USDA United States Department of Agriculture

Saratoga Springs Watershed

Draft Watershed Plan and Environmental Assessment

Saratoga Springs Flood Prevention Project
Utah County, Utah

Lead Federal Agency:
USDA Natural Resources Conservation Services

Sponsoring Local Organization:
City of Saratoga Springs

August 2025

Utah State Office
Natural
Resources
Conservation
Service
nrcs.usda.gov/

Draft

Saratoga Springs Watershed Plan and Environmental Assessment
For the
Saratoga Springs Watershed
Saratoga Springs Flood Prevention Project
Utah County, Utah

Lead Agency: U.S. Department of Agriculture Natural Resources Conservation Service (NRCS).

Sponsoring Local Organization: City of Saratoga Springs

Cooperating Agency: None

Authority: This Watershed Plan and Environmental Assessment (Plan-EA) has been prepared under the authority of the NRCS Watershed and Flood Prevention Operations Program, which includes the Flood Prevention Operations Program authorized by the Flood Control Act of 1944 (Public Law [PL] 78-534) and the provisions of the Watershed Protection and Flood Prevention Act of 1954 [Public Law 83-566 (PL 83-566) Stat. 666 as amended (16 U.S.C Section 1001 et seq.).

Abstract: The Saratoga Springs Flood Prevention Project (Project) is located in the City of Saratoga Spring, Utah County, Utah. The purpose of the Project is to provide flood prevention (flood damage reduction) measures to reduce damage caused by floodwater in the City of Saratoga Springs. There is a need to protect people, structures, roads, utilities, and property within the floodplain.

The preferred alternative for the Project is the Site 1 and Site 2 Debris Basin Improvements Alternative. Proposed modifications would construct two debris basins at Site 1 for Burnt and Lott Canyon and two at Site 2 for Clark Canyon to reduce peak flood flows into the City of Saratoga Springs. The alternative measures provide long-term benefits for reduced flooding to the developed areas of the City of Saratoga Springs and decrease associated health and safety hazards. The alternative would cost $22,222,000 to install and provide an estimated net flood damage reduction benefit to the City of Saratoga Springs of $6,131,900 annually for 100 years.

Comments: NRCS has completed this Draft Watershed Plan and Environmental Assessment (Plan-EA) in accordance with the National Environmental Policy Act (NEPA) and NRCS guidelines and standards. Reviewers should provide their comments to NRCS during the allotted Draft Plan-EA review period. Comments need to be submitted by September 24, 2025, to become part of the Administrative Record. Please send comments to NRCS:

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385-245-7709; anders.fillerup@usda.gov

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Ancestral Land Acknowledgement

The National Resources Conservation Service, through the review of the National Park Service Native American Graves Protection and Repatriation Act Native American Consultation Database, the BLM St. George Field Office tribal consultation list, the U.S. Department of Housing and Urban Development Tribal Directory Assessment Tool, the BIA website, the Utah Division of Indian Affairs website; and through previous National Environmental Policy Act and National Historic Policy Act consultation, identified four Native Hawaiian Organizations/Native Villages/ Tribes with ancestral land, traditional use, and/or traditional cultural property claims within the Area of Potential Effect and the immediate vicinity. These four entities include Confederated Tribes of the Goshute Reservation, Shoshone-Bannock Tribes of the Fort Hall Reservation, Skull Valley Band of the Goshute Indians, and Ute Indian Tribe of the Uintah and Ouray Reservation. Consultation with these four entities continued throughout this Plan-EIS development. Correspondence with the entities is included in Appendix A.

WATERSHED PLAN AGREEMENT

(*TO BE INCLUDED IN FINAL PLAN-EA*)

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Summary (Office of Management and Budget Fact Sheet)

Title of Proposed Action

Saratoga Springs Flood Prevention Project (Project) Draft Watershed Plan and Environmental Assessment (Plan-EA) for the Saratoga Springs Watershed.

Watershed Name

Saratoga Springs Watershed

County, State

Utah County, Utah

Congressional District

Utah Congressional District 4

Sponsoring Local Organizations

The Sponsoring Local Organization (SLO) for the Project is the City of Saratoga Springs.

Cooperating Agency

There are no cooperating agencies for the Project.

Authority

This Plan-EA has been prepared under the authority of United States Department of Agriculture Natural Resources Conservation Service (NRCS) Watershed and Flood Prevention Operations (WFPO) Program, which authorizes funding to help urban and rural communities protect, improve, and develop land resources in watersheds up to 250,000 acres in size. The WFPO Program includes the Flood Prevention Operations Program authorized by Flood Control Act of 1944 (Public Law [PL] 78-534) and the provisions of the Watershed Protection and Flood Prevention Act of 1954 (PL 83-566) Stat. 666 as amended (16 U.S.C. Section 1001 et seq.). The Plan-EA has been prepared in accordance with Section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969, Public Law 91-190, as amended (42 U.S.C. 43221 et seq.).

Purpose and Need for Action

The purpose of the Project is to provide flood prevention (flood damage reduction) measures to reduce damage caused by floodwater in the City of Saratoga Springs. There is a need to protect people, structures, roads, utilities, and property within the floodplain.

Description of Preferred Alternative

The preferred alternative includes structural and nonstructural measures. Structural measures consist of constructing two debris basins at Site 1 for Burnt/Lott Canyon and two debris basins at Site 2 for Clark Canyon to provide flood protection for up to and including a 100-year flood. Existing conveyance channels would be used to convey flows from the debris basins to Utah Lake. New conveyance channels would be constructed where needed to connect surface flow from the debris basins to existing conveyance channels. Nonstructural measures include implementing building restrictions in the remaining regulated floodplain, purchasing easements

along the modified channel corridors through Saratoga Springs to protect and maintain the channels for flood conveyance, and securing easements at the detention dams and for the upstream basin areas.

Resource Information

Table S-1. Existing Resoure Information

Resource	Description
Latitude / Longitude (WGS84)	Site 1 (Burnt/Lott Canyon): 40.3242 / -11.9356 Site 2 (Clark Canyon): 40.2955° / -111.9051°
Hydrologic Unit Name / Code[1]	Enoch Canyon-Frontal Utah Lake / 160202010602
Watershed Climate[2]	July average high/low: 91°F / 56°F January average high/low: 37°F / 17°F
Watershed Topography	Elevation Range 4,500 to 7,650 feet Mountain terrain transitioning to alluvial fans that slope toward Utah Lake.
Average Annual Precipitation / Snowfall[2]	13.5 inches / 30 inches
Proposed Saratoga Springs Watershed Area	13.4 square miles (8,590 acres)
Land Uses of Watershed[3 & 4]	Open Space Public Lands (State/BLM) 49% Residential/Planned Community 41% Private Open Land 5% Agricultural 4% Commercial 1%
Land Ownership of Watershed[4]	Private 50% Federal (Bureau of Land Management [BLM]) 30% State 20%
City of Saratoga Springs Population[5]	37,696
Farms Present (Utah County[6])	2,322 Farms
Land in Farms (Utah County[6])	296,042 acres
Average Farm Size (Utah County[6])	127 acres

1 - Source: U.S. Environmental Protection Agency (EPA) 2023
2 - U.S. Climate Data 2023
3 - City of Saratoga Springs 2024
4 - BLM 2022
5 – U.S. Census Bureau 2020
6 - USDA 2022

Alternative Plans Considered

Alternative plans considered in detailed study and evaluated in this Plan-EA include the No Action Alternative and two Action Alternatives. Alternatives considered in detailed study for each site were combined for the purpose of evaluating environmental, economic, and social effects. One Action Alternative combination considers construction of debris basins at both Site 1 and Site 2 (Site 1 and 2 Debris Basin Improvements Alternative). The other combination of alternatives considers construction of a debris basin at Site 1 and channel improvements at Site 2 (Site 1

Debris Basin and Site 2 Channel Improvements Alternative). Several other alternatives with structural and nonstructural measures were considered during the planning process but were eliminated from detailed study due to environmental impacts, if they were considered infeasible, had exorbitant costs, did not meet the purpose and need of the Project, or other critical factors. A description of the alternatives analyzed in detailed study and associated installation and operation and maintenance (O&M) costs are included below.

No Action Alternative – The No Action Alternative considers the actions that would take place if no federal action or federal funding were provided for the Project. The SLO's most likely course of action would be to continue O&M along the existing channels through the City of Saratoga Springs as needed to maintain the existing conveyance capacities. The flooding risks to the City of Saratoga Springs would remain. The annual O&M costs were estimated at $17,000 annually.

Site 1 and Site 2 Debris Basin Improvements Alternative – The alternative consists of constructing two debris basins at Site 1 for Burnt/Lott Canyon and two debris basins at Site 2 for Clark Canyon to provide flood protection for up to and including a 100-year flood. The flow out of the debris basins at each site would be combined into one conveyance channel. Existing conveyance channels would be used to convey flows from the debris basins to Utah Lake, where available. New conveyance channels would be constructed to connect surface flow from the debris basins to existing conveyance channels. Nonstructural measures would be implemented including building restrictions in the remaining regulated floodplain, purchasing easements along the modified channel corridors through Saratoga Springs to protect and maintain the channels for flood conveyance, and securing easements at the detention dams and for the upstream basin areas. The total installation cost is estimated at $22,222,000 with annual O&M estimated at $27,500 per year for Site 1 and $30,000 for Site 2. The SLO would remove sediment from the debris basins 50 years after construction to extend the sediment life of the basins to 100-years at an estimated cost of $362,000 for Site 1 and $277,000 for Site 2.

Site 1 Debris Basin Improvements and Site 2 Channel Improvements Alternative – The Site 1 Debris Basin Improvements are the same as described for the other Action Alternative above. Site 2 Channel Improvements consist of increasing the channel capacity at Clark Canyon by widening it from the mouth of Clark Canyon north and south drainages to Utah Lake (approximately 11,300 linear feet). Nonstructural measures would be implemented including building restrictions in the remaining regulated floodplain, purchasing easements along the modified channel corridors through Saratoga Springs to protect and maintain the channels for flood conveyance, and securing easements at the detention dams and for the upstream basin areas. The total installation cost is estimated at $21,228,000 with O&M estimated at $27,500 per year for Site 1 and $39,900 per year for Site 2. The SLO would remove sediment from the Site 1 debris basins 50 years after construction to extend the sediment life of the basins to 100-years at an estimated cost of $362,000.

Preferred Alternative Project Costs and Funding Source

The combination of alternatives that "best" maximized public benefits (environmental, economic, and social), also known as the NRCS preferred alternative, was determined to be the Site 1 and Site 2 Debris Basin Improvements Alternative. It is the preferred alternative for implementation. The breakdown of the estimated installation cost for the preferred alternative is provided in Table S-2. The NRCS provides 100 percent PL 83-566 funding for engineering and construction of

alternative measures meeting the NRCS flood prevention authorized purpose. However, the SLO is responsible for funding construction measures associated with modifications of bridge/culvert structures needed for safe conveyance of flood flows. The SLO is also responsible for easement real property rights, permitting, and costs associated with their own administrative time to install the Project. NRCS is responsible for their own administrative time as well to install the Project measures.

Table S-2. Estimated Project Installation Cost

Item	PL 83-566 Funds		Other Funds		Total	
Construction[1]	$17,736,000	99%	$0	0%	$17,736,000	80%
Engineering	$1,786,000	100%	$0	0%	$1,786,000	8%
Permits	$0	0%	$90,000	100%	$90,000	1%
Project Administration	$1,071,000	N/A	$715,000	N/A	$1,786,000	8%
Real Property Rights (easements)	$0	0%	$700,000	100%	$700,000	3%
Real Property Rights (culvert construction)	$0	0%	$124,000	1%	$124,000	<1%
Total	**$20,593,000**	**93%**	**$1,629,000**	**7%**	**$22,222,000**	**100%**

1- Construction cost for other funds includes cost for culvert work.

Project Benefits

Monetary flood damage reduction benefits are estimated at $2,141,700 annually for Site 1 and $4,626,000 annually for Site 2, totaling $6,767,700 annually. The annual installation cost for the Project is estimated at $731,300, resulting in a net benefit from Project implementation of $6,036,400 annually for 100 years (see Table S-3).

Nonmonetary benefits of the preferred alternative are equally important for consideration of Project implementation. These consist of environmental and social benefits in which the cost of the benefit cannot be reasonably calculated. This includes improved mental/physical well-being and safety for all people who inhabit the floodplain that are currently at risk. The alternative benefits daily lives, source of income, and the peace of mind of the community. The water quality of Utah Lake would be improved from reduction in floodwater contaminants and sediment entering Utah Lake during a flood.

Net Economic Benefits

Annual net economic benefits are included in Table S-3 and were calculated by comparing the preferred alternative annual costs to the annual benefits.

Table S-3. Estimated Annual Net Economic Benefits

Item	Average Annual Costs	Total Benefits	Benefit Cost Ratio	Net Economic Benefits
Site 1 (Burnt/Lott Canyon)	$401,700	$2,141,700	5.3	$1,740,000
Site 2 (Clark Canyon)	$329,600	$4,626,000	14.0	$4,296,400
Total	**$731,300**	**$6,767,700**	**9.3**	**$6,036,400**

Period of Analysis, Project Life, and Discount Rate

The period of analysis is the time required for installation of the Project plus the evaluated life of the Project (project life). All alternatives were evaluated with a period of analysis of 102 years (100-year project life plus 2 years for installation). The 2025 discount rate of 3.0 percent was used for economic cost and benefit calculations.

Environmental Impacts

Table S-4 lists the resources of concern and associated environmental consequences associated with the preferred alternative. Resources that would not be impacted by the project are not listed in this table.

Table S-4. Summary of Resource Concerns and Impacts

Resource Concern	Summary of Concern	Consequence
Upland Erosion	Disturbance to soils from proposed Project actions	Direct minor to negligible short-term impacts would occur during construction that would increase erosion potential, but BMPs[1] would be in place and disturbed areas would be restored/stabilized. A direct minor benefit is anticipated that would reduce erosion potential along conveyance channels over the long term.
Sedimentation	Sedimentation to developed community from flooding	Moderate indirect long-term benefits are anticipated that would avoid future overland flooding and sediment deposition (0.26 ac-ft per year at Site 1 and 0.19 ac-ft per year at Site 2) in the benefited area and channels. The risk of sediment-induced channel flow path changes would also be reduced.
Surface Water Quality	Construction activities have the potential to temporarily impact surface water quality.	There would be negligible direct impacts during construction based on the dry nature of the ephemeral system and implementation of BMPs[1]. A minor indirect benefit to Utah Lake water quality would occur from avoided overland flooding during future flood events and associated reduced contamination (sediment and contaminants) to surface water over the long term.

Resource Concern	Summary of Concern	Consequence
Surface Water Flow	Change to surface water flow	A moderate indirect benefit of improved flood flow management for future floods is expected over the long term. The measures reduce susceptibility of flow path changes, decrease flooding in the benefited area, and decrease erosion potential to conveyance channels. Measures increase resilience to the projected rise in flood frequency and intensity.
Waters of the U.S. and wetlands	Changes to water conveyance channels	No impacts to wetlands would occur. The modified ephemeral channels may not meet the current definition for a jurisdictional water of the U.S. per amendments to 40 CFR 120.2 and 33 CFR 328.3 on 8/14/2023. Assuming the ephemeral channels are non-jurisdictional, no impacts to jurisdictional waters of the U.S. are anticipated.
Floodplain Management	Change to floodwater conveyance	Moderate indirect benefits are expected over the long term from flood protection for up to and including a 100-year flood. The risk of injury or death and the risk of damage to buildings and infrastructure would be removed for this event. Measures also reduce flooding for a 500-year flood. Measures increase resilience to the projected rise in flood frequency and intensity.
Air Quality and Climate	Emissions from construction activities	No short-term direct adverse effects to air quality or GHGs[1] would occur during construction based on negligible construction emissions, emission values under the EPA general conformity de minimis thresholds, GHG[1] emissions below the EPA reportable limits, implementation of BMPs[1], and the short-term of construction. Measurable long-term impacts to air quality are not expected from continuation of O&M activities.
Vegetation, Noxious Weeds, and Invasive Plant Species	Increases risk of noxious weeds and invasive species from ground disturbance.	Direct short-term impacts to vegetated areas would occur from temporary disturbance to 42.6 acres of vegetated lands that would also increase the risk for invasion of N&I[1] weeds. These direct impacts are minor based on lack of sensitive vegetation communities, restoration of disturbed areas, development of a PCRP[1], and implementation of BMPs[1] with no long-term impacts.
Special Status Plant Species	No Special Status Plant Species Present	There would be no impact to ESA[1] plant species or habitat because none are present. A BA was submitted to the USFWS on March 26, 2025 to comply with Section 7 of the ESA and concurrence from the USFWS was received on April 15, 2025 (Appendix A).
Wildlife and Wildlife Habitat	Disturbance to general wildlife habitat	Direct short-term impacts to wildlife and wildlife habitat from temporary disturbance to 44.2 acres. Impacts would be minor based on restoration of disturbed areas, type of habitat disturbed, and short-term disturbance. Measurable long-term impacts are not anticipated.
Migratory Birds, Bald Eagles, and Golden Eagles	Construction disturbance in bird habitat	Negligible impacts based on implementation of conservation measures, restoration of disturbed areas, and abundant suitable habitat in the surrounding area. Measurable long-term impacts are not anticipated.

Resource Concern	Summary of Concern	Consequence
Special Status Animal Species	Construction disturbance to suitable habitat	No direct impacts to SGCN[1] or ESA[1] species would occur. Minor indirect benefits to SGCN[1] and ESA[1] June sucker and associated habitat are anticipated from reduced flood contaminants and sediment loads into Utah Lake. A BA[1] was submitted to the USFWS with a **May Effect, Not Likely to Adversely Affect** (beneficial) determination for June sucker and **No Effect** to all other species on March 26, 2025, to comply with Section 7 of the ESA (Appendix A). Concurrence was received from the USFWS on April 15, 2025 (Appendix A).
Social Issues and Local Economy	Economic and social implications to the flooded community	The alternatives would have a moderate indirect benefit to the community over the long term from flood protection. Flooding from a 100-year flood would no longer threaten the social wellbeing and prosperity of the community. Average annual flood damage reduction is estimated at $2,141,700 for Site 1 and $4,626,000 for Site 2.
Public Health and Safety	Flood hazard safety risks	Moderate indirect benefits to the health and safety of the community would occur from the reduced future flooding over the long term. The community would no longer be at risk of injury and loss of life for all flood events up to and including a 100-year flood. The physical and mental health of the community would be improved following a large flood event due to avoided flooding and safe flood routing through the city.
Visual Resources	Disturbed grounds and construction equipment	Minor short-term direct impacts to visual quality would occur during construction from construction equipment and disturbance but these areas would be restored after construction completion.
Transportation Infrastructure	Construction delays and flooding to community roads	Minor short-term direct impacts at one paved road culvert crossing during construction that would include temporary road closures with traffic detours. A long-term indirect benefit to transportation infrastructure would occur from flood protection measures. Average annual reduction in flood damage is estimated at $57,900 for Site 1 and $62,100 for Site 2.
Noise	Construction activities would produce noise	Minor direct short-term impacts would occur for channel modifications at Site 1 due to increases in noise and vibration near sensitive receptors in residential subdivisions. The remaining construction activities would have negligible impacts due to the proximity at ½-mile from sensitive receptors.

Resource Concern	Summary of Concern	Consequence
Historic Properties/ Cultural Resources/Native American Religious Concerns	Flooding to 11 known cultural resource sites	No direct impacts to historic properties or cultural resources would occur because none are present within areas disturbed. Minor indirect benefits would occur from reduced flooding to the 11 known cultural resource sites within the benefited area. NRCS determined there would be **No Historic Properties Affected** from alternative actions and submitted the determination to the SHPO[1] on November 12, 2024 to comply with Section 106 of the NHPA[1]. The SHPO[1] concurred with the determination in a letter dated December 24, 2024 (Appendix A). Four tribes were consulted pursuant to EO 13007, EO 13175, the NHPA[1,] and the AIRFA[1] (Appendix A). Per 36 CFR 800.4, the NRCS also consulted with tribes on the determinations of NRHP site eligibility. No Native American religious concerns were identified by the tribes.
Hazardous Materials	Active limestone and clay mine/landfill in flood path	Indirect minor benefits are expected from flood protection for the limestone and clay mine/landfill and associated reduced risk of contamination to surface water and soil.
Land Use	Added land use	Ther would be no change to the existing land use. Basins and conveyance channels would have an added use of flood management, but easements would be obtained with no impact on existing land use.

1- BMPs = Best Management Practices, N&I = Noxious weeds and invasive plants, PCRP = Post Construction Rehabilitation Plan, ESA = Endangered Species Act, SGCN = Utah Species of Greatest Conservation Need, BA = Biological Assessment, SHPO = State Historic Preservation Office, AIRFA = American Indian Religious Freedom Act, NHPA = National Historic Preservation Act.

Major Conclusions

The preferred alternative meets the purpose and need of the Project, accomplishes the goals and objectives, and provides the greatest combination of environmental, economic, and social benefits of all alternatives analyzed. Short-term adverse effects from alternative actions would be offset through restoration, avoidance/minimization measures, and implementation of Best Management Practices (BMPs). No measurable long-term adverse impacts are anticipated, and long-term environmental, social, and economic benefits would be realized from implementation of flood prevention measures.

Areas of Controversy and Issues to be Resolved

There are no known areas of controversy or issues to be resolved.

Evidence of Unusual Congressional or Local Interest

There is no known evidence of unusual congressional or local interest in the Project.

In Compliance

Is this report in compliance with executive orders, public laws, and other statutes governing the formulation of water resource projects? ☒ Yes ☐ No

1.0 Watershed Planning Background

As the lead federal agency, the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) is proposing to provide funding for a flood prevention project within the new NRCS Saratoga Springs Watershed. A Watershed Plan and Environmental Assessment (Plan-EA) is needed for NRCS to comply with the U.S. Department of Agriculture (USDA) requirements at 7 CFR Part 1b; the Principles, Requirements, and Guidelines for Federal Investments in Water Resources (PR&G) (Council on Environmental Quality [CEQ] 2013 and 2014); and NRCS policy and guidelines (NRCS 2010 and 2016). This section describes the general planning background for NRCS Watershed Program projects and specific planning background and setting for the proposed Project.

1.1 Authority

This Plan-EA has been prepared under the authority of the NRCS Watershed and Flood Prevention Operations (WFPO) Program, which authorizes funding to help urban and rural communities protect, improve, and develop land resources in watersheds up to 250,000 acres in size. The WFPO Program includes the Flood Prevention Operations Program authorized by Flood Control Act of 1944 (Public Law [PL] 78-534) and the provisions of the Watershed Protection and Flood Prevention Act of 1954 (PL 83-566) Stat. 666 as amended (16 U.S.C. Section 1001 et seq.).

1.2 Sponsor

The Project Sponsoring Local Organization (SLO) is the City of Saratoga Springs.

1.3 Cooperating Agencies

There are no cooperating agencies for the Project.

1.4 Planning Area

The Saratoga Springs Watershed (Watershed) Plan area is located on the west side of Utah Lake in Utah County, Utah (Appendix C, Map C1). The Watershed encompasses approximately 8,590 acres (13.4 square miles) of Hydrologic Unit Code (HUC) 12 Enoch Canyon sub-watershed (160202010900). Five drainage areas are located within the Watershed including Burnt Canyon, Lott Canyon, Israel Canyon, Wylie Canyon, and Clark Canyon (Figure 1-1). The Watershed boundary follows the border of the Enoch Canyon sub-watershed on the east, north, and west side. The south boundary of the Watershed follows the southern edge of the Clark Canyon drainage to Utah Lake.

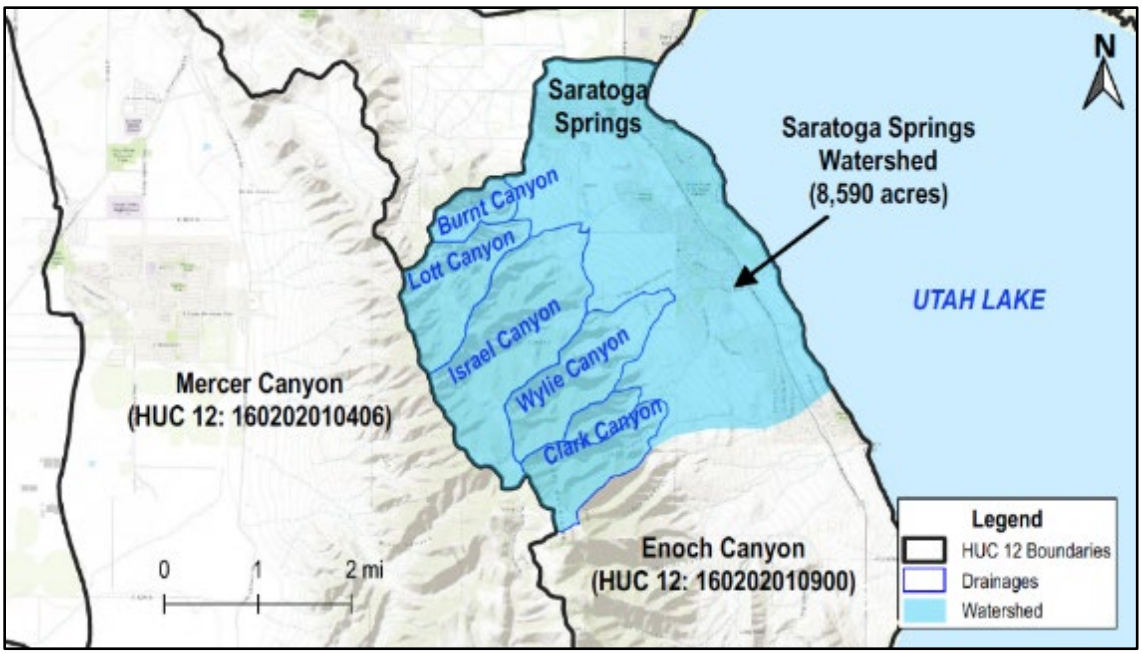

Figure 1-1. Saratoga Springs Watershed

1.4.1 Study Area

The study area for this Project includes the Watershed and may extend beyond the watershed to appropriately address resource concerns and effects. There are four drainage areas that were considered for hydrologic and hydraulic (H&H) analysis and alternative concept design which are listed in Table 1-1. See Figure 1-1 or Appendix B, Map B1 for spatial reference of the drainage areas within the Watershed.

Table 1-1. Drainage Area Summary

Drainage	Area (mi^2)	Area (acres)
Burnt Canyon	0.39	252
Lott Canyon	1.10	703
Clark Canyon (north)	0.28	181
Clark Canyon (south)	0.87	558

Most of the effects on resources are within the Project area which encompasses areas proposed for access, borrow material sources, staging, easements, and improvements for alternatives included in detailed study. Alternatives considered for detailed study and their associated Project area include 120.2 acres of land. The Project area is separated into two Sites, Site 1 at Burnt and Lott Canyon and Site 2 at Clark Canyon. Site 1 Project area consists of 66.2 acres of land associated with flood prevention improvements for Burnt and Lott Canyons. Site 2 Project area consists of 54.0 acres of land associated with flood prevention improvements for Clark Canyon. Refer to Appendix C, Map C1 depicting the Project areas for Site 1 and Site 2. Burnt/Lott Canyon contains two drainages (Burnt Canyon and Lott Canyon), and Clark Canyon also contains two drainages (Clark Canyon north and Clark Canyon south).

Effects associated with flooding focus on the benefited area. The benefited area covers approximately 2,877 acres (2,005 acres at Site 1 and 872 acres at Site 2) and is depicted in Appendix B, Map B1 and

Appendix C, Map C1. It encompasses the area that would benefit from implementation of Project flood prevention measures. The benefited area was determined as the maximum combined extent of the No Action Alternative flooding that would see reduced flooding from implementation of Project measures. The flooded area is located on an alluvial fan where flooding could follow a range of flow paths and the maximum extent of all the combined flow paths determined from Bowen Collins and Associates (BC&A) flood modeling (BC&A 2024a) were considered. In addition, the area downstream of the existing mining pit at Burnt and Lott Canyons is planned to be filled in to accommodate new development and would no longer capture floodwater. Though flood modeling was not performed for this condition, the area downstream of the mining pit is also included in the benefited area because flooding to this area would occur if the mining pit was filled in.

1.4.2 Area of Potential Effects

The Area of Potential Effects (APE) for Section 106 of the National Historic Preservation Act of 1966 (NHPA) consists of the combined Project area (120.2 acres) and benefited area (2,877 acres). It was defined in consultation with the SHPO and the consulted tribes per 36 CFR 800.3 and 800.4. Refer to Appendix C, Map C1 that depicts the Project area and benefited area making up the APE. These extents encompass all areas that may be disturbed or changed from their current conditions with potential to affect historic properties. Historic properties per 36 CFR 800.16 are defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria.

1.5 Planning Process and Study Scope

This document follows the areawide planning process as outlined in the NRCS National Planning Procedures Handbook (NPPH), Amendment 9 (NRCS 2021a). Areawide plans are voluntary, comprehensive plans for a watershed or other large geographic area. The geographic area for this plan consists of the Watershed. Planning policy for areawide plans require consideration of all natural resources within a planning area, as well as social and economic considerations. Areawide plans are developed through a voluntary locally led effort to achieve the following:

- Assess natural resource conditions and needs;
- Set goals;
- Identify programs;
- Alternative actions and other resources to solve those needs;
- Develop proposals and recommendations to solve those needs;
- Implement solutions; and
- Measure success.

The format of this document follows the plan format that must be followed for Watershed Project Plans as outlined in the NRCS National Watershed Program Manual (NWPM) Parts 500 through 506 (NRCS 2024), National Watershed Program Handbook (NWPH), Parts 600 through 606 (NRCS 2014), and National Environmental Compliance Handbook (NECH), Part 610 (NRCS 2016). The planning and decision-making process followed Principles, Requirements, and Guidelines for Federal Investments in

Water Resources (PR&G) (CEQ 2013 and 2014), NRCS Department Manual (DM) 95000-013 (U.S. Department of Agriculture [USDA] 2017), the PR&G eight step evaluation process (refer to the PR&G Preliminary Alternatives Analysis Report included in Appendix E [Adaptive Environmental Planning, LLC and Long Watershed Planning Economics 2024]), and the nine-step planning procedures from the NPPH (NRCS 2021a).

1.5.1 Stepwise Planning Process

The NRCS planning process consists of nine steps, divided into three phases covering development, implementation, and evaluation of an areawide plan. The nine-step planning process as presented in the NRCS NPPH (NRCS 2021a) was considered and incorporated into this Plan-EA as identified below.

Phase 1 - Collection and Analysis

Step 1 - Identify Problems and Opportunities: Problems and opportunities were identified during the Project scoping process and are included in Section 2.2 (Need). Input from the Sponsors, agencies, the public, organizations, and tribes were solicited as described in Sections 1.5.5 (External Scoping) and Section 7.3 (Public Involvement) to help identify problems and opportunities. Engineering analysis was completed to further identify and evaluate problems as documented in the engineering technical memorandum (TM) included in Appendix E.

Step 2 - Determine objectives: The purpose and need statement for the project was formulated with the problems and opportunities in consideration. Where the “purpose” identifies the fundamental reason why the action is being proposed and the “need” describes the problem/s that the proposed action is intended to address and explains the underlying causes of the problem/s. Section 2.0 (Purpose and Need) identifies the purpose, objectives, and need to support step 2.

Step 3 – Inventory Resources: Resources and ecosystem services relevant to the alternative actions were determined during the scoping process as described in Section 3.1 (Resource Categories of Concern). The resource conditions determined to be relevant are described in Section 3.2 (Inventory of Existing Resources and Conditions).

Step 4 – Analyze Resource Data: The environmental baseline conditions for resources to be evaluated against alternative actions were identified and are included in Section 3.2 (Inventory of Existing Resources and Conditions). The best available data and science was used to inventory the existing resource conditions at the level and scale of analysis determined reasonable for evaluating alternatives and impacts during the planning stage.

Phase 2 Decision Support

Step 5 – Formulate Alternatives: Project alternatives were formulated in consideration of the federal objective as set forth in the Water Resources Development Act of 2007, the PL 83-566 general purposes, and the Project purpose and need. Alternatives were formulated following procedures outlined in the NWPM, NWPH, DM 95000-013, and PR&G. Alternatives formulated are described in Section 4.0 (Formation of Alternatives).

Step 6 – Evaluate Alternatives: The effects of alternatives included in detailed study were determined for each resource relevant to the alternative actions. The evaluation of alternatives is included in Section 5.0 (Environmental Consequences) and assessed the proposed alternatives against the baseline data presented in Section 3.2 (Inventory of Existing Resources and Conditions).

Step 7 - Make Decisions: A NRCS preferred alternative, was selected based on the evaluation performed. The selection was made for the alternative that best maximized public benefits (environmental, economic, and social) with appropriate consideration of costs. Section 6.0 (Preferred Alternative) provides information on the decision-making process for selection of the preferred alternative.

Phase 3 Application and Evaluation (Future Work)

Step 8 – Implement the Plan: The Plan-EA is the first phase of three phases to be completed for implementation of the preferred alternative. After the Final Plan-EA is completed, phase 2 would consist of final design, and phase 3 installation of the Project measures.

Step 9 – Monitor the Plan: After the installation of measures from phase 3, NRCS and the Sponsors would evaluate the effectiveness of the plan in solving the resource concerns. Adjustments to the plan would be made as needed.

1.5.2 Ecosystem Services Framework

An ecosystem services framework is required by the PR&G and provides for an integrated approach that allows consideration and transparent evaluation of the benefits (both tangible and intangible) and tradeoffs of potential alternatives. Four categories of ecosystem services are described in the PR&G and are included below for reference.

1) **Provisioning services** are tangible goods provided for direct human use and consumption, such as food, fiber, water, timber, or biomass.
2) **Regulating services** maintain a world in which it is possible for people to live, providing critical benefits that buffer against environmental catastrophe – examples include flood and disease control, water filtrations, climate stabilization or crop pollination.
3) **Supporting services** refer to the underlying processes maintaining conditions for life on earth, including nutrient cycling, soil formation, and primary production.
4) **Culture services** make the world a place in which people want to live – recreational use, spiritual, aesthetic viewsheds, or tribal values.

The project scoping process identified resources relevant to the proposed action that were considered for the determination of applicable ecosystem services (see Section 3.1). Ecosystem service benefits can be both monetary and nonmonetary. Appropriate metrics should be based on current methodology to quantify impacted services over time for determination of project- and/or regional-specific effects. For reference, a list of ecosystem service categories and their subcategories is provided in Figure 1-2. The ecosystem service categories/subcategories relevant to this Project and the applicable resources pertinent to each subcategory that were analyzed in this document are provided in Table 3-2 of Section 3.1 (Resource Categories of Concern).

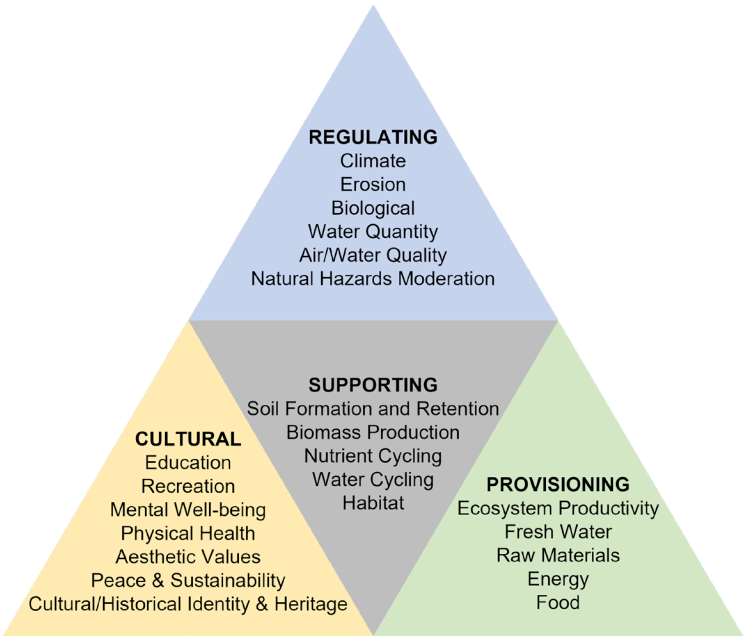

Figure 1-2. Ecosystem Services

The applicable ecosystem services from above were evaluated as part of the PR&G eight-step evaluation process. This process includes consideration of the federal objective, PL 83-566 general purposes, guiding principles, and ecosystem services to assist in decision-making. Refer to the PR&G Preliminary Alternatives Analysis Report included in Appendix E for documentation of the PR&G eight-step evaluation process used for decision-making.

1.5.3 Period of Analysis

The NRCS period of analysis is the time required for implementation (design and construction) plus the evaluated life of the project. The evaluated life is the time over which an alternative will have significant beneficial or adverse effects when the work(s) of improvement function successfully with prescribed operations, maintenance, and replacement (OM&R). The evaluated life is used for discounting and amortizing project benefits and costs. It is also used to determine the duration of operations and maintenance (O&M) agreements for the Project works of improvement.

The NRCS period of analysis for this Project is 102 years, which includes 100 years for the evaluated life and 2 years to install the Project measures.

1.5.4 Project Scope

Areawide Watershed Plans are limited for watershed size and structure size. The maximum watershed size allowed is 250,000 acres and structures cannot provide more than 12,500 acre-feet (ac-ft) of floodwater detention capacity or more than 25,000 ac-ft of total capacity. The existing Watershed covers an area of approximately 8,590 acres and is within the limit established for Areawide Watershed Plans. In addition, floodwater detention capacities for alternative measures are within the required capacity limits.

The focus for this Plan-EA analysis is specific to the Watershed and the downstream receiving water of Utah Lake.

1.5.5 External Scoping

An external scoping process was performed so that those who were interested in or potentially affected by proposed alternatives had an opportunity to share their concerns and provide input regarding the Plan-EA during the initial stages of the process. Project scoping questions, comments, and concerns were requested from the public, SLO, stakeholders, tribes, organizations, and agencies during the external scoping period, both orally at public meetings and via written submittal of comments. A scoping meeting for the Project was held on July 14, 2020. The meeting presented the overall Project and Plan-EA process. The open comment period extended from June 30, 2020, through August 30, 2020. Two scoping comments were received during the open comment period. These comments were considered in preparation of the Plan-EA. A Scoping Report was prepared summarizing the scoping process and is included in Appendix A. The scoping report includes documentation of the scoping announcements and activities that occurred during the external scoping process.

1.6 Related Projects and Studies

Actions and studies within the Project vicinity occurring in the past, present, and reasonably foreseeable future were identified to define the scope of issues to be addressed in this Plan-EA. Those found relevant to this Project were used in describing the resources in Section 3.0 (Affected Environment) and in determining the effects addressed in Section 5.0 (Environmental Consequences). Studies are referenced, where applicable, throughout Section 3.0 and Section 5.0. Section 8.0 (References) provides information on the references and where they can be found. Non-Project actions in the Watershed that were determined relevant to the Project effects analysis and associated cumulative effects are identified in Section 5.21.

2.0 Purpose and Need

2.1 Purpose

The purpose of the Project is to provide flood prevention (flood damage reduction) measures to reduce damage caused by floodwater in the City of Saratoga Springs. There is a need to protect people, structures, roads, utilities, and property within the floodplain.

2.1.1 Federal Objective

Water resources investments shall reflect national priorities, encourage economic development, and protect the environment by:

1) Seeking to maximize sustainable economic development;
2) Seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and
3) Protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

2.1.2 Project Objectives

Project objectives were formulated at the start of the planning process by the SLO and NRCS based on H&H analysis performed. The additional goals listed below were also established through input from the NRCS and SLO.

- Formulate feasible alternatives that would reduce flooding to the City of Saratoga Springs with a preferred level of flood protection for a 100-year flood.
- Provide alternative measures that have a net economic benefit.
- Provide flood damage reduction benefits for the city for the next 50 to 100 years.

2.1.3 Constraints and Considerations

Constraints and considerations were identified in the planning area that influenced the alternative analysis. These constraints limited the extent to which the objectives could be achieved. A description of the constraints and considerations are provided below.

- Alluvial Fan Topography: The developed areas to be protected from flooding are located on alluvial fans at the base of the Lake Mountains. Flow paths frequently vary across alluvial fans for each storm based on the loose soils/sediments and topography of these systems. This results in constantly changing flow paths with difficulty in predicting where the flooding will occur or protecting areas from flooding.
- Cloudburst Storms and Design Considerations: The Lake Mountain area is susceptible to cloudburst storms, which consist of a sudden and very heavy rainfall that hits over a localized area and usually for a short duration of time. Flash flooding or debris flows typically follow these types of events where substantial amounts of sediment laden water is conveyed through stream channels and across floodplains. Consistent with the alluvial fan process, this sediment can quickly deposit and clog stream channels which results in a sudden change of flow path and unpredictable flooding. Alternatives should consider these conditions to develop measures that decrease the risk of flow conveyance failures that may result in adverse flooding conditions.

2.2 Need

Developed areas within the City of Saratoga Springs are at risk of substantial flooding from upstream drainage areas. This flooding has the potential to destroy or cause damage to residences, community buildings, utilities, and city infrastructure. Flooding could cause injury and death adversely impacting the physical and mental well-being of the community. The developed areas within the alluvial floodplain no longer provide beneficial ecological floodplain functions and there is concern for harmful contaminants entering the downstream receiving water of Utah Lake during a flood. The problems leading to these issues and opportunities that could be realized by addressing them are described in the subsections below.

2.2.1 Problems

Developed areas of the City of Saratoga Springs are at risk of flood damage from flooding and flash flooding in the Burnt, Lott and Clark Canyon drainages. This flooding has the potential to destroy or cause damage to residences, community buildings, and city infrastructure, and poses a safety risk for those located within the floodplain.

The City of Saratoga Springs within the Watershed sits at the base of the Lake Mountains on an alluvial fan. Water conveyed from the upstream drainages flows over the alluvial fan draining into Utah Lake. Refer to Appendix C, Map C2 depicting the existing drainage areas and conveyance channels. Prior to the year 2000 this area was void of development. After the City of Saratoga Springs was established as a city in 2001, residential development exploded. Since that time approximately 5,000 new residential homes have been developed across the alluvial fan in the Watershed and development is continuing. Figure 2-1 below provides an aerial comparison of the Watershed in 1997 to the Watershed in 2023. The population of the city reached approximately 37,696 people in 2020 (U.S. Census Bureau). The city had the fastest growth rate in Utah from 2000 to 2010 and the population is projected to double in the next 10 years (City of Saratoga Springs 2023).

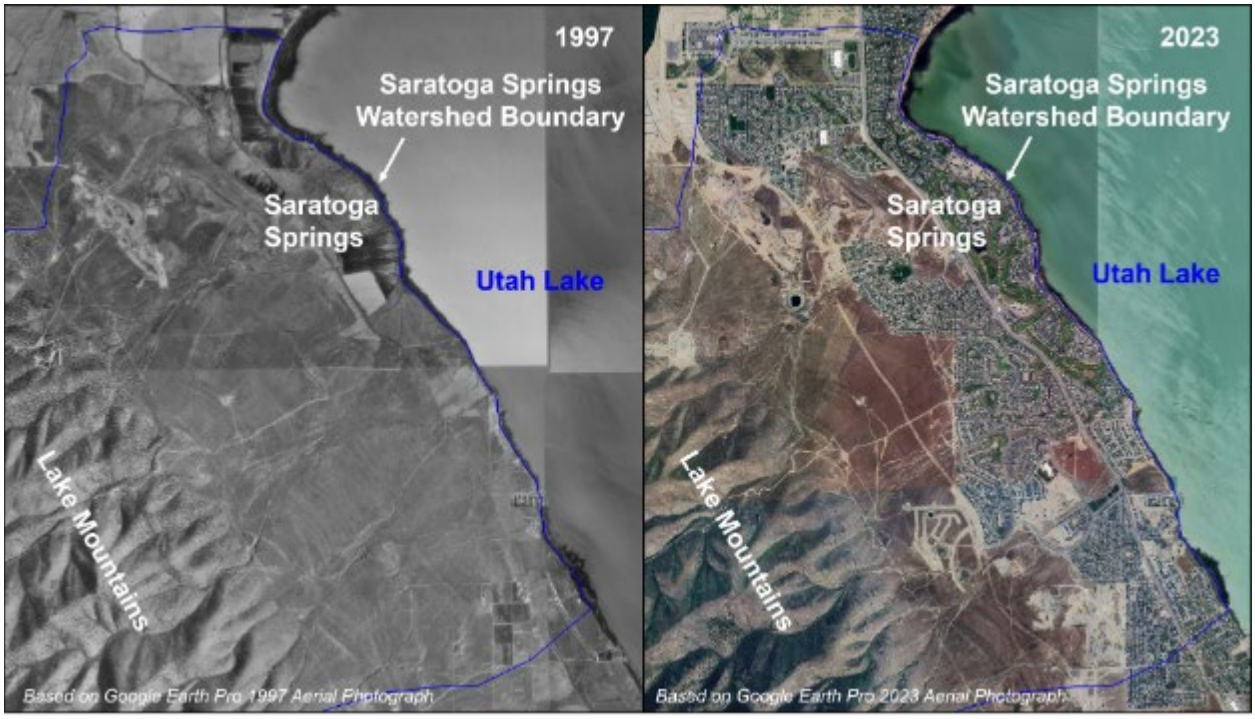

Figure 2-1. Saratoga Springs 1997 and 2023

The Watershed does not have permanent streams and is an ephemeral system, meaning that water only flows in the stream channel after a precipitation event and for a short duration after any given event. Flooding primarily occurs in association with cloudburst events, where heavy rainfall occurs in the drainage area over a short duration of time. When a significant amount of rain falls in the drainage area, flooding and flash flooding conditions can occur. Historically these floods would spread out over the alluvial fans frequently changing flow paths and depositing sediment on their path to Utah Lake.

There are five drainage areas in the Watershed located upstream of the developed areas of Saratoga Springs that have the potential to cause flooding. These include Burnt Canyon, Lott Canyon, Israel Canyon, Wylie Canyon, and Clark Canyon. Refer to Appendix C, Map C2 that depicts these drainage areas. The flood hazards of the Watershed were unknown during the initial development of the City of Saratoga Springs. Current Federal Emergency Management Agency (FEMA) Federal Insurance Rate Maps (FIRMs) do not show flood hazards related to these drainages and still currently show that the Watershed located within Zone X outside of the 500-year floodplain.

As development progressed, the city began to identify flooding and water conveyance issues. The first large flood issues occurred following a fire that burned more than 5,500 acres, including areas of the Burnt, Lott, and Israel Canyon drainages in June 2012. Heavy thunderstorms followed in August of 2012 causing debris flows and flooding from Israel Canyon which damaged dozens of homes in the Watershed. In 2013 and 2014 channel improvements were installed and the Israel Canyon Debris Basin constructed to reduce flooding from the drainage. Another fire occurred in 2020 (Knolls Fire) that burned areas south the City of Saratoga Springs and included a portion of the Clark Canyon and Losee Canyon drainages upstream of the city. The Losee Canyon Debris Basin was constructed in 2021 at the south end of town to reduce flooding, but nothing has been constructed for Clark Canyon.

The city has become more aware of the flood hazards and has incorporated conveyance and detention/retention facilities into planned areas for development. A new flood berm was constructed in 2021 to redirect flood flows from Wiley Canyon drainage to an improved flood conveyance channel. Multiple stormwater detention facilities have also been installed in combination with open space areas to help manage flood flows. Refer to Appendix C, Map C2 that depicts the existing conditions in the watershed and identifies the location of existing flood facilities. Even with these improvements, three of the drainage areas (Burnt, Lot, and Clark Canyon drainages) still pose serious flood threats to the developed communities of the Watershed. Additionally, extreme precipitation is projected to increase, potentially increasing the frequency and intensity of floods in Utah County (NRCS 2023a).

Recent analyses have been conducted that identify the extent and impacts of flooding to the City of Saratoga Springs from Burnt, Lot, and Clark Canyon drainages. A H&H analysis was completed by Bowen Collins and Associates (BC&A) for the Project to determine channel capacities, model storm events, and map flooding conditions (BC&A 2024a). Refer to Appendix D for a summary of the H&H analyses completed and the BC&A TM Attached in Appendix E for the detailed analysis. The analysis found the existing conveyance channels have minimal capacity and flooding outside of the channels occurs for an event as small as a 2-year flood (50 percent annual chance flood). The 2-year flood at the Burnt, Lott, and Clark Canyon drainages has the potential to damage approximately 400 homes, two churches, and one school. During a 100-year flood, approximately 1,200 homes, five churches, two schools, and three commercial/ office buildings are at risk of flooding. Analysis of flood depths and velocities by BC&A determined that there is a risk of loss of life during a 100-year flood event.

In addition to the risk of flood damage and associated loss of life in the Watershed, there is an increased risk of degraded water quality. The developed alluvial fan that lies between the Lake Mountains and Utah Lake no longer maintains its natural floodplain functions. Flooding of the developed alluvial fan could introduce chemicals, fuel, animal waste, bacteria, and other harmful substances into floodwater which would drain back into Utah Lake.

2.2.2 Opportunities

Solutions to reduce the adverse flooding conditions to the City of Saratoga Springs have been a priority for the community since the flooding issues were realized. Through PL 83-566 funding program, there are opportunities for NRCS to assist the SLO in developing, designing, and installing positive solutions for the program's authorized purpose of flood prevention (flood damage reduction). The PL 83-566 set forth three general purposes for Watershed Program projects (NRCS 2024) identified below.

1) flood prevention (including structural and land treatment measures.
2) the conservation, development, utilization, and disposal of water.
3) the conservation and proper utilization of land in watershed or subwatershed area.

The flood prevention authorized purpose, as included in the NWPM, allows for flood damage reduction measures to reduce or prevent floodwater damages by reducing runoff, erosion, and sediment through; modifying the susceptibility of improvements in the floodplain to damage; removing damageable property from the floodplain; or reducing the frequency, depth, or velocity of flooding. Measures may also include actions that prevent encroachment into the floodplain (NRCS 2024).

The flood prevention project can provide the long-term positive benefits listed below.

- Reduced flood damage to structures, utilities, and city infrastructure.
- Improved stability and prosperity for the impacted community in the City of Saratoga Springs.
- Improved public safety and social wellbeing.
- Reduced physical and mental health stressors that impact communities in the wake of flooding.
- Reduced risk of contamination to surface water.

3.0 Affected Environment

3.1 Resource Categories of Concern

A scoping process was completed to identify relevant resources, environmental concerns, and ecosystem services to be analyzed in detail and to determine which could be eliminated from detailed study. These items were identified for the Project based on required scoping concerns outlined in the NWPM Section 501.24 B (NRCS 2024) and from any additional concerns identified by the public, SLO, stakeholders, tribes, agencies, and agencies during the scoping process.

Table 3-1 below provides a list of resources and their relevancy to the Project. Items determined not relevant to the proposed action have been eliminated from detailed study. Items determined to be relevant to the proposed action are detailed in this Plan-EA and addressed in Section 3.2 Inventory of Existing Resources and Conditions, and in Section 5.0**Error! Reference source not found.** Environmental Consequences.

Table 3-1. Resource Concerns Summary

Item/Concern	Relevant		Rationale
	Yes	No	
Soil			
Upland Erosion	X		Construction disturbance could increase erosion potential.
Sedimentation	X		Alternative measures would change sediment transport conditions.
Prime and Unique Farmland		X	The Project area does not contain prime and unique farmland based on a review of NRCS Web Soil Survey data (NRCS 2020a). Refer to Appendix C, Map C6.
Water			
Surface Water Quality	X		Utah Lake has water quality concerns and alternative measures could influence water quality.

Item/Concern	Relevant		Rationale
	Yes	No	
Surface Water Quantity and Flow	X		There would be no change to surface water quantity from alternative actions, but water flow paths could be altered.
Ground Water Quantity/Quality		X	There would be no measurable change to groundwater quantity or quality from alternative actions. No source water protection areas are located in or near the Project area based on a review of Utah Division of Groundwater Source Protection Zones interactive mapper (UDEQ 2024a)
Waters of the U.S. and Wetlands	X		Waters of the U.S. and wetlands are located within the Watershed.
Regional Water Mgt. Plans and Coastal Zone Management Areas		X	The Utah State Water Plan was developed to provide information on Utah's water use and supply conditions (Utah Department of Natural Resources [UDNR] 2021). No water is diverted for use at Burnt, Lott, or Clark Canyons and will not be for alternative measures. Therefore, alternative measures would not have effects to the State Water Plan. Coastal Zone Management Areas are not applicable to the landlocked state of Utah.
Floodplain Management	X		Project actions will directly modify flood conditions and impact floodplain management.
Wild and Scenic Rivers		X	None in or near the Project area, according to National Wild and Scenic Rivers System (NWSRS) interactive Map (NWSRS 2024).
Sole Source Aquifers		X	No sole-source aquifers are in or near the Project area, according to U.S. Environmental Protection Agency (EPA) Sole Source Aquifer interactive map (EPA 2024a).
Air			
Air Quality	X		Alternative construction activities would produce emissions and fugitive dust, and must comply with the Clean Air Act. The Project area is in the Utah Department of Environmental Quality (UDEQ) Provo, Utah non-attainment area. Rule R307-309 for Fugitive Emissions and Fugitive Dust would apply for construction activities.
Greenhouse Gases / Climate	X		The project will have no measurable impact to greenhouse gases or climate.
Plants			
Special Status Plant Species	X		Endangered Species Act (ESA) plants, designated critical habitat, or suitable habitat are not located within the Project area, but are included in detail study to document compliance with Section 7 of the ESA.
Forest Resources		X	There are no forested lands located within the Project area.

Item/Concern	Relevant		Rationale
	Yes	No	
Noxious Weeds and Invasive Plant Species	X		Alternative construction disturbance increases risk of invasive plant species becoming established.
Protected Natural Areas/ Conservation Areas		X	There are no protected natural areas or conservation areas located in the Project area based on a review of Bureau of Land Management conservation areas, USFWS wilderness areas, U.S. Forest Service Research Natural Areas (RNAs), and USFWS wildlife refuges.
Riparian Areas		X	There is no riparian habitat located in the Project area. Refer to Section 3.2.8 for vegetation communities.
Animals			
Essential Fish Habitat		X	There is no essential fish habitat located in the Watershed based on National Oceanic and Atmospheric Administration (NOAA) fisheries Essential Fish Habitat Mapper (NOAA 2024).
National Wildlife Refuges / Wilderness Areas		X	There are no Wildlife Refuges or Wilderness Area in the Watershed based on review of USFWS wilderness area (Wilderness Connect 2024) and wildlife refuges (USFWS 2021).
Fish and Wildlife Habitat	X		The Project area does not contain fish habitat due to lack of surface water. Alternative construction activities would disturb general wildlife and wildlife habitat.
Coral Reefs		X	No coral reefs are present within the landlocked state of Utah.
Special Status Animal Species	X		ESA-listed animals, designated critical habitat, or suitable habitat are not located within the Project area, but are included in detailed study to document compliance with Section 7 of the ESA. State-listed Species of Greatest Conservation Need have the potential to occur in the Project area.
Invasive Animal Species		X	No potential for introduction of invasive animal species.
Migratory Birds / Bald and Golden Eagles	X		Migratory birds, bald eagles, and golden eagles have the potential to be present within the Project area.
Human			
Social Issues and Local Economy	X		The Project is in a populated area and Project measures could impact local social and economic conditions.
Regional and National Economy		X	The Project is not anticipated to have impacts to regional or national economy.
Historic Properties / Cultural Resources / Native American Religious Concerns	X		A determination of **No Historic Properties Affected** was made by NRCS for alternative actions, but this resource is included in detailed study to document compliance with Section 106.
Hazardous Materials	X		A landfill is located within the flood path of Burnt/Lott Canyons.
Public Health and Safety	X		The public is at risk from flooding and alternative

Item/Concern	Relevant		Rationale
	Yes	No	
			measures would change flood conditions.
Recreation		X	No designated recreation areas or trails are present within the Project area.
Public Access		X	No changes to public access are anticipated.
Land Use	X		Alternative actions may change land use.
Visual Resources	X		There are no scenic views within the Project area. Alternatives may impact visual resources from construction disturbance and equipment.
National Scenic and Historic Trails		X	There are no National Scenic and Historic Trails (NSHTs) located in or near Project area, based review of the National Trails System Map (National Park Service [NPS] 2024a).
Natural Areas and Parklands		X	There are no natural areas or parks located within or near the Project area according to National Parks and Monuments Map (NPS 2024b) and Utah State Parks Map (Utah Department of Natural Resources [UDNR] 2024a).
Transportation Infrastructure	X		Alternatives have the potential to change flood conditions for transportation infrastructure.
Noise	X		Alternatives would produce construction-related noise.
Ecological Critical Areas		X	None present in the Watershed based on lack of species critical habitat, wilderness areas, refuges, natural areas, Areas of Critical Environmental Concern (ACEC), or protected areas.
National Landmarks, Monuments, and Historical Sites		X	None located in or near Project area based on National Natural Landmarks Map (NPS 2024c), National Register of Historic Places (NRHP) data (NPS 2020), and National Parks and Monuments Map (NPS 2024b).
Scientific Resources		X	There are no scientific resources in the Project area based on a review of the geologic map (Biek 2004), paleontological sites (Paleobiology Database 2024), NPS maps (NPS 2024a, 2024b, 2024c), and lack of the following identified in this table above; ACECs, national landmarks/monuments, parklands, natural areas, protected areas, conservation areas, NSHT, RNAs, refuges, wilderness areas, or wild and scenic rivers.
Ecosystem Services			
Provisioning		X	Project measures would not result in changes of tangible goods provided for direct human use and consumption
Regulating	X		Project measures include regulation for water and flooding that influence ecosystem processes.
Cultural	X		The Project is intended to improve safety, wellbeing, and sustainability of the local community.
Supporting		X	Project measures would not result in changes to the underlying processes maintaining conditions for life on earth (nutrient cycling, soil formation, and primary

Item/Concern	Relevant		Rationale
	Yes	No	
			production).

An ecosystem services framework is required by the PR&G and provides for an integrated approach that allows consideration and transparent evaluation of the benefits (both tangible and intangible) and tradeoffs of potential alternatives. The four categories of ecosystem services are described in Section 1.5.2 (Ecosystem Services Framework).

Ecosystem service categories overlap with the resource concerns and therefore, are not discussed separately from the resource concerns. For reference, the ecosystem service categories relevant to this Project and the applicable resource concerns contributing to ecosystem services are provided in Table 3-2.

Table 3-2. Applicable Ecosystem Services and Related Resources

Category	Service	Applicable Resources
Regulating	Water Regulation (quality and quantity)	Waters of the U.S., Surface Water Quality, Surface Water Quantity and Flow, Floodplain Management
Regulating	Natural Hazards Moderation (flood)	Floodplain Management, Public Health and Safety, Transportation Infrastructure
Cultural	Peace and Sustainability	Social Issues and Local Economy, Public Health and Safety, Visual Resources, Transportation Infrastructure, Noise.
	Well-being and Safety	Floodplain Management, Public Health and Safety, Social Issues and Local Economy

The applicable ecosystem services from above were evaluated as part of the PR&G eight-step evaluation process. This process includes consideration of the federal objective, PL 83-566 general purposes, guiding principles, and ecosystem services to assist in decision making. Refer to the PR&G Analysis Report included in Appendix E for documentation of the PR&G eight-step evaluation process used for decision-making.

3.2 Inventory of Existing Resources and Conditions

This section describes the resources that were determined to be relevant to the proposed action from Table 3-1. Describing the affected environment defines the context in which the impacts could occur. The environmental analysis process has been conducted in compliance with applicable federal, state, and local regulations. Resources relevant to the Project are described in this section. The environmental consequences to resources are included in Section 5.0.

3.2.1 Upland Erosion

Soils within the Project area vary and the erosivity is dependent upon soil characteristics and the erosional forces acting on them. Erosion of surface materials occurs from wind and water interaction. Chemical processes can also help breakdown surface materials and contribute to erosion. Water is the most powerful erosive force and does the most damage when combined with steep gradients. The steeper the terrain, the greater the potential for erosion from water interaction due to increased water velocities. Soils on slopes greater than 15 percent would have a greater risk of erosion from water interaction. Additionally, any areas that have been disturbed and/or lack vegetative cover would have a

higher susceptibility for erosion. For this reason, geology, soil, topographic, and vegetation conditions in the Watershed are important to understanding erosion potential.

Geologic units of the Watershed consist of mostly bedrock in the Lake Mountains and alluvial fan sediment deposits from the base of the Lake Mountains to Utah Lake, according to the geologic map for the Saratoga Springs 7.5 Minute Quadrangle (Biek 2004). Bedrock in the Lake Mountains is comprised primarily of sandstone and limestone that is part of the Butterfield Peaks Formation (IPobp geologic unit) and transitions to West Canyon Limestone (IPmowc geologic unit) at the base of the Lake Mountains. The alluvial fan deposits are comprised mostly of geologic units Qafy and Ql/Qafo. The Qafy geologic unit consists of debris flows deposited at the mouths of active drainages and the Ql/Qafo geologic unit is older alluvial fan deposits partially concealed by lacustrine deposits. A map of geologic units is provided in Appendix C, Map C5, and a table of geologic unit descriptions is provided in Appendix E for reference.

There are 33 different soil types found within the Watershed. Soil information was accessed through the NRCS Web Soil Survey data (NRCS 2023b). A table of soil types found within the Watershed is included in Appendix E and a map of soil types is provided in Appendix C, Map C6. Representative slopes and erosion hazard rating data was obtained for the soils within the Watershed. The representative slopes in the Lake Mountains were mostly between 45 and 60 percent. The slopes downstream of the Lake Mountains are primarily at 0 to 5 percent. Approximately 50 percent of the Watershed has soil classified with a slight erosion hazard, 49% classified with a moderate erosion hazard, and 1% are not rated. The moderate erosion hazard soils occur in the Lake Mountains where steeper slopes occur and slight erosion hazard soils occur on the less steep alluvial fans located between the Lake Mountains and Utah Lake. A description of hazard ratings is provided below (NRCS 2023b).

- Slight erosion hazard rating indicates that erosion is unlikely under ordinary climatic conditions.
- Moderate erosion hazard rating indicates that some erosion is likely and that erosion-control measures may be needed.
- Severe erosion hazard indicates erosion is very likely and erosion-control measures, including revegetation of bare areas, are advised.

The steeper portions of the Watershed in the Lake Mountains containing moderate erosion hazard soils are vegetated with primarily forested, scrub/shrub, and grasslands reducing erosion susceptibility. They are also mapped as limestone and sandstone which are less susceptible to erosion than loose sediments. Areas downstream of the Lake Mountains contain mostly alluvial fan sediments, however they are at a lower grade with a slight erosion hazard. Additionally, half of the alluvial fan is covered with developed surfaces that further reduce erosion susceptibility. Based on the conditions in the Watershed, erosion does not currently appear to pose a high risk. However, some minor erosion is visible along the lower segment of the Clark Canyon channel and segments of the channel were armored to protect from erosion. Risks of erosion on undeveloped land could increase following a fire or in disturbed areas that have not been appropriately stabilized.

3.2.2 Sedimentation

The lower half of the Watershed is located on overlapping alluvial fans where sediments deposit at the base of the Lake Mountains. These sediments are transported by water from the upstream drainage area and settle out when the steep terrain transitions to flatter terrain. An alluvial fan system deposits larger sediments and rocks at the upstream areas near the apex and sediment sizes decrease as you travel down the alluvial fan to the base. This is due to the decrease in water channel confinement and velocities

from the apex to the base as the fan and channel slopes decrease, gradually reducing the sediment carrying capacity[1]. Flow paths along alluvial fans may vary for each storm based on the loose soil/sediment and topographic conditions. This typically occurs as sediment deposits at various locations along the fan switching the channel flow path. Figure 3-1 below includes a schematic of an alluvial fan.

The City of Saratoga Springs within the Watershed is located on alluvial fans at the base of the Lake Mountains (Figure 3-1). The drainage areas and flow from the Burnt, Lott, and Clark Canyons is currently uncontrolled. Uncontrolled indicates that precipitation or snowmelt in the drainage area is not regulated by a controlling structure such as a dam. Flooding and flood paths of alluvial fans can be very unpredictable as flow paths change frequently. If a large flood event were to occur, water would be conveyed across the alluvial fans depositing sediment (alluvium) on the developed areas of the city. Sediment deposition could occur from in-channel flow, from unconfined overland flow, or from debris flows. As most of the homes in the path of flooding have basements, substantial damage to homes would occur due to basements flooding with sediment laden water. Flooding and sediment deposition would also damage landscaped areas, roadways, and could clog culvert crossing.

Based on a sedimentation analysis performed by BC&A, approximately 0.27 ac-ft of sediment per year originate from the Burnt/Lott Canyon drainages and approximately 0.20 ac-ft of sediment per year originate from the Clark Canyon drainage. Refer to Appendix D for a summary of the sedimentation analyses completed and the BC&A TM Attached in Appendix E for the detailed analysis. This is an annual average and the amount of sediment carried during storm events can vary greatly depending on the intensity of the storm and conditions in the Watershed at the time of the storm. Estimating the amount of sediment that would deposit on the alluvial fans is difficult due to highly unpredictable variables including storm intensity, duration, and location of storm events in the upstream drainage area, along with topographic/building features that play a role in water movement and trapping of sediment. However, based on alluvial fan geomorphology information provided by Benito 2022, 20 to 50 percent of the sediment volume of a stream settles out on alluvial fans (Benito 2013).

[1] Sediment carrying capacity – the amount of sediment that can be transported under the given flow conditions.

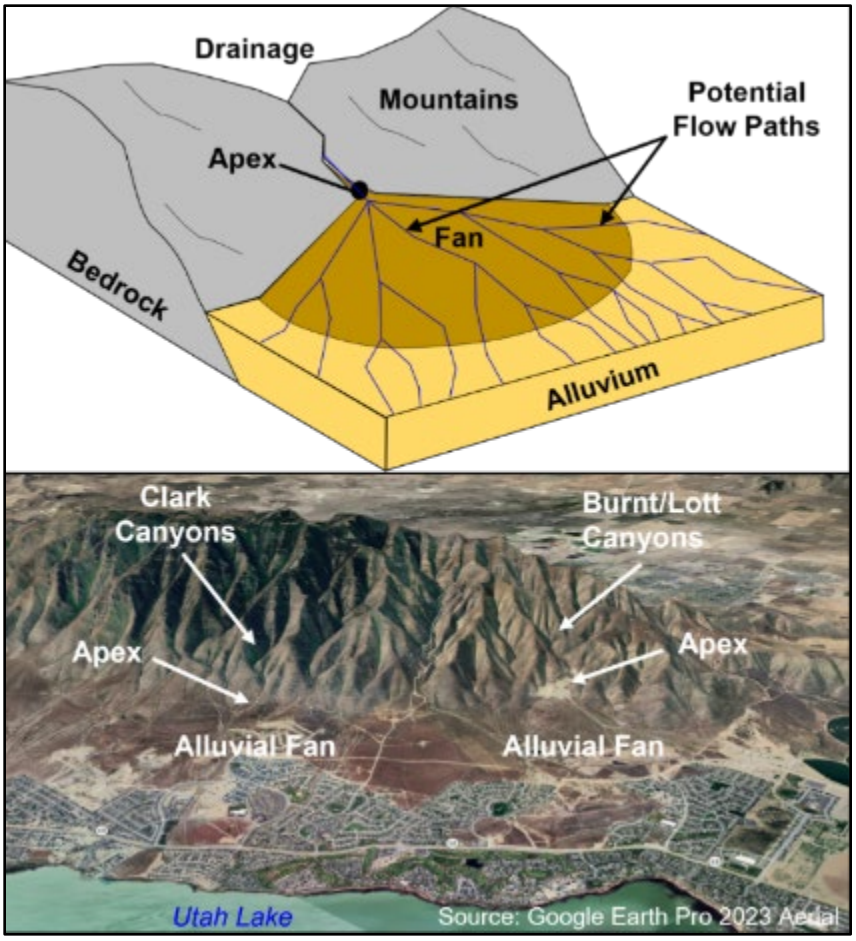

Figure 3-1. Alluvial Fan General Graphic and Aerial

3.2.3 Surface Water Quality

Surface water in Utah is protected, maintained, and restored through Utah's water quality standards regulated through the Clean Water Act and Utah Water Quality Act (UWQA). These include establishment of designated uses, water quality criteria, and antidegradation policy. Utah's antidegradation policy (Rule R317-2-3; Utah Office of Administrative Rules 2018) does not prohibit degradation of water quality unless the Water Quality Board has previously considered the water to be of exceptional recreational or ecological significance (Category 1 or Category 2 waters). Category 1 or Category 2 waters do not exist within or near the project area (Utah Department of Environmental Quality [UDEQ] 2023a); therefore, the antidegradation policy does not apply.

There are no natural permanent surface waters within the Watershed, except for Utah Lake. The ephemeral channels that run through the Project area are dry for most of the year and only flow water during extreme precipitation events. Refer to Section 3.2.5 Waters of the U.S. for information regarding the existing ephemeral channels within the Project area. Water quality data is not available for these channels.

Utah Lake has documented long-standing water quality issues. The lake is the receiving body for wastewater treatment plant effluent, industrial discharges, stormwater discharges, and nonpoint source runoff (UDEQ 2023b). Utah Lake was assigned as a Category 5 in the latest assessment of the quality

of surface waters in the state, meaning it is impaired for one or more beneficial uses by a pollutant requiring the development of a total maximum daily load (TMDL) (UDEQ 2022). Utah Lake does not currently meet criteria for eutrophication, PCBs in fish tissue, *Escherichia coli* (E. Coli), harmful algal blooms, total phosphorus, and total dissolved solids (TDSs), with a 303(d) status of TMDL needed. This has impaired several beneficial uses including Use Class 2A (frequent primary contact recreation), Use Class 3B (warm water fishery/aquatic life), and Use Class 4 (agriculture-crop irrigation, stock watering) (UDEQ 2022).

Even though there is no water quality data for the ephemeral channels in the Project area, it is important to note that flooding from the channels could impact water quality conditions of Utah Lake. Contamination in floodwaters is well documented. Several agencies including FEMA (2024), U.S. Centers for Disease Control and Prevention (2024), National Institute of Environmental Health and Sciences (2022), and the EPA (EPA 2024b), provide information and public warnings to avoid contact with floodwater because they are frequently contaminated. A landfill is in the flood path of Burnt/Lott Canyons (refer to Appendix C, Map C2) that accepts construction/demolition/yard/inert/tire waste and petroleum-contaminated soils. An explosive products facility is also present in the flood path of Burnt/Lott Canyons. Flooding of the City of Saratoga Springs could pick up contaminants from developed areas, the explosive products facility, landfill then convey them downstream to Utah Lake. A flush of pollutants into Utah Lake including chemicals, fuel, animal waste, bacteria, soil/sediments, and other harmful substances could occur during a flood event.

3.2.4 Surface Water Quantity and Flow

There are five drainage areas in the Watershed including include Burnt Canyon, Lott Canyon, Israel Canyon, Wylie Canyon, and Clark Canyon (refer to Appendix C, Map C2). Stormwater runoff is conveyed from these drainages through several ephemeral channels to Utah Lake. For most of the year the stream channels in the Watershed are dry, but flow occurs for a short time following heavy rainfall events. The only permanent surface water in the Watershed is Utah Lake.

The Project area contains several ephemeral channels from Burnt, Lott, and Clark Canyons. A map of delineated channels in the Project area is included in Appendix C, Map C7. The channels are mostly confined in the canyons, but alluvial fans exist at the base of the Canyons where surface water flow paths can frequently change course. The delineated channel from Map C7 includes the current active channels, but alluvial fan paleochannels are visible across the fans. An H&H analysis completed by BC&A found the existing channels have minimal capacity and flooding outside of the channels occurs for an event as small as a 2-year flood (50 percent annual chance flood) (BC&A 2024a, attached in Appendix E). For reference, Table 3-3 includes the peak flood flow from each of the canyon drainage areas during 24-hour storm events.

Table 3-3. Existing Conditions Peak Flood Flow

24-Hour Storm Event	Frequency[1]	Peak Flood Flow (cubic feet per second [cfs])			
		Burnt Canyon	Lott Canyon	Clark Canyon North	Clark Canyon South
2-Year	25%	36	12	5	5
5-Year	20%	69	38	18	19
10-Year	10%	104	74	35	43
25-Year	4%	160	139	67	90
50-Year	2%	213	204	98	139
100-Year	1%	273	283	136	201
500-Year	0.2%	493	587	255	400

1 – percent probability of storm occurring in any given year.

Temperature trends have influenced surface water quantities and flows in the Watershed. It is projected that more winter precipitation will fall as rain instead of snow, which will decrease the snowpack water storage (NRCS 2023a). Studies indicate that more intense droughts and floods are expected in the future (Utah Division of Water Resources 2020). Extreme precipitation is projected to increase, potentially increasing the frequency and intensity of floods in Utah County (NRCS 2023a). These conditions are concerning when considering the existing channel conveyance capacities are less than the capacity needed to convey a 2-year flood and the channels run through heavily developed residential areas.

3.2.5 Waters of the U.S. and Wetlands

Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into jurisdictional waters of the U.S. and requires a permit for these activities unless the activities are exempt from Section 404 regulation.

A survey was performed (BC&A 2021) to identify aquatic resources that could be jurisdictional waters of the U.S. (see the Saratoga Springs Watershed Aquatic Resources Report in Appendix E). The ordinary high water mark (OHWM) of sections of the Burnt, Lott, and Clark Canyons drainage channels were surveyed as depicted in Appendix C, Map C7. The survey found all channels present associated with Burnt/Lott and Clark Canyons to be ephemeral tributaries. A tributary must meet the relatively permanent standard to be considered a jurisdictional water of the U.S. If a tributary has flowing or standing water year-round or continuously during certain times of the year, it meets the relatively permanent standard (U.S. Army Corps of Engineers [USACE] 2023). Relatively permanent waters do not include tributaries with flowing or standing water for only a short duration in direct response to precipitation (USACE 2023). The ephemeral channels in the Project area only flow for a short period of time in direct response to precipitation and therefore, are not anticipated to be considered jurisdictional water of the U.S. However, it is the responsibility of the U.S. Army Corps of Engineers (USACE) to make the final determination of jurisdictional waters of the U.S. Coordination with USACE regarding jurisdiction of the ephemeral drainages would occur during future final design phases for this Project.

Utah Lake and associated wetlands are located in the Watershed based on a review of National Wetland Inventory data (U.S. Fish and Wildlife Service [USFWS] 2024). Utah Lake is classified as a lacustrine system and the wetlands present are classified as freshwater emergent and freshwater forested/shrub (USFWS 2024). Utah Lake has been used in interstate commerce meeting the definition of a traditional navigable water and is considered a jurisdictional water of the U.S. Therefore, Utah Lake and the

wetlands present in the watershed are considered jurisdictional waters of the U.S. Approximately 1.5 acres of emergent wetland, 11.4 acres of forested/shrub wetland, and less than 0.01 acres of lacustrine lake are located in the Watershed. There are approximately 0.04 acres of emergent wetland located in the Project area. A map of NWI features within the Watershed is provided in Appendix C, Map C7.

3.2.6 Floodplain Management

The FEMA coordinates the federal government's role in preparing for, preventing, mitigating, the effects of, responding to, and recovering from all domestic disasters, whether natural or human-caused, including acts of terror. The FEMA has developed floodplain regulations through the National Flood Insurance Program (NFIP) that are adopted by communities to enforce floodplain management regulations that help mitigate flooding effects.

The current FEMA FIRMs (FEMA 2020, Map Numbers 49049C0285F and 49049C0295F) do not have flooding from the Burnt, Lot, or Clark Canyon drainages mapped. The only mapped floodplain in the Watershed is the Utah Lake Floodplain which is identified as Zone AE. Zone AE is a Special Flood Hazard Area (SFHA) subject to inundation by the 1 percent annual chance flood (100-year floodplain) where base flood elevations have been determined. The remaining portion of the Watershed is located within Zone X, which are areas determined to be outside of the 0.2 percent annual chance flood (500-year floodplain).

Even though FEMA maps show no flood hazards downstream of Burnt, Lott, and Clark Canyons, recent flood modeling performed by BC&A shows extensive flooding to the City of Saratoga Springs from these Canyons. Flooding begins to occur for an event as small as a 2-year flood. Maps depicting the flood modeling results for the 100-year and 500-year floods for these drainages are provided in Appendix C, Maps C9.1, C9.2, C10.1 and C10.2. During a 100-year flood, stormwater runoff from Burnt and Lott Canyons could inundate 348 homes, three churches, one school, and two commercial/office buildings. During the same flood event at Clark Canyon, 882 homes, two churches, one school, and one commercial office building could be inundated. Although FEMA FIRMs do not show flood hazards, this recent flood modeling clearly demonstrates that flood hazards exist for Burnt, Lott, and Clark Canyon drainages.

Residents of the City of Saratoga Springs unknowingly purchased and developed land within these flood prone areas. As FEMA FIRMS are updated in the future, residents in flooded areas may be required to purchase insurance coverage through the NFIP.

As discussed in Section 3.2.4, the frequency and intensity of flooding in Utah County has increased. This should be considered in future FEMA planning as it increases the threat to people and property located within SFHAs.

3.2.7 Air Quality and Climate

3.2.7.1 Air Quality

The EPA has established health-based National Ambient Air Quality Standards (NAAQS) for six pollutants considered harmful to public health and the environment, known as criteria pollutants. NAAQS pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), sulfur dioxide (SO_2), and lead (Pb). Pollutant concentrations that exceed the NAAQS are considered unhealthy for some portion of the population. At concentrations between 1.0 and 1.5 times the standard, the general public is not expected to be adversely affected by the pollutant; however, the most sensitive

portion of the population may be affected. At levels above 1.5 times the standard, even healthy people may experience adverse effects (UDEQ 2023c)

Monitoring of NAAQS pollutants in Utah is delegated to the Utah Division of Air Quality (UDAQ). The UDAQ had 24 fixed air quality monitoring stations throughout the state of Utah that monitored the NAAQS pollutants in 2023 (UDEQ 2023c). The closest station to the Project area is the Lindon Station, located approximately 9.5 miles east of the Watershed. The Lindon Station was monitored for CO, NO_2, O_3, PM (including $PM^{2.5}$ and PM^{10}), and Pb in 2023. Results for the station show CO, NO_2, Pb, and PM did not exceed the EPA air quality standards for 2023 monitoring. The pollutant O_3 exceeded the EPA air quality standards and Utah County has been classified as a marginal nonattainment area for O_3.

Even though the standards have been met for $PM_{2.5}$ for the three-year average, this attainment was not reached by the statutory attainment date of December 31, 2015, and EPA had reclassified the Provo moderate nonattainment area, which Utah County is situated, as a serious nonattainment area. In November of 2020, the EPA proposed to redesignate the Provo $PM_{2.5}$ nonattainment area to attainment, but EPA received adverse comments on the proposal, and EPA and UDEQ are working to address the adverse comments so the areas can be redesignated to attainment (UDEQ 2023c).

3.2.7.2 Greenhouse Gasses and Climate

Gases that trap heat in the atmosphere are called greenhouse gases (GHG) and include CO_2, methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride). These GHGs are introduced into the atmosphere by a variety of sources including production of electricity, private and commercial transportation, industry practices, commercial and residential practices, agriculture, land use, and forestry. The largest source of GHG emissions from human activities in the U.S. is from burning fossil fuels for electricity, heat, and transportation (EPA 2024c).

The total gross GHG emissions by gas for the nation in 2021 was reported at 6,340.23 million metric tons of carbon dioxide equivalent (MMT CO_2 eq.) with Utah contributing 79.19 MMT CO_2 eq., or 1.2% of the nation's MMT CO_2 eq (EPA 2021). From 1990 to 2021, the national GHG emissions had a total gross decrease of 2.3% while Utah had a total gross increase of 17.7% (EPA 2021). In 2021 the primary economic sectors contributing GHG in Utah include transportation contributing 28.5%, electric power industry contributing 25%, and industry contributing 23.5%.

The average temperature in Utah has increased more than 2.5°F since the beginning of the 20th century, and over the last 50 years, Utah temperatures have risen about twice the global average (University of Utah 2024). The state is already experiencing increased drought, wildfires, flash floods, and extreme heat waves from rising temperatures. In Utah County, projections show that more winter precipitation will fall as rain instead of snow, which will decrease snowpack water storage (NRCS 2023a). Extreme precipitation is projected to increase, potentially increasing the frequency and intensity of floods (NRCS 2023a).

3.2.8 Vegetation, Noxious Weeds, and Invasive Plants

3.2.8.1 Vegetation

Vegetation cover in the Watershed consists primarily of forested, shrub/scrub, and grassland areas. There are no sensitive plant communities (sensitive plant species, protected natural areas, conservation areas, or ecologically critical areas) in the Project area. Most of the lower half of the Watershed is

developed with hard surfaces, structures, and landscaped areas. Vegetation cover in the Watershed was grouped based on the National Land Cover Database (NLCD) classes (Multi-Resolution Land Characteristics Consortium [MRLC] 2019) which are described below.

- Open Water: Areas of open water, generally with less than 25% vegetation or soil.
- Developed: Includes NLCD classes for developed open space, developed low intensity, developed medium intensity, and developed high intensity areas.
- Barren: Areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
- Forest: Includes NLCD classes for deciduous, evergreen, and mixed forest. Forested areas are dominated by trees generally greater than 5 meters tall and greater than 20% of total vegetation cover.
- Shrub/Scrub: Areas dominated by shrubs that are less than 5 meters tall with shrub canopy typically greater than 20 percent of the total vegetation (MRLC 2019).
- Grassland/Herbaceous: Areas dominated by graminoid or herbaceous vegetation that generally make up 80 percent of the total vegetation (MRLC 2019).
- Agricultural: This includes NLCD classes for cultivated crops and pasture/hay where these covers account for greater than 20% of the total vegetation.
- Wetland: This includes NLCD classes for woody wetlands and emergent herbaceous wetlands.

The acreage of land cover types in the Watershed and in the Project area is displayed in Table 3-4. The Watershed contains approximately 6,500 acres (76%) vegetation cover and the remaining 2,090 acres (24%) is developed, barren, or open water areas. The Project area contains 84.8 acres (71%) vegetation cover, and the remaining 35.4 acres (29%) is developed or barren areas. A map of land cover is included in Appendix C, Map C11.

Table 3-4. Land Cover Summary

Land Cover	Acres in Watershed	% Cover in Watershed	Acres in Project Area	% Cover in Project Area
Water	1	<1%	0	0%
Barren	59	<1%	1.6	1%
Developed	2,057	24%	33.8	28%
Agricultural	136	2%	0	0%
Wetland	26	<1%	<0.01	<0.01%
Grass/Herbaceous	2,439	28%	58.1	49%
Shrub/Scrub	2,622	31%	25.1	21%
Forest[1]	1,250	15%	1.6	1%
Total	**8,590**	**100%**	**120.2**	**100%**

1 – Forest cover within the Project area no longer exists due to a fire and was observed to be grass/herbaceous cover

Grass/herbaceous land cover within the Project area was observed to be dominated by cheatgrass (*Bromus tectorum*). Shrub/Scrub areas were dominated by sagebrush (*Artemisia tridentata*) and

rabbitbrush (*Ericameria nauseosa*) with a cheatgrass ground cover. Forested land cover within the Project area appeared to have burned in a recent fire and these areas no longer provide forest cover. These formerly forested areas now consist primarily of grass/herbaceous cover dominated by cheatgrass with scattered rabbitbrush. Wetland areas were observed to be dominated by phragmites (*Phragmites australis).*

3.2.8.2 Noxious Weeds and Invasive Plants

Executive Order 13122 states that "a federal agency shall not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction and spread of invasive species in the U.S. or elsewhere." Noxious weeds and invasive plants (N&I weeds) are non-native plant species designated by state law or county ordinance because they cause, or have the potential to cause, extraordinary negative economic and ecological impacts.

Utah has 54 plant species listed as N&I weeds in the state of Utah (Utah Department of Agriculture and Food [UDAF] 2022). Utah's weed plan includes a list of weeds that are to be controlled per Utah Noxious Weet Act and are separated into the classes described below. Utah County has adopted the Utah N&I weeds list.

- Class 1A (Early Detection Rapid Response): Declared N&I weeds not native to Utah and not known to exist in the state but pose a serious threat to the state and should be considered as a very high priority.
- Class 1 B (Early Detection Rapid Response): Declared N&I weeds not native to Utah and known to exist in the state in very limited populations but pose a serious threat to the state and should be considered as a very high priority.
- Class 2 (Control): Declared N&I weeds not native to Utah and known to exist in varying population throughout the state that pose a threat to the state and should be considered a high priority for control. The concentration of these N&I weeds is at a level where control or eradication may be possible.
- Class 3 (Containment): Declared N&I weeds not native to Utah that are widely spread and known to exist in various populations throughout the state. These N&I weeds pose a threat to the agricultural industry and agricultural products. Weed control efforts may be directed at reducing or eliminating new or expanding populations through the state. Known and established weed populations may be managed by any approved weed control methodology, as determined by the weed control authority.
- Class 4 (Prohibited): Declared N&I weeds not native to Utah that pose a threat to the state through the retail sale or propagation in the nursery and greenhouse industry. The weeds are annual, biennial, or perennial plants that the commissioner designates as having potential or are known to be detrimental to human or animal health, the environment, public roads, crops, or other property.

The lower half of the Watershed is in highly disturbed and developed areas in and near the City of Saratoga Springs. The upper half is primarily within Bureau of Land Management (BLM)-managed lands where disturbance occurs from recreation activities and grazing. Soil disturbance and seed dispersal from vehicles, foot traffic, livestock, wildlife, and other activities increase risk for invasion of N&I weeds. Several N&I weeds were observed in the Project area during site visits conducted by Adaptive Environmental Planning (AEP) between 2019 and 2023 and are listed in Table 3-5.

Table 3-5. N&I Weeds Observed in Project Area

Scientific Name	Common Name	Weed Class
Carduus acanthoides	Plumeless thistle	1A
Carduus nutans	Musk thistle	3
Elaeagnus angustifolia	Russian olive	4
Phragmites australis	Phragmites	3
Tamarix ramosissima	Tamarisk	3

Many other weeds and non-native plant species were observed in addition to those listed as N&I. Much of the Project area was dominated by non-native and problematic weed species including Russian thistle (*Salsola iberica*), cheatgrass (*Bromus tectorum*), kochia (*Kochia scoparia*), and yellow sweet clover (*Melilotus officinalis*).

3.2.9 Special Status Plant Species

The ESA was established to protect endangered and threatened species and their habitats. Section 7 of the Act requires federal agencies to ensure that federal actions do not jeopardize the existence of any listed species. This is accomplished through Section 7 consultation with USFWS.

No ESA plant species or suitable habitat are located in the Project area as determined in the Biological Assessment (BA) completed for the Project (BC&A 2024b, attached in Appendix E). Section 7 informal consultation was completed for the Project, and the results of the consultation are discussed in Section 5.9 of the Environmental Consequences section.

3.2.10 Wildlife and Wildlife Habitat

Wildlife habitat in the Project area may support a range of native and non-native migratory birds, resident birds, mammals, amphibians, and reptiles. Wildlife populations that are the most documented and understood include those that are special status species that are listed for protection under the ESA, are a state species of concern, or are desired game or furbearers. Refer to Section 3.2.12 for information regarding special status species.

No sensitive wildlife habitat (wilderness areas, wildlife refuges, protected natural areas, conservation areas, or ecological critical areas) are located within the Project area. Approximately 29% of the Project area is developed or barren lacking habitat for wildlife. Vegetated areas within the Project area are 50% grass/herbaceous lands that lack sufficient cover for wildlife. Shrub/scrub land cover is present on approximately 21% of the Project area that may provide some cover for smaller wildlife species. However, these shrub/scrub areas are in and around areas frequently disturbed for mining and landfill operations or adjoin residentially developed areas. Based on the proximity in and near developed and frequently disturbed areas and little vegetation cover, the habitat quality is low. The low-quality habitat and frequent human disturbance likely deter most wildlife from inhabiting the area. If species are present, most would likely pass through the area to forage rather than inhabit the area.

The UDNR has mapped seasonal habitats for 23 wildlife species within Utah (UDNR 2024b). Chukar, mule deer, and ring-necked pheasant have Crucial or Substantial value habitats within the Watershed. This includes approximately 3,392 acres of Substantial Habitat for chukar, 2,744 acres of Substantial Habitat for ring-necked pheasant, and 4,108 acres of value habitat for mule deer (339 acres Substantial

Habitat and 3,769 acres Crucial Habitat). Crucial and Substantial value habitats for wildlife species are defined by UDNR as described below and a map depicting these habitats is provided in Appendix C, Map C12.

- Crucial – habitat on which the local population of a wildlife species depends for survival because there are not alternative ranges or habitats available. Crucial value habitat is essential to the life history requirements of a wildlife species. Degradation or unavailability of crucial habitat will lead to significant declines in carrying capacity and/or numbers of wildlife species in question.
- Substantial – Habitat used by a wildlife species but is not crucial for population survival. Degradation or unavailability of substantial value habitat will not lead to significant declines in carrying capacity and/or numbers of the wildlife species in question.

The Project area contains areas mapped as substantial habitat for ring-necked pheasant, but these areas have been recently disturbed or developed and no longer provide appropriate habitat to support pheasant. Therefore, the value habitat is no longer present. Approximately 61.9 acres (29.9 at Burnt/Lott Canyons and 32.0 at Clark Canyon) of crucial habitat for mule deer are in the Project area. The Project area at Clark Canyon contains 3.2 acres of substantial habitat for chukar. Refer to Appendix C, Map C12 for value habitats within the Project area.

3.2.11 Migratory Birds, Bald Eagles, and Golden Eagles

3.2.11.1 Migratory Birds

Migratory birds are afforded protection under authority of the Migratory Bird Treaty Act (MBTA) (16 U.S.C 703-712). Under the MBTA, it is unlawful to take, kill, or possess migratory birds, their parts, nests, or eggs. Under the MBTA, the term *take* is defined as any attempt or success at pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting. Migratory bird permits must be obtained through the USFWS Migratory Bird Permit Office for any requested waiver or exception to the MBTA. Migratory birds have the potential to occur within the project area for breeding and foraging. However, available habitat is low quality and vegetation cover is limited (refer to Section 3.2.10 for more information on habitat)

The USFWS maintains a list of Migratory Birds of Conservation Concern (MBCC), which are migratory non-game birds that are likely to become candidates for listing under the ESA without additional conservation actions. According to the USFWS Information for Planning and Conservation (IPaC) resource list for the Project area (USFWS 2024), two MBCC may occur in this area, including bald eagle (*Hailaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*).

3.2.11.2 Bald and Golden Eagles

Eagles are protected under the Eagle Protection Act (16 U.S.C 668), which provides specific protection for bald and golden eagles. The act makes it illegal to take, possess, sell, purchase, barter, or transport any bald or golden eagle, alive or dead, or any part, nest, or egg thereof. Under the Eagle Protection Act, the term *take* includes pursuing, shooting, shooting at, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing.

Bald eagles (*Haliaeetus leucocephalus*) breeding sites are extremely localized in Utah, with one in Emery County, two in Grand County, and one in Salt Lake County (Utah Division of Wildlife Resources [UDWR] 2024a). There are no known breeding sites in Utah County and no nesting habitat is in the Project area. Therefore, bald eagles are not anticipated to be present for nesting. Wintering habitats in Utah includes rivers, streams, lakes, reservoirs, ponds, sewage lagoons, montane riparian woodlands, desert riparian

woodlands, submontane shrub, croplands, and orchards (UDWR 2024a). There are several reported winter sightings of bald eagles in the City of Saratoga Springs adjoining Utah Lake (ebird 2024). Therefore, the species has the potential to be present while foraging during winter. However, bald eagles commonly forage in water environments and there are none within the Project area. It is not likely the species would be found in the Project area, due to lack of water for foraging and trees for perching, but they may use adjoining habitats.

Golden eagles (*Aquila chrysaetos*) generally inhabit open and semi-open country such as prairies, sagebrush, arctic/alpine tundra, savannah or sparse woodland, and barren areas in areas with sufficient mammalian prey base and near suitable nesting sites (UDWR 2024a). Nests are constructed on cliffs or in large trees. Nesting habitat is not located within the Project area, but there are several reported sightings of golden eagles in and around the City of Saratoga Springs. Therefore, the species has the potential to be present while foraging. However, the proximity in and adjoining developed areas along with frequent human presence (activity and noise), likely discourages the species from frequently foraging in the area.

3.2.12 Special Status Animal Species

3.2.12.1 Endangered Species Act Species

The ESA was established to protect endangered and threatened species and their habitats. Section 7 of the Act requires federal agencies to ensure that federal actions do not jeopardize the existence of any listed species. This is accomplished through Section 7 consultation with USFWS.

A BA was completed for the Project (see the BA attached in Appendix E), which identified three ESA species that should be considered for Section 7 Consultation for the Project. These include monarch butterfly (*Danaus plexippus*), yellow-billed cuckoo (*Coccyzus americanus*), and June sucker (*Chasmistes liorus*). The BA determined that no yellow-billed cuckoo habitat present and the species is not expected to be present. Monarch butterfly were also determined not to be present due to lack of habitat (milkweed) necessary for butterfly reproduction. June sucker are present downstream of the Project area in Utah Lake. Critical habitat for the ESA threatened June sucker has been designated, but is not located in or near the Watershed or Project area. Additional information for June sucker is summarized below.

June sucker (summarized from UDWR 2024a): The species is very narrowly distributed, occurring in Utah Lake and the Provo Rover, and nowhere else in the world. Although the species was once abundant in Utah Lake, it is now extremely rare. Spawning occurs mainly in June in large tributary streams including the lower portion of Provo River and, at least formerly, lower Spanish Fork River. Major causes of June sucker decline include flow alternations, pollution, drought, hybridization with other sucker species, and competition with and predation from exotic fish species. The Project area does not contain habitat for June sucker, but Utah Lake where the species are known to occur, is located downstream of the Project area.

Section 7 informal consultation was completed for the Project, and the results of the consultation are discussed in Section 5.9 of the Environmental Consequences section.

3.2.12.2 State-Listed Species

The state of Utah has developed a Wildlife Action Plan with the purpose and goal of managing native wildlife species and their habitats, sufficient to prevent the need for additional listings under the ESA (UDWR 2015). The Wildlife Action Plan identifies Species of Greatest Conservation Need (SGCN) that

are considered jurisdictional wildlife under the plan. State-listed SGCN as identified in the Wildlife Action Plan, have potential to occur within the Project area or be affected by alternative actions. Based on review of the UDWR SGCN occurrence (UDWR 2024b) and coordination with UDWR, four species were recommended for consideration in Project actions. These include peregrine falcon (*Falco peregrinus*), golden eagle (*Aquila chrysaetos*), coarse rams-horn (*Planorbella binneyi*), and June sucker (Appendix A). Information on peregrine falcons and coarse rams-horn is included below. Information on June sucker is included in Section 3.2.12.1 for ESA species and information on golden eagles is included in Section 3.2.11.2 for bald/golden eagles.

- Peregrin Falcon (*Falco peregrinus*) summarized from UDNR 2024a: Peregrin falcons arrive in the northern breeding areas in late April to early May and depart beginning late August to early September. Breeding habitat of this species in Utah consists of cliffs, bluffs, caves, and rock pockets, often near water. Habitats during migration include various water-associated habitats; croplands; orchards, shelterbelts, and tree farms; cold desert shrub (including saltbrush and greasewood); and sagebrush-rabbitbrush (at lower elevations).
- Coarse rams-horn (*Planorbella binneyi*) summarized from UDNR 2024a: Coarse rams-horn has been reported to occur in Utah County and was once widespread in Utah Lake. The species has since disappeared from Utah Lake. Habitat includes mainly lakes, but a creek, canals, a pond, and a trout pond have also been noted. The species live on the bottom of lakes in quiet stagnant water.

Nesting habitat for peregrine falcons is not present based on the lack of cliffs, bluffs, caves, and rock pockets. However, these species may use portions of the Project area to forage while migrating. Coarse rams-horn is not anticipated to be present based on the disappearance of the species from Utah Lake.

3.2.13 Social Issues and Local Economy

The socioeconomic baseline is characterized by population, demographics, employment, and income. Socioeconomic baseline conditions of the City of Saratoga Springs are identified in the subsections below, and for comparative purposes, baseline socioeconomic conditions for Utah County and Utah are also provided. In addition, the projected economic flood damage to the City of Saratoga Springs is included.

3.2.13.1 Population

Table 3-6 shows population trends from 2000 to 2020 for the City of Saratoga Springs, Utah County, and Utah (U.S. Census Bureau 2000-2020). The City of Saratoga Springs was established in 2001 and has experienced exponential growth since its establishment. The Utah Governor's Office of Economic Development identified Saratoga Springs with the fastest growth rate in the State from 2000 to 2010 at 1,627.8% (City of Saratoga Springs 2023). In comparison, Utah County had a growth of approximately 40% and Utah had a growth rate of approximately 24% during the same period.

Table 3-6. Population Trends

Year	City of Saratoga Springs	Utah County	Utah
2000	1,003	368,536	2,233,169
2010	17,781	516,564	2,763,885
2020	37,696	659,399	3,271,616

3.2.13.2 Demographics

Demographic data from Table 3-7 shows that percentage of minority populations in the City of Saratoga Springs are higher than the county and state.

Table 3-7. Demographics

Year 2020	City of Saratoga Springs	Utah County	Utah
Total Population	37,696	659,399	3,271,616
Percent White	87.6%	92.0%	90.0%
Percent Minority Races	12.4%	8%	10%

Source: U.S. Census Bureau 2020

3.2.13.3 Employment and Income

Employment and income data is summarized in Table 3-8. The data shows the City of Saratoga Springs has a much higher median household income and much lower poverty percentage with a lower unemployment rate than the county or the state.

Table 3-8. Employment and Income Summary

Item	City of Saratoga Springs	Utah County	Utah
Unemployment Rate	2.5%	3.7%	3.6%
Median Household Income	$101,592	$77,057	$74,197
Persons in Poverty	3.9%	6.9%	6.3%

Source: U.S. Census Bureau 2020

3.2.13.4 Local Economy

The largest economic industry in the City of Saratoga Springs is retail trade. However, the Watershed is primarily a residential area containing very few retail businesses. Aside from residences, schools, and churches, the Watershed contains a gas station, golf course, dental office, explosive products facility, landfill, and mine. The housing market is the primary economic activity in the Watershed as development surges.

3.2.13.5 Economy and Flooding

Flooding of communities incurs more than just the cost of damage alone. Flood risk threatens social wellbeing and prosperity of the community. Flooding losses may include property damage, environmental degradation, and interruption in business operations. Flooding also often takes a mental health toll on those impacted.

Flood damage for Burnt, Lott, and Clark Canyons were calculated using a cumulative probability method for numerous flooding events between the 2-year and 500-year floods, as described in the PR&G Preliminary Alternatives Analysis Report included in Appendix E. Flood modeling performed by BC&A (BC&A 2024a – Attached in Appendix E) was used to determine depth of inundation to structures, transportation infrastructure, and lands. The cost of damage was calculated by Long Watershed Planning Economics, LLC using a period of analysis of 102 years and the 2025 discount rate of 3.0 percent. Total annual damage associated with flooding of buildings was calculated at $2,117,800 for Burnt/Lott Canyons

and $4,581,000 for Clark Canyon. For roads, the annual damages were calculated at $59,500 for Burnt/Lott Canyons and $62,300 for Clark Canyon. Refer to Section 12.0 of Appendix D for more information on the economic analysis performed.

Flooding can also result in mental health issues with associated costs. Floods destroy livelihoods, can result in fatality, can damage buildings/homes, and ruin possessions, turning lives upside down and disrupting communities (MarshMcLennan 2021). Increases in depression, post-traumatic stress disorder, and substance abuse are well documented in the aftermath of floods and can persist for years afterward (MarshMcLennan 2021). These costs were not calculated for flood damages due to uncertainties in calculation methods, but they are important to note as they influence impacted individuals financially.

3.2.14 Public Health and Safety

Flooding is the primary public health and safety concern for the Project. Large and damaging floods have the potential to occur. With the recent explosion in residential development, many residents are now subject to public safety hazards from flooding. Additionally, FEMA flood maps do not show these developed areas in a floodplain. The City of Saratoga Springs has identified a need for flood prevention measures to reduce the public health and safety hazard associated with flooding from Burnt, Lott, and Clark Canyon.

Based on an H&H analysis completed by BC&A (BC&A 2024a, attached in Appendix E), flood conveyance channels for Burnt, Lott, and Clark Canyons don't have enough capacity to convey flood flows from a storm as small as a 2-year flood event. Any event equal to or greater than a 2-year flood has the potential to inundate the residential community and threaten public safety. Table 3-9 and Table 3-10 below identify the type and number of structures inundated during several 24-hour flood events. Analysis of flood depths and velocities by BC&A determined that there is a risk of loss of life during a 100-year flood event. Maps depicting existing condition flooding during a 100-year and 500-year flood are provided in Appendix C, Maps C9.1 C9.2, C10.1, and C10.2. Maps depicting lesser flood events are provided in the BC&A TM attached in Appendix E.

Table 3-9. Burnt/Lott Canyon Inundated Features Summary

Flood Event	Homes	Church	School	Commercial/ Office
2-Year	53	1	1	0
5-Year	190	2	1	2
10-Year	239	2	1	2
25-Year	293	2	1	2
50-Year	329	3	1	2
100-Year	348	3	1	2
500-Year	389	3	1	2

Table 3-10. Clark Canyons Inundated Features Summary

Flood Event	Homes	Church	School	Commercial/ Office	Other*
2-Year	344	1	0	0	1
5-Year	514	2	1	0	1
10-Year	648	2	1	1	1
25-Year	762	2	1	1	1
50-Year	825	2	1	1	1
100-Year	882	2	1	1	1
500-Year	959	2	1	1	2

** Other consists of the El Nautica Boat Club with RV lots for the 2-year through 100-year floods and a pump house for the 500-year flood.*

Flooding also has lasting effects on mental health. Many factors such as death, destruction of property, impacts to livelihoods, etc. can increase mental health issues for those impacted. Damage to much of the community would occur during a flood as shown in the numbers of features inundation from Table 3-9 and Table 3-10. Deterioration of mental health of the individuals of the community would be at risk based on the loss of life and damages anticipated from flooding to homes, places of worship, schools, and other community structures.

3.2.15 Visual Resources

Visual landscape can be influenced by urban development, vegetation, hydraulic features, geologic conditions, topography, wildlife, and recreation. The combined topography, vegetation, geologic conditions, limited vegetation cover, and presence of disturbed and developed areas do not offer unique or outstanding views in the Project area. A general view of the undeveloped Project area at Site 1 (Burnt and Lott Canyon) and Site 2 (Clark Canyon) is provided in Figure 3-2 and a general view through developed areas is provided in Figure 3-3.

Figure 3-2. General View of Undeveloped Visual Landscape at Canyon Sites

Figure 3-3. General View of Developed Visual Landscape at Canyon Sites

3.2.16 Transportation/Infrastructure

The Watershed contains several paved surface roads and one highway (Highway 68). These roads are at risk of future flooding. As described in Section 3.2.14, Burnt, Lott, and Clark Canyons don't have enough capacity to convey flood flows from a storm as small as a 2-year flood event. This flooding has the potential to damage roadways and road water crossings (culverts, bridges, etc.). Additionally, substantial amounts of sediment would be deposited over the roadways. A count of roads and highways inundated based on the inundation extents from the H&H analysis completed by BC&A (BC&A 2024a, Attached in Appendix E) was performed and is included in Table 3-11. Maps depicting existing condition flooding during a 100-year and 500-year flood are provided in Appendix C, Maps C9.1 C9.2, C10.1, and C10.2. Maps depicting lesser flood events are provided in the BC&A TM attached in Appendix E. The cost of damage was calculated by Long Watershed Planning Economics, LLC using a period of analysis of 102 years and the 2025 discount rate of 3.0 percent. Total annual damage associated with flooding of roads was calculated at $59,600 for Site 1 at Burnt/Lott Canyon and $62,400 for Site 2 at Clark Canyon (Refer to the PR&G Preliminary Alternatives Analysis included in Appendix E).

Table 3-11. Summary of Transportation Infrastructure Inundated

Flood Event	Number of Roads Flooded		Number of Highways Flooded*	
	Site 1 (Burnt/Lott Canyon)	Site 2 (Clark Canyon)	Site 1 (Burnt/Lott Canyon)	Site 2 (Clark Canyon)
2-Year	22	46	0	1
5-Year	37	62	1	1
10-Year	40	65	1	1
25-Year	43	67	1	1
50-Year	44	68	1	1
100-Year	45	69	1	1
500-Year	46	71	1	1

** Highway 68*

3.2.17 Noise

Noise- and vibration-sensitive receptors are those facilities, land areas, or wildlife populations that require lower noise levels for health and function. Examples include residential neighborhoods, medical facilities, schools, churches, research facilities, parks, and open space. Noise can be a nuisance, can interfere with normal activities (sleep, speech, learning, etc.), or can cause physiological effects such as hearing loss. Vibration can be a nuisance, can cause structural damage, and interfere with vibration-sensitive activities. Ambient noise and vibration in the Project area has not been measured, and therefore no baseline is available.

General noise and vibration sources in the Project area consist of vehicle traffic, air traffic, residential construction, and other general community noises (lawn maintenance equipment, radios, shouting, general construction, sporting events, etc.).

Noise laws are implemented and regulated at a state and local level per the Noise Control Act of 1972 (42 U.S.C. 4901 et seq.), amended by the Quiet Communities Act of 1978 (42 U.S.C. 4913), which promotes the development of state and local noise control programs. The City of Saratoga Springs has jurisdiction over noise ordinances within the city limits which are outlined in the city code (City of Saratoga Springs Code). Utah County has jurisdiction over noise ordinances within the county and outside of city limits which are outlined in the county Code (Utah County Code).

3.2.18 Historic Properties / Cultural Resources / Native American Religious Concerns

Section 106 of the 1966 NHPA, as amended (54 U.S.C. 300101), requires federal agencies to consider the effects of their undertakings on historic properties. A Cultural Resource Assessment was conducted for the Project (Certus Environmental Solutions, LLC [Certus] 2024) to identify and document cultural resources with a potential to be impacted by alternative measures. Refer to Appendix D for a summary of survey/research methods and assumptions. Cultural resources include archaeological sites, historic structures, sacred sites, and traditional cultural properties (TCPs) that are important to a community's practices and beliefs, and are necessary to maintain a community's cultural identity.

The Project area within the Area of Potential Effects (APE) encompassed 120.2 acres (areas proposed for modification, borrow areas, staging areas, access, etc.) with field survey work being performed on November 3 and 4, 2021, by a Principal Investigator exceeding the Secretary of the Interior Standards and Guidelines for archaeology and architectural history. A file search and archival research was conducted prior to the survey which included the survey area plus a ½-mile buffer around the survey area. The file search and field survey identified two sites within the survey area consisting of historical roads and electrical transmission line. Both sites were determined to be ineligible for the NRHP under all criteria. Refer to the NRHP eligibility criteria below for reference. No prehistoric sites were identified within the survey area.

The NRHP status of eligibility for the identified sites include Criteria A, B, C, and D as defined below (NRHP 2023).

- Criterion A – Associated with events that have made a significant contribution to the broad patterns of our history.
- Criterion B – Associated with the lives of significant persons in our past.

- Criterion C – Distinctive characteristics of a type, period, or methods of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D – Yielded or may be likely to yield information important in prehistory or history.

In addition to the surveyed APE, SHPO archaeological and historic building records were reviewed to identify previously documented sites in the 2,877-acre benefited area of the APE. The benefited area consists of the area that benefits from reduced flooding after implementation of the proposed Action Alternatives. A survey of the benefited area was determined not necessary because no ground disturbing activities would occur within the benefited area. The records search identified 11 known sites in the benefited area that include historic canals, artifact scatters, and roads (Certus 2024). All sites are ineligible or unevaluated for their NRHP eligibility. However, unevaluated sites are assumed to be eligible for this analysis. No historic buildings or structures are currently identified (Certus 2024).

Per 36 CFR 800.4, the NRCS consulted with the SHPO and tribes on November 12, 2024, on the description of the APE and determinations of NRHP site eligibility of the sites above to comply with EO 13007, EO 13175, the American Indian Religious Freedom Act (AIRFA), and the NHPA. The SHPO concurred with the eligibility of the sites on December 24, 2024 (Appendix A). One tribe response has been received as discussed in Section 7.1.2 and is included in Appendix A.

3.2.19 Hazardous Materials

A landfill and mine are located downstream and along the flood path of Clark/Burnt Canyon at Site 1 (refer to Appendix C, Map C2). The Project area at Site 1 also passes through the landfill/mine property where there is an increased risk of contaminants being present. The Project area does not appear to pass through actively mined or solid waste disposal locations, but does cross areas containing soil stockpiles and construction/demolition debris.

The landfill is located within an open mining pit that has historically been mined for clay and limestone. Based on review of available information accessed online through UDEQ (UDEQ 2024b), the solid waste landfill permit was renewed in 2020 to include a Class VI landfill, which is a commercial nonhazardous solid waste landfill. The facility was permitted for 1,000,000 tons of waste with a design capacity for 30 years (Permit #0306R1). Prior to issuance of the landfill renewal permit, portions of the mining pit operated as a Class VI b landfill for construction and demolition waste. The 2020 permit renewal also included renewal of the construction and demolition Class VI b landfill. The landfill currently accepts construction/demolition/yard/inert/tire waste and petroleum-contaminated soils. Clay and limestone mining operations are also ongoing in the pit.

3.2.20 Land Use

Most of the Watershed (4,180 acres or 49%) is open space public land consisting of BLM- and Utah Trust Lands Administration (TLA)- managed public land. Residential use covers a large portion of the Watershed at 3,555 acres or 41%. The remaining 855 acres of the Watershed is private open land (481 acres or 5%), agricultural (306 acres or 4%), and commercial (68 acres or <1%). Land use within the Project area consists of 63.8 acres or 53% public open space and 56.4 acres or 47% residential.

4.0 Formation of Alternatives

4.1 Alternative Formulation Process

The alternative formulation process followed an eight-step watershed planning process for PR&G and the NRCS nine-step planning process as described in Section 1.5. The PR&G eight-step evaluation process includes consideration of the federal objective (see section 2.1.1), PL 83-566 general purposes (see Section 2.2.2), guiding principles (see Section 4.1.1), and ecosystem services (see Section 3.1). A framework was developed that included comparison of alternatives against guiding principles, ecosystem services, and economic benefits to select the alternative that maximized public benefits (environmental, economic, and social goals). A PR&G analysis was completed to document the alternative formulation process and framework comparison for alternative decision-making which was used to determine alternatives for detailed study in the Plan-EA. The PR&G Preliminary Alternatives Analysis is included is included in Appendix E.

4.1.1 Guiding Principles

Guiding principles were used to assist in decision-making and weighing tradeoffs of Project alternatives. The guiding principles were included in a comparison framework and are listed below.

1) Healthy and Resilient Ecosystems
2) Sustainable Economic Development
3) Floodplains (avoiding unwise use of floodplains)
4) Public Safety (reducing public health and safety risks)
5) Environmental Justice
6) Watershed Approach

4.1.2 Alternative Formulation Criteria

The process of formulating alternatives for the Project followed procedures outlined in the NRCS NWPM (NRCS 2015) Parts 500 through 506; NRCS NWPH (NRCS 2014), Parts 600 through 606; PR&G (CEQ 2013 and 2014); NRCS DM 95000-013 (USDA 2017), and other NRCS watershed planning policy. Numerous alternatives were developed to meet the Project purpose and need by the Project team. The alternatives were developed considering problems and opportunities as presented in Section 2.2, and objectives and constraints as presented in Section 2.0. Alternatives were formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability.

4.1.3 Risk and Uncertainty

During the planning process, decisions are made with information that is uncertain, including errors in measurements and climatic changes that could alter rainfall storm events. Assumptions made during the planning process are based on the best available science, technology, and information. Extended delays between the planning process and construction increase the degree of risk and uncertainty. Estimated alternative costs are based on computed work quantities multiplied by the appropriate unit cost for that type of work. Unit costs are based on current market prices from similar projects. Costs can be influenced by economic factors that cannot be predicted between the planning process and construction that could increase the actual cost and decrease the availability of materials.

Additional risk and uncertainties associated with the project decision-making include the following:

- Erosion and Sedimentation: Erosion and sedimentation are dependent upon several unpredictable factors. Sedimentation could vary based on conditions in the drainage area, including construction activity, wildfires, storm events, climate variations, and off-highway vehicle/pedestrian traffic, among others. Erosion can vary based on climactic, hydrological, topographic, soil, geological, and vegetation conditions.
- Costs and Benefits: As with all projections of future costs and benefits, there is a degree of uncertainty assumed. Installation costs, O&M costs, crop yields, housing markets, labor markets, and commodity and input prices will all fluctuate.
- Flood Protection: Flood frequencies and magnitudes used in the analysis always carry a degree of uncertainty. Economic estimates of flood control measures are not precise. The intention is that they are reasonably accurate and can assist in making good decisions.

4.2 Alternatives Considered

The project team considered two Action Alternatives and one No Action Alternative in detailed study. Multiple additional alternatives were formulated but were eliminated from further study as documented in the PR&G Preliminary Alternative Analysis included in Appendix E and described in Sections 4.3 and 4.4. Alternatives developed to meet the objectives included both structural and nonstructural measures.

The cost estimates for the alternatives provide a level of detail judged appropriate for the purpose of identifying the preferred alternative among the alternatives considered. Project costs provided for alternatives selected for detailed study incorporate installation and O&M costs. Installation costs are the costs to be incurred for installing the works of improvement after the Project is authorized for installation. Installation costs include, as applicable, construction, engineering, real property rights, natural resource rights, permitting, replacement in-kind relocation payments, and Project administration costs. Detailed construction cost estimates are provided in the PR&G Preliminary Alternative Analysis Report included in Appendix E.

4.2.1 No Action Alternative

The No Action Alternative considers the actions that would take place if no federal action or federal funding were provided for the Project. It provides a baseline for comparison with the Action Alternatives.

The SLO's most likely course of action would be to continue O&M along the existing channels through the City of Saratoga Springs as needed to maintain the existing conveyance capacities. The flooding risks to the City of Saratoga Springs would remain. The annual O&M costs were estimated at $17,000 annually.

4.2.2 Action Alternative Site 1 (Burnt and Lott Canyon)

The Action Alternative (Debris Basin Improvements Alternative) for detailed study at Site 1 include measures to protect the City of Saratoga Springs from flooding associated with the Burnt and Lott Canyon drainages for up to and including a 100-year flood (1 percent annual chance flood). Alternative measures are anticipated to function and provide substantial flood prevention benefits to the City of Saratoga Springs for 100 years incorporating proper O&M. A description of the Site 1 Action Alternative measures is provided below and maps depicting alternative measures are included in Appendix C, Maps C3.1 and C 3.2.

Flood Prevention Improvements

This alternative would include construction of debris basins at Burnt and Lott Canyons and channel improvements to safely convey the 100-year flood. The debris basins would be designed to attenuate flood flows for up to and including the 100-year flood without activation of the auxiliary spillway and to provide for 50 years of sediment storage. The 100-year flood flows will be attenuated in the debris basins such that the attenuated outflow would be low enough to be conveyed through existing Saratoga Springs storm drainage infrastructure. Two debris basins would be constructed, one at the base of the Burnt Canyon drainage and the other at the base of the Lott Canyon drainage.

The components of the debris basins consist of an earthen dam embankment, auxiliary spillway excavated into bedrock, principal spillway (reinforced concrete riser and conduit through the dam embankment), and basin. Table 4-1 provides a summary of the debris basin components and the location of the components are depicted in Appendix C, Map C3.1 and C3.2.

Table 4-1. Site 1 Debris Basin Structure Summary

Item	Burnt Canyon Debris Basin	Lott Canyon Debris Basin
Contributing Drainage Area	252 acres	703 acres
Inflow 24-hour/100-year	274	283
Outflow 24-hour/100-year	3 cfs	7 cfs
Dam Embankment Crest Elevation	5,095.0 feet	5,145.0 feet
Auxiliary Spillway Crest Elevation	5,090.0 feet	5,139.5 feet
Principal Spillway Crest Elevation	5,089.4 feet	5,139.0 feet
Basin Sediment Storage Volume[1]	3.1 ac-ft	10.1 ac-ft
Basin Floodwater Storage Volume[2]	15.3 ac-ft	25.2 ac-ft
Basin Total Storage Volume[3]	18.4 ac-ft	35.3 ac-ft

1 – Storage volume below the elevation of the principal spillway crest.
2 – Storage volume between the principal spillway crest and the auxiliary spillway crest.
3 – Total volume for sediment and floodwater storage below the elevation of the auxiliary spillway crest.

Conveyance channels downstream of the debris basins would be installed or improved to safely convey the 100-year outflow from the two debris basins. The area downstream of the debris basins is located on an alluvial fan containing several alternating stream flow paths. To focus the flow into one conveyance channel, new channels would be constructed to connect the debris basin principal spillway outflow from both basins into one conveyance channel. Approximately 245 linear feet of an existing channel would be improved and approximately 1,100 linear feet of new channel installed to convey flood flows into the existing combined flow channel. Riprap armoring would be installed at the toe of the modified and new channels to prevent erosion. A cross section of the modified channel is provided in the Concept Design Drawings included in Appendix E. Five new 36-inch culverts and one 18-inch culvert would need to be installed for safe conveyance of flows through road crossings. Channel improvements are depicted in Appendix C, Map C3.1 and C3.2.

Nonstructural measures would be implemented including building restrictions in the remaining regulated floodplain, purchasing easements along the modified channel corridors through Saratoga Springs to protect and maintain the channels for flood conveyance, and securing easements at the detention dams and for the upstream basin areas.

Construction Staging and Access

Access to the site would be from Foothill Boulevard. Existing access roads would be used to travel between Foothill Boulevard and the debris basin locations. The existing access roads would be improved or maintained where needed to facilitate construction traffic. Two new gravel access roads would be constructed around the debris basins for construction access and left in place for O&M access after measures are installed. This includes one approximate 1,000-foot-long gravel access road at the Burnt Canyon Debris Basin and one approximate 2,000-foot-long gravel access road at Lott Canyon Debris Basin. Access for construction of new channels and modified channel segments would follow the channel alignments within the proposed disturbance footprints.

Three staging areas are proposed around the debris basins. These include Staging areas 1, 2, and 3 covering approximately 0.7 acres, 0.6 acres, and 1.3 acres, respectively. Staging areas and access roads are depicted in Appendix C, Map C3.1 and C3.2.

Borrow Material and Disposal

All materials for channel armoring would be purchased from a permitted offsite facility or distributor and no borrow areas are proposed. Sediment removed during construction of the debris basin or excavation of new channels would be used for construction of the dam, if determined suitable. Unused excavated materials or debris would be disposed of at an offsite permitted disposal location.

Revegetation

After construction completion, disturbed areas would be seeded with an NRCS approved native seed mix appropriate for the anticipated hydraulic regime and climate. Revegetated areas would be maintained on a regular basis to prevent the establishment of N&I weeds until areas are fully established. A Post Construction Rehabilitation Plan (PCRP) would be developed and would include mechanisms for addressing weed establishment and treatment.

Real Property Rights

An easement would be acquired for the installed measures that includes the debris basin, conveyance channels, and access in and around the features to perform regular O&M. A total of 30.6 acres of land (27.2 acres TLA and 3.4 acres private) would be included in the easement. Proposed easements are depicted in Appendix C, Map C13.

Schedule

Alternative measures could be implemented over two years. Work would be stopped or avoided during precipitation events that could result in activation of channel flow. Construction would be anticipated to start in 2027 and be completed in 2029.

Costs

Installation costs for these measures are estimated at $12,331,000, which includes construction ($10,119,000), engineering ($1,012,000), permitting ($51,000), real property rights ($137,000), and administrative time ($405,000 for Sponsor and $607,000 for NRCS). Costs for O&M are estimated at $27,500 per year. Approximately 12.9 ac-ft of sediment removal in the debris basins is proposed to be completed by the Sponsor 50 years after construction completion with 3.1 ac-ft at Burnt Canyon Debris Basin and 9.8 ac-ft at Lott Canyon Debris Basin at a cost of approximately $362,000. This sediment removal will extend the sediment life of the structure another 50 years which provides a total sediment life of 100 years.

4.2.3 Action Alternatives Site 2 (Clark Canyon)

The Action Alternatives for detailed study at Site 2 for Clark Canyon include the Debris Basin Improvements Alternative and the Channel Improvements Alternative. These Action Alternatives include measures to protect the City of Saratoga Springs from flooding associated with the Clark Canyon drainages (Clark Canyon north and south drainages) for up to and including a 100-year flood (1 percent annual chance flood). The alternative measures are anticipated to function and provide substantial flood prevention benefits to the City of Saratoga Springs for 100 years incorporating proper O&M. A description of the Debris Basin and Channel Improvements Alternative is provided in Section 4.2.3.1 and a description of the Channel Improvements Alternative is provided in Section 4.2.3.2.

4.2.3.1 Site 2 Debris Basin Improvements Alternative

A description of the Site 2 Debris Basin Improvements Alternative measures is provided below and maps depicting alternative measures are included in Appendix C, Maps C4.1 and C 4.2.

Flood Prevention Improvements

This alternative would include construction of debris basins at Clark Canyon and channel improvements to safely convey flood flows out of the basins. The debris basins would be designed to attenuate flood flows for up to and including the 50-year flood without activation of the auxiliary spillway and to provide for 50 years of sediment storage. The existing channels downstream of the debris basin have sufficient capacity to convey the 100-year flood flow out of the basins. Therefore, this alternative would still provide flood protection for up to and including a 100-year flood. Two debris basins would be constructed, one at the base of the Clark Canyon North drainage and the other at the base of the Clark Canyon South drainage.

The components of the debris basins consist of an earthen dam embankment, auxiliary spillway (excavated into bedrock at Clark Canyon North and armored at Clark Canyon South), principal spillway (reinforced concrete riser and conduit through the dam embankment), and basin. Table 4-2 provides a summary of the debris basin components and the location of components are depicted in Appendix C, Map C4.1 and C4.2.

Table 4-2. Site 2 Debris Basin Structure Summary

Item	Clark Canyon N Debris Basin	Clark Canyon S Debris Basin
Contributing Drainage Area	171 acres	558 acres
Inflow 24-hour/100-year	136	202
Outflow 24-hour/100-year (cfs)	10 cfs	47.7 cfs
Dam Embankment Crest Elevation	5,342.0 feet	5,244.5 feet
Auxiliary Spillway Crest Elevation	5,337.5 feet	5238.5 feet
Principal Spillway Crest Elevation	5,337.1 feet	5,238.0 feet
Basin Sediment Storage Volume[1]	2.5 ac-ft	7.1 ac-ft
Basin Floodwater Storage Volume[2]	3.5 ac-ft	11.2 ac-ft
Basin Total Storage Volume[3]	6.0 ac-ft	18.3 ac-ft

1 - Storage volume below the elevation of the principal spillway crest.
2 - Storage volume between the principal spillway crest and the auxiliary spillway crest.
3 - Total volume for sediment and floodwater storage below the elevation of the auxiliary spillway crest.

The conveyance channel downstream of the Clark Canyon North Debris Basin would be improved as needed along approximately 11,300 feet to safely convey the outflow from the debris basins. Riprap armoring would be installed along the toe of the modified channel to protect from erosion. A cross section of the modified channel is provided in the Concept Design Drawings included in Appendix E. Three new 36-inch culverts would be installed. Channel improvements are depicted in Appendix C, Map C4.1 and C4.2.

Nonstructural measures would be implemented including building restrictions in the remaining regulated floodplain, purchasing easements along the modified channel corridors through Saratoga Springs to protect and maintain the channels for flood conveyance, and securing easements at the detention dams and for the upstream basin areas.

Construction Staging and Access

Access to the site would be from Foothill Boulevard. Existing access roads would be used to travel between Foothill Boulevard and the debris basin locations. The existing access roads would be improved or maintained where needed to facilitate construction traffic. Access for the modified channel segments would follow the channel alignments within the proposed disturbance footprints. Two new gravel access roads would be constructed around the debris basins for construction access and left in place for O&M access after measures are installed. This includes one approximate 1,085-foot-long gravel access road at the Clark Canyon North Debris Basin and one approximate 2,225-foot-long gravel access road at Clark Canyon South Debris Basin.

Two staging areas are proposed around the debris basins. These include Staging areas 4 and 5 covering approximately 0.5 acres and 1.5 acres, respectively. Staging areas and access roads are depicted in Appendix C, Map C4.1 and C4.2.

Borrow Material and Disposal

All materials for channel armoring would be purchased from a permitted offsite facility or distributor and no borrow areas are proposed. Sediment removed during construction of the debris basin or excavation of new channels would be used for construction of the dam, if determined suitable. Unused excavated materials or debris would be disposed of at an offsite permitted disposal location.

Revegetation

After construction completion, disturbed areas would be seeded with an NRCS approved native seed mix appropriate for the anticipated hydraulic regime and climate. Revegetated areas would be maintained on a regular basis to prevent the establishment of N&I weeds until areas are fully established. A PCRP would be developed and would include mechanisms for addressing weed establishment and treatment.

Real Property Rights

An easement would be acquired for the installed measures that includes the debris basin, conveyance channels, and access in and around the features to perform regular O&M. A total of 25.9 acres of land (11.4 acres TLA and 14.5 acres private) would be included in the easement. Proposed easements are depicted in Appendix C, Map C13.

Schedule

Alternative measures could be implemented over two years. Work would be stopped or avoided during precipitation events that could result in activation of channel flow. Construction would be anticipated to start in 2027 and be completed in 2029.

Costs

Installation costs for these measures are estimated at $9,891,000, which includes construction ($7,741,000), engineering ($774,000), permitting ($39,000), real property rights ($563,000), and administrative time ($310,000 for Sponsor and $464,000 for NRCS). Costs for O&M are estimated at $27,5000 per year. Approximately 9.7 ac-ft of sediment removal in the debris basins is proposed to be completed by the Sponsor 50 years after construction completion with 2.6 ac-ft at Clark Canyon North Debris Basin and 7.1 ac-ft at Clark Canyon South Debris Basin at a cost of approximately $277,000. This sediment removal will extend the sediment life of the structure another 50 years which provides a total sediment life of 100 years.

4.2.3.2 Site 2 Channel Improvements Alternative

A description of the Site 2 Channel Improvements Alternative measures is provided below and a map depicting alternative measures are included in Appendix C, Maps C4.3.

Flood Prevention Improvements

Flood improvements consist of increasing the channel capacity at Clark Canyon by widening conveyance channels from the mouth of Clark Canyon north and south drainages to Utah Lake (approximately 11,300 linear feet). The modified channels would be designed to safely convey flood flows for up to and including a 100-year flood (1 percent annual chance flood) to Utah Lake. Riprap armoring would be installed along the toe of the modified channel to protect from erosion and drop structures placed as needed to reduce velocities. A map of the channel modifications is provided in Appendix C, Map C4.3.

Construction Staging and Access

Access to the channel alignment would be from paved city roads (Foothill Boulevard, Wildlife Boulevard, Swainson Ave, Highway 68). Temporary access roads for construction would be constructed adjacent to the modified channel segments and follow the channel alignments within the proposed disturbance footprints.

Three staging areas are proposed around the debris basins. These include Staging areas 4, 5, and 6 covering approximately 0.5 acres, 1.5 acres, and 18.0 acres, respectively. Staging areas and access roads are depicted in Appendix C, Map C4.3.

Borrow Material and Disposal

All materials for channel armoring would be purchased from a permitted offsite facility or distributor and no borrow areas are proposed. Unused excavated materials or debris would be disposed of at an offsite permitted disposal location.

Revegetation

After construction completion, disturbed areas would be seeded with an NRCS and USACE approved native seed mix appropriate for the anticipated hydraulic regime and climate. Revegetated areas would be maintained on a regular basis to prevent the establishment of N&I weeds until areas are fully established. A PCRP would be developed and would include mechanisms for addressing weed establishment and treatment.

Real Property Rights
An easement would be acquired for the installed measures that include the modified channels and access in and around the channels to perform regular O&M. A total of 16.9 acres would be included in the easement.

Schedule
Alternative measures could be implemented over one year. Work would be stopped or avoided during precipitation events that could result in activation of channel flow. Construction would be anticipated to start in 2027 and be completed in 2028.

Costs
Installation costs for these measures are estimated at $8,897,000, which includes construction ($7,039,000), engineering ($704,000), permitting ($35,000), real property rights ($415,000), and administrative time ($282,000 for Sponsor and $422,000 for NRCS). Costs for O&M are estimated at $39,900 per year.

4.3 Site 1 Alternatives Considered but Eliminated from Detailed Study

4.3.1 Debris Basin Improvements for 100-Year Sediment Storage and Protection for a 100-Year Flood

This alternative would include construction of debris basins and channel improvements to safely convey the 100-year flood similar to the preferred alternative described in Section 4.2.2, but additional sediment storage would be provided in the debris basin to accommodate 100-years of sediment accumulation. The level of flood prevention and operation of the basin would be the same as the preferred alternative. The disturbance footprints for construction of measures would be almost identical to the preferred alternative with no measurable changes to resource effects or ecosystem services. However, the cost to construct a larger debris basin increases the installation cost. An economic analysis was completed for this alternative thar shows a lower benefit cost ratio and net benefits when compared to the preferred alternative (refer to the PR&G Preliminary Alternative Analysis Report included in Appendix E). Therefore, this alternative was eliminated from detailed study because it cost more than the preferred alternative with no added social, environmental, or economic benefits.

4.3.2 Channel Improvements Protection for a 100-Year Flood

This alternative modifies the existing stream channels to increase the channel capacity and safely convey the 100-year flood to Utah Lake. It would provide the same flood prevention benefits as the preferred alternative but was found to cost substantially more. Installation costs for this alternative would be approximately $5,755,000 more than the preferred alternative with no added flood prevention benefits. Additionally, this alternative removes the floodplain which would increase the amount of sediment transported downstream into Utah Lake adversely impacting water quality. Therefore, this alternative was removed from detailed study based on the substantially higher cost, no added benefit, and adverse impacts to water quality.

4.3.1 Debris Basin Improvements Protection for a 50-Year Flood

This alternative would include construction of debris basins and channel improvements to safely convey the 100-year flood to Utah Lake. The alternative does not meet the project goal of providing protection for a 100-year flood. An analysis was performed to determine the risk to the community of a 100-year flood after implementation of the alternative measures. The analysis found that a risk to loss of life for

residents in the floodplain remains (refer to Section 3.0 of Appendix D). Due to this adverse condition and inability to meet the project goals, this alternative was eliminated from detailed study.

4.3.2 Channel Improvements Protection of a 50-Year Flood

This alternative modifies the existing stream channels to increase the channel capacity and safely convey the 50-year flood to Utah Lake. It does not meet the project goal of providing protection for a 100-year flood. An analysis was performed to determine the risk to the community of a 100-year flood after implementation of the alternative measures. The analysis found that a risk to loss of life for residents in the floodplain remains (refer to Section 3.0 of Appendix D). Additionally, the removal of the floodplain would increase the amount of sediment transported downstream into Utah Lake adversely impacting water quality. Due to these adverse conditions and inability to meet the project goals, this alternative was eliminated from detailed study.

4.3.3 Land Acquisition for Existing 100-Year Floodplain (Nonstructural Alternative)

This alternative would establish a flood easement for the 100-year floodplain and require acquisition of private lands. Approximately 348 homes, three churches, one school, and two office buildings are located within the 100-year flood inundation area that would need to be purchased. All structures would need to be demolished, utilities relocated, roads removed, etc. and the land returned to a natural state. Costs were estimated and averaged per structure type and the total cost for purchase of structures alone would be exorbitant at more than $160,000,000. Costs do not include purchase of undeveloped lands, demolition of structures, relocation of roads/utilities, restoration of the land, etc. This exorbitant cost far exceeds the flood benefits that could be achieved, resulting in negative economic benefits. Adverse social impacts are also anticipated from uprooting 348 families from their homes. Based on the exorbitant costs, negative economic benefit, and adverse social impacts to occupants of the structures, this alternative was eliminated from further study.

4.3.4 Land Terracing (Nonstructural)

This alternative includes terracing Burnt and Lott Canyon drainage areas to spread out flows and decrease the peak flood flow entering the city 100-year flood. Obtaining approvals or acquiring lands to install land terracing is infeasible. This disturbance would have adverse impacts to soil, vegetation, animals, and water resources. It may slightly reduce flooding, but structural flood protection measures would still be required to protect from flooding. Therefore, this alternative was eliminated from detailed study due to infeasibility with acquisition, adverse environmental impacts, and inability to meet the purpose and need or project goals.

4.3.5 Seeding (Nonstructural)

Seeding in the upstream drainage area was looked at to reduce the amount of flooding for the City of Saratoga Springs. The drainage areas upstream of the city are relatively small, steep, and vegetative cover on the slopes is present. Flooding is primarily associated with cloudburst events where heavy rainfall occurs over a short duration of time. Based on the drainage area topography, existing vegetation conditions, and type of events that produce flooding, additional vegetation efforts in the drainage areas are not anticipated to have a measurable change to flooding conditions. Therefore, this alternative was eliminated from detailed study.

4.3.6 Protection of Sensitive Facilities for a 500-Year Flood

The 500-year flood was taken into consideration for sensitive facilities and infrastructure. Modeling results for the preferred alternative show that minimal flooding would occur outside of the stream channel after installation of the alternative measures and no sensitive facilities or infrastructure would be flooded during the 500-year flood. Refer to Appendix C, Map C9.4 for flooding at the 500-year flood for the preferred alternative. Therefore, alternatives to protect sensitive facilities were determined not applicable to the alternative formulation process.

4.3.7 Combined Debris Bain and Channel Improvements

An alternative was explored to construct one debris basin to attenuate flows from both the Burnt Canyon and Lott Canyon drainage areas. To accomplish this, the debris basin would need to be constructed further downstream where residential development is present and additional development is occurring. These are privately owned lands that are not available for acquisition. Therefore, this alternative was determined infeasible and eliminated from detailed study.

4.4 Site 2 Alternatives Considered but Eliminated from Detailed Study

4.4.1 Debris Basin Improvements for 100-Year Sediment Storage and Protection of a 100-Year Flood (Option A)

This alternative would include construction of debris basins and channel improvements to safely convey the 100-year flood. Two debris basins would be constructed, one at the base of Clark Canyon North and one at the base of Clark Canyon South. The debris basin would have enough capacity to attenuate the 100-year flood without activation of the auxiliary spillway and provide 100-years of sediment storage. Bank armoring up to the 100-year water surface would be installed along the downstream channel, where needed. The alternative footprints for construction of measures would be almost identical to the preferred alternative with no measurable changes to resource effects or ecosystem services. However, the cost to construct a larger debris basin increases the installation cost. An economic analysis was completed for this alternative thar shows a much lower benefit cost ratio and net benefits when compared to the preferred alternative (refer to the PR&G Preliminary Alternative Analysis Report included in Appendix E). Therefore, this alternative was eliminated from detailed study because it costs more than the preferred alternative with no added social, environmental, or economic benefits.

4.4.2 Debris Basin Improvements for 100-Year Sediment Storage and Protection of a 100-Year Flood (Option B)

This alternative would include construction of debris basins and channel improvements to safely convey the 100-year flood. Two debris basins would be constructed, one at the base of Clark Canyon North and one at the base of Clark Canyon South. The debris basins would have enough capacity to attenuate the 50-year flood without activation of the auxiliary spillway and provide 100-years of sediment storage. The existing downstream channel was found to have sufficient capacity to convey the combined outflow from the debris basin’s principal and auxiliary spillway at a 100-year flood, but channel bank armoring up to the 100-year water surface would be installed. The disturbance footprints for construction of measures would be almost identical to the preferred alternative with no measurable changes to resource effects or ecosystem services. The installation cost of this alternative was determined to be higher than Option A. An economic analysis was completed for this alternative that shows a much lower benefit cost ratio and net benefits when compared to the preferred alternative (refer to the PR&G Preliminary Alternative

Analysis Report included in Appendix E). Therefore, this alternative was eliminated from detailed study because it costs more than the preferred alternative with no added social, environmental, or economic benefits.

4.4.3 Debris Basin Improvements for 100-Year Sediment Storage and Protection for a 50-Year Flood

This alternative would include construction of debris basins and channel improvements to safely convey the 50-year flood similar to the preferred alternative described in Section 4.2.3.1, but additional sediment storage would be provided in the debris basin to accommodate 100-years of sediment accumulation. The level of flood prevention and operation of the basin would be the same as the preferred alternative. The disturbance footprints for construction of measures would be almost identical to the preferred alternative with no measurable changes to resource effects or ecosystem services. However, the cost to construct a larger debris basin increases the installation cost. An economic analysis was completed for this alternative thar shows a lower benefit cost ratio and net benefits when compared to the preferred alternative (refer to the PR&G Preliminary Alternative Analysis Report included in Appendix E). Therefore, this alternative was eliminated from detailed study because it cost more than the preferred alternative with no added social, environmental, or economic benefits.

4.4.4 Channel Improvements Protection for a 50-Year Flood

This alternative modifies the existing stream channels to increase the channel capacity and safely convey the 50-year flood to Utah Lake. It does not meet the project goal of providing protection for a 100-year flood. An analysis was performed to determine the risk to the community of a 100-year flood after implementation of the alternative measures. The analysis found that the alternative removes the risk to loss of life for residents in the floodplain (refer to Section 3.0 of Appendix D). However, 138 homes are still exposed to shallow flooding during a 100-year flood and the alternative does not meet the project goals. In addition, there are 75 acres of undeveloped land that could be exposed to flooding and will likely be developed with residences in the next 10 years. Future development should be taken into consideration for decision-making. The residential building layout is currently unknown, and therefore, wasn't considered in the economic damage assessment or the loss of life risk analysis. Based on an approximate lot size of 0.2 acres per home, it is safe to assume an additional 375 homes could be developed within the 75 acres. This would decrease the alternative net benefits and increase the loss of life risk potential. Due to the inability to meet the project goals, flood damage considerations for existing and future homes, and future loss of life risk, this alternative was eliminated from detailed study.

4.4.5 Land Acquisition for Existing 100-Year Floodplain (Nonstructural)

This alternative would establish a flood easement for the 100-year floodplain and require acquisition of private lands. Approximately 882 homes, two churches, one school, and one business are located within the 100-year flood inundation area that would need to be purchased. All structures would need to be demolished, utilities relocated, roads removed, etc. and the land returned to a natural state. Costs were estimated and averaged per structure type and the total cost for purchase of structures alone would be exorbitant at more than $390,000,000. Costs do not include purchase of undeveloped lands, demolition of structures, relocation of roads/utilities, restoration of the land, etc. This exorbitant cost far exceeds the flood benefits that could be achieved, resulting in negative economic benefits. Adverse social impacts are also anticipated from uprooting 882 families from their homes. Based on the exorbitant costs, negative

economic benefit, and adverse social impacts to occupants of the structures, this alternative was eliminated from further study.

4.4.6 Land Terracing (Nonstructural)

This alternative includes terracing Cark Canyon drainage areas to spread out flows and decrease the peak flood flow entering the city 100-year flood. Obtaining approvals or acquiring lands to install land terracing is infeasible. This disturbance would have adverse impacts to soil, vegetation, animals, and water resources. It may slightly reduce flooding, but structural flood protection measures would still be required to protect from flooding. Therefore, this alternative was eliminated from detailed study due to infeasibility with acquisition, adverse environmental impacts, and inability to meet the purpose and need or project goals.

4.4.7 Seeding (Nonstructural)

Seeding in the upstream drainage area was looked at to reduce the amount of flooding for the City of Saratoga Springs. The drainage areas upstream of the city are relatively small, steep, and vegetative cover on the slopes is present. Flooding is primarily associated with cloudburst events where heavy rainfall occurs over a short duration of time. Based on the drainage area topography, existing vegetation conditions, and type of events that produce flooding, additional vegetation efforts in the drainage areas are not anticipated to have a measurable change to flooding conditions. Therefore, this alternative was eliminated from detailed study.

4.4.8 Protection of Sensitive Facilities for a 500-Year Flood

The 500-year flood was taken into consideration for sensitive facilities and infrastructure. Modeling results for the preferred alternative show that minimal flooding would occur outside of the stream channel after installation of the alternative measures and no sensitive facilities or infrastructure would be flooded during the 500-year flood. Refer to Appendix C, Map C10.4 for flooding at the 500-year flood for the preferred alternative. Therefore, alternatives to protect sensitive facilities were determined not applicable to the alternative formulation process.

4.4.9 Combined Debris Bain and Channel Improvements

An alternative was explored to construct one debris basin to attenuate flows from both Clark Canyon North and South drainage areas. To accomplish this, the debris basin would need to be constructed further downstream where residential development is present and additional development is occurring. These are privately owned lands that are not available for acquisition. Therefore, this alternative was determined infeasible and eliminated from detailed study.

4.4.10 Floodproofing (Nonstructural)

This alternative consists of floodproofing buildings within the floodplain. While this alternative protects buildings, it still leaves a risk of loss of life and does not protect roads or utilities. Additionally, the American Society of Civil Engineers (ASCE) design standard does not allow substantial improvements in active alluvial fan areas unless protective works have been designed and constructed to safely pass the design flood at the apex, within the capacity of the constructed channels (ASCE 2014). This alternative was eliminated from detailed study due to the remaining threat to loss of life, insufficient level of protection for roads/utilities, inability to meet the Project goals/objectives/purpose, and noncompliance with ASCE design standards.

4.5 Final Array of Alternatives

Twenty one (21) Action Alternatives (ten at Site 1 for Burnt/Lott Canyon and eleven at Site 2 for Clark Canyon) were explored during the scoping process, including nonstructural alternatives. In accordance with NEPA, some initial alternatives were eliminated from further analysis due to exorbitant costs, logistics, environmental reasons, or other critical factors (see Section 4.4).

Alternatives were screened at two levels to determine the feasibility of implementing alternative measures. The first level of alternative screening consisted of a practicability test screened against: 1) ability to meet the purpose and need of the Project; 2) land acquisition feasibility; 3) logistics; 4) risk to loss of life; and 5) exorbitant costs. Refer to the PR&G Preliminary Alternative Analysis Report included in Appendix E for further information.

Alternatives determined feasible from the first level of screening were advanced through an economic analysis to determine the net benefits and benefit cost ratio of each to aid in decision-making. This included two debris basin alternatives at Site 1 for Burnt/Lott Canyon and four alternatives at Site 2 for Clark Canyon (two debris basin alternatives and two channel improvement alternatives). At Site 1, the two feasible alternatives had similar installation measures and footprints and provided the same level of flood protection. Therefore, the alternative providing the highest net benefit and benefit cost ratio (Debris Basin Improvements Alternative – see Section 4.2.2) was advanced for detailed study in this Plan-EA. Refer to the PR&G Analysis Report included in Appendix E for the economic analysis performed and decision-making process for selection of the alternative for detailed study.

Similarly at Site 2, the debris basin alternatives also provided similar footprints and the same level of flood protection. Therefore, the debris basin Action Alternative providing the highest net benefit and benefit cost ratio (Debris Basin Improvements Alternative – see Section 4.2.3.1) was advanced for detailed study in this Plan-EA. The two channel improvement alternatives included modifications along the same length of channel, but provided different levels of flood protection, a 50-year flood level of protection and a 100-year flood level of protection. The channel improvement alternative providing a 50-year flood level of protection was found to have a slightly higher net annual economic benefit that was $1,200 more than the alternative providing a 100-year flood level of protection. The change in benefit was determined to be negligible considering it accounts for less than 0.03% of the total benefits provided by either alternative. Future development and project goals were also considered for decision-making. Assuming residential development within the next 10 years would occur on approximately 75 acres of undeveloped land that currently adjoin the channel, the alternative providing a 50-year level of flood protection would have more damage to structures and infrastructure than what was calculated in the economic analysis. Based on the consideration of flood damages to future development, project goal to meet a 100-year level of flood protection, and ecosystem service benefits, the Channel Improvements Alternative providing a 100-year level of flood protection was advanced for detailed study in this Plan-EA. Refer to the PR&G Preliminary Alternative Analysis Report included in Appendix E for the economic analysis performed and decision-making process for selection of alternatives for detailed study.

Alternatives considered in detailed study for each site were combined for the purpose of evaluating environmental, economic, and social effects in Section 5.0 Environmental Consequences. One alternative combination considers construction of debris basins at both Site 1 and Site 2 (Site 1 and 2 Debris Basin Improvements Alternative), and includes the measures described in Sections 4.2.2 and 4.2.3.1. The other combination of alternatives considers construction of a debris basin at Site 1 and

channel improvements at Site 2 (Site 1 Debris Basin and Site 2 Channel Improvements Alternative), and includes the measures described in Sections 4.2.2 and 4.2.3.2.

5.0 Environmental Consequences

The final array of alternatives was evaluated to compare the economic, environmental, and social effects that may result from each alternative. The final array of alternatives includes the No Action Alternative and the Action Alternatives. Action Alternatives consist of the Site 1 and Site 2 Debris Basin Improvements Alternative, and the Site 1 Debris Basin and Site 2 Channel Improvements Alternative.

This section describes the potential effects of the alternatives within each resource category as defined in Section 3.2. Ecosystem service categories overlap with the resource concerns and therefore, are not discussed separately from the resource concerns. For reference, the ecosystem service categories relevant to this Project and the applicable resource concerns that discuss these categories are provided in Table 3-2 of Section 3.1. A summary and comparison of resource concerns for alternatives is provided at the end of this section in Table 5-4. Even though ecosystem services are incorporated as applicable into each relevant resource effect discussion, they are broken out separately at the end of this section in Table 5-5 to identify the ecosystem services tradeoffs between alternatives. The information in Table 5-5 is summarized from the Ecosystem Services Tradeoff Analysis Evaluation Table included in Appendix E that was performed for alternatives included in detailed study.

The following lists the specific terminology used to describe impacts associated with alternative measures:

Type

- Direct Effect: Impacts caused by a proposed action and occurring at the same time and place.
- Indirect Effect: Impacts caused by an action that are later in time or farther removed in distance but are still reasonably foreseeable.
- Cumulative Effect: The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person is undertaking such other action.

Duration

- Temporary and Permanent Impacts: Temporary impacts are impacts that are not lasting and the affected resource will return or be restored to its previous (pre-project) state. Permanent impacts are those in which the affected resource will not return to its previous state within one's lifetime.
- Short- and Long-Term Impacts: Short-term impacts are those that last through the duration of construction and shortly after (duration of impact is approximately 2 to 3 years). Long-term impacts are those that last for an extended duration of time. For this evaluation, long-term impacts extend beyond year 3 up to the end of the 100-year Project life.

Intensity

- No Impact – Resource conditions would not change.
- Negligible – Resource condition changes would be so slight there would be no measurable or perceptible consequence to the resource.

- Minor – A small measurable effect to the resource, but localized, small, and of little consequence to the resource. Mitigation measures, if needed to offset adverse effects, would be easily implemented and successful based on knowledge and experience.
- Moderate – A measurable effect to the resource from the alternative actions. Mitigation measures would likely be needed to offset adverse effects and could be extensive, moderately complicated to implement, and probably successful based on knowledge and experience.
- Substantial – A large, measurable effect to the resource from the alternative actions. Mitigation measures would be needed to offset adverse effects and could be extensive and complicated to implement.

5.1 Upland Erosion

Please refer to Section 3.2.1 for existing upland erosion conditions for the Project area.

5.1.1 No Action Alternative

For this alternative, upland erosion conditions would not change from existing conditions and erosion would continue at the same rate it has historically occurred. No measurable impacts to upland erosion are anticipated for continuation of O&M activities.

5.1.2 Site 1 and 2 Debris Basin Improvements Alternative

Direct short-term impacts during construction in disturbed areas are anticipated until ground cover becomes established and areas have been stabilized. Ground disturbed during construction would have an increased potential for erosion. This includes approximately 60.3 acres (37.1 acres at Site 1 and 23.2 acres at Site 2) of temporarily disturbed grounds that are outside of road corridors. Disturbance for the proposed debris basins are partially located within areas designated as moderate erosion hazards (See Appendix C, Map C6). Disturbance for channel improvements is mostly located within areas designated with a slight erosion hazard. Proper Best Management Practices (BMPs) would be installed during and after construction to prevent and control soil erosion. Areas disturbed during construction activities would be restored and stabilized through the establishment of ground cover. Disturbed flood conveyance channels would be armored or restored to protect from surface erosion protection, as needed. Direct impacts would be negligible within areas designated with a slight erosion hazard and minor within areas designated with a moderate erosion hazard based on the small area of temporary disturbance, implementation of BMPs during construction, and stabilization/restoration measures.

Construction of the debris basins at Site 1 and Site 2 will decrease channel flows downstream of the basins during future flood events, reducing the erosion potential along the conveyance channels. This is anticipated to have an indirect long-term benefit of reduced erosion potential. The benefits would be minor based on the limited amount of erosion issues that currently exist along the channel corridors. No measurable long-term impacts to upland erosion are anticipated from O&M activities.

5.1.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

Ground disturbed during construction would have an increased short-term potential for erosion. This includes approximately 84.2 acres (37.1 acres at Site 1 and 47.1 acres at Site 2) of temporarily disturbed grounds that are outside of road corridors. This alternative implements BMPs and restores/stabilizes disturbed areas after construction the same as described for the other Action Alternative above with the same negligible to minor short-term direct impacts.

Construction of the debris basin at Site 1 would provide the same minor indirect benefit of reduced channel erosion potential. The channel modification at Stie 2 would increase erosion potential in the channel from higher water volumes and velocities. However, the channel would be armored to protect from erosion and no indirect adverse impacts are expected for routing of future flood flows. No measurable long-term impacts to upland erosion are anticipated from O&M activities.

5.2 Sedimentation

Please refer to Section 3.2.2 for existing sedimentation conditions for the Project area.

5.2.1 No Action Alternative

Sediment would continue to be deposited in the conveyance channels for all flood events and in the developed areas of the City of Saratoga Springs for all flood events equal to or greater than a 2-year flood. Sediment deposition could occur from in-channel flow, from unconfined overland flow, or from debris flows. Based on a sedimentation analysis performed by BC&A, approximately 0.27 ac-ft of sediment per year originate from the Site 1 Burnt/Lott Canyon drainages and approximately 0.20 ac-ft of sediment per year originate from the Site 2 Clark Canyon drainage. It is estimated that 20 to 50 percent of this sediment is deposited across the alluvial fan with the remaining depositing in Utah Lake. Unpredictable channel flow path changes from sediment-induced channel and culvert clogging would continue. This sediment deposition would have long-term moderate indirect adverse impacts during future flood events to the developed areas of the city that are located within the floodplain with financial consequences for sediment cleanup.

5.2.2 Site 1 and 2 Debris Basin Improvements Alternative

Alternative measures would construct debris basins to attenuate flood flows and capture sediment. The basins were estimated by BC&A to have a trap efficiency[2] of 98% for Site 1 at Burnt/Lott Canyon and 96% for Site 2 at Clark Canyons (BC&A 2024a, attached in Appendix E). Therefore, the sediment loads downstream of the basins would be reduced by 98% or by 0.26 ac-ft per year at Site 1 and 96% or 0.19 ac-ft per year at Site 2. This will substantially decrease sediment deposition in the conveyance channels and reduce the risk of unpredictable channel flow path changes caused from channel and culvert clogging. All flows up to and including the 100-year flood would be contained in the downstream conveyance channel and no longer result in sediment deposition from unconfined overland flow or from overland debris flows. Moderate long-term indirect benefits are expected for the developed communities within the benefitted area from decreased sediment damage during future flood events. Long-term indirect benefits are also expected for Utah Lake from decreased sedimentation in the lake. The benefits of reduced sedimentation in Utah Lake would be minor considering Saratoga Springs Watershed accounts for a small percentage of the overall Utah Lake drainage area contributing sediment to the lake.

The O&M activities to remove sediment from the conveyance channels would be reduced. The debris basins would provide enough storage capacity to capture 50-years of sediment and the SLO would remove the sediment at year 50 to extend the sediment life of the debris basins to 100 years.

[2] Trap efficiency is the ratio of total sediments retained by the debris basin to the total sediments entering the debris basin.

5.2.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

This alternative has the same moderate long-term benefits for the benefitted area as those described for the other Action Alternative in Section 5.2.2. However, an indirect adverse impact would occur during future flood events from increased sediment loads carried through the Site 2 channels. Greater sediment loads in the channel increases the risk of unpredictable channel flow path changes caused from channel and culvert clogging. The amount of sediment flowing through the channel and reaching Utah Lake from the Site 2 drainage area would increase by 20 to 50 percent from the No Action condition. The indirect adverse impact on channel flow path changes would be moderate because it could result in increased risk of channel failure and sediment deposition across the Site 2 benefited area. The indirect adverse impact of increased sedimentation to Utah Lake at Site 2 would be negligible considering the reduction of sediment from the Site 1 basins and that the Saratoga Springs Watershed accounts for a small percentage of the overall Utah Lake drainage area contributing sediment to the lake.

The O&M activities to remove sediment from the conveyance channels at Site 1 would be less frequent but would be more frequent at Site 2 to maintain conveyance capacities.

5.3 Surface Water Quality

Please refer to Section 3.2.3 for existing surface water quality conditions for the Project area.

5.3.1 No Action Alternative

There would be no change to surface water quality conditions for this alternative or from continued O&M activities. Introduction of contaminants from overland flooding of developed areas would continue to have indirect adverse impacts to the water quality of Utah Lake for future flood events.

5.3.2 Site 1 and 2 Debris Basin Improvements Alternative

Project design elements, including required BMPs, would be implemented to reduce the quantity of sediment (1) entering drainages, and (2) flowing downstream and violating any federal or state water quality rules and regulations. This alternative would also meet Utah antidegradation requirements. Refer to Section 6.6.2 for a list of construction BMPs. Based on implementation of BMPs and ephemeral nature of the channels that are dry for most of the year, construction activities would have negligible impacts on surface water quality.

Alternative measures protect from flooding for up to and include a 100-year flood. This would reduce contamination input into Utah Lake caused from overland flooding of developed areas during storm events greater than or equal to a 2-year flood through flood events up to a 100-year flood. The alternative also traps sediment in debris basins, reducing the sediment loads into Utah Lake (refer to Section 5.2.2). This would result in a minor long-term indirect benefit to surface water quality of Utah Lake during future flood events.

5.3.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

This alternative has minor long-term indirect benefits to water quality as those described in Section 5.3.2, but Site 2 at Clark Canyon increases sediment loads into Utah Lake. However, the amount of sediment that would be trapped at the Site 1 debris basins is almost equal to the increase in sediment load into Utah Lake at Site 2. Therefore, the change in sediment load into Utah Lake would be negligible with no anticipated change in water quality conditions from sediment input.

5.4 Surface Water Quantity and Flow

Please refer to Section 3.2.4 for existing surface water quality and flow conditions for the Project area.

5.4.1 No Action Alternative

There would be no change to surface water quantities and flow for this alternative. The moderate indirect adverse flood flow management conditions would remain over the long term. The conveyance channels through the City of Saratoga Springs and associated culverts would remain at their current limited capacities and adverse flooding would continue for all events equal to or greater than a 2-year flood. The risk of channel flow path changes and channel failure would remain. The projected increased frequency and intensity of floods would remain.

5.4.2 Site 1 and 2 Debris Basin Improvements Alternative

Water quantities produced from storm events would not change for this alternative, but the attenuation of flood flows in the debris basins will reduce the peak flood flows in the downstream conveyance channels and trap sediment. This is anticipated to provide an indirect moderate benefit of improved flood flow management for future flood events over the long term. The combined flow for Burnt/Lott Canyons would be reduced from 556 cfs down to 10 cfs and from 337 cfs downs to 57.7 cfs at Clark Canyon during a 100-year flood. This will allow for safe conveyance of flood flows through the conveyance channels through the City of Saratoga Springs and into Utah Lake for up to and including a 100-year flood. The alternative will reduce the susceptibility of flow path changes, decrease flooding in the benefited area, and decrease erosion potential to the downstream channels. The measures would also increase resilience to the projected rise in flood frequency and intensity.

5.4.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

The indirect benefits at Site 1 of improved flood flow management for future flood events would be the same as described for the other Action Alternative above. At Site 2 the capacity of the Clark Canyons capacity of less than 10 cfs would be increased to 337 cfs. The alternative is anticipated to have an indirect benefit of improved flood flow management that will decrease flooding in the benefited area. It will also increase the resilience to the projected rise in flood frequency and intensity. However, the higher flows and sediment load would result in susceptibility to adverse flow path changes and channel failure similar to the No Action condition. The indirect benefits of improved flood flow management would be minor with the adverse risk of sediment-induced flow path changes remaining.

5.5 Waters of the U.S.

Refer to Section 3.2.5 for a list of all waters of the U.S. within the Project area.

5.5.1 No Action Alternative

No impacts to waters of the U.S. or wetlands are anticipated for this alternative. The O&M activities along ephemeral channels would continue but the channels are not anticipated to meet the definition for a jurisdictional water of the U.S. per amendments to 40 CFR 120.2 and 33 CFR 328.3 on 8/14/2023. No wetlands are present in the areas where O&M activities occur.

5.5.2 Site 1 and 2 Debris Basin Improvements Alternative

No impacts to waters of the U.S. or wetlands are anticipated for this alternative. Modifications along ephemeral channels would occur, but they are not anticipated meet the current definition for a jurisdictional water of the U.S. per amendments to 40 CFR 120.2 and 33 CFR 328.3 on 8/14/2023. No wetlands would be impacted from alternative measures because none are present within the areas proposed for disturbance. No waters of the U.S. or wetlands are anticipated to be impacted from O&M activities because wetlands are not present in the areas where O&M activities would occur, and ephemeral channels are expected to be non-jurisdictional.

5.5.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

Like the other Action Alternative, impacts to waters of the U.S. from installation of alternative measures or from O&M activities are not anticipated because the ephemeral channels are expected to be non-jurisdictional. Emergent wetlands would be disturbed to enlarge the existing Clark Canyon conveyance channel. Approximately 0.04 acres of assumed jurisdictional wetland would be temporarily disturbed for construction measures, but the areas would be restored after construction completion. Emergent wetlands could also be temporarily disturbed from future O&M activities that may be needed at the channel outfall. Direct wetland impacts would be negligible based on the minimal amount of disturbance and restoration of disturbed areas.

5.6 Floodplain Management

Refer to Section 3.2.6 for existing floodplain conditions within the Project area.

5.6.1 No Action Alternative

This alternative would have a moderate indirect adverse impact from continued exposure to damaging future floods within the City of Saratoga Springs from Burnt, Lott, and Clark Canyons over the long term. The community within the flooded areas would continue to be at risk of injury or death during flood events, and buildings, lands, roads, infrastructure, and utilities would be damaged if a large flood were to occur. As FEMA flood maps are updated, developed areas would likely be classified within a FEMA regulated flood zone. Lenders to occupants of buildings within the regulated floodplain could require flood insurance coverage through the NFIP, directly impacting building owners financially. The projected increase in flood frequency and intensity would continue to threaten the community.

5.6.2 Site 1 and 2 Debris Basin Improvements Alternative

This alternative would have a moderate indirect benefit that would safely convey all future flood flows from Burnt, Lott, and Clark Canyons through the City of Saratoga Springs for up to and including a 100-year flood and substantially reduce flooding at a 500-year flood. Easements would be obtained along the channels to preserve the flood conveyance corridors. The community within the benefited area would no longer be at risk of injury or death during a 100-year flood, and buildings, lands, roads, infrastructure, and utilities would be protected if a 100-year flood or lesser flood were to occur. As FEMA flood maps are updated, the developed areas would likely not be classified within the FEMA regulated floodplain. The alternative measures would also increase resilience to the projected rise in flood frequency and intensity
.

5.6.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

This alternative has the same impacts as those described in Section 5.6.2 because it provides the same level of flood protection.

5.7 Air Quality and Climate

Please refer to Section 3.2.7 for existing air quality and climate conditions.

5.7.1 No Action Alternative

This alternative would have no change to the air quality conditions. The Sponsor performs routine O&M along the Burnt, Lott, and Clark Canyon channels through Saratoga Springs as needed. However, construction equipment and activity is limited consisting of one backhoe and/or one dump truck operating less than 1 week with activities occurring every other year. Based on the limited equipment, duration of activities, and frequency of performing work, the O&M activities are not anticipated to have a measurable impact on air quality or GHG emissions.

5.7.2 Site 1 and 2 Debris Basin Improvements Alternative

Construction activities would temporarily emit several air pollutants. PM10 emissions are associated with the dust created from demolition, land clearing, ground excavation, cut-and-fill operations, and road construction. All other pollutants ($PM_{2.5}$, CO, sulfur oxides [SOx], nitrous oxides [NOx], mobile source air toxics [MSATs], and greenhouse gases [GHGs]) are generated from heavy-duty diesel engines used by the construction equipment. Construction emissions are greatest during the earthwork phases because of the dust associated with this activity. Fugitive dust can also be produced by winds blowing through the construction site and by trucks carrying uncovered loads. Additionally, mud tracked onto paved roads leading to and from the construction site creates a source of fugitive dust (i.e., road dust) after it dries.

Fugitive dust, MSAT, and GHG emissions increases associated with construction would be minimized by implementing applicable BMPs. Refer to Section 6.6.3 for a list of BMPs. Because the project is located within a NAAQs nonattainment area, the Project may be subject to Rule R307-309 for Fugitive Emissions and Fugitive Dust, and a Fugitive Dust Control Plan must be submitted to the UDAQ for approval prior to commencement of project activities. The emissions must also ensure compliance with the EPA General Conformity regulations. General conformity ensures that the action taken by federal agencies do not interfere with a State or tribe's ability to attain and maintain the NAAQS for air quality, as required by the Clean Air Act (EPA 2024c). The General conformity regulations play an important role in helping to protect air quality with those areas that do not meet the NAAQS (nonattainment areas) and areas of vulnerable air quality (maintenance areas).

The NRCS has calculated emissions for another similar NRCS PL 83-566 project that includes constructing a detention dam and channel improvements. The other NRCS PL 83-566 project is much larger in footprint at over double the disturbance footprint and larger in scale than this Project. The emissions calculated for the other project were compared to annual emissions for the county, EPA de minimis thresholds for compliance with General Conformity, and EPA thresholds for GHG emissions. The results concluded that the larger scale project emissions had a negligible contribution to county emissions, were well below EPA General Conformity de minimis thresholds and GHG threshold for reporting, and had a negligible contribution to GHG emissions. Considering that this alternative is half of the disturbance footprint of the larger project and is smaller in scale with less emissions, it can be

assumed that this alternative would also have negligible emissions with no measurable direct impact to air quality or GHG emissions.

Long-term indirect impacts to air quality are not anticipated and O&M activities would not result in measurable changes to air quality conditions or GHG emissions.

5.7.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

This alternative would have no measurable impacts to air quality or GHG emissions the same as described for the other Action Alternative in Section 5.7.2.

5.8 Vegetation, Noxious Weeds, and Invasive Plants

Please refer to Section 3.2.8 for existing information on vegetation communities, N&I weeds, and non-native plants.

5.8.1 No Action Alternative

There would be no change to existing plant communities including N&I weeds for this alternative.

5.8.2 Site 1 and 2 Debris Basin Improvements Alternative

This alternative would have short-term direct impacts to vegetated areas that would temporarily disturb approximately 42.6 acres of vegetation. This includes 16.2 acres of grass/herbaceous cover and 7.2 acres of shrub/scrub cover at Site 1 for Burnt/Lott Canyon, and 19.2 acres of grass/herbaceous cover at Site 2 for Clark Canyon. Refer to Appendix C, Map C11 depicting disturbance areas. Vegetation would be reestablished on disturbed areas through application of a weed free NRCS approved grass/herbaceous seed mix. Disturbed shrub/scrub cover would be converted to grass/herbaceous cover which is negligible conversion based on a 0.27% change of the shrub/scrub cover in the Watershed and 0.08% change of total vegetation cover in the Watershed. Short-term impacts would be minor based on lack of sensitive vegetation communities, vegetation restoration measures, and N&I management measures described below.

Construction disturbance would have minor impacts that would put the Project area at risk for future invasion of N&I weeds. BMPs would be implemented during construction to prevent the spread of N&I plant species and comply with Executive Order 13112. During construction and until restoration areas are fully established, they would be maintained on a regular basis to prevent the establishment of N&I plant species. Non-desirable plant species would be controlled by cleaning equipment prior to delivery to the Project site and eradicating these species before the start and during construction as discovered. In addition, a Post Construction Rehabilitation Plan (PCRP) would be developed and would include mechanisms for addressing weed establishment and treatment. The increased risk for invasion of N&I weeds is anticipated to be short term and minor. No measurable long-term impacts to vegetation communities or N&I weeds are anticipated from implementation of alternative measures or from O&M activities based on implementation of BMPs, adherence to the PCRP, and restoration of disturbed areas.

5.8.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

This alternative has the same impacts as those described in Section 5.8.2, but more vegetated area totaling 50.7 acres would be disturbed. The vegetation disturbance at Site 1 is the same as described for the other Action Alternative above. More disturbance would occur at Site 2 with approximately 27.3 acres

of vegetated areas disturbed. Approximately 18.8 acres of this disturbance would be to grassland/herbaceous cover and 8.5 acres to shrub/scrub cover.

5.9 Special Status Plant Species

A BA was completed for the Project area (Refer to the BA included in Appendix E), and no ESA plant species, designated habitat, or suitable habitat were determined to be present. The BA was submitted to the USFWS on March 26, 2025, to comply with Section 7 of the ESA and concurrence from the USFWS was received on April 15, 2025 (Appendix A).

5.9.1 No Action Alternative

ESA plant species, designated critical habitat, or suitable habitat would not be impacted because none are present.

5.9.2 Site 1 and 2 Debris Basin Improvements Alternative

ESA plant species, designated critical habitat, or suitable habitat would not be impacted because none are present.

5.9.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

ESA plant species, designated critical habitat, or suitable habitat would be not impacted because none are present.

5.10 Wildlife and Wildlife Habitat

Please refer to Section 3.2.10 for information regarding the presence of wildlife and wildlife habitat within the Project area.

5.10.1 No Action Alternative

There would be no change to existing wildlife habitat or wildlife communities within the Project area for this alternative.

5.10.2 Site 1 and 2 Debris Basin Improvements Alternative

Direct minor short-term impacts to low quality wildlife habitat are anticipated. No aquatic habitat would be disturbed and no sensitive wildlife habitat (wilderness areas, wildlife refuges, protected natural areas, conservation areas, or ecological critical areas) are located within the Project area. Approximately 44.2 acres of wildlife habitat (25.0 acres at Site 1 and 19.2 acres at Site 2) would be temporarily disturbed for this alternative. This also includes 43.3 acres of mule deer crucial habitat and 2.3 acres of chukar substantial habitat for game species. However, the state does not regulate these habitats, and no threat is present for the species continued existence by the state or by federally agencies.

Wildlife species, if present, may be temporarily disturbed and displaced to adjacent habitats. Once construction is completed, they could return to the area. Temporarily disturbed areas would be restored upon construction completion. Minor modifications to habitat types would occur from alternative measures, but are not anticipated to have measurable long-term impacts to wildlife or wildlife habitat availability, including areas designated as mule deer crucial habitat and chukar substantial habitat. Measurable impacts to wildlife or wildlife habitat are not anticipated from O&M activities.

5.10.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

This alternative would have the same impacts as those described in Section 5.10.2, but 52.3 acres of habitat (25.0 acres at Site 1 and 27.3 acres at Site 2) would be temporarily disturbed. This includes 36.4 acres of crucial habitat for mule deer.

5.11 Migratory Birds, Bald Eagles, and Golden Eagles

Please refer to Section 3.2.11 for a description of migratory birds, bald eagles, and golden eagles occurrence within the Project area.

5.11.1 No Action Alternative

There would be no measurable impact to migratory birds, bald eagles, or golden eagles for this alternative.

5.11.2 Site 1 and 2 Debris Basin Improvements Alternative

Direct short-term impacts would occur from construction disturbance. With implementation of the conservation measures, measurable direct impacts to migratory birds and bald/golden eagles would consist of human activity/noise nuisances that would discourage birds from foraging and nesting in the construction disturbance areas. If construction activities occur during migratory bird breeding/nesting periods, the Project area (and surrounding habitats) would be surveyed by a qualified biologist for active nests no more than 5 days prior to the commencement of work. If active nests were found during surveys, spatial buffers would be established around such in coordination with USFWS and NRCS. Construction activities within the buffer areas would be prohibited until a qualified biologist confirmed that all nests are no longer active. Direct short-term impacts would be negligible based on implementation of avoidance/minimization measures, preconstruction surveys, restoration of disturbed areas, and abundant suitable habitat in the surrounding area.

No nesting habitat for bald eagles or golden eagles would be disturbed as none is present. If either species is present, they may avoid foraging in the Project area during construction activities. Short-term impacts to either species would be negligible based on lack of nesting habitat, the construction duration, restoration of disturbed areas, and abundant suitable foraging habitat in the surrounding area.

There would be no measurable long-term impacts to migratory birds, bald eagles, or golden eagles for this alternative or for O&M activities.

5.11.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

This alternative has the same conservation measures and negligible impacts as those described in Section 5.11.2.

5.12 Special Status Animal Species

A BA was completed for the Project (Refer to the BA included in Appendix E) and determined that there would be **No Effect** to yellow-billed cuckoo (*Coccyzus americanus*) and monarch butterfly (*Danaus Plexippus*) due to lack of presence and suitable habitat. The BA determined that June sucker (*Chasmistes liorus*) and associated habitat are present downstream of the Project area and have the potential to be impacted from alternative actions. In addition, SGCN peregrine falcon and golden eagle may use the area to forage.

5.12.1 No Action Alternative

No measurable impacts to ESA or SGCN are anticipated for continued O&M along the existing conveyance channels. The O&M activities occur through developed areas where peregrine falcon and golden eagle are likely already discouraged from foraging based on extensive human disturbance (activity and noise). June sucker and associated habitat would not be impacted because O&M activities do not occur in Utah Lake and would not have a measurable change to sediment deposition in Utah Lake.

5.12.2 Site 1 and 2 Debris Basin Improvements Alternative

No direct impacts to June sucker would occur from alternative actions, but minor indirect benefits could occur from reduced floodwater contaminants and sediment loads into Utah Lake. A BA was submitted to the USFWS on March 26, 2025, with a **May Effect, Not Likely to Adversely Affect** determination for June Sucker and **No Effect** determination for all other ESA animal species to comply with Section 7 of the ESA (Appendix A). The USFWS concurred with the determination on April 15, 2025 (Appendix A).

The SGCN peregrine falcon and golden eagle may be discouraged from foraging in the Project area during construction due to noise and activity. However, the Project area adjoins developed and frequently disturbed areas. Based on the existing background activities in the area, duration of construction, conservation measures implemented for migratory birds (see Section 5.11.2), and abundant better suited foraging habitat outside of the Project area, this short-term impact is anticipated to be negligible.

Areas of disturbance would also be surveyed by a qualified biologist prior to the commencement of work for SGCN. If SGCN were identified during surveys, UDWR would be notified and applicable conservation measures implemented in coordination with UDWR.

No measurable long-term impacts to ESA species or SGCN are anticipated from O&M activities.

5.12.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

This alternative has the same conservation measures and negligible impacts to SGCN as those described in Section 5.12.2. This alternative decreases the sediment load into Utah Lake at Site 1 but increases the sediment load into Utah Lake at Site 2 (refer to Section 5.3.3). The increase and decrease in sediment canceling each other out. However, the alternative still provides an indirect benefit to water quality from reduced floodwater contaminants into Utah Lake. Therefore, impacts to ESA species are expected to be the same as those listed for the other Action Alternative above.

No measurable long-term impacts to ESA species or SGCN are anticipated from O&M activities.

5.13 Social Issues and Local Economy

Refer to Section 3.2.13 for existing social issues and local economic conditions.

5.13.1 No Action Alternative

There would be no change to socioeconomic conditions for this alternative. The risk of flooding to the City of Saratoga Springs would continue to have a moderate indirect adverse impact that threatens the social wellbeing and prosperity of the community over the long term. Flooding would cause property damage, environmental degradation, and interruption in business operations. The annual average flood damage to buildings and roads is estimated at $2,177,300 for Burnt/Lott Canyons and $4,643,300 for Clark Canyons would remain.

There would be continued risk of flood-related mental health issues (depression, post-traumatic stress disorder, substance abuse, etc.) with associated costs for those impacted by flooding over the long term. These costs were not calculated as part of the flood damage due to uncertainties in calculation methods, but they are important to note as they influence impacted individuals financially.

5.13.2 Site 1 and 2 Debris Basin Improvements Alternative

This alternative has a moderate indirect benefit to the social and economic conditions of the City of Saratoga Springs and residents in the floodplain over the long term. Alternative measures would reduce flooding to the city from the Burnt, Lott, and Clark Canyon drainages for up to and including a 100-year flood. It would also substantially reduce flooding at a 500-year flood. The reduction in flooding would benefit the social wellbeing and prosperity of the community. It would reduce property damage, environmental degradation, and interruption in business operations. The average annual damage reduction after implementation of this alternative were estimated at $2,141,700 for Site 1 at Burnt/Lott Canyon and $4,626,000 for Site 2 at Clark Canyon (refer to Section 12.0 of Appendix D).

The risk of flood-related mental health issues (depression, post-traumatic stress disorder, substance abuse, etc.) would be reduced over the long term. These costs were not calculated as part of the flood damage reduction due to uncertainties in calculation methods, but they are important to note as they influence impacted individuals financially.

5.13.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

The flood damage reduction benefits of this alternative would be the same at Site 1 as those described in Section 5.13.2, but the average annual damage reduction was estimated at $4,633,500 for Site 2 at Clark Canyon (refer to Section 12.0 of Appendix D). There is an increased risk of unpredictable channel flow path changes caused from channel and culvert clogging during routing of all flood events at Site 2 under this alternative. The alluvial fan conditions and sediment load would likely result in channel conveyance failures during routing of some storm events over the Project life. Damages associated with channel conveyance failures were not calculated based on high uncertainty in assumptions. However, damage to homes, roads, utilities, and infrastructure could occur during such an event. Therefore, this alternative is expected to provide slightly less protection from flooding at Site 2 than the other Action Alternative above, even though the average annual damage reduction estimate is higher.

5.14 Public Health and Safety

Please refer to Section 3.2.14 for existing public health and safety conditions.

5.14.1 No Action Alternative

The residents of the City of Saratoga Springs within the floodplain would continue to have moderate adverse indirect impacts to their health and safety from the risk of flooding over the long term. The community would suffer from degraded physical and mental health if a damaging flood were to occur. The risk of injury and loss of life would remain. Table 5-1 provides the number of structures at risk of inundation for the 24-hour flood events.

Table 5-1. No Action Alternative Structures Flooded

Flood Event	Homes		Commercial/ Office		Schools		Churches		Other	
	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2
2-Year	53	344	0	0	1	0	1	1	0	1
5-Year	190	514	2	0	1	1	2	2	0	1
10-Year	239	648	2	1	1	1	2	2	0	1
25-Year	293	762	2	1	1	1	2	2	0	1
50-Year	329	825	2	1	1	1	3	2	0	1
100-Year	348	882	2	1	1	1	3	2	0	1
500-Year	389	959	2	1	1	1	3	2	0	2

** Other consists of the El Nautica Boat Club with RV lots for the 2-year through 100-year floods and a pump house for the 500-year flood.*

5.14.2 Site 1 and 2 Debris Basin Improvements Alternative

The residents of the City of Saratoga Springs within the floodplain would experience moderate indirect benefits to their health and safety from the reduced risk of flooding over the long term. The community would no longer be at risk of injury and loss of life for all flood events up to and including a 100-year flood. The physical and mental health of the community would be improved following a large storm event due to avoided flooding and safe flood routing through the city. Table 5-2 provides the number of structures remaining at risk of inundation for the 500-year flood.

Table 5-2. Debris Basin Improvements Alternative Structures Flooded

Flood Event	Homes		Commercial/ Office		Schools		Churches	
	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2
500-Year	283	196	1	1	0	0	1	0

Note: No flooding would occur outside of the Burnt, Lott, and Clark Canyon conveyance channels through the City of Saratoga Springs for all floods up to and including the 100-year flood.

This alternative also constructs NRCS high hazard class detention dams upstream of the City of Saratoga Springs with a risk of loss of life if a dam were to fail. However, the detention dams (debris basins) would be constructed to meet all Utah and NRCS dam safety requirements for safe operation and passage of all required design storm events to protect the dam from a breach. Additionally, the detention dam would be dry and would only hold water temporarily to attenuate flood flows during passage of flood events. Based on the dam meeting safety requirements and the normal dry dam conditions, a breach is not anticipated over the life of the structure and the structure is not anticipated to impact the health and safety of the downstream community.

5.14.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

The long-term health and safety benefits from reduced flooding would be the same as those described for the alternative in Section 5.14.2. Table 5-3 provides the number of structures remaining at risk of inundation during the 500-year flood.

Table 5-3. Debris Basin and Site 2 Channel Improvements Alternative Structures Flooded

Flood Event	Homes		Commercial/ Office		Schools		Churches	
	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2	Site 1	Site 2
500-Year	283	111	1	1	0	0	1	0

Note: No flooding would occur outside of the Burnt, Lott, and Clark Canyon conveyance channels through the City of Saratoga Springs for all floods up to and including the 100-year flood.

The Channel Improvements Alternative at Site 2 would increase the amount of flood water and sediment traveling down the conveyance channel through the City of Saratoga Springs. There is an increased risk of unpredictable channel flow path changes caused from channel and culvert clogging during routing of all flood events under this alternative. The alluvial fan conditions and sediment load would likely result in channel conveyance failures during routing of some storm events over the project life. If such an event were to occur, the health and safety of residents in the changed flow path would be at risk. Therefore, this alternative is expected to provide slightly less benefit to public health and safety than the other Action Alternative above.

5.15 Visual Resources and Scenic Beauty

Please refer to Section 3.2.15 for existing visual resources and scenic beauty conditions within the Project area.

5.15.1 No Action Alternative

There would be no change to visual resources and scenic beauty for this alternative.

5.15.2 Site 1 and 2 Debris Basin Improvements Alternative

Short-term impacts are anticipated that would directly affect visual quality, due to disturbed lands and construction equipment parked or operating on those lands. Areas disturbed during construction activities would be restored after construction completion by grading to match natural contours and revegetating as described in Section 5.8.2. Impacts would be minor based on lack of unique/outstanding visual characteristics of the landscape and restoration measures after construction. Long-term impacts to visual quality from installation of alternative measures are not anticipated. Measurable impacts to the visual quality from O&M activities are also not anticipated.

5.15.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

This alternative has the same impacts as those described in Section 5.15.2.

5.16 Transportation Infrastructure

Please refer to Section 3.2.16 for a description of existing transportation infrastructure with the potential to be impacted.

5.16.1 No Action Alternative

There would continue to be a minor indirect adverse impact on transportation infrastructure over the long term from future flooding. The annual estimated cost of flood damage to roads of $59,600 for Site 1 at Burnt/Lott Canyon and $62,400 for Site 2 at Clark Canyon would remain.

5.16.2 Site 1 and 2 Debris Basin Improvements Alternative

Alternative measures would modify water crossings along the conveyance channels to safely pass the anticipated 100-year flood flow out of each debris basin. Most of the crossings are along dirt roads where traffic is not present. One culvert crossing is located along a paved road at Site 1 Burnt/Lott Canyon where traffic is present. Short-term direct impacts at this paved roadway culvert crossing would occur, including road closures with traffic detours. This may slow traffic movement through the area and place temporary increases in traffic flow on other surface roads for detours. The area would reopen for normal traffic flow after construction completion and short-term impacts would be minor.

Alternative improvements would reduce future flooding to the City of Saratoga Springs and associated roadways providing minor indirect benefits to roadway corridors over the long term. No flooding would occur to roadways for up to and including a 100-year flood event from the drainages and a substantial decrease in flooding to roadways would occur during a 500-year flood. The annual damage reduction costs to roads after implementation of this alternative were estimated at $57,900 annually for Site 1 at Burnt/Lott Canyon and $62,100 for Site 2 at Clark Canyon (refer to Section 12.0 of Appendix D).

5.16.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

This alternative has the same impacts as those described for Site 1 in Section 5.16.2. Alternative measures at Site 2 for Clark Canyon include increasing the conveyance channel capacity through the City of Saratoga Springs. Seven (7) culverts would need to be installed or replaced, three of which are in paved city roads. Short-term direct impacts at the paved roadway culvert crossings would occur, including road closures with traffic detours. This may slow traffic movement through the area and place temporary increases in traffic flow on other surface roads for detours. The area would reopen for normal traffic flow after construction is completed. Because two culverts are located along main arterials and one is located along Highway 68, short-term impacts would be moderate.

Long-term benefits from reduced flooding would occur the same as described in Section 5.16.2, but the average annual damage reduction cost to roads after implementation for the Site 2 alternative at Clark Canyon were estimated at $62,200 (refer to Section 12.0 of Appendix D). There is an increased risk of unpredictable channel flow path changes caused from channel and culvert clogging during routing of all flood events at Site 2 under this alternative. The alluvial fan conditions and sediment load would likely result in channel conveyance failures during routing of some storm events over the Project life. Damages associated with channel conveyance failures were not calculated based on high uncertainty in assumptions. However, damage to roads and culverts could occur during such an event. Therefore, this alternative is expected to provide slightly less flood protection to roads at Site 2 than the other Action Alternative above, even though the annual damage reduction estimate is higher.

5.17 Noise

Please refer to Section 3.2.17 for existing noise conditions.

5.17.1 No Action Alternative

There would be no noise impacts for this alternative.

5.17.2 Site 1 and 2 Debris Basin Improvements Alternative

During construction activities, noise and vibration could be generated that would constitute a nuisance to

nearby residences. Construction activities for the debris basins would be approximately ½-mile from sensitive receptors (residences). Based on the distance from sensitive receptors and existing background construction noises from residential development and the active mine/landfill, noise and vibrations from construction of the debris basins would be negligible.

Site 1 for Burnt/Lott Canyon includes construction of a new conveyance channel within approximately 200 feet of residences for an approximate 800-foot length. Construction of the conveyance channel would increase noise and vibration and create a minor short-term nuisance to nearby residences. The noise and vibration levels would not be continuous throughout the entire workday and would move with construction equipment as activities progressed along the channel alignment.

Noise control programs (42 U.S.C. 4913) and any appliable noise/vibration regulations within the City of Saratoga Springs jurisdiction would be followed. Noise minimization efforts may include outfitting construction equipment with noise dampening measures (if needed) and avoiding operation of mechanical equipment and construction traffic in residential zones between the hours of 10:00 p.m. and 7:00 a.m. or before 9:00 a.m. on Sundays. In non-residential zones within the city limits, construction work shall not be performed between the hours of 10:00 p.m. and 6:00 a.m.

Noise control programs (42 U.S.C. 4913) and any appliable noise/vibration regulations within Utah County jurisdiction would be followed. This includes abiding by the noise limits identified for the county zoned use of Mining and Grazing 1. The maximum number of decibels permitted at any hour is 80 decibels when measured off-site, meaning measured upon the property owned by someone other than the owner of the property from which the sound was emitted.

5.17.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

This alternative has the same impacts as those described for Site 1 in Section 5.17.2.

Alternative measures at Site 2 for Clark Canyon include increasing the conveyance channel capacity through the City of Saratoga Springs. Most of the modification would be performed adjoining and near residential developments for an approximate 1.2-mile length. Construction of the conveyance channel would increase noise and vibration and create a short-term nuisance to nearby residences. The same noise/vibration minimization efforts would be followed as described in Section 5.17.2. The short-term direct noise impacts for this alternative are expected to be moderate based on more extensive channel modifications and associated increase in noise to sensitive receptors along the 1.2-mile stretch through residential neighborhoods.

5.18 Historic Properties / Cultural Resources / Native American Religious Concerns

The APE consists of the Project area and benefited area. Based on results of the Cultural Resource Survey (Certus 2024), the Project area does not contain cultural resource sites that are eligible for listing in the NRHP. The benefited area contains 11 known sites that include historic canals, artifact scatters, and roads. All sites are ineligible or unevaluated for their NRHP eligibility. However, the unevaluated sites are assumed to be eligible for this analysis. Please refer to Section 3.2.18 for information regarding cultural resource sites within the Project area.

5.18.1 No Action Alternative

There would be no direct impacts to historic properties or cultural resources for this alternative because none are present within areas disturbed by O&M. Minor indirect adverse impacts could occur to the 11 historic canals, artifact scatters, and roads located within the benefitted area that could be damaged from future flooding.

5.18.2 Site 1 and 2 Debris Basin Improvements Alternative

Project measures would not include ground disturbing activities or modifications to historic properties, cultural resources, or Native American religious sites.

NRCS's determination of **No Historic Properties Affected** was submitted to the SHPO and tribes on November 12, 2024 to comply with Section 106 of the NHPA as described in Section 7.1.4. The SHPO concurred with determinations of project effects in a letter dated December 24, 2024 (Appendix A). Four tribes were consulted to comply with EO 13007, EO 13175, the NHPA, and the AIRFA as described in Section 7.1.2. No Native American religious concerns and/or TCPs have been identified. Refer to these referenced sections for consultation details and dates and refer to Appendix A for documentation of consultation.

An indirect benefit to resources within the benefited area would be achieved over the long term due to reduced risk of flooding to 11 historic canals, artifact scatters, and roads located within the benefited area.

5.18.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

There would be no direct impacts to historic properties or cultural resources for this alternative because none are present within areas disturbed the same as the other Action Alternative. A minor indirect benefit to resources within the benefited area would be achieved over the long term due to reduced risk of flooding to 11 historic canals, artifact scatters, and roads located within the benefitted area.

5.19 Hazardous Materials

An active landfill and mine are located downstream and in the flood path of Site 1 Burnt/Lott Canyon, and the Project area at Site 1 extends through the clay and limestone mine/landfill. Please refer to Section 3.2.19 for information regarding the presence of hazardous materials.

5.19.1 No Action Alternative

There would be no direct impacts to hazardous materials for this alternative. Indirect minor impacts could occur from future flooding to the clay and limestone mine/landfill at Site 1. Floodwaters could pick up contaminants from the mine/landfill and convey them downstream through surface water or into the subsurface soils from percolation.

5.19.2 Site 1 and 2 Debris Basin Improvements Alternative

The alternative would protect the clay and limestone mine/landfill from flooding for up to and including a 100-year flood. This would have a minor long-term indirect benefit reducing the risk of contamination to surface water and soils during flood events.

The project measures include constructing a conveyance channel through the clay and limestone mine/landfill to connect it to an existing downstream channel. The alignment does not appear to pass

through actively mined or solid waste disposal locations, but does cross areas containing soil stockpiles and construction/ demolition debris. The contractor shall ensure that the new channel is constructed on clean soil free from contamination. Soil testing would be performed in areas of suspect fill prior to channel installation to verify compliance with state/federal soil contaminant regulatory limits and to ensure all state/federal water quality regulations are met.

NRCS requires that contractors comply with all federal, state, and local laws and regulations pertaining to pollution and contamination of the environment to prevent pollution of surface water, groundwater, soil, and air with any hazardous materials. If any hazardous materials/sediment or suspect hazardous materials/sediment are encountered during ground disturbing activities, the contractor shall follow all applicable state and federal regulations for handling, disposing, and reporting of hazardous materials. Based on adherence to the items above prior to and during construction, no direct adverse impacts from hazardous materials are expected.

5.19.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

The alternative has the same impacts as those described for the other Action Alternative in Section 5.19.2.

5.20 Land Use

Land use within the Project area consists of 63.8 acres or 53% public open space and 56.4 acres or 47% residential.

5.20.1 No Action Alternative

There would be no impacts to land use because no changes to land use would occur.

5.20.2 Site 1 and 2 Debris Basin Improvements Alternative

There would be no changes to the existing land uses. An additional use of flood management would be added for the debris basin and flood easements along the conveyance channels. Easements would be obtained for these areas and no impact on the existing land uses would occur.

5.20.3 Site 1 Debris Basin and Site 2 Channel Improvements Alternative

The alternative has the same impacts as those described for the other Action Alternative in Section 5.20.2.

5.21 Cumulative Effects

A list of known past, present, or reasonably foreseeable future actions in the vicinity of the Project area is provided below. The area over which the cumulative effects are evaluated varies by resource, as the nature and range of potential effects vary by resource. A potential for cumulative impact was identified if a relationship exists such that the impacts from the Project might affect or be affected by impacts from another action.

- Development: The population of Saratoga Springs has grown exponentially since it was established as a city in 2001. Development of city infrastructure and buildings has occurred to accommodate population growth and is anticipated to continue. The city population was 37,696 in 2020 (U.S. Census Bureau 2020). The city estimates it will nearly double size in the next 10 years.
- Foothill Boulevard Extension: Foothill Boulevard currently extends from the Pony Express Parkway south approximately 3 miles to Lariat Boulevard. Foothill Boulevard is planned to extend southeast another 5.5 miles to connect to SR-68. The road corridor was cleared of vegetation and lightly graded in 2020 along the alignment. The road was paved along the cleared alignment from Pony Express Parkway to Lariat Boulevard in 2024. Paving for the remaining portion is planned to be phased over the next 10 years.

Impacts that are negligible are not considered in the cumulative analysis because they would not combine to create a measurable cumulate effect. The Action Alternatives do not have long-term adverse impacts on resources. Resources that have measurable adverse impacts from the Action Alternatives include short-term localized impacts during construction to erosion, vegetation, wildlife, visual resources, transportation movement, and noise. Long-term positive benefits to resources would be realized from implementation of the Action Alternatives. However, these benefits do not affect, nor would they be affected by the other actions, except for resources related to floodwater management. Resources determined to be applicable to the cumulative analysis are described in Sections 5.21.1 through 5.21.7.

5.21.1 Erosion

Both the Action Alternatives and other actions include temporary ground disturbance occurring at the same time and near the same place that may have cumulative impacts on erosion in the Watershed. However, a Utah Pollutant Discharge Elimination System (UPDES) permit would be obtained to construct the Action Alternatives. As part of the UPDES permit a Stormwater Pollution Prevention Plan (SWPPP) is required which outlines the required erosion and sediment control and pollution prevention BMPs to be adhered to. The Action Alternatives are small scale localized projects, with a short duration of temporary adverse impact (2 years), include measures to control and offset erosion, and do not result in long-term adverse effects. Therefore, they are not expected to have a measurable combined contribution for cumulative adverse erosion effects in the Watershed when compared to the other long-term actions with much larger disturbance footprints.

5.21.2 Vegetation

Both the Action Alternatives and other actions include disturbance to vegetation. To consider the contribution of impact from the Action Alternatives it is important to compare vegetation impacts from the other actions. The Watershed was completely undeveloped in 2000 and developed land from other actions now covers 2,057 acres, which has completely removed natural vegetation and replaced it with buildings, hard surfaces, and nonnative landscaped areas. The population of Saratoga Springs is projected to double in the next 10 years (City of Saratoga Springs 2023). Assuming development in the Watershed also doubles, this would result in another 2,057 acres of permanent removal of natural vegetation or a total of about 4,000 acres in the Watershed (46% of the Watershed). Considering the Action Alternatives would only disturb up to 50.7 acres of vegetation, or 0.5% of the Watershed and disturbed areas would be restored with only temporary impacts over two years that have no long-term effects, the Action Alternatives do not have a measurable contribution to cumulative effects on vegetation communities in the Watershed.

5.21.3 Wildlife

Both the Action Alternatives and other actions include construction disturbance that could affect wildlife and associated habitat. Similar to the vegetation analysis, the comparison of disturbance from other actions compared to the Action Alternatives is important to distinguish. Based on the project permanent removal of vegetation ten years from now of approximately 4,000 acres or 46% of the Watershed, this is also how much wildlife habitat is projected to be removed from the Watershed due to development from 2000 to 2035. The Action Alternatives would only disturb up to 50.7 acres of habitat or 0.5% of the Watershed and disturbed areas would be restored with only temporary impacts over two years that have no long-term effects to wildlife/habitat. The duration of temporary impact of 2 years is also negligible compared to the 35 years of permanent impacts to wildlife/vegetation from development. Therefore, the Action Alternatives do not have a measurable contribution to cumulative adverse effects on vegetation communities in the Watershed.

5.21.4 Visual Resources

Both the Action Alternatives and other actions include measures that could cumulatively effect visual resources. Similar to the vegetation and wildlife analysis, the comparison of disturbance from other actions compared to the Action Alternatives is important to distinguish. Development is projected to cover approximately 4,000 acres or 46% of the Watershed 10 years from now. Development has permanently changed the viewshed and will continue to change the viewshed of the entire northeast half of the Watershed. In comparison, the Action Alternatives will have temporary construction disturbance, but disturbed areas would be restored with no long-term adverse impacts to visual quality. These temporary impacts lasting two years are negligible compared to the 35 years of the permanent progression of adverse viewshed impacts from development. Therefore, the Action Alternatives do not have a measurable contribution to cumulative adverse effects on visual resources in the Watershed.

5.21.5 Transportation Movement

Both the Action Alternatives and other actions include construction measures that could cumulatively impact transportation movement. Replacement of culvert crossings for the Action Alternatives could result in temporary road closures up to 3 months. The alignment of the Foothill Boulevard Extension is located southwest and outside of existing road corridors. Ten years from now when the extension is connected to SR-68, the Action Alternatives would have already been constructed with no contribution to adverse cumulative impacts on transportation movement. Due to unpredictability related to residential development road closures, the timing for such closures cannot be reasonably predicted. If development road closures occur at the same time and in the same area as the temporary road closures for the Action Alternatives, they could have minor temporary cumulative effects on delays or traffic detours through residential roads.

5.21.6 Noise

Both the Action Alternatives and other actions include noise disturbances that could cumulatively contribute to noise nuisances in residential neighborhoods. The Foothill Boulevard Extension would be constructed through Site 1 and Site 2 prior to construction of the Action Alternatives so cumulative noise impacts are not anticipated for those projects. The location and extent of noise associated with residential development cannot be reasonably predicted. If development occurs at the same time and in the same area as the Action Alternative channel modifications proposed near residential neighborhoods, they could cumulatively contribute to noise nuisances.

5.21.7 Floodwater Management

The Action Alternatives provide long-term benefits for reduced erosion potential in stream channels, reduced sedimentation in the benefited area, improved water quality of Utah Lake, better management of flood flows, flood damage reduction in the benefited area, improved public health and safety. The other actions do not contribute cumulatively to these benefits. However, the flood damage reduction benefits of the Action Alternatives would provide long-term flood prevention benefits to the Foothill Boulevard Extension and developed areas.

5.22 Summary and Comparison of Alternative Plans

The alternatives proposed for consideration and analyzed in detail in this Plan-EA have been compared against each other to discern the merits and disadvantages of each alternative. This includes a side-by-side comparison of environmental, social, and economic effects.

5.22.1 Summary of Effects on Resource Concerns

A summary of effects for the resource concerns for the final array of alternatives is provided in Table 5-4. Please refer to the detailed analysis in Sections 5.1 through 5.19 for more detailed information on effects to resources.

Table 5-4. Summary and Comparison of Alternatives – Effects on Resource Concerns

Resource Concern/Item	No Action Alternative	Site 1 and Site 2 Debris Basin Improvements	Site 1 Debris Basin and Site 2 Channel Improvements
Upland Erosion	No impacts to upland erosion are expected. Minor amounts of channel erosion would continue along segments of the Burnt, Lott, and Clark Canyon conveyance channels.	Direct short-term impacts from construction disturbance on 60.3 acres that would increase erosion potential. BMPs would be implemented to offset impacts and disturbed areas restored/stabilized after construction. Negligible impacts would occur in areas designated with a slight erosion hazard and minor impacts would occur in areas designated with a moderate erosion hazard. A direct minor benefit is anticipated at Site 1 and Site 2 that would reduce erosion potential along conveyance channels over the long term.	Direct short term impacts would be negligible and minor as described for the other Action Alternative, and the same BMPs implemented. However, there would be slightly more disturbed land at 84.2 acres. A direct minor benefit is anticipated at Site 1 that would reduce erosion potential along conveyance channels over the long term. Site 2 channel modifications increase erosive power from higher flows, but the channel would be armored to protect from erosion.

Resource Concern/Item	No Action Alternative	Site 1 and Site 2 Debris Basin Improvements	Site 1 Debris Basin and Site 2 Channel Improvements
Sedimentation	Indirect moderate long-term adverse impacts would occur from 20% to 50% of the sediment originating from the drainage areas depositing in the benefited area during future flood events and from continued risk of sediment-induced channel flow path changes.	Moderate indirect long-term benefits are expected that would avoid future flooding and sediment deposition (0.26 ac-ft per year at Site 1 and 0.19 ac-ft per year at Site 2) in the benefited area and channels. The risk of sediment-induced channel flow path changes would be reduced. Minor indirect long-term benefits are also expected for Utah Lake from decreased sedimentation to the lake during future floods.	The moderate indirect benefits for Site 1 would be the same as described for the other Action Alternative. However, an indirect moderate adverse impact would occur during future flood events from higher sediment loads (20% to 50% more) at Site 2 and increased risk of sediment-induced channel failure. Changes to sedimentation of Utah Lake are negligible.
Surface Water Quality	Introduction of contaminants from overland flooding of developed areas during future floods would continue to have minor indirect adverse impacts to the water quality of Utah Lake over the long term.	There would be negligible direct impacts during construction based on the dry nature of the ephemeral system and implementation of BMPs. A minor indirect long-term benefit to Utah Lake water quality is expected from avoided overland flooding during future flood events and associated reduced contamination (sediment and contaminants) to surface water.	This alternative has the same negligible direct impacts during construction and minor long-term indirect benefits to water quality as the other Action Alternative, but there would be negligible change in sediment load into Utah Lake.

Resource Concern/Item	No Action Alternative	Site 1 and Site 2 Debris Basin Improvements	Site 1 Debris Basin and Site 2 Channel Improvements
Surface Water Quantity and Flow	The moderate indirect adverse flood flow management condition would remain over the long term with flood risks to the benefited area for all events greater than or equal to a 2-year flood. The increased frequency and intensity of floods would remain.	A moderate indirect benefit of improved flood flow management for future floods at Site 1 and Site 2 is expected over the long term. The measures reduce susceptibility of flow path changes, decrease flooding in the benefited area, and decreased erosion potential to conveyance channels. Measures increase resilience to the projected rise in flood frequency and intensity.	The indirect long-term benefits of improved management for future floods at Site 1 and Site 2 would be similar as described for the other Action Alternative. However, the benefits for Site 2 would be minor due to the increased risk of sediment-induced channel failure.
Waters of the U.S. and Wetlands	No impacts to waters of the U.S. or wetlands.	No impacts to wetlands would occur. The modified ephemeral channels may not meet the current definition for a jurisdictional water of the U.S. per amendments to 40 CFR 120.2 and 33 CFR 328.3 on 8/14/2023. Assuming the ephemeral channels are non-jurisdictional, no impacts to jurisdictional waters of the U.S. are anticipated.	Assuming the ephemeral channels are non-jurisdictional, no impacts to jurisdictional waters of the U.S. are anticipated. Temporary disturbance would occur in 0.04 acres of emergent wetland. Direct wetland impacts would be negligible based on minimal amount of disturbance and restoration of disturbed areas.
Floodplain Management	Moderate indirect adverse impacts would continue over the long term from exposure to damaging floods. The risk of injury or death and the risk of damage to buildings and infrastructure from flooding would remain. The increased frequency and intensity of floods would continue to threaten the community over the long term.	Moderate indirect benefits are anticipated over the long term from flood protection for future flooding up to and including a 100-year flood. The risk of injury or death and the risk of damage to buildings and infrastructure would be removed for this event. Measures also reduce flooding for a 500-year flood. Measures increase resilience to the projected rise in flood frequency and intensity.	This alternative would have the same indirect benefits as the other Action Alternative.

Resource Concern/Item	No Action Alternative	Site 1 and Site 2 Debris Basin Improvements	Site 1 Debris Basin and Site 2 Channel Improvements
Air Quality	There would be no change to air quality conditions.	No short-term direct adverse effects to air quality or GHGs would occur during construction based on negligible construction emissions, emission values under the EPA general conformity de minimis thresholds, GHG emissions below the EPA reportable limits, implementation of BMPs, and the short-term of construction. Measurable long-term impacts to air quality are not expected from continuation of O&M activities.	This alternative would have the same negligible impacts as the other Action Alternative.
Vegetation Communities and N&I Weeds	There would be no change to vegetation or N&I weeds.	Direct short-term impacts to vegetated areas would occur from temporary disturbance to 42.6 acres of vegetated lands that would also increase the risk for invasion of N&I weeds. These direct impacts are minor based on lack of sensitive vegetation communities, restoration of disturbed areas, development of a PCRP, and implementation of BMPs with no long-term impacts.	This alternative would have the same impacts as the other Action Alternative, with more temporary disturbance to vegetated areas of 50.7 acres.
Special Status Plant Species	There would be no impact to ESA plant species or habitat because none are present.	There would be no impact to ESA plant species or habitat because none are present. A BA was submitted to the USFWS on March 26, 2025 to comply with Section 7 of the ESA (Appendix A).	There would be no impact to ESA plant species or habitat as described for the other Action Alternative.

Resource Concern/Item	No Action Alternative	Site 1 and Site 2 Debris Basin Improvements	Site 1 Debris Basin and Site 2 Channel Improvements
Wildlife and Wildlife Habitat	No impacts.	Direct short-term impacts to wildlife and wildlife habitat from temporary disturbance to 44.2 acres. Impacts would be minor based on restoration of disturbed areas, type of habitat disturbed, and short-term disturbance. Measurable long-term impacts are not anticipated.	This alternative would have the same impacts as the other Action Alternative, with more temporary disturbance to habitat of 52.3 acres.
Migratory Birds/Bald and Golden Eagles	No impacts.	Negligible impacts based on implementation of conservation measures, restoration of disturbed areas, and abundant suitable habitat in the surrounding area. Measurable long-term impacts are not anticipated.	This alternative would have the same negligible impacts as the other Action Alternative
Special Status Animal Species	No impacts	No direct impacts to SGCN or ESA species would occur. Minor indirect benefits to SGCN and ESA-listed June sucker are anticipated from reduced flood contaminants into Utah Lake. A BA was submitted to the USFWS with a **May Effect, Not Likely to Adversely Affect** determination for June sucker and **No Effect** to all other ESA species on March 26, 2025 to comply with Section 7 of the ESA (Appendix A).	The impacts would be the same as described for the other Action Alternative.

Resource Concern/Item	No Action Alternative	Site 1 and Site 2 Debris Basin Improvements	Site 1 Debris Basin and Site 2 Channel Improvements
Social Issues and Local Economy	The risk of flooding would continue to have a moderate adverse indirect impact that threatens the social wellbeing and prosperity of community over the long term. Annual average flood damage is estimated at $2,177,300 for Site 1 and $4,643,300 for Site 2.	The alternatives would have a moderate indirect benefit to the community over the long term from flood protection. Flooding from a 100-year flood would no longer threaten the social wellbeing and prosperity of the community. Average annual reduction in flood damage is estimated at $2,141,700 for Site 1 and $4,626,000 for Site 2.	This alternative has the same benefits and average annual flood damage reduction at Site 1 as the other Action Alternative. Site 2 average annual flood damage reduction estimated at $4,633,500. However, increased risk of sediment-induced channel failure at Site 2 could not be calculated and this alternative is expected to provide slightly less protection from flooding due to this risk, even though the damage reduction was estimated higher.
Public Health and Safety	There would be moderate indirect adverse impacts to the health and safety of the community from the risk of flooding over the long term. The community would suffer from degraded physical and mental health if a damaging flood were to occur. The risk of injury and potential loss of life would remain.	Moderate indirect benefits to the health and safety of the community would occur from the reduced future flooding over the long term. The community would no longer be at risk of injury and loss of life for all flood events up to and including a 100-year flood. The physical and mental health of the community would be improved following a large flood event due to avoided flooding and safe flood routing through the city.	The benefits are the same as those described for the other Action Alternative, but there is an increased risk to public health and safety from sediment-induced channel failure during routing of flood events through the Site 2 Clark Canyon conveyance channel.
Visual Resources	There would be no change to visual resources within the Project area.	Minor short-term impacts to visual quality would occur during construction from construction equipment and disturbance but these areas would be restored after construction completion.	The impacts would be the same as those described for the other Action Alternative.

Resource Concern/Item	No Action Alternative	Site 1 and Site 2 Debris Basin Improvements	Site 1 Debris Basin and Site 2 Channel Improvements
Transportation Infrastructure	The risk of flooding would continue to have a minor adverse indirect impact to transportation infrastructure over the long term. Annual flood damages to transportation infrastructure are estimated at $59,600 for Site 1 and $62,400 for Site 2.	Minor short-term direct impacts at one paved road culvert crossing during construction that would include temporary road closures with traffic detours. A minor indirect benefit to transportation infrastructure would occur over the long term from flood protection measures. Average annual reduction in flood damage is estimated at $57,900 for Site 1 and $62,100 for Site 2.	Moderate short-term direct impacts are expected at three culvert crossings during construction that would include temporary road closures with traffic detours. The benefits and average annual flood damage reduction would be the same for Site 1 as other Action Alternative. Site 2 average annual damage reduction is estimated at $62,200. However, this alternative is expected to provide slightly less protection to roads from flooding due to increased risk of sediment-induced channel failure, even though the damage reduction was estimated higher.
Noise and Vibration	No impacts.	Minor direct short-term impacts would occur for channel modifications at Site 1 due to increases in noise and vibration near sensitive receptors in residential subdivisions. The remaining construction activities would have negligible impacts due to the proximity at ½-mile from sensitive receptors.	Impacts at Site 1 would be the same as the other Action Alternative. Moderate direct short-term impacts would occur for channel modifications at Site 2 due to increase in noise and vibration to sensitive receptors in residential subdivisions.

Resource Concern/Item	No Action Alternative	Site 1 and Site 2 Debris Basin Improvements	Site 1 Debris Basin and Site 2 Channel Improvements
Historic Properties / Cultural Resources / Native American Religious Concerns	Minor indirect adverse impacts could occur to cultural resource sites. Eleven known cultural resource sites including historic canals, artifact scatters, and roads could be damaged during future flood events.	No direct effects to historic properties or cultural resources would occur because none are present within areas disturbed. Minor indirect benefits would occur from reduced flooding to the 11 known cultural resources within the benefited area. NRCS determined **No Historic Properties Affected** from alternative actions and submitted the determination to the SHPO on November 12, 2024 to comply with Section 106 of the NHPA. The SHPO concurred with the determination in a letter dated December 24, 2024 (Appendix A). Four tribes were consulted pursuant to EO 13007, EO 13175, the NHPA, and the AIRFA (Appendix A). No Native American religious concerns were identified by the tribes.	No direct impacts to historic properties or cultural resources would occur because none are present within areas disturbed. Minor indirect benefits would occur from reduced flooding to the 11 known cultural resources within the benefited area.
Hazardous Materials	Minor indirect adverse condition from future flooding to the limestone and clay mine/landfill with risk of contamination to surface water and soil would remain over the long term.	Indirect minor benefits are expected from flood protection for the limestone and clay mine/landfill and associated reduced risk of contamination to surface water and soil.	This alternative has the same benefits as described for the other Action Alternative.
Land Use	No impacts.	There would be no change to the existing land uses. Basins and conveyance channels would have an added use of flood management, but easements would be obtained with no impact to existing land uses.	This alternative has the same benefits as described for the other Action Alternative.

5.22.2 Ecosystem Services Tradeoff

A comparison of ecosystem services covering long-term effects was performed for the final array of alternatives and is provided in Table 5-5. Ecosystem service effects overlap with the resource concerns effects. Refer to Table 3-2 of Section 3.1 for information on overlapping resource concerns used in determination of ecosystem service effects. Refer to Sections 5.1 through 5.19 for detailed effects to resource concerns that include ecosystem services. See Appendix E for the full Ecosystem Services Tradeoff Analysis Evaluation Table.

Table 5-5. Summary and Comparison of Alternatives – Ecosystem Services Tradeoff

Resource Concern/Item	No Action Alternative	Site 1 and Site 2 Debris Basin Improvements	Site 1 Debris Basin and Site 2 Channel Improvements
Regulating Services			
Water Regulation (quality and quantity)	Risk of water quality degradation to Utah Lake from floodwater contaminants would remain. Contaminated water could adversely impact downstream water uses.	Reduces risk of water quality degradation to Utah Lake benefiting downstream water uses.	Same as the other Action Alternative.
Flood Moderation	Future flood damage risk remains for the City of Saratoga Springs along with risk of injury or death to residents. Average annual flood damage is estimated at $2,177,300 for Site 1 and $4,643,300 for Site 2.	The risk of flooding would be removed for up to and including the 100-year flood. Public safety would be improved. Flood damage reduction is estimated at $2,141,700 for Site 1 and $4,626,000 for Site 2.	The risk of flooding would be removed for up to and including the 100-year flood. Public safety would be improved. Flood damage reduction is estimated at $2,141,700 for Site 1 and $4,633,500 for Site 2. However, this alternative is expected to provide slightly less flood protection from future flooding due to increased risk of sediment-induced channel failure and associated uncalculated damage.
Cultural Services			
Peace and Sustainability	The people inhabiting the floodplain would continue to be threatened from risk of flooding which could adversely impact their daily lives, source of income, and peace of mind.	The threat of flooding would be reduced benefiting the daily lives, source of income, and peace of mind of the community.	The benefits would be similar to the other Action Alternative, but the increased risk of channel conveyance failure at Site 2 could have unexpected adverse consequences to peace and sustainability.

Resource Concern/Item	No Action Alternative	Site 1 and Site 2 Debris Basin Improvements	Site 1 Debris Basin and Site 2 Channel Improvements
Well-being and safety	The flood risk would remain. Flooding could result in mental and physical health impacts from injury, potential loss of life, destruction of property, business closures, financial stressors, etc.	The threat of flooding would be reduced. This would improve the mental/ physical well-being and safety for all people who inhabit the floodplain that are currently at risk.	The benefits would be similar to the other Action Alternative, but the increased risk of channel conveyance failure could have unexpected adverse consequences to the well-being and safety of the community.
Economic Analysis – Cost and Benefit Summary			
Federal Installation Cost (PL-53566)	-	$20,593,000	$17,693,000
Sponsor Installation Cost	-	$1,629,000	$3,535,000
Total Installation Cost	-	$22,222,000	$21,228,000
Annual Installation Cost[1]	-	$672,900	$642,800
Annual O&M Cost[1]	$17,000	$58,400	$65,900
Total Annual Costs	**$17,000**	**$731,300**	**$708,700**
Total Annual Benefits	-	$6,767,700	$6,775,200
Benefit-Cost Ratio	**-**	**9.3**	**9.6**
Net Annual Benefits	**($17,000)**	**$6,036,400**	**$6,066,500**

[1] Calculated using FY 2025 Water Resources Discount Rate (3.0 percent), annualized over 100-year evaluation period, and using 102-year period of analysis (*period of analysis = 100-year project life plus 2 years for installation)*.

6.0 Preferred Alternative

6.1 Rationale for Preferred Alternative Selection

Alternatives were compared to select one alternative that “best” maximized public benefits (environmental, economic, and social) with appropriate consideration of costs, guiding principles, the federal objective, PL 83-566 general purposes, and ecosystem services. This alternative is known as the NRCS preferred alternative. See Appendix E for the Ecosystem Services Tradeoff Analysis Evaluation Table used in alternative decision-making.

Based on the effects to resources and ecosystem services tradeoffs, the Site 1 and Site 2 Debris Basin Improvements Alternative was determined to be the combination of alternative measures that best maximized environmental and social benefits. However, the Site 1 Debris Basin and Site 2 Channel

Improvements Alternative was determined to be the combination of alternative measures with the highest economic benefit.

While both Action Alternatives had similar benefits, the Site 1 Debris Basin and Site 2 Channel Improvements Alternative was found to create an adverse condition that increases the probability of channel failure and flooding when compared to the other Action Alternative. The unpredictable nature of channel failure and unknown flood paths make it not possible to calculate flood damages for such an event, and these costs were not considered in the economic analysis. The adverse condition creates additional risk to health, safety, peace, sustainability, and well-being of the community. The difference in net annual benefits between the Action Alternatives was determined to be negligible at 0.5% of the total net benefits of either alternative. The overall social and environmental benefits for the Site 1 and Site 2 Debris Basin Improvements Alternative were determined to be a sufficient tradeoff for the negligible 0.5% difference in economic benefit between Action Alternatives, along with the qualitative economic considerations for uncalculated damages that could result from channel failure for the Site 2 Channel Improvements Alternative. Therefore, the NRCS preferred alternative for the Project was determined to be the Site 1 and Site 2 Debris Basin Improvements Alternative based on the PR&G analysis performed.

6.2 Measures to be Installed

The temporary and permanent measures to be installed are described in detail in Section 4.2.2 and 4.2.3.1. A list of permanent alternative measures to be installed at each Site is provided below for reference. Structural data for the debris basins is provided in Table 6-6 and for structural data for channel work is provided in Table 6-7 of Section 6.12.2.

Flood Prevention Installation Measures at Site 1:

- Construct a debris basin at the mouth of Burnt Canyon and a debris basin at the mouth of Lott Canyon to attenuate flood flows and capture sediment.
- Construct approximately 800 linear feet of new channel downstream of the Burnt Canyon debris basin and approximately 330 linear feet of new channel downstream of the Lott Canyon debris basin to combine the principal spillway outflow from both basins into an existing conveyance channel.
- Construct 3,600 linear feet of new channel downstream of both debris basins to convey the combined flow to an existing conveyance channel.
- Replace two culvert crossings through dirt access roads, install two new culver crossings through dirt access roads, and install one new culvert crossing through a paved road.

Flood Prevention Installation Measures at Site 2:

- Construct a debris basin at the mouth of Clark Canyon north and a debris basin at the mouth of Clark Canyon south to attenuate flood flows and capture sediment.
- Improve approximately 1,525 linear feet of existing channel downstream of the Clark Canyon north debris basin to connect flows to an existing conveyance channel. No improvements are needed to the conveyance channel downstream of Clark Canyon south.
- Replace three culvert crossings through dirt access roads.

6.3 Irreversible and Irretrievable Resource Commitments

NEPA requires that environmental analysis include identification of "… any irreversible and irretrievable commitments of resource which would be involved in the Proposed Action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects this use could have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural resource).

Implementing the preferred alternative would involve a commitment of a range of natural, physical, human, and fiscal resources. Considerable amounts of fossil fuels, labor, and construction materials would be expended. Additionally, labor and natural resources would be used in the fabrication and preparation of construction materials. These materials are generally not retrievable. They are not, however, in short supply, and their use would not have an adverse effect upon the continued availability of these resources. Any construction would also require a substantial one-time expenditure of federal and cost-share funds that would not be retrievable.

The commitment of these resources would be based on the premise that residents in the immediate area would benefit from the improved quality of post-construction conditions. These benefits are anticipated to outweigh the permanent commitment of resources. Implementation of the preferred alternative would not result in irreversible effects on a specific resource or irretrievable resource commitments.

6.4 Areas of Controversy

No areas of controversy have been identified for the implementation of the preferred alternative measures.

6.5 Permits and Compliance

The federal, state, and local permits and compliance actions described in this section are required for construction of the preferred alternative. A Watershed Agreement and a Memorandum of Understanding (MOU) shall be completed and signed by the NRCS and the SLO prior to the obligation of construction funds for the Project.

6.5.1 Federal

6.5.1.1 Section 106 of the National Historic Preservation Act

Per 36 CFR 800.3, the NRCS initiated consultation with four tribes/THPOs listed in Table 7-1 of Section 7.1.2 during the NEPA scoping process regarding historic properties or places of traditional religious and cultural importance near the APE and assistance in identifying other applicable tribes. NRCS determined there would be **No Historic Properties Affected** for preferred alternative measures based on a Cultural Resources Assessment (Certus 2024). Per 36 CFR 800.3 and 800.4, the NRCS consulted with the Utah SHPO and four tribes/THPOs on November 12, 2024, on the description of the APE, site eligibility, and determination of **No Historic Properties Affected**. A SHPO concurrence letter, dated December 24, 2024, was received and has been included in Appendix A. The NRCS followed-up with tribes/THPOs via email on December 20, 2024, and via telephone on April 7, 2025. One tribe response was received from

the Confederated Tribes of the Goshute Reservation who indicated that the tribe has no concerns. Refer to Appendix A for a detailed tribal consultation table and all letters.

In the event that cultural/archaeological resources or human remains/funerary objects are found during construction activities, construction would stop, and the appropriate agencies would be notified according to NRCS protocol outlined in the NRCS Prototype Programmatic Agreement with the Utah SHPO.

6.5.1.2 U.S. Army Corps of Engineers

Section 404 permitting would be required for work in jurisdictional waters of the U.S. Measures for alternatives include work along ephemeral drainages that may not meet the definition of a jurisdictional water of the U.S. Therefore, Section 404 permitting may not be required for installation of alternative measures. Coordination with USACE regarding jurisdiction of the ephemeral drainages would occur during future final design phases for this Project.

6.5.1.3 U.S. Fish and Wildlife Service

A BA was completed for the Project and is included in Appendix E. The BA was submitted to the USFWS on March 26, 2025 with a **May Effect, Not Likely to Adversely Affect** determination for June Sucker and **No Effect** determination for all other ESA species to comply with Section 7 of the ESA (Appendix A). The USFWS provided concurrence with the determination on April 15, 2025 (Appendix A). No further Section 7 consultation is required for the Project unless the proposed action changes or ESA-listed species designations change within the Project area.

6.5.2 State

6.5.2.1 Utah Department of Environmental Quality

A Utah Pollutant Discharge Elimination System Construction General Permit is required for construction activities that disturb more than 1 acre and discharge pollutants to surface waters. An SWPPP would be developed, including submitting a Notice of Intent (NOI) to the Utah DEQ.

A Fugitive Dust Control Plan (FDCP) must be submitted to the UDAQ for projects located within the NAAQ nonattainment area that involve clearing or leveling of land or access haul roads that are ¼-acre or greater in size. The FDCP must be submitted to UDAQ prior to commencement of the project.

6.5.2.2 Utah Division of Water Resources

Utah Division of Water Resources requires written authorization from the state engineer to comply with the state Stream Alternation Program before any natural stream bed or banks could be altered. Based on the ephemeral nature of the channels and no presence of riparian vegetation, the channels to be modified do not meet the definition of a natural stream and the Stream Alteration Program would not apply. This was confirmed with the Utah Division of Water Resources in an email dated April 11, 2024 (Appendix A). Therefore, no stream alteration permit would be required for implementation of the preferred alternative. The division also requires written approval from the Dam Safety State Engineer for construction of a new dams.

6.5.2.1 Utah Trust Lands Administration

Installation of alternative measures would occur on TLA lands requiring an easement, purchase of TLA lands, or exchange of ITLA lands. Applications would be required for these activities and coordinated with TLA prior to installation of preferred alternative measures.

6.5.3 Local

6.5.3.1 City of Saratoga Springs

The City of Saratoga Springs requires a grading permit for any grading activities within the city limits. The city also requires a right-of-way (ROW) encroachment permit for any activities performed within the specified city roads, streets, and rights-of-way. Grading activities and work within city road ROWs would occur for implementation of preferred alternative measures. A grading permit and ROW encroachment permit shall be obtained prior to construction activities for work within the City of Saratoga Springs.

6.5.3.1 Utah County

Utah County requires an excavation permit for any excavation activities within county ROWs and/or county owned properties. The county also requires an access permit for any activities performed within county ROWs and/or county owned properties. Excavation activities and work within county road ROWs and county owned properties would occur for implementation of preferred alternative measures. A county excavation permit and access permit shall be obtained prior to construction activities for preferred alternative measures.

6.6 Avoidance, Minimization, and Mitigation of Potential Effects

6.6.1 Upland Erosion

Proper BMPs would be installed during and after construction to offset short-term impacts that would help prevent and control soil erosion, such as, but not limited to, silt fences, fiber wattles, and/or earthen berms. A SWPPP would be implemented that contains erosion and sediment control BMPs (see measures in Section 6.6.2 below). Areas disturbed would be restored and/or stabilized through establishment of ground cover after construction completion.

6.6.2 Surface Water Quality

Construction activities may temporarily affect surface water quality, but Project design elements, including BMPs, would be implemented to reduce the quantity of sediment (1) entering drainages, and (2) flowing downstream and violating any federal or state water quality rules and regulations. Construction BMPs would include, but are not limited to, the following:

- A Storm Water Pollution Prevention Plan (SWPPP) would be required and implemented that contains erosion and sediment control and pollution prevention BMPs, such as, but not limited to, silt fences, fiber wattles, and/or earth berms.
- Water bodies adjacent to construction and staging areas would be identified, and such measures as straw bales, silt fences, and other appropriate sediment control BMPs would be implemented to prevent the entry of sediment and other contaminants into waters.
- To ensure that accidental spills do not enter waters, the storage of petroleum-based fuels and other hazardous materials and the refueling of construction machinery would not occur outside of approved designated staging/batch plant areas. Furthermore, the Project would comply with federal and state water quality standards and toxic effluent standards to minimize any potential adverse impacts from discharges to waters of the U.S. or wetlands.
- No construction materials would be stockpiled or deposited in or near any water bodies.

6.6.3 Air Quality

Fugitive dust, MSAT, and GHG emission increases associated with construction would be minimized through implementation of the following applicable BMPs:

- Spraying the soil on-site with water or other similar approved dust suppressant/soil binder.
- Wetting materials hauled in trucks, providing adequate freeboard (space from the top of the material to the top of the truck), or covering loads to reduce emissions during material transportation/handling.
- Providing a stabilized construction entrance (track-out pad), wheel washers, and/or other similar BMPs at construction site access to reduce track-out of site materials onto the adjacent roadway network.
- Removing tracked-out materials deposited onto adjacent roadways.
- Wetting material stockpiles to prevent wind-blown emissions.
- Establishing vegetative cover on bare ground as soon as possible after grading to reduce wind-blown dust.
- Requiring appropriate emission-control devices on all construction equipment.
- Requiring the use of cleaner-burning fuels.
- Using only properly operating, well-maintained construction equipment.

6.6.4 Vegetation, Noxious Weeds, and Invasive Plants

Disturbed areas would be restored to preconstructions conditions or better after construction completion. BMPs would be implemented during construction to prevent the spread of N&I weeds and comply with Executive Order 13112. During construction and until restoration areas are fully established, they would be maintained on a regular basis to prevent the establishment of N&I weeds. Non-desirable plant species would be controlled by cleaning equipment prior to delivery to the Project site and eradicating these species before the start and during construction as discovered. In addition, a PCRP would be developed and would include mechanisms for addressing weed establishment and treatment.

6.6.5 Wildlife and Wildlife Habitat

Construction activities would be limited to the smallest extent practicable within the Project area. Disturbed areas would be restored after construction is completed. See Section 6.6.6 and 6.6.7 for additional avoidance and minimization measures for special status animal species, migratory birds, bald eagles, and golden eagles.

6.6.6 Special Status Animal Species

Areas of disturbance would also be surveyed by a qualified biologist prior to the commencement of work for SGCN. If SGCN were identified during surveys, UDWR would be notified and applicable conservation measures implemented in coordination with UDWR. See Section 6.6.7 for avoidance and minimization measures for SGCN that are bird species.

6.6.7 Migratory Birds, Bald Eagles, and Golden Eagles

Construction activities would be limited to the smallest extent practicable within the Project area. Disturbed areas would be restored after construction is completed. If construction activities occur during migratory bird breeding/nesting periods, the Project area (and surrounding habitats) would be surveyed

by a qualified biologist for active nests no more than 5 days prior to the commencement of work. If active nests are found during surveys, spatial buffers would be established around them in coordination with USFWS and NRCS. Construction activities within the buffer areas would be prohibited until a qualified biologist confirms that all nests are no longer active.

6.6.8 Hazardous Materials

The contractor shall ensure that the new channel is constructed on clean soil free from contamination. Soil testing would be performed in areas of suspect fill prior to channel installation to verify compliance with state/federal soil contaminant regulatory limits and to ensure all state/federal water quality regulations are met.

NRCS requires that contractors comply with all federal, state, and local laws and regulations pertaining to pollution and contamination of the environment to prevent pollution of surface water, groundwater, soil, and air with any hazardous materials. If any hazardous materials/sediment or suspect hazardous materials/sediment are encountered during ground disturbing activities, the contractor shall follow all applicable state and federal regulations for handling, disposing, and reporting of hazardous materials.

6.6.9 Visual Resources

Areas disturbed during construction activities would be restored after construction completion by grading to match natural contours and stabilizing through establishment of ground cover. These areas would be reestablished by seeding with an herbaceous plant seed mixture and revegetation with NRCS-approved plant species to match the surrounding plant community. Refer to Section 6.6.4 for vegetation restoration measures.

6.6.1 Noise

Within the City of Saratoga Springs city limits, noise minimization efforts would be implemented including outfitting construction equipment with noise dampening measures (if needed) and avoiding operation of mechanical equipment and construction traffic in residential zones between the hours of 10:00 p.m. and 7:00 a.m. or before 9:00 a.m. on Sundays. In non-residential zones within the city limits, construction work shall not be performed between the hours of 10:00 p.m. and 6:00 a.m.

Within Utah County jurisdiction, noise would not exceed 80 decibels at any hour when measured off-site, meaning measured upon the property owned by someone other than the owner of the property from which the sound was emitted.

6.7 Costs and Cost-Sharing

The Watershed Plan must be authorized before funding may be made available for Project operations. NRCS would provide funding from the Watershed Protection and Flood Prevention Act (PL 83-566, as amended by PL 106-472). The funding program for this project is through the NRCS Watershed and Flood Prevention Operations (WFPO) Program.

Federal assistance varies by authorized purpose, and the Project authorized purpose is flood prevention. For this authorized purpose, NRCS federal cost share covers 100 percent installation, construction, engineering, and technical assistance. However, the SLO is responsible for funding measures associated with modifications of existing or new bridge/culvert structures needed for safe conveyance of flood flows. NRCS does not provide federal cost share for permitting or real property rights and those items are

funded by the SLO. Funding for O&M of facilities after construction would be derived from normal revenues of the SLO. This O&M cost would be budgeted annually so that the facilities are kept in good condition. Administrative time for NRCS and the SLO to design and install the preferred alternative measures is the responsibility of each individual entity. Please refer to Table 6-2 in Section 6.12.1 for the installation cost share breakout.

6.8 Ecosystem Services Benefits

Applicable ecosystem service benefits include regulating and cultural services. Benefits for regulating services consist of water quality, and natural hazard (flood) moderation. The preferred alternative increases resilience the anticipated rise in extreme precipitation events and associated flooding from runoff. Water quality would be improved from reduction in floodwater contaminants and sediment entering Utah Lake. Flood damage reduction from flood moderation is estimated at $2,141,700 for Site 1 and $4,626,000 for Site 2.

Benefits for cultural services consist of peace, sustainability, well-being, and safety. The threat of flooding to the City of Saratoga Springs would be reduced benefiting the daily lives, source of income, and peace of mind of the community. This would improve the mental/physical well-being and safety for all people who inhabit the floodplain that are currently at risk. The risk of flood-related mental/physical health issues and impacts to income were not calculated due to uncertainties in calculation methods, but they are important to note as they influence impacted individuals financially. Refer to the Ecosystem Services Tradeoff Analysis Evaluation Table included in Appendix E for more information.

6.9 Installation and Financing

6.9.1 Installation

Installation of preferred alternative measures would be sequenced to complete the critical path items first. Construction would take place over approximately two years. Modifications for channel conveyance would occur at Site 1 and Site 2 in the first 6 to 8 months, beginning in the spring of 2027. Construction of the principal spillway system at the debris basins would occur concurrent with the channel modifications and be completed before construction of the dam embankment. Construction of the remaining components of the debris basins would begin after the conveyance channel work and principal spillway system is completed, in the late summer or fall of 2027. Work on debris basin construction would occur in unison at each site over approximately 1-year from late summer/fall 2027 to fall of 2028. Site stabilization and restoration activities would be completed in the fall of 2028 through the spring of 2029.

The ephemeral streams to be modified are normally dry and only flow in direct response to large precipitation events. Shallow groundwater conditions do not exist and are not anticipated to be encountered during construction. Therefore, construction activities would be performed in the dry and dewatering would not be necessary. However, if precipitation events or conditions are anticipated that could result in activation of flow in the ephemeral channels, work would be stopped or avoided during those periods.

6.9.2 Responsibilities

This Watershed Work Plan sets forth the responsibilities of NRCS and the SLO. The roles and responsibilities for NRCS and the SLO would be in accordance with this Plan-EA, the Watershed Agreement, MOU, and the O&M Agreement. NRCS is responsible for leading the planning efforts and

providing engineering support. The SLO is responsible for environmental permits and construction implementation, and NRCS or the SLO are responsible for the Project design. The SLO would complete all approvals and permits for the Project prior to the start of construction; these may take up to 1 year to obtain. NRCS would assist the SLO during construction by providing oversight and certifying completion of the Project. The SLO is responsible for O&M and replacement costs associated with the improvements installed.

6.9.3 Contracting

Improvements installed from NRCS funding mechanisms would be procured using contracts awarded. The SLO would oversee and administer construction of the Project in coordination with NRCS.

6.9.4 Real Property and Relocations

Property within the Project area is on private and TLA lands. Easements for proposed improvements (including egress/ingress) and for future O&M activities would need to be obtained. Proposed easements include approximately 30.6 acres of land (27.2 acres TLA and 3.4 acres private) at Site 1 Burnt/Lott Canyon and approximately 25.9 acres of land (11.4 acres TLA and 14.5 acres private) at Site 2 Clark Canyon. A map depicting proposed easements for the preferred alternative is included in Appendix C, Map C13. It is the responsibility of the SLO to secure and pay for all easements associated with the preferred alternative installation.

6.10 Operation, Maintenance, and Replacement

Operation of facilities includes the administration, management, and performance of non-maintenance actions needed to keep the facilities safe and functioning as designed. Maintenance includes performance of work, measuring the recording instrumentation data, preventing deterioration of facility components, and repairing damage or replacing the facility components as needed. Repairing damage to completed facilities caused by normal deterioration, droughts, flooding, or vandalism is considered maintenance. Maintenance includes both routine and as-needed measures.

The SLO would be responsible for the operation, maintenance, and future modifications to facilities. A specific O&M Plan would be prepared by NRCS and the SLO in accordance with the NRCS National Operation and Maintenance Manual (NRCS 2003). This plan and agreement would be entered into prior to the start of construction activities and would be in place for the extended life of the Project. The agreement would provide for inspections, reports, and procedures for performing the maintenance items. The agreement would include specific provisions for retention, use, and property improved with PL 83-566 assistance.

6.11 Emergency Action Plan

An Emergency Action Plan (EAP) must be completed by the SLO and must be prepared as a standalone document. NRCS would need to approve the EAP prior to the execution of fund-obligating documents for construction of the preferred alternative. EAPs shall be reviewed and updated by the SLO annually for consistency with the project and to include all local points of contact necessary for an emergency response. The EAP assists the SLO in recognizing and responding to emergency and non-emergency events and should include the items outlined in the Utah Dam Safety Guide to Emergency Action Plans Development and Implementation (UDNR 2020).

6.12 Economic and Structural Tables

6.12.1 Economic Tables

Economic tables have been included to present information relevant to the costs and benefits of the preferred alternative. The costs for the preferred alternative are conceptual-level cost estimates only, with a level of detail judged appropriate for the purpose of identifying the preferred alternative. Detailed structural designs and construction cost estimates would be prepared for the Project during the final design phase and prior to the start of the competitive bidding process. The final cost of the Project would be the price received from the winning construction bid plus or minus the amount of contract modifications. Assessments, considerations, and calculations are based on a 100-year evaluation period, a 102-year period of analysis, and a FY 2025 discount rate of 3.0 percent.

The estimated installation cost in Table 6-1 documents land status upon which the Project structures reside, as well as federal and non-federal funding sources, respectively. NRCS is the only federal agency participating in the installation of works of improvement and all installation works of improvement will be on non-federal land.

Table 6-1. Estimated Installation Cost
Saratoga Springs Watershed, Utah
(Dollars) [1/]

Works of Improvement	Unit	Number[2/]			PL 83-566	Other Funds	Total
		Federal Land	Non-Federal Land	Total			
Site 1 (Burnt/Lott Canyon) floodwater retarding structure	acres	0	30.6	30.6	$11,688,000	$643,000	$12,331,000
Site 2 (Clark Canyon) floodwater retarding structure	acres	0	25.9	25.9	$8,905,000	$986,000	$9,891,000
Total	**acres**	**0**	**56.5**	**56.5**	**$20,593,000**	**$1,629,000**	**$22,222,000**

1/ - Price base: 2023 *Prepared April 2024*
2/ - All installation of works of improvement will be on non-federal land.

The estimated cost distribution in Table 6-2 shows the estimated installation cost works of improvement between PL 83-566 funds and the costs borne by the SLO (other).

Table 6-2. Estimated Cost Distribution - Water Resource Project Measures

Saratoga Springs Watershed, Utah

(Dollars) [1/]

Works of Improvement	Installation Cost - Public Law 83-566				Installation Cost - Other Funds					Total
	Const	Eng	Project Admin	Total Public Law 83-566	Real Prop Rights [2/]	Real Prop Rights[3/]	Permits	Project Admin	Total Other	Installation Costs
Site 1 (Burnt/Lott Canyon) floodwater retarding structure	$10,069,000	$1,012,000	$607,000	**$11,688,000**	$50,000	$137,000	$51,000	$405,000	**$643,000**	**$12,331,000**
Site 2 (Clark Canyon) floodwater retarding structure	$7,667,000	$774,000	$464,000	**$8,905,000**	$74,000	$563,000	$39,000	$310,000	**$986,000**	**$9,891,000**
TOTAL	**$17,736,000**	**$1,786,000**	**$1,071,000**	**$20,593,000**	**$124,000**	**$700,000**	**$90,000**	**$715,000**	**$1,629,000**	**$22,222,000**

1/ Price base: 2023 *Prepared: April 2024*

2/ Includes cost for culvert work.

3/ Includes cost to obtain easements for installation of works of improvement.

Const = Construction, Eng = Engineering, Prop = Property

Table 6-3 shows the average annal costs for the preferred alternative.

Table 6-3. Average Annual Preferred Alternative Costs

Saratoga Springs Watershed, Utah

(Dollars) [1/]

Works of Improvements	Project Outlays Amortization of Installation Cost	Project Outlays O&M and Replacement Cost	Total
Site 1 (Burnt/Lott Canyon)	$373,400	$28,300	$401,700
Site 2 (Clark Canyon)	$299,500	$30,100	$329,600
TOTAL	**$672,900**	**$58,400**	**$731,300**

1/ - Price base: 2023 *Prepared: April 2025*

Calculated using FY 2025 Water Resources Discount Rate (3.0%), annualized over 100 years, and 102-year period of analysis (period of analysis = 100-year project life plus 2 years for installation).

The preferred alternative includes monetary and non-monetary benefits. Table 6-4 summarizes the results of the monetary benefits calculated for the preferred alternative. Monetary benefits include flood damage reduction for rural communities, which are considered as agricultural related benefits per the NWPM. A rural community is defined as a community with a population of less than 50,000 according to the latest decennial census of the United States. The 2020 decennial census population for the City of Saratoga Springs is 37,696. Therefore, flood damage reduction benefits are considered agriculture related.

Non-monetary benefits were also considered in determining the preferred alternative. Non-monetary benefits include a reduction in channel erosion potential, improved water quality for Utah Lake, and improved public safety, peace and sustainability, and well-being for the community within the floodplain.

Table 6-4. Estimated Average Annual Flood Damage Reduction Benefits

Saratoga Springs Watershed, Utah

(Dollars)[1/]

Item	Estimated Average Annual Benefit				Damage Reduction Benefit	
	Without Project		With Project			
	Agriculture Related[2/]	Non-Agriculture Related	Agriculture Related[2/]	Non-Agriculture Related	Agriculture Related[2/]	Non-Agriculture Related
Floodwater						
Site 1 Residential	$1,278,500	$0	$0	$24,200	$1,254,300	$0
Site 1 Commercial	$10,100	$0	$0	$200	$9,900	$0
Site 1 Other	$829,200	$0	$0	$9,600	$819,600	$0
Site 2 Residential	$3,891,000	$0	$0	$16,900	$3,874,100	$0
Site 2 Commercial	$2,100	$0	$0	$100	$2,000	$0
Site 2 Other	$687,900	$0	$0	$0	$687,900	$0
Site 1 Roads	$59,500	$0	-	$1,600	$57,900	-
Site 2 Roads	$62,300	$0	$0	$300	$62,000	$0
Site 1 Subtotal	*$2,177,300*	*$0*	*$0*	*$35,600*	*$2,141,700*	*$0*
Site 2 Subtotal	*$4,643,300*	*$0*	*$0*	*$17,300*	*$4,626,000*	*$0*
Total	**$6,820,600**	**$0**	**$0**	**$52,900**	**$6,767,700**	**$0**

1/ - Price base: 2023 *Prepared: April 2025*

2/ - Agriculture related damage includes damage to rural communities.

Calculated using FY 2023 Water Resources Discount Rate (3.0%), annualized over 100 years, and 102-year period of analysis (period of analysis = 100-year project life plus 2 years for installation).

Table 6-5 summarizes the benefits and costs of the preferred alternative and documents the benefit to cost ratio of the preferred alternative.

Table 6-5. Economic Table 6 - Comparison Preferred Alternative Benefits and Costs

Saratoga Springs Watershed, Utah

(Dollars) [1/]

Item	Average Annual Costs[2/]	Total Benefits[3/]	Benefit Cost Ratio	Net Economic Benefits
Site 1 (Burnt/Lott Canyon)	$401,700	$2,141,700	5.3	$1,740,000
Site 2 (Clark Canyon)	$329,600	$4,626,000	14.0	$4,296,400
Total	**$731,300**	**$6,767,700**	**9.3**	**$6,036,400**

1/ - Price base: 2023 *Prepared: April 2025*

2/ - From Table 6-3

3/ - From Table 6-4

6.12.2 Structural Tables

Table 6-6 identifies the structural data for the planned storage capacity for the preferred alternative debris basins and Table 6-7 includes the structural data drainage channel work. Stream reaches for Table 6-7 are depicted in Figure 6-1, Figure 6-2, and Figure 6-3.

Table 6-6. Debris Basins with Planned Storage Capacity

Saratoga Springs Watershed, Utah

Item	Unit	Burnt Canyon	Lott Canyon	Clark Canyon N	Clark Canyon S
Class of structure		High	High	High	High
Peak Ground Acceleration	g	0.1	0.1	0.1	0.1
Uncontrolled drainage area	mi^2	0.39	1.10	0.28	0.87
Controlled drainage area	mi^2	0	0	0	0
Total Drainage Area	mi^2	0.39	0.39	0.28	0.87
Runoff curve N. (1-day) (AMC II)		83	76	74	71
Time of concentration (Tc)	hours	0.36	0.73	0.36	0.77
Elevation top dam	ft	5,095	5,145	5,342	5,244.5
Elevation crest auxiliary spillway	ft	5,090	5,139.5	5,337.5	5238.5
Elevation crest high stage inlet	ft	5,089.4	5,139.0	5,337.1	5,238.0
Elevation crest low stage inlet	ft	5,078.3	5,130.9	5,332.2	5,231.7
Auxiliary spillway type		Rock	Rock	Rock	Riprap armored
Auxiliary spillway bottom width	ft	64	120	44	80
Auxiliary spillway exit slope	%	0.5, 20.5	0.5, 15	0.6, 18.9	0.5, 11
Maximum height of dam	ft	24	25	21	26.5
Volume of fill in dam embankment	Yd^3	38,900	77,300	19,300	44,600
Total capacity	ac-ft	18.4	35.3	6.0	18.3
Sediment submerged	ac-ft	0	0	0	0
Sediment aerated	ac-ft	3.1	10.1	2.5	7.1
Beneficial use	ac-ft	0	0	0	0
Floodwater retarding	ac-ft	15.3	25.2	3.5	11.2
Between high and low stage	ac-ft	14.3	23.5	3.0	10.3
Surface Area					
Sediment pool	ac	(1.01)	(2.5)	(0.6)	(1.4)
Beneficial use pool	ac	0	0	0	0
Floodwater retarding pool	ac	1.70	3.4	0.8	1.9
Principal Spillway Design					
Rainfall volume (1-day)	inches	2.20	2.20	2.55	2.55
Rainfall volume (10 day)	inches	3.76	3.76	4.73	4.73
Runoff volume (10 day)	inches	2.05	1.56	1.49	1.3
Capacity of low stage (max)	cfs	3	7.3	21	25

Item	Unit	Burnt Canyon	Lott Canyon	Clark Canyon N	Clark Canyon S
Capacity of high stage (max)	cfs	23	22.6	41	36
Dimension of conduit	inches	30	30	30	30
Type of conduit		Concrete encased steel			
Frequency operation-auxiliary spillway[1/]	% chance	>1%	>1%	>2%	>2%
Auxiliary Spillway Hydrograph (Stability Design Hydrograph)					
Rainfall volume	inches	3.89	3.89	3.86	3.86
Runoff volume	inches	2.19	1.66	1.52	1.32
Storm duration	hours	6	6	6	6
Velocity of flow (Ve)	ft/s	2.9	3.4	4.2	3.6
Max. reservoir water surface elevation	ft	5,090.9	5140.6	5338.1	5239.5
Freeboard Hydrograph					
Rainfall volume	inches	9.60	9.60	9.34	9.34
Runoff volume	inches	7.2	6.63	6.14	5.76
Storm duration	hours	6	6	6	6
Max. reservoir water surface elevation	ft	5094.7	5144.6	5341.6	5243.5
Capacity Equivalents					
Sediment volume	inches	0.15	0.17	0.17	0.15
Floodwater retarding volume	inches	0.73	0.43	0.23	0.24
Beneficial volume	inches	0	0	0	0

1/ - Assumes a full sediment pool

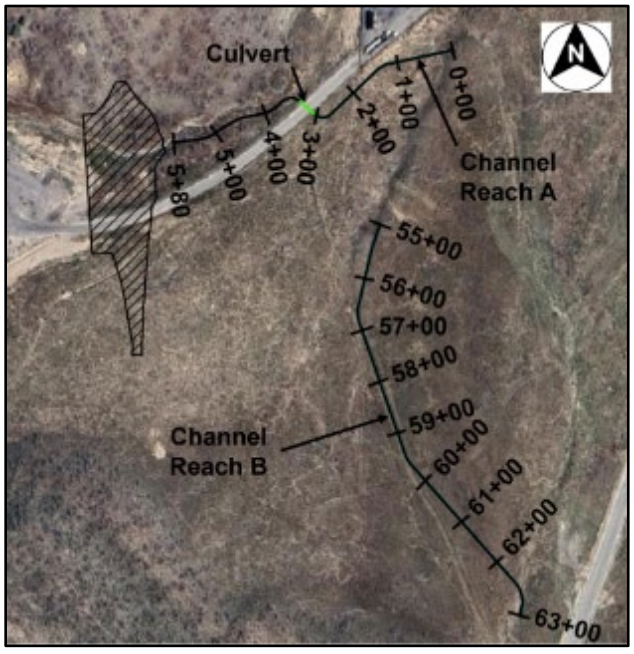

Figure 6-1. Channel Reaches A and B for Burnt/Lott Canyons

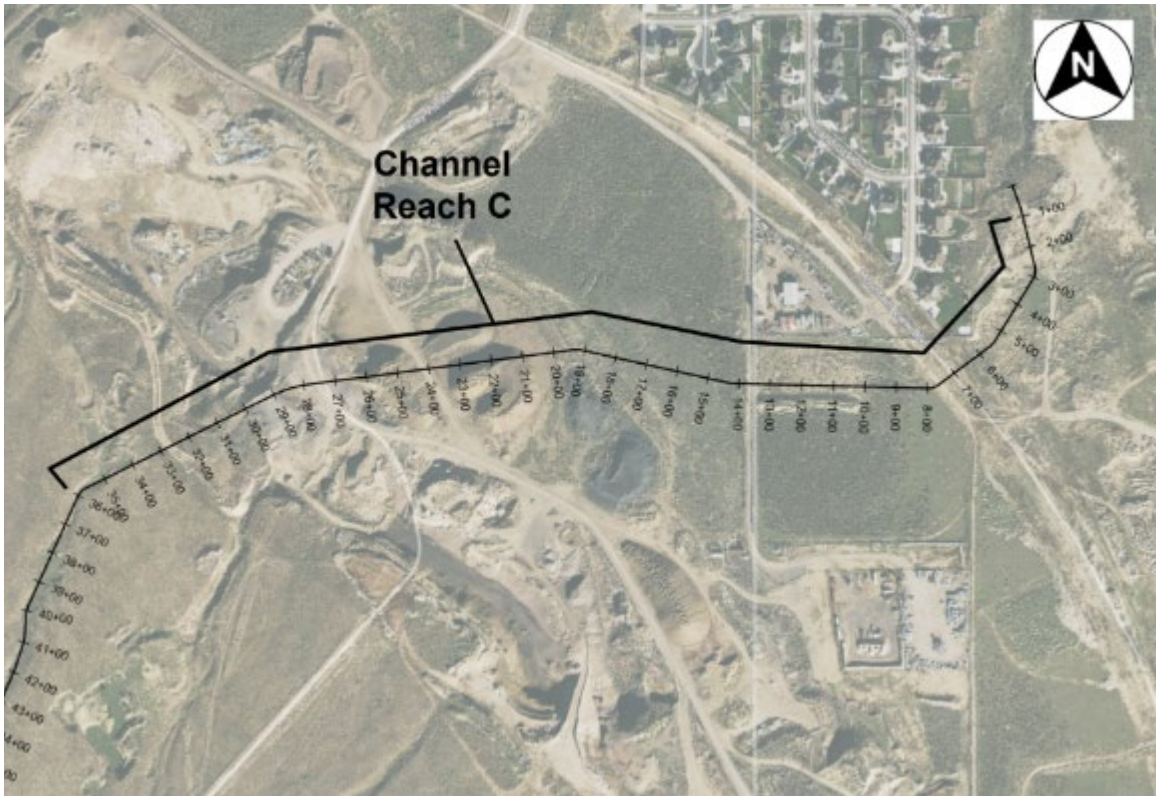

Figure 6-2. Channel Reach C for Burnt/Lott Canyons

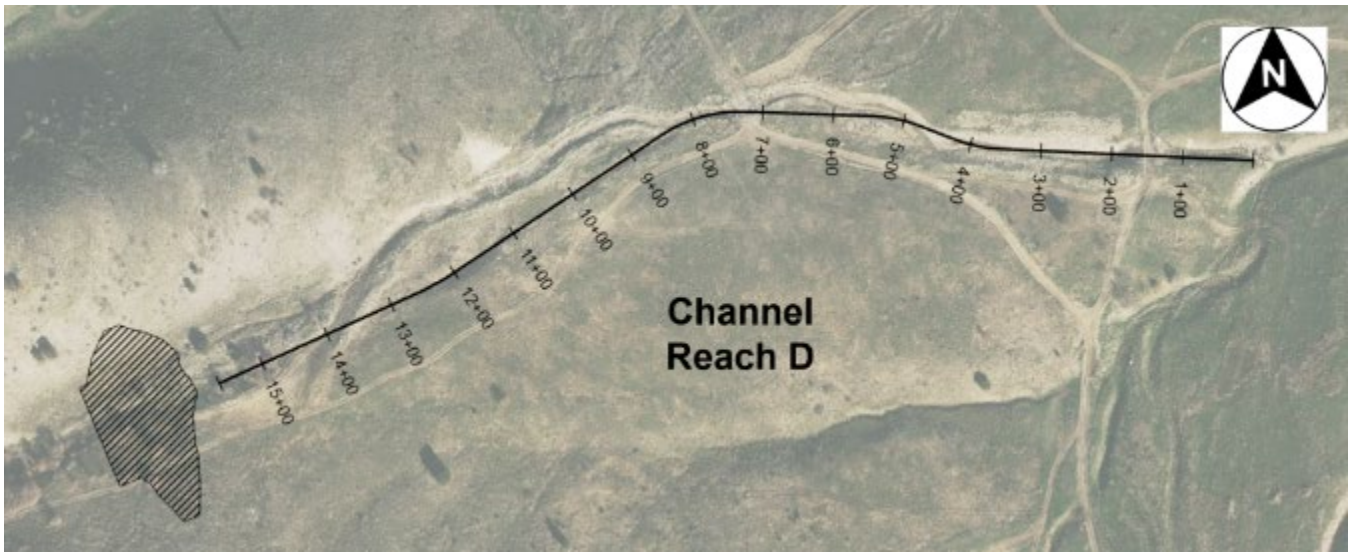

Figure 6-3. Channel Reach D for Clark Canyon

Table 6-7. Structural Data - Channel Work

Saratoga Springs Watershed, Utah

Channel Reach	Station	Drain Area (mi^2)[1/]	100-yr Design Discharge (cfs)	Water Surface Elevation (ft)	Hydraulic Gradient (ft/ft)	Channel Dimensions				*n* Value		Velocities (ft/s)		Excav Volume (yd^3)	Type of Work[2/]	Existing Channel Type[3/]	Present Flow Condition[4/]
						Gradient (ft/ft)	Bottom Width (ft)	Elev (ft)	Side Slope (H:V)	Aged	As Built	Aged[5]	As-Built[5/]				
A	5+80	0.39	3	5058.53	0.0576	0.0576	2	5058.23	2	0.035	0.035	3.9	3.9	190	II	O	Ephemeral
	3+80		3	5047.41	0.0183	0.0183	2	5047.00	2	0.035	0.035	2.6	2.6	133	II	O	Ephemeral
	2+40		3	5044.67	0.0829	0.0829	2	5044.40	2	0.035	0.035	4.4	4.4	228	II	O	Ephemeral
	0+00		3	5025.07	0.0829	0.0829	2	5024.80	2	0.035	0.035	4.4	4.4	0	II	O	Ephemeral
B	63+00	1.1	7	5107.05	0.071	0.071	2	5106.60	2	0.035	0.035	5.4	5.4	1771	II	O	Ephemeral
	55+00		7	5049.45	0.071	0.071	2	5049.00	2	0.035	0.035	5.4	5.4	0	II	O	Ephemeral
C	36+00	1.49	10	4931.16	0.055	0.055	2	4930.58	2	0.035	0.035	5.4	5.4	458	II	O	Ephemeral
	33+70		10	4919.47	0.076	0.076	2	4918.94	2	0.035	0.035	6.1	6.1	886	II	O	Ephemeral
	29+25		10	4885.88	0.051	0.051	2	4885.29	2	0.035	0.035	5.3	5.3	627	II	O	Ephemeral
	26+10		10	4870.03	0.016	0.016	2	4869.23	2	0.035	0.035	3.5	3.5	1782	II	O	Ephemeral
	17+15		10	4855.61	0.105	0.105	2	4855.12	2	0.035	0.035	6.8	6.8	458	II	O	Ephemeral
	14+85		10	4831.67	0.056	0.056	2	4831.09	2	0.035	0.035	5.5	5.5	329	II	O	Ephemeral
	13+20		10	4821.99	0.037	0.037	2	4821.34	2	0.035	0.035	4.7	4.7	1214	II	O	Ephemeral
	7+10		10	4799.71	0.012	0.012	2	4798.85	2	0.035	0.035	3.1	3.1	219	II	O	Ephemeral
	6+00		10	4786.33	0.042	0.042	2	4785.70	2	0.035	0.035	4.9	4.9	368	II	O	Ephemeral
	4+15		10	4778.68	0.01	0.01	2	4777.78	2	0.035	0.035	2.9	2.9	677	II	O	Ephemeral
	0+75		10	4774.83	0.105	0.105	2	4774.34	2	0.035	0.035	6.8	6.8	149	II	O	Ephemeral
	0+00		10	4767.18	0.105	0.105	2	4766.69	2	0.035	0.035	6.8	6.8	0	II	O	Ephemeral

Channel Reach	Station	Drain Area (mi^2)[1/]	100-yr Design Discharge (cfs)	Water Surface Elevation (ft)	Hydraulic Gradient (ft/ft)	Channel Dimensions				*n* Value		Velocities (ft/s)		Excav Volume (yd^3)	Type of Work[2/]	Existing Channel Type[3/]	Present Flow Condition[4/]
						Gradient (ft/ft)	Bottom Width (ft)	Elev (ft)	Side Slope (H:V)	Aged	As Built	Aged[5]	As-Built[5/]				
D	15+15	0.28	57.7	5298.96	0.095	0.095	4	5298.00	2	0.035	0.035	10.2	10.2	262	II	N	Ephemeral
	14+00		57.7	5288.12	0.051	0.051	4	5286.99	2	0.035	0.035	8.2	8.2	91	II	N	Ephemeral
	13+60		57.7	5285.83	0.125	0.125	4	5284.94	2	0.035	0.035	11.2	11.2	455	II	N	Ephemeral
	11+60		57.7	5261.12	0.052	0.052	4	5260.00	2	0.035	0.035	8.2	8.2	137	II	N	Ephemeral
	11+00		57.7	5257.80	0.117	0.117	4	5256.89	2	0.035	0.035	11.0	11.0	1378	II	N	Ephemeral
	4+95		57.7	5186.92	0.11	0.11	4	5186.00	2	0.035	0.035	10.7	10.7	900	II	N	Ephemeral
	1+00		57.7	5143.93	0.087	0.087	4	5142.95	2	0.035	0.035	9.9	9.9	228	II	N	Ephemeral
	0+00		57.7	5135.27	0.087	0.087	4	5134.29	2	0.035	0.035	9.9	9.9	0	II	N	Ephemeral

Elev = Elevation, Exav = Excavation

1/ Drain area listed refers to the subcatchment area above each proposed debris basin.

2/ II - Enlargement or realignment of existing channel or stream.

3/ N - An unmodified, well-defined natural channel or stream.

3/ O - None or practically no defined channel.

4/ E - Ephemeral—Flows only during periods of surface runoff, otherwise dry.

5/ Velocities are based on outflows from the debris basins during a 100-year frequency flood.

7.0 Consultation, Coordination, and Public Participation

This section describes the coordination efforts with the public, agencies, tribes, stakeholders, and the SLO for the Project.

7.1 Consultation

7.1.1 Bureau of Land Management

A formal request to be a cooperating agency on the Project was submitted to the BLM on June 30, 2020 (Appendix A). The BLM declined cooperating agency status in a letter dated July 15, 2020 (Appendix A).

7.1.2 Tribal Consultation

Tribes who hold ancestral land, traditional use, and/or TCP claims in and near the APE were identified using the NPS Native American Graves Protection and Repatriation Act Native American Consultation Database (NACD), a database through which any federally recognized tribe could identify those counties in Utah where they have consultation interests. The U.S. Department of Housing and Urban Development Tribal Directory Assessment Tool (TDAT), the Bureau of Indian Affairs, and the Utah Division of Indian Affairs (UDIA) websites were also used as supplemental sources to identify tribes with consultation interests. The assembled list of tribes is included in Table 7-1.

Tribes/THPOs were consulted to comply with EO 13007, 13175, the AIRFA, and the NHPA (Appendix A). A reasonable and good faith effort was made per 36 CFR pt. 800.4(b)(1) to consult with these tribes via letter, email, and telephone. During the scoping process, the NRCS reached out to the assembled list of tribes regarding known historic properties or places of traditional religious and cultural importance near the APE in scoping letters sent on June 30, 2020 (see Scoping Report in Appendix A). The Cultural Resource Assessment and consultation letters for concurrence with **No Historic Properties Affected** from Project actions were sent on on November 12, 2024 to the four tribes listed in Table 7-1 (Appendix A). Table 7-1 summarizes the tribal consultation. A detailed tribal consultation table and all tribal consultation correspondence may be found in Appendix A. No tribe concerns were identified during the consultation and a summary of tribe responses received are provided below Table 7-1.

Table 7-1. Tribal Consultation Summary

Tribe	Cultural Package Sent	Follow Up #1	Follow Up #2	Response Received	Consultation Outcome
Confederated Tribes of the Goshute Reservation	11/12/2024	12/20/2024	4/7/2025	No Concerns	No Concerns
Shoshone-Bannock Tribes of the Fort Hall Reservation	11/12/2024	12/20/2024	4/7/2025	none	No Response
Skull Valley Band of Goshute Indians	11/12/2024	12/20/2024	4/7/2025	none	No Response
Ute Indian Tribe of the Uintah & Ouray Reservation, Utah	11/12/2024	12/20/2024	4/7/2025	none	No Response

One response was received from the Confederated Tribes of the Goshute Reservation who indicated they had no concerns.

The tribes will also be offered a chance to review and comment on the Draft Plan-EA, and the results will be documented in the Final Plan-EA.

7.1.3 U.S. Fish and Wildlife Service

A formal request to be a cooperating agency on the Project was submitted to USFWS on June 30, 2020 (Appendix A). In accordance with Section 12 of PL 83-566, a letter was sent to the USFWS on July 18, 2024 to welcome their participation in preparation of the Plan-EA (Appendix A). No response was received from the USFWS for the cooperating agency request or Section 12 letter. A BA was submitted to the USFWS on March 26, 2025, with a **May Effect, Not Likely to Adversely Affect** determination for June Sucker and **No Effect** determination for all other ESA species to comply with Section 7 of the ESA (Appendix A). The USFWS concurred with the determination on April 15, 2025 (Appendix A).

7.1.4 Utah State Historic Preservation Office

A Cultural Resource Assessment was completed (Certus 2024) and NRCS determined **No Historic Properties Affected** for the Project. The Cultural Resource Assessment, description of the APE, site eligibility, and determination (per 36 CFR 800.4(d)(1)) was submitted to Utah SHPO for concurrence with the determination on November 12, 2024, and SHPO concurrence was received on December 24, 2024 (Appendix A).

If undocumented cultural/archaeological resources are found during construction activities, construction would stop, and the appropriate agency officials would be notified, per procedures described in the NRCS Prototype Programmatic Agreement. Consultation with SHPO will continue during the Draft Plan-EA review period, and the results will be documented in the Final Plan-EA.

7.2 Coordination

7.2.1 Stakeholders

Coordination was conducted with private landowners having a stake in the Project. These include landowners of parcels where temporary and permanent easements are required to install alternative measures. Consultation with landowner stakeholders will continue throughout the planning process and the results will be documented in the Final Plan-EA.

Project measures would also be installed on TLA lands and coordination with the TLA was performed. The NRCS sent an invitation to participate in development of the Plan-EA to TLA on July 6, 2020. The TLA responded on August 3, 2020 that they agree to be a partnering agency in development of the Plan-EA (Appendix A). The TLA was provided copies of the preliminary Plan-EA for review prior to issuance of the Draft Plan-EA to the public. The TLA report comments or concerns were addressed and/or corrected prior to issuance of the Draft Plan-EA to the public.

7.2.2 Sponsoring Local Organization

Financial assistance for the Project was requested by the SLO from NRCS through Standard Form 424-Application for Federal Assistance. Initial coordination was conducted with the SLO

regarding the Project and the proposed measures. Meetings were conducted throughout the planning and engineering process to discuss the Project measures and identify potential concerns. The SLO was provided copies of the preliminary Plan-EA for review prior to issuance of the Draft Plan-EA to the public. SLO report comments or concerns were addressed and/or corrected prior to issuance of the Draft Plan-EA to the public.

7.2.3 Utah Division of Wildlife Resources

Coordination with the UDWR was performed to identify state sensitive species of concern that should be considered in the Plan-EA analysis for the Project. Correspondence with the UDWR is included in Appendix A.

7.2.1 Utah Division of Water Resources

Coordination with the Utah Division of Water Resources was performed to identify if a Stream Alteration Permit would be necessary for alternative measures. The channels to be modified do not meet the definition of a natural stream and the Stream Alteration Program would not apply. This was confirmed with the Utah Division of Water Resources in an email dated April 11, 2024 (Appendix A).

7.3 Public Involvement

7.3.1 Public Participation Plan

A Public Participation Plan was prepared to provide effective procedures that define outreach to the general public, recreationists, tribes, local businesses, associations, stakeholders, affected landowners, and affected government agencies. The main goal of public participation is to involve a diverse group of public and government agency participants to solicit input and provide timely information throughout the NEPA review process. As part of the public participation process, the plan seeks to meaningfully engage minority, low-income, and traditionally under-represented populations during the NEPA review process.

7.3.2 Project Scoping

The participation of the public is a vital component of the Project so that those who are interested in or potentially affected by proposed alternatives have an opportunity to share their concerns and provide input regarding the Plan-EA during the initial stages of the process. The Project Scoping Report (Appendix A) outlines the scoping efforts and comments received from the agencies and public during the scoping process.

Project scoping questions, comments, and concerns were requested from the public and government agencies during the preliminary scoping period, both orally at public meetings and via written submittal of comments.

7.3.3 Public Outreach

Table 7-2 lists the Project's public outreach activities. The public, tribes, agencies, and organizations were notified of activities as described below and provided with opportunities to comment on the Project. The NRCS established a Project website for the public to access Project information, announce outreach activities, and post outreach materials.

Table 7-2. Public Outreach Activities

Date	Item
June 30, 2020	Scoping – Public Comment Period Open Scoping notice and meeting announcements were sent prior to the start of the open comment period
July 6 and 13, 2020	Scoping Notice Posted in The Daily Herald
July 14, 2020	Scoping Public Meeting Held
August 3, 2020	Scoping – Public Comment Period Closed
August 25, 2025	Draft Plan-EA Public Comment Period Open and NOA for interested parties*
September 10, 2025	Draft Plan-EA Public Meeting
September 24, 2025	Draft Plan-EA Public Comment Period Closed
Estimated December 2025	Final Plan-EA and FONSI

** Interested parties include local/state/federal agencies, tribes, organizations, landowners, members of the public, etc. included in the Project mailing list.*

7.4 Plan Development and Review

7.4.1 NRCS Plan-EA Reviews

Agency Plan-EA reviews included appropriate NRCS reviews prior to issuance of the Draft Plan-EA to the public. The sequential review process included the following.

1) NRCS Utah review
2) NRCS National Water Management Center (NWMC) review
3) NRCS National Headquarters review
4) Issue the Draft Plan-EA for public review

7.4.2 Draft Plan-EA Public Comment

This portion will be completed in the Final Plan-EA to document the Draft Plan-EA public comment process. Comments and responses on the Draft Plan-EA will be included in Appendix A of the Final Plan-EA.

7.4.3 Final Plan-EA and FONSI Public Comment

When the Final Plan-EA and FONSI are issued, a Notice of Availability will be published locally to notify the public of the finding and copies made available on the Project website.

7.5 Distribution List

Table 7-3 lists the government agencies, tribes, and organizations that are included on the Project distribution list for scoping notice and/or notice of availability for the Draft Plan-EA.

Table 7-3. Distribution List

Federal Government	
BLM	USACE
BOR	U.S. Department of Indian Affairs
EPA	U.S. Forest Service
FEMA	USFWS
State Government	
State Representatives/Senators	Utah Division of Forestry, Fire & State Lands
TLA	Utah Division of Indian Affairs
U.S. Representatives/Senators	Utah Division of Water Resources
Utah Department of Agriculture	Utah Division of Wildlife Resources
Utah Department of Environmental Quality	Utah Natural Heritage Program
Utah Department of Heritage and Arts	Utah Public Land & Policy Coordination Office
Utah Department of Public Safety	Utah Reclamation Mitigation & Conservation
Utah Department of Transportation	
Local Government	
City of Saratoga Springs	Utah County
Business and Organizations	
Rocky Mountain Power	Western Land Exchange Project
Questar Gas	Wild Earth Guardians
Sierra Club Utah Chapter	
Tribes	
Confederated Tribes of the Goshute Reservation	Ute Indian Tribe of the Uintah & Ouray Reservation, Utah
Skull Valley Band of Goshute Indians	
Private Parties	
The names of private parties receiving notice are not listed in this section for privacy.	

8.0 References

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9.0 List of Preparers

Table 9-1 lists the people who participated in the preparation of this document.

Table 9-1. List of Preparers

Name	Title (Years of Experience)	Education	Other
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10.0 Acronyms, Abbreviations, and Short Forms

ac	acre
ac-ft	acre-feet
AEP	Adaptive Environmental Planning, LLC
AIRFA	American Indian Religious Freedom Act
APE	Area of Potential Effect
BA	Biological Assessment
BC&A	Bowen Collins & Associates
BLM	Bureau of Land Management
BMPs	Best Management Practices
CEQ	Council on Environmental Quality
Certus	Certus Environmental Solutions, LLC
CFR	Code of Federal Regulations
cfs	cubic feet per second
DM	Department Manual
EAP	Emergency Action Plan
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FDCP	Fugitive Dust Control Plan
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
ft	feet
ft/ft	feet per feet
ft/s	feet per second
GHG	greenhouse gas
H&H	hydrologic and hydraulic
H:V	horizontal to vertical
HUC	Hydrologic Unit Code
IPaC	Information for Planning and Consultation
MBCC	Migratory Birds of Conservation Concern
MBTA	Migratory Bird Treaty Act
mi^2	square miles
MRLC	Multi-Resolution Land Characteristics Consortium
MSAT	Mobile Source Air Toxics
N&I	Noxious and invasive weeds
NAAQS	National Ambient Air Quality Standards
NACD	Native American Consultation Database
NECH	National Environmental Compliance Handbook
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program

NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NOI	Notice of Intent
NPPH	National Planning Procedures Handbook
NPS	National Park Service
NRCS	U.S. Department of Agriculture Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWMC	National Watershed Management Center
NWPH	National Watershed Program Handbook
NWPM	National Watershed Program Manual
NWSRS	National Wild and Scenic River System
OHWM	Ordinary High Water Mark
O&M	Operations and Maintenance
OM&R	Operation, Maintenance, and Replacement
PCRP	Post Construction Rehabilitation Plan
PL	Public law
Plan-EA	Watershed Plan and Environmental Assessment
PM	particulate matter
PR&G	Principles, Requirements, and Guidelines for Federal Investments in Water Resources
Project	Saratoga Springs Flood Prevention Project
ROW	Right-of-way
SFHA	Special Flood Hazard Area
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
SLO	Sponsoring Local Organization
SWPPP	Storm Water Pollution Prevention Plan
Tc	Time of Concentration
TCP	Traditional Cultural Properties
TDAT	Tribal Directory Assessment Tool
TDS	Total Dissolved Solids
TLA	Utah Trust Lands Administration
TM	Technical Memorandum
TMDL	Total Maximum Daily Load
UDAF	Utah Department of Agriculture and Food
UDAQ	Utah Division of Air Quality
UDEQ	Utah Department of Environmental Quality
UDIA	Utah Division of Indian Affairs
UDNR	Utah Department of Natural Resources
UDWR	Utah Division of Wildlife Resources
USACE	U.S. Army Corps of Engineers

USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
UWQA	Utah Water Quality Act
Ve	Velocity of flow
Watershed	Saratoga Springs Watershed
WFPO	Watershed and Flood Prevention Operations
Yd^3	cubic yards