Is the percent chance that the emergency spillway will function in any given year.
4/ For Class A structures 0.5 x P of the 6-hour rainfall shown by figure 3.21-1, NEH-4, Supplement A, and 0.75 x P for Class B structures.
5/ Where velocity is shown it was obtained from the formula $V = \frac{Q}{A}$ and was determined from the routed Hp and Q. Critical velocity was not attained by outflow of the emergency spillway hydrographs.
6/ Values obtained from routing.
7/ For Class A structures 1.23 x P, Class B structures 1.73 x P, for 6-hour rainfall shown on figure 3.21-1, NEH, Sec. 4, Suppl. A.
8/ Obtained from curves drawn from figure 4-R-11472 revised 3/59 and ES 98 dated 4-27-55, based on flows obtained from graphical routing of the Freeboard Hydrograph.

OATA FOR FLOOOWATER RETARDING STRUCTURES
Lower Plum Creek Watershed, Texas

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Percent Chance of Use 3/	-	3.64	3.69	3.08	3.26	3.10
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Storm Runoff	Inch	4.85	3.28	2.45	5.05	4.19
Velocity of Flow (Vc) 5/	Ft./Sec.	1.6	0	0	1.4	0
Discharge Rate 6/	c.f.s.	443	0	0	1,040	0
Maximum Water Surface Elevation 6/	Foot	454.2	-	-	540.8	-
Freeboard Hydrograph						
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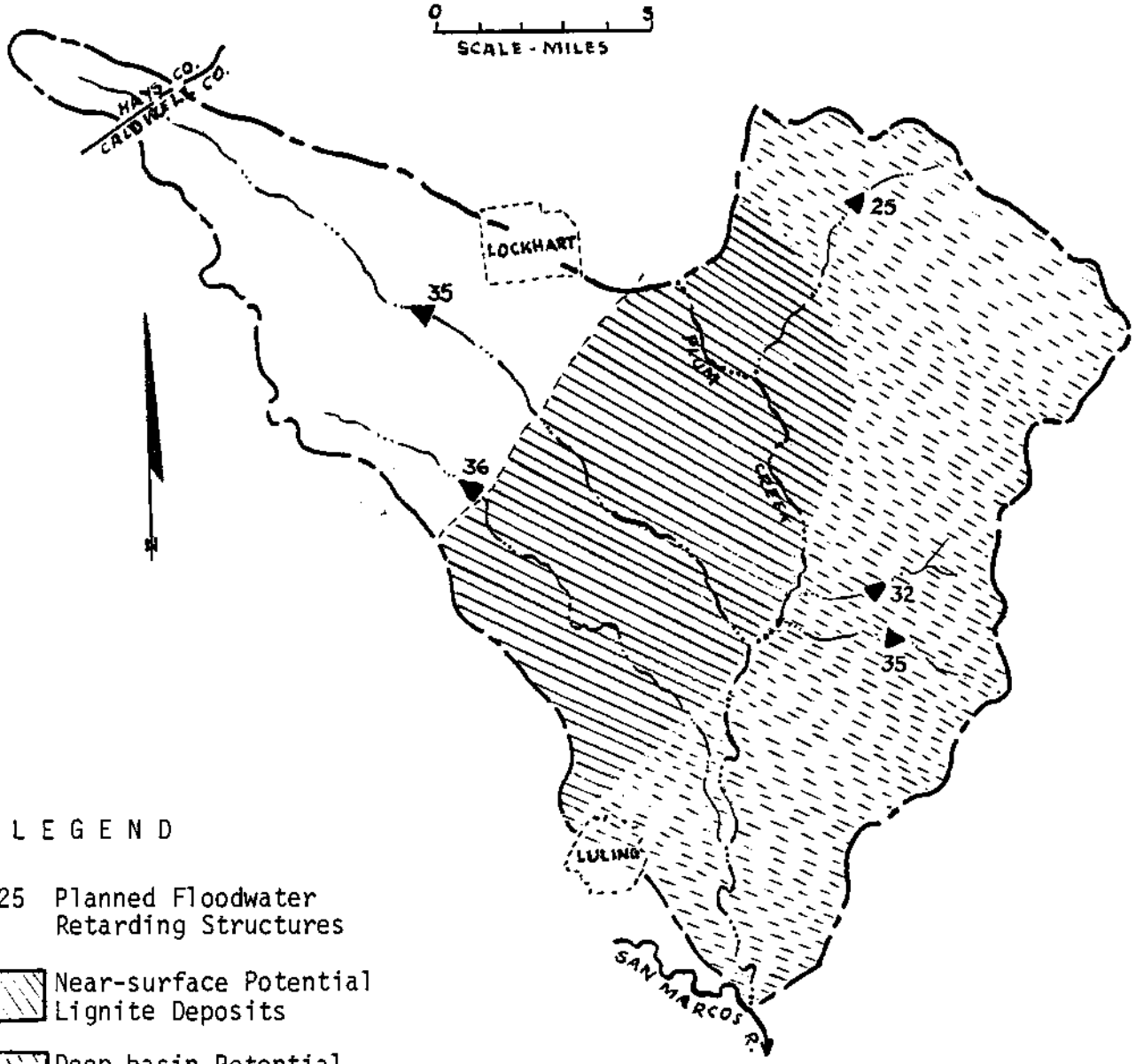
APPENDIX C



L E G E N D

▲25 Planned Floodwater Retarding Structures

Near-surface Potential Lignite Deposits

Deep-basin Potential Lignite Deposits

From data by W. R. Kaiser, Bureau of Economic Geology, "Near-Surface and Deep-Basin Resources," Report of Investigations No. 79, University of Texas, Austin, Texas, 1974

LIGNITE RESOURCES

LOWER PLUM CREEK WATERSHED
Hays and Caldwell Counties, Texas