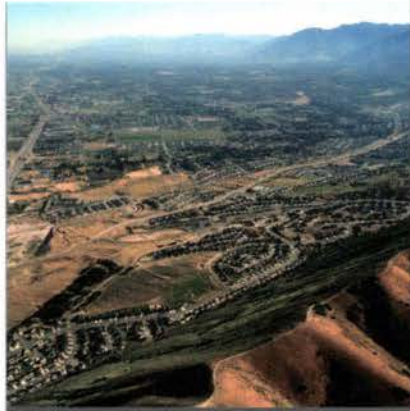

Utah Lake Drainage Basin Water Delivery System

Final Environmental Impact Statement Volume 1

September 2004

CENTRAL UTAH WATER CONSERVANCY DISTRICT

UTAH RECLAMATION MITIGATION AND CONSERVATION COMMISSION

U.S. DEPARTMENT OF THE INTERIOR
MARCH 3, 1849

U.S. DEPARTMENT OF THE INTERIOR

UTAH LAKE DRAINAGE BASIN WATER DELIVERY SYSTEM FINAL ENVIRONMENTAL IMPACT STATEMENT

Prepared by

Central Utah Water Conservancy District

September 2004

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COVER SHEET

Utah Lake Drainage Basin Water Delivery System Environmental Impact Statement

( ) Draft (X) Final

Joint Lead Agencies

Central Utah Water Conservancy District (District)
U.S. Department of the Interior (DOI)
Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission)

Cooperating Agencies

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Department of Agriculture, Forest Service
U.S. Bureau of Reclamation
Utah Department of Transportation
Utah Department of Natural Resources
Utah Department of Environmental Quality
Western Area Power Administration

Counties that Could Be Affected

Utah County, Utah
Juab County, Utah
Salt Lake County, Utah

Abstract

This FEIS covers the features that would complete the Utah Lake Drainage Basin Water Delivery System (Utah Lake System or ULS). The ULS is the last system of the Bonneville Unit of the Central Utah Project. The Spanish Fork Canyon – Provo Reservoir Canal Alternative (Proposed Action) was formulated to deliver the remaining 15,800 acre-feet of uncommitted Bonneville Unit water and combined with DOI acquisition of the District's secondary water rights in Utah Lake, it would deliver 30,000 acre-feet of M&I water to southern Utah County and 30,000 acre-feet of M&I water to Salt Lake County. The Proposed Action would include 5 new pipelines for delivery of M&I water and 2 new hydropower plants and associated transmission lines and substations. Two other alternatives are analyzed in detail. The Bonneville Unit Water Alternative would include 3 new pipelines and 2 new hydropower plants and associated transmission lines and substations. This alternative would deliver 15,800 acre-feet of M&I water to southern Utah County. The No Action Alternative would involve no construction and would not deliver any additional Bonneville Unit M&I water.

The ULS action alternatives would provide in-stream flows in the lower Provo River and Hobble Creek for June sucker spawning and rearing as elements of the June Sucker Recovery Implementation Program. The two action alternatives would provide additional water to meet target in-stream flows in the lower Provo River.

Other Requirements Served

This FEIS is intended to serve other environmental review and consultation requirements pursuant to 40 CFR 1502.25 (a), Clean Water Act Section 404 (r), Section 7 of the Endangered Species Act and the Fish and Wildlife Coordination Act.

Date DEIS Made Available to EPA and the Public: INT DEIS 04-16 March 25, 2004

Date FEIS Made Available to EPA and the Public: INT FEIS 04-41 September 30, 2004

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Summary

Summary

S.1 Introduction

As Joint-Lead Agencies, the Central Utah Water Conservancy District (District), U.S. Department of the Interior (DOI), and Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission) have prepared this Utah Lake Drainage Basin Water Delivery System Final Environmental Impact Statement (FEIS). This FEIS addresses potential impacts related to construction and operation of alternatives analyzed for the Utah Lake Drainage Basin Water Delivery System (ULS).

This summary provides an overview of:

The purpose and need for the project
Proposed Action and other alternatives
Major areas of concern
Major significant impact conclusions
Issues to be resolved
Environmentally preferred alternative

The Joint-Lead Agencies will use this EIS and other relevant materials to plan actions and make decisions. It is intended to satisfy disclosure requirements of the National Environmental Policy Act (NEPA) and will serve as the compliance document for Clean Water Act section 404 as provided by section 404(r), withdrawal and revocation of National Forest System lands, Section 7 of the Endangered Species Act, Fish and Wildlife Coordination Act, and contracts, agreements and permits that would be required for construction and operation of the Utah Lake System. Construction funds will be requested from Congress for Fiscal Year 2007.

S.2 Purpose and Need

The Proposed Action and other action alternatives respond to the following needs:

1. To complete the Bonneville Unit by delivering 101,900 acre-feet on an average annual basis from Strawberry Reservoir to the Wasatch Front Area and project water from other sources to meet some of the municipal and industrial (M&I) demand in the Wasatch Front Area.
2. To implement water conservation measures.
3. To address all remaining environmental commitments associated with the Bonneville Unit.
4. To maximize current and future M&I water supplies associated with the Bonneville Unit.

Following are the purposes that have been identified:

1. To protect water quality of surface and underground water resources that may be affected by Bonneville Unit completion
2. To provide creative methods, facilities and incentives to implement water conservation measures, reuse and conjunctive use of water resources
3. To participate in the implementation of the June Sucker Recovery Implementation Program
4. To provide previously committed in-stream flows within the Bonneville Unit area and statutorily mandated in-stream flows, and assist in improving fish, wildlife and related recreational resources
5. To provide for the United States to acquire adequate District water rights in Utah Lake to implement the ULS and other water rights as authorized by CUPCA

6. To continue to provide Bonneville Unit water in accordance with existing contracts
7. To develop project power

S.3 Proposed Action and Other Alternatives Description

S.3.1 Spanish Fork Canyon-Provo Reservoir Canal Alternative (Proposed Action)

The Spanish Fork Canyon–Provo Reservoir Canal Alternative has an average transbasin diversion of 101,900 acre-feet, which consists of a delivery of: 30,000 acre-feet of M&I water for secondary use to southern Utah County and 30,000 acre-feet of M&I water to Salt Lake County water treatment plants; 1,590 acre-feet of M&I water already contracted to southern Utah County cities, and 40,310 acre-feet of M&I water to Utah Lake for exchange to Jordanelle Reservoir. The 30,000 acre-feet (less the water returned to DOI under the Section 207 Program) of M&I water utilized in southern Utah County would be used in the cities' secondary water systems. Use of this water as a potable supply in the future would require additional NEPA compliance. Under this alternative, the DOI would acquire all of the District's secondary water rights in Utah Lake. These rights would amount to 57,073 acre-feet. The acquired water rights would be used to exchange water to Jordanelle Reservoir.

The Spanish Fork Canyon–Provo Reservoir Canal Alternative would include the following features (see Map 1-3 or Map A-1 in map pocket): 1) Sixth Water Hydropower Plant and Transmission Facilities, 2) Upper Diamond Fork Hydropower Plant and Underground Transmission Facilities, 3) Spanish Fork Canyon Pipeline, 4) Spanish Fork–Santaquin Pipeline, 5) Santaquin–Mona Reservoir Pipeline, 6) Mapleton–Springville Lateral Pipeline, and 7) Spanish Fork–Provo Reservoir Canal Pipeline. These features would deliver ULS M&I secondary water to southern Utah County cities, deliver water to Hobble Creek to provide June sucker spawning flows, and supplemental flow during other times of the year, deliver water for supplemental flow in the lower Provo River, deliver M&I raw water to the Provo Reservoir Canal and the Jordan Aqueduct for conveyance to water treatment plants in Salt Lake County, and provide water to generate electric power at 2 hydropower plants in the Diamond Fork System, with associated transmission facilities. The Spanish Fork Canyon Pipeline, Mapleton-Springville Lateral Pipeline and Spanish Fork–Santaquin Pipeline would convey up to 10,200 acre-feet of Strawberry Valley Project (SVP) water shares contractually assigned or made available to South Utah Valley Municipal Water Association (SUVMWA) or its member cities/municipalities in southern Utah County on a space-available basis.

S.3.2 Bonneville Unit Water Alternative

The Bonneville Unit Water Alternative would convey an average transbasin diversion of 101,900 acre-feet consisting of: 15,800 acre-feet of M&I water to southern Utah County to be used in secondary water systems; 1,590 acre-feet of M&I water already contracted to the southern Utah County cities; and 84,510 acre-feet of M&I water delivered to Utah Lake for exchange to Jordanelle Reservoir. It would conserve water in the Provo River basin and deliver it along with acquired water to assist June sucker spawning and rearing, conserve water in a Mapleton-Springville Lateral Pipeline and convey water to support in-stream flows in Hobble Creek to assist recovery of the June sucker; and generate electric power at 2 hydropower plants in the Diamond Fork System. It would involve construction of three new pipelines and 2 new hydropower plants with associated transmission facilities. Under this alternative, DOI would acquire up to 15,000 acre-feet of the District's secondary water rights in Utah Lake to provide a firm annual yield of 15,800 acre-feet of M&I water for secondary water systems.

The Bonneville Unit Water Alternative would include the following features (see Map 1-5 or Map A-2 in map pocket): 1) Sixth Water Hydropower Plant and Transmission Facilities, 2) Upper Diamond Fork Hydropower Plant and Underground Transmission Facilities, 3) Spanish Fork Canyon Pipeline, 4) Spanish Fork–Santaquin Pipeline, and 5) Mapleton–Springville Lateral Pipeline. The Spanish Fork-Santaquin Pipeline would be constructed as a combined ULS/Section 207 feature. These features would deliver ULS M&I secondary water to outhern Utah County cities, deliver Bonneville Unit water to Hobble Creek to provide June sucker flows, and generate and deliver electric power from 2 hydropower plants. The Spanish Fork Canyon Pipeline, Mapleton-Springville Lateral Pipeline and Spanish Fork–Santaquin Pipeline would convey up to 10,200 acre-feet of Strawberry Valley Project (SVP) water shares contractually assigned or made available to SUVMWA or its member cities/municipalities in southern Utah County.

S.3.3 No Action Alternative

No new water conveyance features would be constructed under the No Action Alternative. The 15,800 acre-feet of available Bonneville Unit water would remain in Strawberry Reservoir to provide a firm supply for delivery of the Bonneville Unit M&I exchange water that would be made without any shortages. Some of the Bonneville Unit M&I exchange water would be routed through the Strawberry Tunnel to meet in-stream flow needs in Sixth Water and Diamond Fork creeks. The remaining Bonneville Unit M&I exchange water would be conveyed through the Syar Tunnel and Diamond Fork System and discharged into Diamond Fork Creek at the outlet near Monks Hollow for in-stream flows or discharged from the Diamond Fork Pipeline and Spanish Fork River Flow Control Structure into Diamond Fork Creek at the mouth of Diamond Fork Canyon. The irrigation diversions on lower Spanish Fork River would be modified to bypass and measure the 86,100 acre-feet into Utah Lake, and to allow fish passage as previously agreed by the DOI and District in the 1999 Diamond Fork FS-FEIS and ROD. This alternative would conserve water in the Provo River basin and deliver it along with acquired water to assist June sucker spawning and rearing in the lower Provo River. The DOI would not acquire any of the District's secondary water rights in Utah Lake and no water would be conveyed to Hobble Creek. The No Action Alternative would be operated the same as the Interim Proposed Action in the Diamond Fork FS-FEIS.

S.4 Major Areas of Concern

Several areas of concern and issues were raised at scoping and consultation with cooperating agencies. The impact analysis contained in Chapter 3 of this FEIS deals with the following issues:

Flows in creeks and rivers
Changes in groundwater levels
Water quality changes in rivers, lakes, and reservoirs
Changes in wetlands and riparian habitat
Threatened, endangered and other species of special concern
Impacts from construction activity

S.5 Major Impact Conclusions

S.5.1 Spanish Fork Canyon-Provo Reservoir Canal Alternative (Proposed Action)

S.5.1.1 Surface Water Hydrology

Significant streamflow and river stage changes associated with the Proposed Action would be confined to general increases on the lower Provo River, and on Hobble Creek, and decreases on the Spanish Fork River.

S.5.1.2 Surface Water Quality

The primary impacts on surface water quality would occur in Utah Lake, the Provo River, Hobble Creek and the Spanish Fork River. Total phosphorus load in Utah Lake would decrease by 3.2 tons per year from baseline conditions. Total dissolved solids concentrations in Utah Lake would increase slightly and remain below the water quality standard for agricultural use. Total dissolved solids load to Utah Lake would decrease by 11,486 tons per year (-3.3 percent) from baseline. Water quality conditions in the lower Provo River would improve, with increased dissolved oxygen, lower summer water temperatures, and lower total dissolved solids. Total phosphorus concentrations in the lower Provo River would remain unchanged. Water quality conditions in Hobble Creek would improve as well, with increased dissolved oxygen, lower summer water temperatures, and lower total dissolved solids. Total phosphorus concentrations in Hobble Creek would increase under the Proposed Action. Water quality conditions in the Spanish Fork River would slightly degrade, with decreased dissolved oxygen, higher summer water temperatures, increased total dissolved solids, and increased total phosphorus. These impacts would occur because Bonneville Unit exchange flows to Utah Lake would be removed from the Spanish Fork River and discharged into Hobble Creek and the lower Provo River. Impacts on water quality would not exceed the significance criteria.

S.5.1.3 Groundwater Hydrology

Under the Proposed Action a total of 27,000 acre-feet (30,000 acre-feet minus 3,000 acre-feet returned to DOI under 207 projects) of secondary M&I water would be delivered to southern Utah County. It is estimated that approximately 9,660 acre-feet would return to Utah Lake as groundwater. The change in groundwater levels from baseline conditions as a result of this 9,660 acre-feet over such a large area could cause a slight increase in groundwater levels; however this increase would be so small it would not be considered significant.

S.5.1.4 Groundwater Quality

No significant impacts are expected from construction and operation.

S.5.1.5 Aquatic Resources

Estimated change in habitat is variable for the areas of impact and by habitat type. In the Provo River slow and backwater habitats generally would decrease while moderate and fast water habitats will increase. One notable exception is the lowest reach of the Provo River where large increases in all habitats would be expected. Projected increases in habitat likely would provide a significant benefit to aquatic species in Hobble Creek. Projected flow decreases in the Spanish Fork River would be expected to decrease habitat complexity for fishes and macroinvertebrates.

Game fish biomass and total biomass are projected to increase substantially because of reduction in stream flow variation on the Provo River downstream of the Olmsted Diversion Dam. Trout standing crop and total biomass are projected to decrease compared to baseline conditions in two of four reaches in the Spanish Fork River. Impacts on game fish in the Spanish Fork River would be compounded by a loss in available habitat and would likely have a significant impact on trout populations and biomass. In Hobble Creek, game fish populations were estimated to experience significant long-term increases. Total biomass was estimated to increase in Hobble Creek. Overall the game fish biomass would experience an increase of 19,496 pounds under the Proposed Action.

Macroinvertebrate populations may experience high potential increases in the Provo River downstream of the I-15 Bridge. Habitat change in Hobble Creek associated with enhanced flows has a moderate to high potential to benefit macroinvertebrates. In the Spanish Fork River, macroinvertebrate populations may experience a low to moderate negative impact because flow would be decreased in all months.

S.5.1.6 Wetlands Resources

A total of 0.27 acres comprised of 12 small, scattered non-jurisdictional wetlands would be temporarily lost, but then restored upon completion of construction; 1.03 acres comprised of 16 small, scattered, non-jurisdictional wetlands would be permanently lost from construction of the Mapleton-Springville Lateral Pipeline and drain or discharge structures associated with other pipelines. The permanent loss of wetland associated with construction of pipelines would be a significant impact.

Construction of the Mapleton-Springville Lateral Pipeline would cause permanent conversion of 0.3 acre of riparian forest and 0.7 acre of scrub-shrub wetland to upland vegetation. Construction of drain or discharge structures would result in the loss of 0.04 acres of riparian forest, scrub-shrub and emergent marsh wetlands. Soils would be restored after pipeline construction disturbance, but hydrology would be permanently affected within the pipeline corridor. The changes associated with the construction of pipelines would be a significant impact.

Wetland functions would be permanently lost on 1.03 acres of riparian forest, scrub-shrub and emergent marsh wetlands that would be converted to upland vegetation from construction of the Mapleton-Springville Lateral Pipeline and drain or discharge structures on other pipelines. Wetland functions would be temporarily lost on 0.27 acre until restoration was completed. Proposed mitigation for the ULS project would include 10 acres of the 85.5-acre Mona Springs Unit. This would result in a mitigation ratio of approximately 9.7 to 1. This is substantial mitigation for both temporary and permanent loss of small, scattered, non-jurisdictional wetlands that currently have low functional value and do not support any TES species.

S.5.1.7 Wildlife and Habitat

The Proposed Action would result in a loss of 2.4 acres of wildlife habitat, scattered throughout the impact area of influence. This habitat has marginal wildlife values, and abundant equivalent or higher value habitat is available adjacent to all features constructed for this alternative. Impacts on game and non-game wildlife home ranges would be minimal. Construction and operation of the alternative would not cause a substantial disturbance to wildlife habitats; habitat disturbance would not exceed the significance criteria.

S.5.1.8 Threatened and Endangered Species

S.5.1.8.1 June sucker. The Proposed Action flows in the Provo River would provide a 192 percent higher weighted usable area (WUA) in May and 122 percent higher WUA in June for the moderate flow – mid-depth habitat on an annual basis for June sucker specific spawning habitat between the Tanner Diversion and Interstate 15 compared to baseline conditions. Proposed flows would provide a 181 percent higher WUA in May and 96 percent higher WUA in June for the moderate flow – mid-depth habitat on an annual basis for June sucker specific spawning habitat in the Provo River between the Interstate 15 and Utah Lake compared to baseline conditions. Backwater/edge habitat niche would decrease by 61 percent and slow flow/shallow habitat would decrease by 8 percent from baseline from Tanner Diversion to Interstate 15. Backwater/edge and slow flow/shallow habitat would not change from Interstate 15 to Utah Lake. The small magnitude of projected habitat decreases for early life stages would be offset by large predicted habitat gains for spawning June sucker. July flow increases in both reaches of the Provo River would provide a benefit to young-of-year June sucker by restoring the hydrograph to a more natural condition. Changes in predation on June sucker from increased populations of predator fish were not analyzed.

S.5.1.8.2 Ute Ladies'-tresses. Projected decreased flows in the Spanish Fork River are not likely to adversely affect Ute ladies'-tresses individuals or habitat.

S.5.1.9 Sensitive Species

Leatherside chub would be significantly impacted in the Spanish Fork River. Although the change in habitat is not expected to be substantial (i.e., greater than 25 percent of habitat in the eco-region), the impact can be considered significant because it meets the following previously determined significance criteria:

- A reduction in fish numbers and/or biomass in an affected stream section as a result of change in habitat conditions (quantity and quality of instream flows or water quality) as defined by a sensitivity analysis on existing HQI and IFIM/PHABSIM data.

To offset potential impacts on leatherside chub, the Joint-Lead Agencies commit to supporting the Utah Division of Wildlife Resources in evaluating population and habitat status, or determining threats and/or identifying conservation actions that could protect, and where appropriate, enhance leatherside chub. This would occur first in the Spanish Fork River, but if necessary, in other streams of the Utah Lake drainage.

No other sensitive species would be significantly impacted by the Proposed Action.

S.5.1.10 Agriculture and Soils

There would be a temporary loss of production on 43.1 acres of rotational crop land, and 16.7 acres of orchard land. There would be a permanent loss of 15.4 acres of orchard land. See Sections 3.11.8.3.1 through 3.11.8.3.3 for details on the type of crops and locations involved in these impacts. The significance of these impacts would depend on each farmers operation and can not be determined with the data available for analysis.

S.5.1.11 Socioeconomics

S.5.1.11.1 Employment. Construction activities would create about 800 to 1,190 jobs (annual equivalent). Most jobs are expected to be filled by the existing construction force labor pool located within the impact area of influence. Project operations would slightly increase District operations staff. These impacts would not be significant.

S.5.1.11.2 Income. Construction activities would result in an increase of approximately $72 million in direct income impacts. The additional indirect income that would be generated by construction activities is estimated to be about $79 million. Total direct and indirect income impacts would equal approximately $151 million. Construction activities would result in $270 million in new equipment and materials purchases spread throughout the local, state, and national economies. Operations would not create any measurable income impacts.

S.5.1.11.3 Public and Business Services and Fiscal Conditions. Some construction and operation impacts would occur on local businesses and landowners, but the magnitude of such impacts would be minimized by the SOPs (see Chapter 1, Section 1.8.8.11). However, some disruptions of public and business services would occur, and would be of short duration.

Strawberry Water Users Association power generation revenue from the Upper Generator would be about $502,342 per year, which would be a decrease of about $6,125 per year (1.2 percent) from baseline conditions.

There would likely be an increase in the water rates, which would be a significant impact.

S.5.1.11.4 Agriculture. Construction would result in a peak annual reduction in gross crop revenues of approximately $77,300, with a permanent annual reduction of about $34,600. Peak decreases in regional household income for the construction phase would be less than $100,000, with permanent decreases being less than $50,000.

S.5.1.11.5 Recreational Fishing. Operation of the Proposed Action would result in increased recreational fishing that would generate an additional $1,288,083 in direct net value and about $4,770,483 in total regional/state expenditures. This impact represents about a 27 percent increase above baseline conditions and would be a significant impact.

S.5.1.12 Cultural Resources

This alternative would adversely affect the Castilla Warm Springs Spa historic archaeological site, two farmsteads in Salem, the Summit Creek Reservoir Drain Structure, the Mapleton Lateral, and two canals. The canals include the West Union Canal in Provo, and the Provo Reservoir Canal (PRC), commonly known as the Murdock Canal in Orem.

S.5.1.13 Visual Resources

The Sixth Water Transmission Line, Substation and the Upper Diamond Fork Power Plant Facility would be inconsistent with the Unita National Forest Plan VQO of partial retention because slope cuts, site grading and buildings would result in dominant elements in the foreground view from Sheep Creek-Rays Valley Road (FR #051) and the Diamond Fork Road. These Forest access routes are used by a large number of users.

S.5.1.14 Recreation Resources

There would be a significant impact on angler day use on the Provo River. It is estimated that the Proposed Action would increase angler day use by 36,342 days per year in reaches with public access. Total net angler-days per year would increase by 36,438 (+27 percent) under the Proposed Action.

S.5.1.15 Public Health and Safety

Table S-1 shows only high-risk urban areas by feature, pipeline milepost, number of miles, and towns and cities where impacts would occur. Potential public exposure to air quality, traffic and noise impacts would occur on a short-term basis along 30.9 miles of construction corridors.

Table S-1
Location of High-Risk Urban Areas for PM_{10}, Traffic and Noise Significant Impacts Under the Proposed Action

Feature	Pipeline Milepost*	Miles	Towns/Cities Affected
Spanish Fork-Santaquin Pipeline	0.0 to 1.8 5.7 to 8.4 9.0 to 9.5 9.7 to 12.1	7.4	Spanish Fork, Salem, Payson
Mapleton-Springville Lateral Pipeline	0.0 to 0.7 1.5 to 5.7	4.9	Spanish Fork, Mapleton
Spanish Fork-Provo Reservoir Canal Pipeline	0.7 to 17.8 17.9 to 18.0 18.3 to 19.7	18.6	Spanish Fork, Mapleton, Springville, Provo, Orem

*Pipeline mileposts are shown on Map A-1

S.5.1.16 Paleontology

Approximately 34 miles of pipeline features would be constructed on Condition 1 formations (areas that are known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils) and 13 miles on Condition 3 formations (areas that are very unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils based on their surficial geology, igneous or metamorphic rocks, extremely young alluvium, colluvium, or Aeolian deposits or the presence of deep soils). Until construction occurs it is not possible to estimate if any paleontological resources would be impacted.

S.5.1.17 Transportation Networks and Utilities

The following would experience a temporary (short term) 10 percent or greater increase in Annual Average Daily Traffic flow which would be a significant impact: Foothill Drive in southeast Provo, and rural, county, and residential streets and roads associated with constructing the Sixth Water Power Facility, Substation and Transmission Line, Spanish Fork-Santaquin Pipeline, Santaquin-Mona Reservoir Pipeline, Mapleton-Springville Lateral Pipeline, and Spanish Fork-Provo Reservoir Canal Pipeline.

S.5.1.18 Air Quality

National Ambient Air Quality Standards (NAAQS) standards for PM_{10}, NO_2, and SO_2 would be exceeded. Exceedances would be temporary and localized. See Section 3.20.8.3.9 for detailed amounts.

S.5.1.19 Minerals and Energy

There would be a loss of 76,560 kwh per year in power produced by the Upper Generator at the Strawberry Water Users Association power plant. New power generation (average annual water-year conditions) would be provided by the Sixth Water Power Facility (about 134,269,000 kwhr) and Upper Diamond Fork Power facility (about 30,874,000 kwhr).

S.5.2 Bonneville Unit Water Alternative

S.5.2.1 Surface Water Hydrology

Significant stream flow and river stage impacts associated with this alternative are confined to general increases on the lower Provo River below Olmsted Diversion, increases on Hobble Creek, and decreases on the Spanish Fork River.

S.5.2.2 Surface Water Quality

The primary impacts on surface water quality would occur in Utah Lake, Hobble Creek and the Spanish Fork River. Total phosphorus load in Utah Lake would increase by 1.0 ton per year (+0.3 percent) from baseline conditions. Total dissolved solids concentrations in Utah Lake would change slightly and remain below the water quality standard for agricultural use. Water quality conditions in Hobble Creek would improve, with increased dissolved oxygen, lower summer water temperatures, and lower total dissolved solids. Total phosphorus concentrations in Hobble Creek would increase under the Bonneville Unit Water Alternative. Water quality conditions in the Spanish Fork River would include increased dissolved oxygen, decreased summer water temperatures, increased total dissolved solids concentrations above Moark Junction and lower total dissolved solids concentrations below Moark Junction, and slightly increased total phosphorus concentrations above Moark Junction. Impacts on water quality would not exceed the significance criteria.

.5.2.3 Groundwater Hydrology

A total of 12,800 acre-feet (15,800 acre-feet minus 3,000 acre-feet returned to DOI under 207 projects) of secondary M&I water would be delivered to southern Utah County on an annual basis. It is estimated that approximately 4,660 acre-feet would return to Utah Lake as groundwater. The change in groundwater levels from baseline conditions as a result of this 4,660 acre-feet over such a large area could cause a slight increase in groundwater levels; however this increase would be so small it would not be considered significant.

S.5.2.4 Groundwater Quality

No impacts are expected from construction and operation.

S.5.2.5 Aquatic Resources

S.5.2.5.1 Habitat. Large increases in habitat availability would be expected for the lower Provo River. The greatest increases would be expected to occur downstream of the Murdock Diversion Dam reach and should improve game and non-game fish habitats. In the Spanish Fork River habitat is projected to increase and decrease seasonally. The greatest potential loss would occur during summer months and could have significant impact on non-game spawning habitat. Hobble Creek habitat is projected to increase significantly under the Bonneville Unit Water Alternative.

S.5.2.5.2 Game Fish Biomass. Game fish biomass may be expected to increase as a result of reduction in streamflow variation in the Provo River downstream of the Olmsted Diversion Dam to Utah Lake. Game fish populations in the Spanish Fork River were projected to decrease because of changes in late summer flows, itrate-nitrogen, and cover. In Hobble Creek, game fish populations and total biomass were estimated to experience significant long-term increases. Overall the Bonneville Unit Water Alternative would result in an increase of 10,220 pounds of fish biomass.

S.5.2.5.3 Macroinvertebrates Macroinvertebrate populations are expected to experience habitat changes that range from low to moderate potential and moderate to high benefit for populations in the Provo River downstream of the Murdock Diversion Dam. Flow decreases in the Spanish Fork River are not expected to result in significant impacts to macroinvertebrates. There is a low to moderate potential for benefits to macroinvertebrates in Hobble Creek.

S.5.2.6 Wetlands Resources

S.5.2.6.1 Areal Extent. One acre of wetland habitat would be lost from construction of the Mapleton-Springville Lateral Pipeline and 0.02 acre from construction of drain or discharge structures. The Spanish Fork-Santaquin Pipeline would cause a temporary loss of 0.18 acre during construction and until restoration was completed. The permanent loss of wetland associated with construction of pipelines would be a significant impact. Mitigation for wetland impacts would be the same as described for the Proposed Action in Section S.5.1.6.

S.5.2.6.2 Changes in Plant Communities, Soils or Hydrology. Construction of the Mapleton-Springville Lateral Pipeline would permanently convert 0.3 acres of riparian forest and 0.7 acres of scrub-shrub wetland to upland vegetation, while 0.02 acre of riparian wetlands would be converted from construction of drain or discharge structures. Soils would be restored after pipeline construction disturbance, but hydrology would be permanently affected. The changes associated with construction of pipelines would be a significant impact.

.5.2.6.3 Changes in Functions. Wetland functions would be permanently lost in 1.0 acre of riparian forest and scrub-shrub wetland converted to upland vegetation from construction of the Mapleton-Springville Lateral

Pipeline and 0.04 acres of riparian wetlands from construction of drain or discharge structures. Wetland functions would be temporarily lost on 0.18 acre until restoration was completed. The temporary and permanent loss of wetland functions associated with construction would be a significant impact.

S.5.2.7 Wildlife and Habitat

Construction would eliminate 1.8 acres of wildlife habitat scattered throughout the impact area of influence. These acres have marginal wildlife values and abundant equivalent or higher value habitat is available adjacent to all features constructed for this alternative. Impacts on game and non-game wildlife habitat and home ranges would not be significant. The alternative would not cause a substantial disturbance to wildlife habitats; habitat disturbance would not exceed the significance criteria.

S.5.2.8 Threatened and Endangered Species

S.5.2.8.1 June sucker. Proposed flows in the Provo River would provide a 134 percent higher WUA in May and 64 percent higher WUA in June for the moderate flow – mid-depth habitat on an annual basis for June sucker specific spawning habitat between the Tanner Diversion and Interstate 15 compared to baseline conditions. Proposed flows would provide a 111 percent higher WUA in May and 64 percent higher WUA in June for the moderate flow – mid-depth habitat on an annual basis for June sucker specific spawning habitat in the Provo River between the Interstate 15 and Utah Lake compared to baseline conditions. Backwater/edge habitat niche would decrease by 55 percent and slow flow/shallow habitat would increase by 10 percent from baseline from Tanner Diversion to Interstate 15. Backwater/edge habitat would increase by 160 percent and slow flow/shallow habitat would increase by 324 percent over baseline from Interstate 15 to Utah Lake. The large predicted habitat gains for spawning June sucker would provide a benefit to young-of-year June sucker by restoring the hydrograph to a more natural condition. Changes in predation on June sucker from increased populations of predator studies were not analyzed.

S.5.2.8.2 Ute Ladies'-tresses. Projected decreased flows in July through September in the Spanish Fork River are not likely to adversely affect Ute ladies'-tresses individuals or habitat.

S.5.2.9 Sensitive Species

Leatherside chub would be significantly impacted in the Spanish Fork River. Although the change in habitat is not expected to be substantial (i.e., greater than 25 percent of habitat in the eco-region), the impact can be considered significant because it meets the following previously determined significance criterion:

- A reduction in fish numbers and/or biomass in an affected stream section as a result of change in habitat conditions (quantity and quality of instream flows or water quality) as defined by a sensitivity analysis on existing HQI and IFIM/PHABSIM data.

Mitigation for leatherside chub impacts would be the same as described for the Proposed Action in Section S.5.1.9.

No other sensitive species would be impacted.

S.5.2.10 Agriculture and Soils

There would be a temporary loss of production on 14.3 acres of rotational crop land, and 16.7 acres of orchard land. There would be a permanent loss of 15.4 acres of orchard land. See Section 3.11.8.4 for details on the crops involved in these impacts.

S.5.2.11 Socioeconomics

S.5.2.11.1 Employment. Construction activities would create about 620-930 jobs (annual equivalent). Most jobs would be filled by the existing construction force labor pool located within the impact area of influence. Project operations would slightly increase District operations staff.

S.5.2.11.2 Income. Construction activities would result in an increase of approximately $37 million in direct income impacts. The additional indirect income that would be generated by construction activities is estimated to be about $41 million. Total direct and indirect income impacts would equal approximately $78 million. Construction activities would result in $147 million in new equipment and materials purchases spread throughout the local, state, and national economies. Operations would not create any measurable income impacts.

S.5.2.11.3 Public and Business Services and Fiscal Conditions. Some construction and operation impacts would occur on local businesses and landowners throughout the impact area of influence, but the magnitude of such impacts would be minimized by the SOPs (see Chapter 1, Section 1.8.8.11). However, some disruptions of public and business services would occur, and would be of short duration. Please see Map A-1 and Map A-2 (in the map pocket) for specific towns that could be affected.

Strawberry Water Users Association power generation revenue from the Upper Generator would be $502,342 per year, which would be a decrease of about $6,125 per year (-1.2 percent) from baseline conditions.

There would likely be an increase in the water rates which would be a significant impact.

S.5.2.11.4 Agriculture. The Spanish Fork–Santaquin Pipeline, the Santaquin–Mona Reservoir Pipeline, and the Mapleton – Springville Lateral Pipeline agricultural economics impacts would be the same as described under the Proposed Action (see Section 3.12.8.3.3). For construction related impacts, peak annual crop revenue reductions would be about $75,800, with peak regional income losses under $100,000.

S.5.2.11.5 Recreational Fishing. Operation of the Bonneville Unit Water Alternative would result in increased recreational fishing that would generate annually an additional $638,208 in direct net value, and about $2,708,100 in total regional/state expenditures. This impact represents about a 13.4 percent increase above baseline conditions and would be a significant impact.

S.5.2.12 Cultural Resources

This alternative would have an adverse impact on the Castilla Warm Springs Spa historic archaeological site, two historic farmsteads in Salem, the historic Summit Creek Reservoir drain structure, and the Springville-Mapleton Lateral.

S.5.2.13 Visual Resources

The Sixth Water Transmission Line, Substation and the Upper Diamond Fork Power Plant Facility would be inconsistent with the Unita National Forest Plan VQO of partial retention because slope cuts, site grading and buildings would result in dominant elements in the foreground view from Sheep Creek-Rays Valley Road (FR #051) and the Diamond Fork Road. These Forest access routes are used by a large number of users.

S.5.2.14 Recreation Resources

There would be a significant impact on angler day use on the Provo River. It is estimated that the Bonneville Unit Water Alternative would increase angler day use by 19,716 days per year. Total net angler-days per year would increase by 18,054 (+13.4 percent) under the Bonneville Unit Water Alternative.

S.5.2.15 Public Health and Safety

Table S-2 shows only high-risk urban areas by feature, pipeline milepost, number of miles, and towns and cities where impacts would occur. Potential public exposure to air quality, traffic and noise impacts would occur on a short-term basis along 9.9 miles of construction corridors.

Table S-2
Location of High-Risk Urban Areas for PM_{10}, Traffic and Noise Significant Impacts Under the Bonneville Unit Water Alternative

Feature	Pipeline Milepost*	Miles	Towns/Cities Affected
Spanish Fork-Santaquin Pipeline	0.0 to 1.8 5.7 to 8.4 9.0 to 9.5	5.0	Spanish Fork, Salem, Payson
Mapleton-Springville Lateral Pipeline	0.0 to 0.7 1.5 to 5.7	4.9	Spanish Fork, Mapleton

*Pipeline mileposts are shown on Map A-2

S.5.2.16 Paleontology

Approximately 20 miles of pipeline features would be constructed on Condition 1 formations (areas that are known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils) and 3.2 miles on Condition 3 formations (areas that are very unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils based on their surficial geology, igneous or metamorphic rocks, extremely young alluvium, colluvium, or Aeolian deposits or the presence of deep soils). Until construction occurs it is not possible to estimate if any paleontological resources would be impacted.

S.5.2.17 Transportation Networks and Utilities

The following would experience a temporary (short term) 10 percent or greater increase in Annual Average Daily Traffic flow which would be a significant impact: rural roads and residential streets associated with construction of the Sixth Water Power Facility, Substation and Transmission Line, Spanish Fork-Santaquin Pipeline, and Mapleton-Springville Lateral Pipeline.

S.5.2.18 Air Quality

National Ambient Air Quality Standards (NAAQS) standards for PM_{10}, NO_2, and SO_2 would be exceeded. Exceedances would be temporary and localized. See Section 3.20.8.4.1 for detailed amounts.

S.5.2.19 Minerals and Energy

There would be a loss of 76,560 kwh per year in power produced by the Upper Generator at the Strawberry Water Users Association power plant. New power generation (average annual water-year conditions) would be provided by the Sixth Water Power Facility (about 134,269,000 kwhr) and Upper Diamond Fork Power facility (about 30,874,000 kwhr).

S.5.3 No Action Alternative

S.5.3.1 Surface Water Hydrology

Streamflow and river stage changes associated with the No Action Alternative are confined to general increases on the lower Provo River from Olmsted Diversion to Utah Lake.

S.5.3.2 Surface Water Quality

The primary impacts on surface water quality would occur in Utah Lake and the Spanish Fork River. Total phosphorus load in Utah Lake would increase by 2.5 tons per year from historic baseline conditions. Total dissolved solids concentrations in Utah Lake would generally decrease from historic values and would remain below the water quality standard for agricultural use. Water quality conditions in the Spanish Fork River would include decreased summer water temperatures, increased dissolved oxygen concentration, decreased total dissolved solids and total phosphorus concentrations and unchanged to slightly increased selenium concentrations. Impacts on water quality would not exceed the significance criteria.

S.5.3.3 Groundwater Hydrology

Under this alternative no additional Bonneville Unit M&I water would be delivered. It is reasonable to estimate that without additional Bonneville Unit M&I water the cities in southern Utah County would rely heavily upon additional groundwater pumping. The increased pumping by the cities would cause a drawdown in groundwater levels. Model studies indicate that groundwater levels could decrease by up to 26 feet in part of the impact area of influence (Woodland Hills).

S.5.3.4 Aquatic Resources

There would be no change in habitat, standing crop per acre or total biomass, and macroinvertebrate populations and communities from baseline in the following reaches:

- Spanish Fork River from Diamond Fork to Utah Lake
- Hobble Creek from Mapleton-Springville Lateral discharge to Utah Lake
- Provo River from Deer Creek Reservoir to Olmsted Diversion

The change in habitat, standing crop per acre, total biomass, and macroinvertebrate populations and communities would be the same as under the Bonneville Unit Water Alternative for the following reach:

- Provo River from Olmsted Diversion to Utah Lake

The No Action Alternative would result in an increase of 9,703 pounds of fish biomass.

S.5.3.5 Wetland Resources

S.5.3.5.1 Areal Extent. Wetlands that could be potentially impacted are those that occur in the area where the wetland water supply may decline because of groundwater drawdown of one foot or more relative to baseline conditions. The wetland area and specific locations of potential wetland impacts relative to baseline, are not measurable based on the information available for use in the analysis (see Section 3.4.8.5 Groundwater Hydrology). However, it is expected that a considerable amount of wetland area could potentially change under the No Action Alternative. Potential increased pumping resulting from continued population growth would cause the drawdown of groundwater levels relative to baseline and the potential effect on wetlands.

S.5.3.5.2 Change in Plant Communities, Soils or Hydrology. There is potential for change in plant communities, soils and hydrology in areas affected by groundwater drawdown, however the specific location and amount of change can not be determined based on the available information (see Section 3.4.8.5 Groundwater Hydrology).

S.5.3.5.3 Changes in Functions. Wetland functions would be potentially reduced or lost in wetland areas in southern Utah County that are affected by groundwater drawdown.

S.5.3.6 Wildlife and Habitat

The No Action Alternative could cause significant impacts on wetland wildlife habitats in southern Utah County. Local sub-populations of wetland-associated wildlife could be adversely impacted, although it is unlikely that any regional species population would have impacts that would exceed the significance criteria.

S.5.3.7 Threatened and Endangered Species

S.5.3.7.1 June sucker. Proposed flows in the Provo River would provide a 134 percent higher WUA in May and 64 percent higher WUA in June for the moderate flow – mid-depth habitat on an annual basis for June sucker specific spawning habitat between the Tanner Diversion and Interstate 15 compared to baseline conditions. Proposed flows would provide a 111 percent higher WUA in May and 64 percent higher WUA in June for the moderate flow – mid-depth habitat on an annual basis for June sucker specific spawning habitat in the Provo River between the Interstate 15 and Utah Lake compared to baseline conditions. Backwater/edge habitat niche would decrease by 55 percent and slow flow/shallow habitat would increase by 10 percent from baseline from Tanner Diversion to Interstate 15. Backwater/edge habitat would increase by 160 percent and slow flow/shallow habitat would increase by 324 percent over baseline from Interstate 15 to Utah Lake. The large predicted habitat gains for spawning June sucker would provide a benefit to young-of-year June sucker by restoring the hydrograph to a more natural condition. Changes in predation on June sucker from increased populations of predator studies were not analyzed.

S.5.3.7.2 Ute Ladies'-tresses. There would be no effect as flows in the Spanish Fork River would be the same as under baseline.

S.5.3.8 Sensitive Species

S.5.3.8.1 Leatherside Chub. No impact.

S.5.3.8.2 Wildlife Species. Wetland habitat loss could impact local populations of wetland-associated species (long-billed curlew), but would not place regional populations at risk.

S.5.3.9 *Agriculture and Soils*

There would be no loss of production associated with construction of ULS project features. Factors not associated with the ULS project, such as population growth, would continue to impact agriculture, resulting in loss of agricultural land and associated production.

S.5.3.10 Socioeconomics

S.5.3.10.1 Public and Business Services and Fiscal Conditions. Water resource agency officials and local water delivery providers have determined that future population and economic growth would place new demands on water supply resources. Under the guidance of the Governor's "Baseline 2020" project, water resource planning requirements have been established, and cost estimates have been prepared for new water supply infrastructure. This management and fiscal analysis concludes that adequate water supply resources are available to meet projected needs, but the new resource alternatives would be more expensive than existing resources, and water delivery customers would bear higher water service taxes and rates.

Future water rates would be determined by increasing marginal resource costs. A review of the existing and marginal costs for new water supply delivery under the No Action Alternative is displayed in Table S-3. These cost estimates cover several water supply options that have been identified for the general impact area of influence. The reason for the higher cost when converting an existing irrigation surface water system to an M&I that involves water recycling and reverse osmosis treatment is due to the costly technologies to treat the water. There is also the additional cost of distribution lines, pumping plants and the annual operation, maintenance and replacement for pumping. Most of the present facilities for water distribution are cheaper because the water is delivered by gravity means and many of the local water sources are from springs, which only require chlorination and is a very minimal water treatment cost.

Table S-3
Estimated Costs for New Water Resources

Water Resource	Volume (acre-feet)	Annual $/acre-foot	Purpose/Use
Salt Lake County			
Bear River Water	50,000	$417	Municipal
Efficiency Measures	12 to 25 percent of Existing Supplies	<$300	Municipal
Groundwater Wells	50,000	$460 to $522	Municipal
Water Recycling	18,000	$450 to 600	Secondary/Irrigation
Utah Lake RO Plant	50,000	$700 to $1,000	Municipal
Southern Utah County			
Efficiency Measures	12 to 25 percent of Existing Supplies	<$300	Municipal
Irrigation Private Wells to M&I	Undetermined	<$200	Municipal
Water Recycling	Undetermined	>$300	Secondary/Irrigation
Irrigation Surface Water to M&I	Undetermined	>$600 to 1,000	Municipal

Notes:
CUWCD 2003
Pacific Northwest Project 2003
RO = Reverse Osmosis

S.5.3.11 Recreation Resources

There would be an estimated increase of 19,716 (+14.6 percent) angler days per year over baseline on the Provo River from Deer Creek Dam outlet to Utah Lake under the No Action Alternative.

S.6 Issues To Be Resolved

There are no unresolved issues.

S.7 Environmentally Preferred Alternative

The environmentally preferred alternative is the Spanish Fork Canyon-Provo Reservoir Canal Alternative (Proposed Action).

Utah Lake Drainage Basin
Water Delivery System
Bonneville Unit, Central Utah Project

Final
Environmental Impact Statement

Chapter 1
Description of the Proposed Action and Other Alternatives

Chapter 1
Description of the Proposed Action and Other Alternatives

1.1 Introduction

The Utah Lake Drainage Basin Water Delivery System (Utah Lake System or ULS) is the last of the six original systems of the Bonneville Unit of the Central Utah Project (CUP) that would develop central Utah's water resources for municipal and industrial supply, irrigation, fish and wildlife, and recreation. The ULS evolved from and would replace the Irrigation and Drainage System, which was first identified in the Bonneville Unit Final Environmental Impact Statement in 1973 (Reclamation 1973). The other five Bonneville Unit systems are complete and operating, or under construction. The ULS is now proposed to deliver the remaining uncommitted Bonneville Unit water in Strawberry Reservoir as a municipal and industrial water supply to Wasatch Front communities.

This chapter describes the following:

- Purpose of this EIS
- Overview of the Bonneville Unit of the CUP
- Purpose and need of the ULS
- Details of ULS proposed features under the Proposed Action and other alternatives
- Details on ULS construction and operations under each alternative
- Authorizing actions, permits, and licenses required to allow ULS construction and operation
- Inter-related projects
- Alternatives considered but eliminated from detailed analysis

1.1.1 Purpose of This EIS

This final environmental impact statement (FEIS) addresses potential impacts related to construction and operation of the alternatives proposed for the ULS. As Joint-Lead Agencies for this document, the Central Utah Water Conservancy District (District), the U.S. Department of the Interior (DOI) and the Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission) will use this EIS and other relevant materials to plan actions and make decisions. It is intended to satisfy disclosure requirements of the National Environmental Policy Act (NEPA) and will serve as the compliance document for Clean Water Act section 404 as provided by section 404(r), withdrawal and revocation of National Forest System lands, Section 7 of the Endangered Species Act, Fish and Wildlife Coordination Act, and contracts, agreements and permits that would be required for construction and operation of the Utah Lake System.

1.1.2 Overview of the Bonneville Unit

The CUP was authorized for construction as a participating project under the Colorado River Storage Project Act of 1956 (43 United States Code [USC] 620). The CUP authorized the following individual units: 1) the Vernal Unit, completed in 1962; 2) the Jensen Unit, completed in 1980; 3) the Upalco and Uintah Units have not been completed and were addressed in Public Law 107-366, which states "The Secretary is authorized to utilize all unexpended budget authority for units of the Central Utah Project ... the balance of such budget authority is ... de-authorized."; 4) the Ute Indian Unit, de-authorized by Central Utah Project Completion Act of 1992 (CUPCA); and 5) the Bonneville Unit, which has been under construction since 1965. Map 1-1 shows the original CUP units.

1.1.2.1 Systems of the Bonneville Unit

The Bonneville Unit of the CUP is located in central and northeastern Utah. The unit includes facilities to develop and more fully utilize waters tributary to the Duchesne River in the Uinta Basin of Utah, to facilitate a transbasin diversion from the Colorado River Basin to the Bonneville Basin, and to develop and distribute project water in the Bonneville Basin. For planning and coordination purposes the Bonneville Unit was initially divided into six systems according to location and function. These systems are 1) the Starvation Collection System, 2) the Strawberry Collection System, 3) the Ute Indian Tribal Development, 4) the Diamond Fork Power System, re-authorized by CUPCA as the Diamond Fork System, 5) the Municipal and Industrial System (M&I System), and 6) the Irrigation and Drainage System (I&D System). The I&D System was re-authorized by CUPCA and replaced by the Spanish Fork Canyon-Nephi Irrigation System (SFN System) in 1995 when Sevier and Millard counties in the lower Sevier River Basin chose to withdraw from the District and were removed from the Bonneville Unit irrigation water service area. Planning on the SFN System was discontinued in 1998. Pursuant to Section 202(a)(1) of CUPCA, as amended, a new planning process was initiated in 2000 on the ULS, which is the subject of this FEIS. The ULS is a replacement system for the I&D System. Although they are not considered systems under the Bonneville Unit, the Section 203(a) Uinta Basin Replacement Project, the Wasatch County Water Efficiency Project and Daniel Replacement Project were authorized by CUPCA as part of the Bonneville Unit of the CUP, and are described in Section 1.1.2.3.

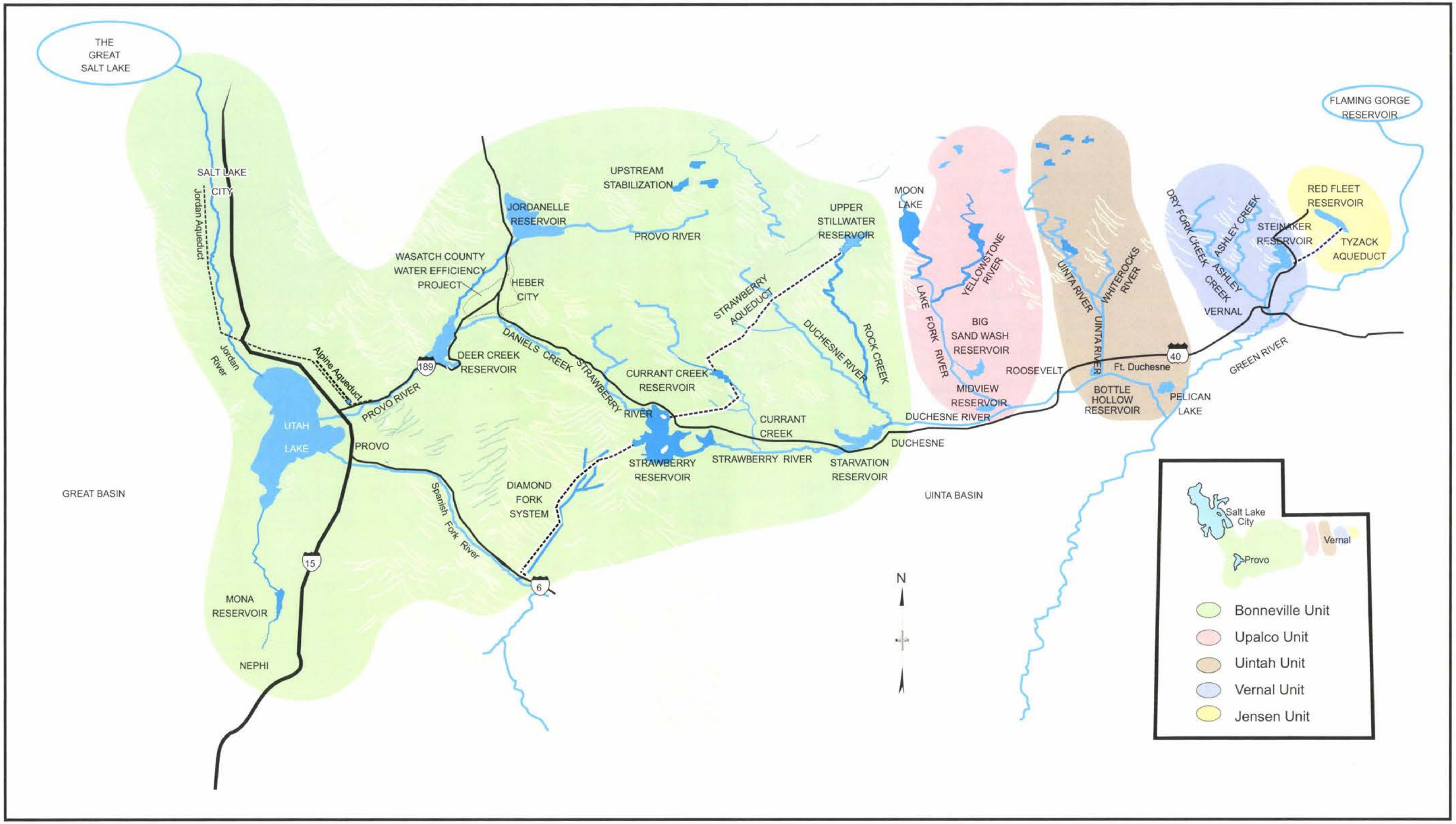
The relative locations and major features of each of the Bonneville Unit systems are shown on Map 1-2. A summary description of each system is presented in Sections 1.1.2.1.1 through 1.1.2.1.5.

1.1.2.1.1 Starvation Collection System. The Starvation Collection system was completed in 1970. The system provides water for irrigation and M&I use, flood control, recreation, and fish and wildlife benefits in the Duchesne area of the Uinta Basin. Water storage is provided by the 167,310 acre-foot Starvation Reservoir, located on the Strawberry River just above its confluence with the Duchesne River. Starvation Reservoir is filled by winter and spring flows of the Duchesne and Strawberry Rivers. Duchesne River water is diverted by Knight Diversion Dam and conveyed to the reservoir through the Starvation Feeder Conduit.

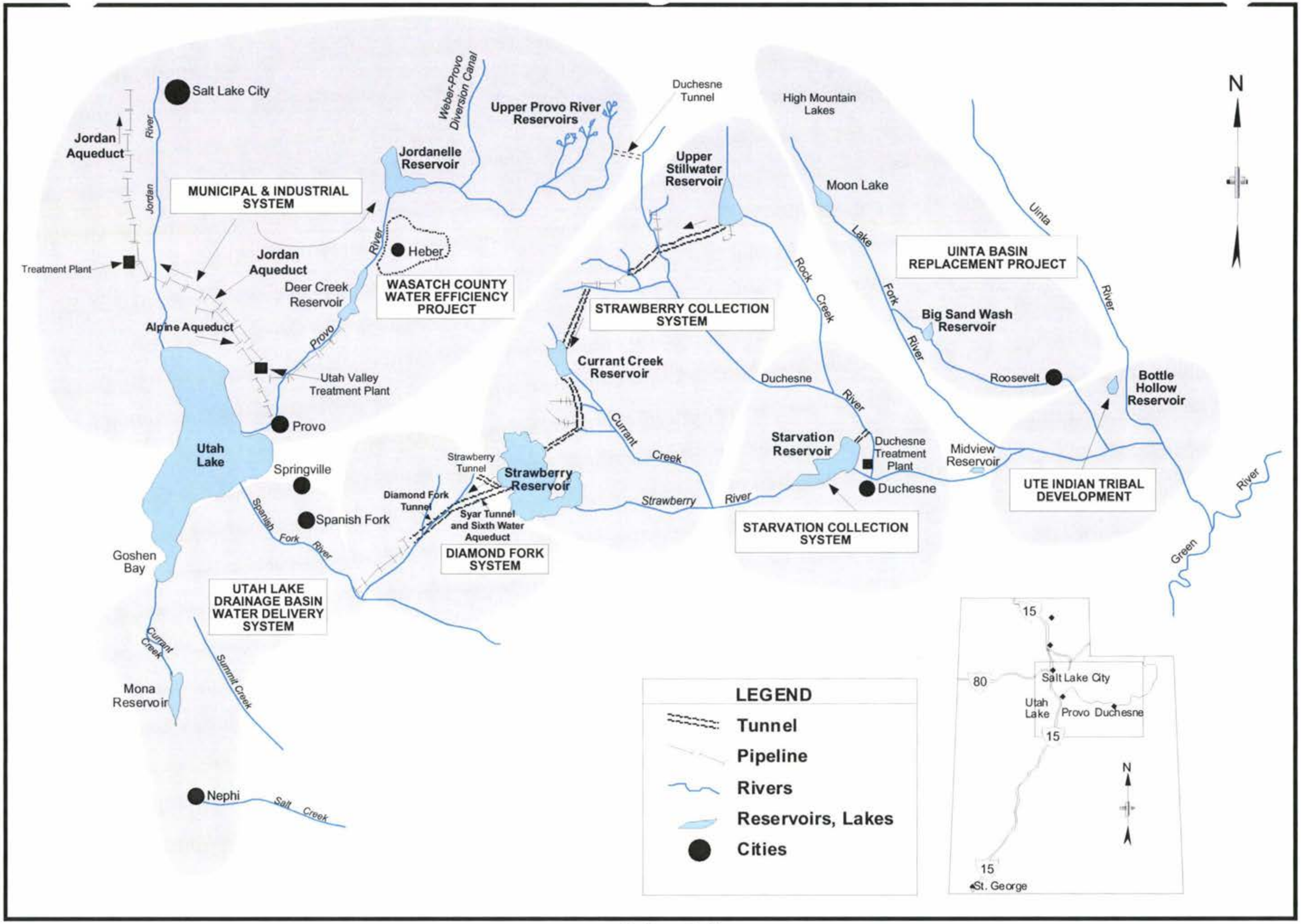
Starvation Reservoir provides a benefit to irrigators along the Duchesne River in the form of water delivery in the late summer and fall when streamflows typically decline below the levels needed for irrigation diversion. Water stored in Starvation Reservoir provides 24,400 acre-feet of irrigation water and 500 acre-feet of M&I water for use in the Uinta Basin. Starvation Reservoir provides an average of approximately 43,000 acre-feet of water annually to irrigators to replace water diverted in the Strawberry Collection System to Strawberry Reservoir. The reservoir provides fishery benefits and public recreation.

1.1.2.1.2 Strawberry Aqueduct and Collection System. The Strawberry Aqueduct Collection System (SACS), completed in the late 1980s, diverts part of the flows of Rock Creek and eight other tributaries of the Duchesne River and conveys the diverted flows through the 36.8-mile-long Strawberry Aqueduct to Strawberry Reservoir. Upper Stillwater Reservoir, with a capacity of 32,009 acre-feet, serves as a regulating reservoir at the head of the Strawberry Aqueduct to provide temporary storage during the high runoff period for later diversion to the aqueduct and storage in Strawberry Reservoir. Currant Creek Reservoir, with a total capacity of 15,671 acre-feet, diverts Currant Creek and five tributaries into the Strawberry Aqueduct. The SACS provides 44,400 acre-feet of in-stream flows for fishery mitigation purposes annually.

The capacity of Strawberry Reservoir was enlarged from 273,000 acre-feet to 1,106,500 acre-feet by the construction of Soldier Creek Dam on the Strawberry River. Some of the water stored in the reservoir is released to the Strawberry River to provide fishery flows, but most of the stored water is for transbasin diversion to the Bonneville Basin. In addition to water supply, the Strawberry Collection System provides flood control, recreation, and fish and wildlife benefits.



Map 1-1
Central Utah Project Units



Map 1-2
Location of Bonneville Unit Systems

'.1.2.1.3 Ute Indian Tribal Development Project. The purpose of the Ute Indian Tribal Development Project is to mitigate stream-related fish and wildlife losses on Indian lands and other specific fish and wildlife losses associated with the Bonneville Unit. Bottle Hollow Reservoir was constructed to compensate the Ute Indian Tribe for economic losses associated with stream fishing on the portion of Rock Creek located on the Uintah and Ouray Indian Reservation. With a surface area of 420 acres, this reservoir provides fishing opportunities, wildlife habitat, and a basis for recreation-oriented enterprises to provide additional employment and income for tribal members. The Lower Duchesne River Wetlands Mitigation Project, currently being planned by the Mitigation Commission, DOI and the Ute Indian Tribe, will create, restore and otherwise enhance riparian wetland habitats along the Duchesne River, Utah, as partial mitigation for the Bonneville Unit, Central Utah Project. This project has been planned in conjunction with the Northern Ute-Tribe of the Uintah and Ouray Reservation and is intended to fulfill long-standing commitments to mitigate for impacts on Ute Indian tribal and non-tribal wetland-wildlife habitats arising from construction and operation of the Bonneville Unit, and to provide additional wetland/wildlife benefits to the Ute Indian Tribe. Originally proposed in 1965, this project has undergone recent planning revisions and a Draft EIS was issued in November 2003. Section 505(f) of CUPCA allows for $10 million to be appropriated for the development of fishing and hunting facilities in lieu of the construction of Lower Stillwater Dam, a feature specified in the 1965 Deferral Agreement. In addition, Section 201(a)(1) of CUPCA authorized the appropriation of funds to implement this project and these measures.

1.1.2.1.4 Diamond Fork System. The Diamond Fork System will allow for the transbasin diversion of Bonneville Unit water from Strawberry Reservoir in the Colorado River drainage basin to Spanish Fork Canyon in the Bonneville Basin. The Diamond Fork System will protect the Diamond Fork Creek and Sixth Water Creek riparian areas from damaging high flows. The Diamond Fork System has been constructed in three primary phases. The U.S. Bureau of Reclamation (Reclamation) constructed the first phase; the District constructed the second and third phases under the CUPCA. The first phase included the Syar Tunnel Inlet, Syar Tunnel, Sixth Water Aqueduct, and Sixth Water Flow Control Structure, which together form a continuous 7.3-mile conduit from Strawberry Reservoir to Sixth Water Creek and currently discharges water into Sixth Water Creek. The second phase included the Diamond Fork Pipeline from Monks Hollow downstream to the mouth of Diamond Fork Creek, which will not be operable until upstream features are completed to convey water through the Diamond Fork System. The third phase, currently under construction, consists of a tunnel connection to the Sixth Water Shaft and Flow Control Structure, Tanner Ridge Tunnel, Upper Diamond Fork Pipeline, Upper Diamond Fork Flow Control Structure, connection to Upper Diamond Fork Tunnel, Diamond Fork Tunnel, and connection to the Diamond Fork Pipeline. Flow control structures are located at Sixth Water Creek, Upper Diamond Fork Creek, and near the Spanish Fork River Outlet. When construction is completed in 2004, the 19.8-mile-long conduit will convey Bonneville Unit water and Strawberry Valley Project (SVP) water to the mouth of Diamond Fork Canyon. The Diamond Fork System will remove a portion of the SVP irrigation flows that were historically conveyed down Sixth Water Creek and Diamond Fork Creek. In-stream flows specified in CUPCA will be released into Sixth Water Creek and lower Diamond Fork Creek as part of an effort to enhance fisheries in these streams. DOI has completed modifications to Strawberry Tunnel gates and Syar Tunnel gates to provide continuous release of flows to Sixth Water Creek, even when Syar Tunnel is shut down for system maintenance or repair.

1.1.2.1.5 Municipal and Industrial System (M&I System). The Bonneville Unit M&I System provides M&I water to Salt Lake, Utah, and Wasatch Counties and supplemental irrigation water to Wasatch and Summit Counties. The system provides flood control, recreation, and fish and wildlife benefits. Jordanelle Dam is the major feature of the M&I System. The 300-foot-high dam located on the Provo River about 6 miles north of Heber City was completed in April 1994. The reservoir has an active capacity of 310,980 acre-feet. Provo River flow that historically flowed into Utah Lake is stored in Jordanelle Reservoir and in Deer Creek Reservoir. Utah Lake water originating from the Provo River would be replaced by Bonneville Unit return flows to the lake, water rights previously acquired by the District in Utah Lake, direct releases of water from Strawberry Reservoir to Utah Lake, and flows that are surplus to Utah Lake rights. The M&I water for northern Utah County (20,000 acre-feet per year) and Salt Lake County (70,000 acre-feet per year) is released from Jordanelle Reservoir or diverted under direct flow water rights and then re-diverted from the Provo River into the Olmsted Flowline. From this diversion, the water is conveyed to the Salt Lake County area by the 38-mile-long Jordan Aqueduct and to northern Utah County through the 14-mile-long Alpine Aqueduct. Water for use in Wasatch County is released from Jordanelle Reservoir for delivery through local irrigation canals, current secondary M&I systems, and a future M&I treated water system. Water for use in Summit County is provided from Washington, Trial, and Lost lakes in the headwaters of the Provo River or directly from the Provo River, both facilitated through an exchange with storage in Jordanelle Reservoir.

1.1.2.2 CUPCA Amendments

The CUPCA (Public Law 102-575) re-authorized construction of the Irrigation and Drainage System consisting of an enclosed pipeline as the water conveyance system from Spanish Fork Canyon to Sevier Bridge Reservoir for the purpose of supplying new and supplemental irrigation water supplies to Utah, Juab, Millard, Sanpete, Sevier, Garfield, and Piute Counties. CUPCA included a provision to construct alternate features to deliver irrigation water to lands in the Utah Lake drainage basin in the event the plan to deliver water to the Sevier River basin was not viable. Millard and Sevier Counties withdrew from participation in the Central Utah Project during scoping of the Irrigation and Drainage System, which rendered the plan to deliver water to the Sevier River basin no longer viable. The alternative plan under CUPCA was activated. The initial planning process focused on an irrigation project named the "Spanish Fork Canyon-Nephi Irrigation System" or SFN System. When insurmountable issues associated with the SFN project were raised in 1998, the Joint-Lead Agencies discontinued planning on the SFN System and they announced a new planning process for the ULS.

CUPCA was amended in December 2002 by Public Law 107-366 (PL 107-366). The CUPCA authorization to construct features to deliver irrigation water to lands in the Utah Lake drainage basin was amended specifically by adding "and municipal and industrial water" features and authorized funding of power development on units of the CUP. In addition, PL-107-366 allowed the reallocation of existing funding for implementing water conservation measures to include water recycling of return flows from wastewater treatment plants and the use of reverse osmosis membrane technology, which is a key to using Utah Lake waters for M&I use.

1.1.2.3 Other CUPCA Program Components

In addition to providing direction for the completion of the six systems of the Bonneville Unit (in some cases with additional features), CUPCA authorized the following eight additional projects or program components listed below. Descriptions of each component are provided in Sections 1.1.2.3.1 through 1.1.2.3.8. Table 1-1 summarizes the following additional components, along with the six original systems of the Bonneville Unit:

- Wasatch County Water Efficiency Project and Daniel Replacement Project
- Conjunctive Use of Surface Water and Groundwater
- Additional Studies of Utah Lake Salinity and Provo River Water Supply
- Water Management Improvement
- Local Development
- Fish, Wildlife, and Recreation Mitigation and Enhancement
- Ute Indian Water Rights Settlement
- Uinta Basin Replacement Project

Table 1-1
Bonneville Unit Components

Original Systems						New Components Authorized by CUPCA & Amendments								
STARVATION COLLECTION SYSTEM	**STRAWBERRY COLLECTION SYSTEM**	**M&I SYSTEM**	**UTE INDIAN TRIBAL DEVELOPMENT**	**DIAMOND FORK POWER SYSTEM**	**I&D SYSTEM**	**SECTION 202 DIAMOND FORK SYSTEM**	**SECTION 202 ULS SYSTEM[1]**	**SECTION 202 WASATCH COUNTY WATER EFFICIENCY PROJECT & DANIEL REPLACEMENT PROJECT**	**SECTION 202 CONJUNCTIVE USE OF SURFACE & GROUNDWATER**	**SECTION 202 ADDITIONAL STUDIES**	**SECTION 203 UINTA BASIN REPLACEMENT PROJECT**	**SECTION 207 WATER MANAGEMENT IMPROVEMENT SECTION 206 LOCAL DEVELOPMENT**	**TITLE III FISH, WILDLIFE, & RECREATION MITIGATION & CONSERVATION**	**TITLE V UTE INDIAN WATER RIGHTS**
• Knight Diversion Dam • Starvation Feeder Conduit • Starvation Reservoir • Duchesne River Canals	• Soldier Creek Dam and Enlarged Strawberry Reservoir • Upper Stillwater Reservoir • Currant Creek Reservoir • Strawberry Aqueduct	• Jordanelle Reservoir • Jordan Aqueduct • Alpine Aqueduct • Stabilization of High Mountain Lakes (Trial, Lost, & Washington)	• Bottle Hollow Reservoir • Wildlife Habitat Development • Lower Stillwater • Midview Exchange	• Syar Tunnel • Sixth Water Aqueduct • Last Chance Powerplant • Monks Hollow Reservoir • Monks Hollow Powerplant • Diamond Fork Powerplant	• Wasatch Aqueduct (tunnels and pipelines) • Mona-Nephi Canal • Mona, West Mona, and Nephi Pumping Plants • Nephi-Sevier Canal • Mosida Area Canals and Pumping Plants	• Sixth Water Connection to Tanner Ridge Tunnel • Tanner Ridge Tunnel • Upper Diamond Fork Pipeline • Upper Diamond Fork Control Structure • Aeration Chamber and Connection to Upper Diamond Fork Tunnel • Upper Diamond Fork Tunnel • Monks Hollow Overflow Structure • Diamond Fork Creek Outlet • Diamond Fork Pipeline Extension • Diamond Fork Pipeline	• Sixth Water Power Generation • Upper Diamond Fork Power Generation • Spanish Fork Flow Control Structure • Spanish Fork Canyon Pipeline • Spanish Fork-Provo Reservoir Canal Pipeline • Spanish Fork-Santaquin Pipeline • Santaquin-Mona Reservoir Pipeline • Mapleton-Springville Lateral Pipeline	• Pump Stations • River Diversions • Lateral Piping • Pipeline to Daniel Irrigation Company • Wasatch Canal Rehabilitation • Timpanogos Canal Rehabilitation • Restoration of Stream Flows in Upper Strawberry River and Tributaries	• Sec. 202(a)(2)–Study and Development by Utah Division of Water Resources, in Salt Lake, Utah, Davis, Wasatch, and Weber Counties	• Sec. 202(a)(4)–Study of Utah Lake Salinity Control • Sec. 202(a)(5)–Provo River Studies (i.e. Strawberry-Provo Conveyance Study)	• Big Sand Wash Reservoir Enlargement • Big Sand Wash Diversion Dam • Big Sand Wash Feeder Pipeline • Big Sand Wash Roosevelt Pipeline • High Mountain Lakes Stabilization • Moon Lake Outlet Modification	• Sec. 207(b)–Water Management Improvement Plan • Sec. 207(b)(5)–Water Conservation Credit Program • Sec. 207(c)–Water Conservation Pricing Study • Sec. 207(d)–Study of Coordinated Operations • Sec. 207(f)–Utah Water Conservation Advisory Board • Sec. 206–Local Development in Sanpete, Garfield, and Piute Counties	• Diamond Fork Creek • Provo River and Utah Lake • Duchesne and Strawberry Rivers • Statewide Fish, Wildlife, and Recreation Enhancement • Fish, Wildlife, and Conservation	• Ute Indian Water Rights Settlement

Note:
[1]Alternate system to the I&D System. Authorized in CUPCA, Section 202(a)(1)(B).

1.1.2.3.1 Wasatch County Water Efficiency Project and Daniel Replacement Project. The Wasatch County Water Efficiency Project and Daniel Replacement Project improves water use efficiency in Heber Valley by delivering pressurized irrigation water and making it possible for farmers to convert from flood to sprinkler irrigation. Water conserved by the project is used to supplement flows of Heber Valley streams. The project provides the Daniel Irrigation Company with replacement water after its diversion from the upper Strawberry River basin was terminated as provided in Section 303 of CUPCA. Water conserved by the project from CUP agricultural supply is used to provide the replacement water. This project is described in the *Final Environmental Impact Statement–Wasatch County Water Efficiency Project and Daniel Replacement Project* (CUWCD 1996a), and the *Wasatch County Water Efficiency Project Feasibility Study* (CUWCD 1997a). The Mitigation Commission signed its Record of Decision on March 12, 1997, and the Department of the Interior signed its Record of Decision on March 21, 1997, both selecting the Proposed Action for implementation. Construction has been completed and the projects are operational. During the 2002 irrigation season, the Wasatch County Water Efficiency Project reported water conservation savings of 24,492 acre-feet.

The termination of the Daniel Creek Irrigation Company's transbasin diversion in 2001 and restoration of summer flow in the Strawberry River and its tributaries upstream of Strawberry Reservoir fulfilled a long-standing commitment as partial mitigation for the adverse effects of construction and operation of the SACS on riverine resources. The Wasatch County Water Efficiency Project and Daniel Replacement Project FEIS provided for restoring the natural flows in the upstream tributaries and increasing the water supply of Strawberry Reservoir by an average of 2,900 acre-feet. The Mitigation Commission is considering delivery of the 2,900 acre-feet from Strawberry Reservoir into: the Strawberry River below Soldier Creek Dam for in-stream flows; and/or delivery by exchange into tributaries below the Strawberry Collection System. In accordance with section 303 of CUPCA, a separate evaluation and NEPA compliance will be conducted by the Mitigation Commission regarding the designation of the 2,900 acre-feet.

1.1.2.3.2 Conjunctive Use of Surface Water and Groundwater. Conjunctive use of surface water and groundwater consists of the planning and development of systems to allow groundwater recharge, management, and conjunctive use of surface water and groundwater. Section 202(a)(2) of CUPCA authorizes the Utah Division of Water Resources to conduct this program in Salt Lake, Utah, Davis, Wasatch, and Weber counties and authorized federal funding for that purpose. This program has the following objectives: to provide greater efficiency in the use of water for federally-funded facilities as well as local sources, to prevent the further degradation of useable groundwater into aquifers of poor quality water, to reduce groundwater pumping costs, to conserve Utah's water resources, and to facilitate maintenance of year-round streamflows for fish, wildlife, and water quality valued in streams such as the Provo River. The program is intended to build upon studies and demonstration projects that have been undertaken by local entities in those counties. This program contributed toward the construction of the Salt Lake County High Runoff Treatment and Storage Project developed and operated by the Jordan Valley Water Conservancy District.

1.1.2.3.3 Additional Studies of Utah Lake Salinity and Provo River Water Supply. Section 202 of CUPCA authorized several studies involving water management in the Bonneville Unit. One feasibility study documented several potential alternative plans for reducing salinity levels of Utah Lake. Two other studies involved water supplies of the Provo River. The first consisted of an operations study including development of a model to simulate river system operation (CUWCD 1998d). A report on the computer model development for the Provo River was completed in January 1998. A final report on the second study, direct delivery of Colorado River Basin water from Strawberry Reservoir to the Provo River Basin, was completed in June 1997 (CUWCD 1997b).

1.1.2.3.4 Water Management Improvement. Section 207 of CUPCA authorized a comprehensive program to improve water management within the CUP service area, including the establishment of water conservation goals to be achieved by year 2010. Specific purposes are to encourage water conservation and wise use, reduce the probability and duration of extraordinary water shortages, reduce water use and system costs, prevent unnecessary depletions that adversely affect environmental values or other public purposes, make effective use of available supplies before importation of water from the Bear River, and provide an objective basis for measuring achievements under this program. To achieve these purposes, the District has developed a Water Management Improvement Plan and is using its Water Conservation Credit Program to assist local agencies in funding measures. The Utah Water Conservation Advisory Board was established to assist the District in identifying criteria and priorities for water conservation projects. This Board was disbanded in 1995 and its function is now provided by the State Board of Water Resources. The District's water conservation goal was originally established at 39,294 acre-feet of savings per year. However, strong local support has indicated that a greater potential exists, and the District has increased its goal to 62,100 acre-feet of water savings per year after 2016. The District has funded approximately 30 CUPCA Section 207 projects with water savings in excess of the target water conservation goal. Water has been developed for operating the Provo River for a favorable spring spawning regime for June sucker in the lower Provo River.

1.1.2.3.5 Local Development. Section 206 of CUPCA authorized the development of projects for counties electing not to participate in the CUP. Funding for the projects are provided from federal appropriations and a rebate of ad valorem tax contributions previously paid by an eligible county to the District. Counties eligible for local development include Sanpete, Garfield, and Piute counties. Projects have been implemented in Sanpete and Garfield counties.

1.1.2.3.6 Fish, Wildlife, and Recreation Mitigation and Enhancement. Under Title III of CUPCA, the Mitigation Commission was established to develop plans and administer the mitigation and conservation program authorized by Congress. It is a joint lead agency for the preparation of this FEIS with the District and DOI. CUPCA established the Utah Reclamation Mitigation and Conservation Account, which has been funded by the federal government, the State of Utah, the District, and other project beneficiaries. The Mitigation Commission is charged with administration of this account and implementation of the mitigation measures enumerated in CUPCA, and for future fish and wildlife mitigation measures associated with the ULS.

1.1.2.3.7 Ute Indian Water Rights Settlement. Title V of CUPCA, administered by DOI, contains a variety of provisions for the benefit of the Ute Indian Tribe that, together with earlier agreements, form the Ute Indian Water Rights Settlement. The associated provisions are intended to put the Tribe in the economic position envisioned at the initiation of the CUP, by quantifying the Tribe's reserved water rights, allowing increased beneficial use of such water, and providing funds for economic development through agriculture and other enterprises that would put the Tribe in the same economic position it would have enjoyed had the 1965 Deferral Agreement been fully implemented.

1.1.2.3.8 Section 203(a) Uinta Basin Replacement Project. The Section 203(a) Uinta Basin Replacement Project was authorized through the following features in Section 203(a) of CUPCA: 1) Pigeon Water Dam and Reservoir with an enclosed pipeline conveyance system; 2) McGuire Draw Dam and Reservoir; 3) Clay Basin Dam and Reservoir; and 4) Farnsworth Canal rehabilitation. Project replacement features were developed from the authorized features in the Section 203 legislation. These replacement features were included and evaluated in the alternatives formulation and development process described in the Final Environmental Assessment/Finding of No Significant Impact for the Section 203(a) Uinta Basin Replacement Project dated October 2001. Feasibility of a Section 203 project was discussed and evaluated in the Uinta Basin Replacement Project Final Feasibility Study dated October 2001. The Section 203(a) Uinta Basin Replacement Project provides variations of those replacement features and alternatives to meet project needs to manage the water resources within the project area to provide early- and late-season irrigation water, M&I water supplies, water conservation, and to enhance facilities for environmental purposes. Under the October 2001 plan, the Section 203(a) Uinta Basin Replacement Project includes enlargement of Big Sand Wash Reservoir (12,000 acre-feet increased capacity), the new Big Sand Wash Feeder Diversion Structure, a new Big Sand Wash Feeder Pipeline, a new Big Sand Wash-Roosevelt Pipeline to deliver 3,000 acre-feet of M&I water to the city of Roosevelt, Utah, modification of the Moon Lake Dam outlet works to allow for winter operation to release minimum in-stream flows, and stabilization of thirteen high Uinta Mountain lakes.

1.1.2.4 Bonneville Unit Definite Plan Report

A Definite Plan Report (DPR) for the Bonneville Unit of the CUP was prepared in 1964 (Reclamation 1964). That document paved the way for the start of construction of the Bonneville Unit in 1965. As development of the Bonneville Unit proceeded over time, changes occurred in the original plan. In 1988, Reclamation prepared the *1988 Bonneville Unit Definite Plan Report* (1988 DPR) (Reclamation 1988a) to update the Bonneville Unit plan. In October 1992, Congress enacted CUPCA, which modified the Bonneville Unit Definite Plan and indicated that the 1988 DPR (Reclamation 1988a) was approved by the Secretary of the Interior. Section 205 of CUPCA requires an updated DPR be prepared. In March 1998, the District published a draft DPR.

A draft DPR Supplement to the 1988 Bonneville Unit DPR was completed when the ULS Draft EIS was filed in March 2004. A final DPR Supplement will be completed when the ULS Final EIS is filed. Additional details on water conservation, water recycling, and project power will be presented in the final DPR Supplement.

1.1.2.5 Bonneville Unit Operations

The Bonneville Unit is the largest and most comprehensive of the authorized units of the CUP. Water is collected in the SACS starting at Upper Stillwater Reservoir, conveyed through tunnels and pipelines, with additional collection from selected streams along its route, to Currant Creek Reservoir. From Currant Creek Reservoir the water continues through another series of tunnels and pipelines and is eventually discharged into the enlarged Strawberry Reservoir (see Map 1-1). The Starvation Collection System stores flows from the Duchesne and Strawberry rivers in Starvation Reservoir, releases water to supplement irrigation in the Duchesne area, and replaces water diverted for use in the Bonneville Basin by the SACS.

Bonneville Unit water is released from Strawberry Reservoir into the Diamond Fork System, which is a series of tunnels and pipelines that convey the water to the Spanish Fork River and into Utah Lake. -The Diamond Fork System was dedicated and placed into operation in June 2004. Up to 86,100 acre-feet of Bonneville Unit water is now being conveyed through the Diamond Fork System and conveyed through Sixth Water Creek and Diamond Fork Creek to the Spanish Fork River. An average of 84,510 acre-feet of Bonneville Unit water conveyed to Utah Lake is exchanged for Provo River water that is stored in Jordanelle Reservoir, which is the primary feature of the M&I System. The remaining 1,590 acre-feet is M&I water already contracted for use by cities in southern Utah County. Water stored in Jordanelle Reservoir for M&I supply is released down the Provo River and conveyed though existing pipelines and tunnels to northern Utah County and Salt Lake County to meet municipal and industrial water needs. Completion of the Bonneville Unit of the CUP would be achieved with construction and operation of Utah Lake System features presented in the alternatives described in this EIS chapter.

1.1.2.6 Bonneville Unit NEPA Compliance Documents

This EIS is preceded by a number of NEPA compliance documents prepared for the Bonneville Unit of the CUP. In August 1973, Reclamation issued the Bonneville Unit Final EIS (Reclamation 1973). That document was a programmatic EIS for the Bonneville Unit, and provided specific NEPA compliance for construction of the Strawberry and Starvation Collection Systems. Several environmental organizations initiated a legal challenge to that document's adequacy (i.e., Sierra Club v. Stamm). In 1974, the U.S. District Court for the State of Utah ruled that the Bonneville Unit Final EIS was in compliance with NEPA (Ritter 1974). The United States Tenth Circuit Court of Appeals upheld the decision. Reclamation committed to prepare a site-specific EIS for each of the remaining Bonneville Unit systems before initiating construction. Site-specific EISs have been prepared for the Municipal and Industrial (M&I) System and Diamond Fork System (see Map 1-2).

A draft EIS for the M&I System was issued in April 1979 (Reclamation 1979b), and a Final EIS was issued in October 1979 (Reclamation 1979a). The M&I System Final EIS disclosed the impacts of constructing and operating Jordanelle Reservoir and powerplant on the Provo River, completing the Alpine and Jordan Aqueducts, and modifying 15 upper Provo River reservoirs. The purpose of the M&I System is to provide 107,500 acre-feet of water from the Provo River drainage, including 90,000 acre-feet of water annually for M&I use in Salt Lake County and northern Utah County, 2,400 acre-feet for M&I use in Wasatch County, 12,100 acre-feet for agricultural use in Wasatch County, and 3,000 acre-feet for agricultural use in Summit County. An additional 1,590 acre-feet of M&I water is contracted for use in southern Utah County from Strawberry Reservoir through the Diamond fork System. A final supplement to the M&I System Final EIS was issued in March 1987 (Reclamation 1987). The final supplement to the Final EIS disclosed impacts of relocating U.S. Highway 189, adding a new Wasatch County road, relocating the reservoir outlet works, adjusting the Jordanelle Reservoir management boundary, and modifying the fishery, recreation and wildlife mitigation plans for the Provo River between Jordanelle Reservoir and Deer Creek Reservoir. It disclosed impacts on wetlands and results of consultation with the U.S. Fish and Wildlife Service (FWS) on the endangered June sucker.

There have been six NEPA compliance documents prepared on the Diamond Fork System. The original Diamond Fork Power System EIS (Reclamation 1984) disclosed impacts of Syar, Sixth Water and Monks Hollow dams and reservoirs, and Syar, Sixth Water, Dyne, Monks Hollow and Diamond Fork "flow-through" powerplants and associated power facilities. It included Syar Tunnel and penstock, Corona Aqueduct and Sixth Water penstock, Dyne Aqueduct and penstock, and the Diamond Fork Pipeline. The original plan was modified and reduced in size in 1990 as described in the Final Supplement to the Final EIS for the Diamond Fork System (Reclamation 1990). Power generation facilities were scaled back and the term "power" was deleted from the name. Features under the modified plan included Syar Tunnel, Sixth Water Pipeline, Sixth Water Shaft, Sixth Water Tunnel, Monks Hollow Dam and Reservoir, Diamond Fork Pipeline, and three flow-through power plants and associated power facilities: Last Chance, Monks Hollow and Diamond Fork. A Draft EIS was prepared on the SFN System (CUWCD 1998a), which was proposed to replace the Irrigation & Drainage System as provided in CUPCA Section 202(a)(1)(b). The SFN Draft EIS, released for public review on March 31, 1998, included a Proposed Action that covered features necessary to complete the Diamond Fork System. These features were identified as the "Diamond Fork Tunnel Alternative" portion of the SFN Proposed Action. The Joint-Lead Agencies discontinued planning on the SFN System in October 1998 but chose to continue NEPA compliance on the Diamond Fork portion of the SFN Draft EIS. A new Final Supplement to the Final EIS (FS-FEIS) for the Diamond Fork System was issued in July 1999 (CUWCD 1999a). This FS-FEIS disclosed impacts of the revised project consisting of the Sixth Water Connection to Tanner Ridge Tunnel, Tanner Ridge Tunnel, Diamond Fork Siphon, Red Mountain Tunnel, Red Hollow Pipeline, Flow Control Structure connection to Diamond Fork Pipeline, and Spanish Fork River Flow Control Structure and outlet pipeline. The District initiated a value engineering (VE) workshop after the 1999 FS-FEIS was completed and then prepared the Final Environmental Assessment for the Diamond Fork System Proposed Action Modifications in June 2000, which was tiered to the 1999 FS-FEIS. The proposed action modifications recommended from the value engineering workshop consisted of replacing the two proposed tunnels and connecting siphon with the Upper Diamond Fork Tunnel and associated features to control flow and connect to existing pipelines. The Diamond Fork System 2002 Final Environmental Assessment for the Proposed Action Modifications (CUWCD 2002a) was prepared in March 2002 after extreme hydrogen sulfide concentrations and high tunnel groundwater inflows were encountered during construction of the Upper Diamond Fork Tunnel rendering further excavation infeasible. The 2002 Proposed Action Modifications consisted of the following Diamond Fork System features now under construction: Connection to the Sixth Water Flow Control Structure, Tanner Ridge Tunnel, Upper Diamond Fork Pipeline, Upper Diamond Fork Flow Control Structure, Connection to Upper Diamond Fork Tunnel, Upper Diamond Fork Tunnel (shortened), and connection to the Diamond Fork Pipeline.

.1.3 Utah Lake System

Initiation of planning for the ULS was announced in a Notice of Intent published in the Federal Register on October 14, 1998 (FR Doc. 98-27484). The notice stated that "The Joint-Lead Agencies will initiate a new planning process with public involvement on the facilities authorized in section 202(a)(1) of the Central Utah Project Completion Act (Utah Lake Drainage Basin Water Delivery System). Any other additional uses of Bonneville Unit water on the Wasatch Front (Salt Lake City to Nephi, Utah), and all-remaining environmental issues and commitments associated with the Bonneville Unit will be addressed during this new process. When planning for the Utah Lake Drainage Basin Water Delivery System is initiated, a Notice of Intent regarding NEPA compliance will be published." This statement was included in the Notice of Intent to discontinue planning on the SFN System.

The Joint-Lead Agencies published a Notice of Intent to prepare an EIS and hold an informal scoping meeting on the ULS of the Bonneville Unit, Central Utah Project in the Federal Register on August 23, 2000 (FR Doc. 00-21458). The notice indicated that the ULS would connect to the Diamond Fork System and make water available to the Wasatch Front Area for irrigation, municipal and industrial, fish and wildlife, and other authorized uses. It stated that "Any other additional uses of Bonneville Unit water within the Wasatch Front Area and all remaining environmental issues and commitments associated with the Bonneville Unit will be addressed during this planning and EIS process."

1.1.3.1 Development of Project Power Under the Utah Lake System

CUP project power on CUP facilities is exclusively a function of the CUP even though it utilizes both CUP and SVP water flowing through CUP facilities. Participation by any non-CUP entity in power development in the CUP, Bonneville Unit, Diamond Fork System, would require a determination that a lease of power privilege is authorized and would be made available. If such a determination were made, the general concepts and procedures outlined in Federal Register Notice Nos. 94-31057, dated December 19, 1994, and 99-16852, dated July 2, 1999, would be followed.

1.2 Purpose and Need

The Joint-Lead Agencies initially developed the purpose and need statement following a September 2000 public meeting and after requests for project water were received and analyzed by the Joint-Lead Agencies. The purpose and need statement and results of the water needs analysis were presented at a public meeting on October 17, 2001, where additional public comment was solicited. The purpose and need statement was modified to include project power because the CUPCA Amendment (PL 107-366) enacted in December 2002 authorized the appropriation of funds to construct power facilities.

The Joint-Lead Agencies finalized a purpose and need statement to guide them through the planning process and development of this NEPA document. The statement defines the underlying needs to which the selected plan and any alternatives must respond, and the attendant purposes of the ULS.

Needs:

1. To complete the Bonneville Unit by delivering 101,900 acre-feet on an average annual basis from Strawberry Reservoir to the Wasatch Front Area and project water from other sources to meet some of the municipal and industrial (M&I) demand in the Wasatch Front Area.

2. To implement water conservation measures.

3. To address all remaining environmental commitments associated with the Bonneville Unit.

4. To maximize current and future M&I water supplies associated with the Bonneville Unit.

Purposes:

1. To protect water quality of surface and underground water resources that may be affected by Bonneville Unit completion
2. To provide creative methods, facilities and incentives to implement water conservation measures, reuse and conjunctive use of water resources
3. To participate in the implementation of the June Sucker Recovery Implementation Program
4. To provide previously committed in-stream flows within the Bonneville Unit area and statutorily mandated in-stream flows, and assist in improving fish, wildlife and related recreational resources
5. To provide for the United States to acquire adequate District water rights in Utah Lake to implement the ULS and other water rights as authorized by CUPCA
6. To continue to provide Bonneville Unit water in accordance with existing contracts
7. To develop project power

1.2.1 Explanation of Needs

The following sections discuss the project needs.

1.2.1.1 M&I Water Demands

The M&I water demands in the Bonneville Unit of the CUP occur in Salt Lake and Utah counties. Based on the input received from scoping meetings and subsequent analyses, M&I water demands were identified in Salt Lake County and southern Utah County through 2050. The computation of future water demands required a detailed analysis of future population growth by the Governors Office of Planning and Budget, the Mountainland Association of Governments in Utah County, and the Wasatch Front Regional Council of Governments in Salt Lake County. The projections of future M&I water needs incorporated the State of Utah's water conservation goals of 12.5 percent reduction in per capita use rates by year 2020 and 25 percent reduction in per capita use rates by year 2050. In addition, the M&I water demands analysis considered full utilization of local groundwater supplies, surface water supplies, and conversion of water supplies from agricultural use. It was assumed that water converted from agricultural use to M&I use would be utilized in secondary water systems, and therefore, consumptive use and return flows would be essentially what occurred historically. The documentation of the complete analysis of the M&I demands is contained in the Water Supply Appendix, Volume 5, M&I Water Demands, 2004 draft Supplement to the 1988 Bonneville Unit Definite Plan Report. In summary, the analysis determined that at year 2050 the projected M&I shortages in Salt Lake County would be approximately 100,000 acre-feet and the projected shortages in southern Utah County would be about 32,000 acre-feet for the corresponding time frame. These combined shortages in Salt Lake County and southern Utah County are far in excess of the available water supply from the ULS project.

For the ULS, a planning horizon at year 2030 was selected as the time frame for conducting the impact analysis in this EIS. With DOI's acquisition of 57,073 acre-feet of the District's secondary water rights in Utah Lake and the 15,800 acre-feet of remaining Bonneville Unit water from Strawberry Reservoir, a total of 60,000 acre-feet of M&I firm yield water would be made available to the Wasatch Front to meet some of the M&I demands.

For the water short areas in Salt Lake County, including Jordan Valley Water Conservancy District and Sandy City, the 2030 M&I water demand would be 236,305 acre-feet per year. The existing local supplies in Salt Lake valley plus known future supplies (not including ULS water) would provide 177,816 acre-feet per year, resulting in an annual shortage of 58,489 acre-feet of water. To meet this shortage, the ULS would provide 30,000 acre-feet for culinary use and the remaining shortage at 2030 would be met through water recycling of return flows from wastewater treatment plants and reverse osmosis treatment of Utah Lake waters. Sandy City and member cities of JVWCD would reduce well pumping after the ULS water becomes available. Well pumping would gradually resume to pre-ULS rates after Salt Lake County population increases exceed the ULS water supplies. Prior to the initiation of planning activities on the ULS System the JVWCD had plans of developing approximately 50,000 acre-feet of Bear River water shortly after the year 2020. With M&I water supply deliveries from the ULS System and with increased focus on recycling Bonneville Unit water, the present plans for developing a water supply from the Bear River would be delayed for about 20 years.

The 2030 M&I water demand in southern Utah County would be 45,858 acre-feet per year. The existing local supplies would meet 43,184 acre-feet of this demand, leaving an M&I shortage of 2,674 acre-feet at year 2030. However, cities in southern Utah County have indicated a willingness to begin taking delivery of the full 30,000 acre-feet of Bonneville Unit water starting in 2016. The water would be delivered and used as secondary system M&I water (used for outdoor watering) in southern Utah County communities. By taking delivery of ULS M&I water in 2016, the cities could voluntarily reduce their groundwater pumping that would otherwise be used for outdoor watering and could reserve this groundwater supply for indoor use as the demand for culinary grade water increases in the time-frame from 2016 to 2050.

1.2.1.2 Water Conservation

As early as 1972, the Environmental Protection Agency (EPA) raised concerns about the lack of incentive among the Wasatch Front communities to implement stronger M&I water conservation policies and programs. In the 1987 Final Supplement of the M&I FEIS, Reclamation committed to work with EPA and the Wasatch Front communities to make sure that water conservation became a major part of the Bonneville Unit water supply ethic. In 1992 as part of CUPCA, Congress took the unprecedented step of establishing a comprehensive water conservation program and in-stream flow obligations for the Bonneville Unit. Section 207 of CUPCA provides specific water conservation goals, which are a project obligation. To meet the requirements of CUPCA, the District prepared a water conservation plan establishing a goal and the means to accomplish the goal. To meet this goal, the District developed and implemented the Water Conservation Credit Program. The credit program provides a continuous process to identify, evaluate, and implement water conservation measures that conserve water and contribute to the District goal. The credit program is the mechanism for partial funding of conservation measures. In 2002, PL 107-366 amended CUPCA and authorized the use of unexpended budget for water conservation measures under Section 207, including use of reverse osmosis membrane technologies, water recycling, and conjunctive use. The credit program is an option available to those entities to assist in implementing conservation plans. Entities interested in the credit program must develop a proposal to be submitted to the District for evaluation, prioritization, and potential funding. If the District fails to meet these water conservation goals, the Secretary of the Interior is authorized to impose financial penalties on the District.

Former Utah Governor Michael Leavitt assembled his "Governor's Water Conservation Team" in spring 2002 and charged members with heading up a statewide media campaign to reduce M&I water consumption. The Team includes representatives from Utah Division of Water Resources, Central Utah Water Conservancy District, Jordan Valley Water Conservancy District, Metropolitan Water District of Salt Lake and Sandy, Weber Basin Water Conservancy District, and Washington County Water Conservancy District. Each of these six agencies contributes significant funding to the campaign. The Utah Water Users Association, Rural Water Users Association, Utah Water Conservation Forum, Envision Utah, and the "green industry" also are participants in Team promotions and activities.

Through 2004, this program has had outstanding success and is now conserving over 70,000 acre-feet annually. The following sections summarize the efforts of the State of Utah and the project's major water petitioners over the past decade to implement measures to conserve their water supplies.

1.2.1.2.1 ULS Water Conservation Plans. In the Final Supplement to the Diamond Fork System FEIS (July 1999), the Joint-Lead Agencies committed to EPA that water conservation as it relates to Bonneville Unit municipal and industrial water uses would be included and addressed in the planning effort for the Utah Lake System. The numerous activities implemented by the State of Utah, the District, and the project's major water petitioners to conserve water are substantial and are summarized in the following section. These combined activities serve as partial fulfillment of this commitment. In addition, the repayment contracts and water petitions listed in Tables 1-36 and 1-38 include provisions requiring the water users to: 1) comply with the State of Utah's water conservation goals consisting of a 12.5 percent reduction in per capita water use by 2020 and a 25 percent reduction in per capita water use by 2050, using 2000 water use as a comparison basis; 2) annual reporting of actual per capita water use; and 3) appropriate penalties if the conservation goals are not met.

The Utah Governor's Office has established water conservation goals consisting of a 12.5 percent reduction in per capita water use by 2020 and a 25 percent reduction in per capita water use by 2050, using 2000 water use as a comparison basis. The ULS target conservation goal builds on the State water conservation goals, the CUPCA Water Conservation Credit Program, and the success of other municipalities. The Joint-Lead Agencies for the ULS project have established an average daily M&I water usage ranging from 180 to 220 gallons per capita per day (gpcd) to be eligible for Bonneville Unit water. One of the criteria for receiving Bonneville Unit water under the ULS project is that entities requesting water must develop and implement an acceptable water conservation plan. Water petition contracts incorporating water conservation measures with South Utah Valley Municipal Water Association (SUVMWA), Jordan Valley Water Conservancy District (JVWCD), and Metropolitan Water District of Salt Lake and Sandy (MWDSLS) have been negotiated. The following language is directly from the Repayment Contract between the District and the DOI. This same language has been included in the water petition contracts for ULS water with JVWCD, MWDSLS, SUVMWA and the District.

1.2.1.2.1.1 Compliance with Water Conservation Requirements

A. The District will comply with the State's water conservation goals of reducing per capita water use within the District's service area by 12.5 percent by the year 2020, and by 25 percent by the year 2050 ("Conservation Goals").

B. Commencing in the year 2005 and continuing thereafter until 2050, the District agrees to report annually to the Utah Division of Water Resources and the Secretary ("Annual Report") on average annual per capita water use within the District's service area by each of the District's petitioners of ULS water. The Annual Report shall be submitted to the Director, Utah Division of Water Resources and the Secretary's authorized representative(s) on or before June 1 of each year. Using the per capita water use data from the year 2000 as the base year for comparison, the District's Annual Report will include updated graphs for each of its petitioners showing average per capita water use throughout the petitioner's service area. Each graph will include a plotted line ("Target Line") showing the required annual conservation savings necessary to achieve the goal of 12.5 percent reduction by 2020 and 25 percent reduction by 2050, actual yearly per capita use data points, and a linear regression of those data points ("Actual Progress Line"). The first regression line will be prepared in 2005. The annual data points for the Actual Progress Line will begin in 2000 and extend annually one year at a time as data becomes available through 2050. The regression line is intended to compensate for year to year variations in climatic and economic conditions that affect per capita water use. The Annual Report shall be prepared in a format that is acceptable to the Secretary and shall be available for public review. The District will certify in its Annual Report the extent to which its petitioners have made annual progress towards achieving the required Conservation Goals.

C. The Annual Report shall identify which petitioners have not made annual progress towards meeting the Conservation Goals and by what amount.

D. In the event that the District fails to annually certify or cannot annually certify to the Secretary that its petitioners have made the required annual progress towards meeting the Conservation Goals, the District shall implement the following corrective measures:

- Before the end of the year following any year in which the District did not or could not certify that the required annual progress has been made towards meeting the Conservation Goals, the District shall surcharge the petitioner or petitioners who substantially have not complied with the annual per capita water use reduction.
- The surcharge for the first year of substantial non-compliance shall be five percent (5%) of the petitioner's annual repayment obligation for all Project Water then available to the petitioner under District Allotment Notices, less any Project Water that has been turned back by Petitioner to the District and the Secretary under §207 of CUPCA.
- The surcharge for the second consecutive year of substantial non-compliance shall be ten percent (10%) of the petitioner's annual repayment obligation for all Project Water then available to the petitioner under District Allotment Notices, less any Project Water that has been turned back by Petitioner to the District and the Secretary under §207 of CUPCA.
- The surcharge for the third consecutive year of substantial non-compliance, and any subsequent consecutive years of substantial non-compliance, shall be fifteen percent (15%) of the petitioner's annual repayment obligation for all Project Water then available to the petitioner under District Allotment Notices, less any Project Water that has been turned back by Petitioner to the District and the Secretary under §207 of CUPCA.
- If the District determines that compliance has been accomplished within 12 months of the determination of substantial non-compliance, the District shall refund 100 percent (100%) of the collected surcharge, unless the collected surcharge has been expended on water conservation projects as provided in paragraphs (F) and (G) hereof.
- The right to impose this surcharge shall be expressly reserved by the District in each of its petitions for the ULS Water, and the petitions for the ULS Water shall also stipulate that any surcharge so levied shall be paid in addition to the annual repayment obligation of the petitioner as set forth in the individual district allotment notices. The surcharge shall be due and payable at the same time and manner as petitioner's annual repayment contract payment is due.

E. For purposes of the Agreement, a determination of annual progress will be made by the District by comparing the Actual Progress Line to the Target Line. The first year of comparison will be 2005. Thereafter, the comparison will be made each year through the year 2050. Annual progress will be certified by the District when the end of the Actual Progress Line for the year of comparison is at or below the Target Line. The District will determine that substantial non-compliance has occurred in a year in which the end of the Actual Progress Line for the year of comparison is above the Target Line. Penalties for substantial non-compliance are described in Paragraph (D) above.

F. The collected surcharge will be deposited into a segregated interest-bearing account (Conservation Account) that will be maintained and managed by the District. Surcharges collected and deposited to the Conservation

Account, together with accrued interest thereon, will be used by the District to help fund water conservation projects developed under Section 207 of CUPCA within the service area of the petitioner who fails to substantially comply with the annual reduction of per capita water use.

G. Water conservation projects to be developed under Section 207 of CUPCA aimed at reducing the per capita water use within the District's service area may include, but are not hereby limited to, construction of new water-saving delivery and storage facilities; payment of incentives for removal of traditional lawns and groundcover and their replacement with water-wise landscaping; development of staged, conservation-incentive billing; funding of education programs, etc.

- Determinations on the particular programs to be funded from the Conservation Account and the manner in which such account is administered shall be made by the District's Board of Trustees ("Trustees") and the Secretary's authorized representative(s).
- The decision of the Trustees shall be subject to the approval of the Secretary prior to disbursement of any funds from the Conservation Account. Any funds not disbursed in any single year shall be carried over in the Conservation Account for use in subsequent years.
- In any event, all funds in the Conservation Account must be disbursed by the end of 2055. At that time, the Conservation Account shall be discontinued and the Trustees shall no longer have responsibility for the administration thereof.

H. The provisions of this Article shall be included in all ULS M&I water petitions between the District and its subscribers.

1.2.1.2.1.2 Water Recycling

A. The District, working with the DOI, the District's petitioners, and the owners/operators of wastewater treatment plants shall by the year 2030 recycle 18,000 acre-feet of return flows from the Bonneville Unit Project Water, as described in Chapter 1, Section 1.4.9.3 of this Final EIS. After issuance of the Block Notice(s) for Salt Lake County, pursuant to Article VII, but prior to receiving full delivery of the ULS water supply, the District shall annually certify to the Secretary that it and its Salt Lake County petitioners have complied with the requirements set forth in this Final EIS.

B. Commencing with the year 2016 and continuing until the year 2033, the District shall demonstrate its annual progress towards recycling 18,000 acre-feet by the year 2033 and shall continue to maintain the recycling of 18,000 acre-feet from 2034 through 2050.

C. Annual progress towards reaching the recycling goal will be demonstrated by the District's meeting the schedule and the amounts of recycled water as set forth in Table 1-2 attached hereto and incorporated by this reference.

Table 1-2 Schedule for Recycled Water							
Year	**Annual Recycled Water (acre-feet)**	**Year**	**Annual Recycled Water (acre-feet)**	**Year**	**Annual Recycled Water (acre-feet)**	**Year**	**Annual Recycled Water (acre-feet)**
2016	1,000	2025	10,000	2034	18,000	2043	18,000
2017	2,000	2026	11,000	2035	18,000	2044	18,000
2018	3,000	2027	12,000	2036	18,000	2045	18,000
2019	4,000	2028	13,000	2037	18,000	2046	18,000
2020	5,000	2029	14,000	2038	18,000	2047	18,000
2021	6,000	2030	15,000	2039	18,000	2048	18,000
2022	7,000	2031	16,000	2040	18,000	2049	18,000
2023	8,000	2032	17,000	2041	18,000	2050	18,000
2024	9,000	2033	18,000	2042	18,000		
Source: ULS Repayment Contract 081304							

D. In the event the District fails to achieve the annual progress, as set forth in Table 1-2, the District shall assess itself a surcharge as follows:

- In the first year the District fails to achieve the annual progress, the surcharge shall equal (5%) five percent of its annual ULS per acre foot repayment rate for each acre foot of recycled water the District falls short of its annual goal for recycling of water for that year.
- In the second consecutive year the District fails to achieve the annual progress, the surcharge shall equal (10%) ten percent of its annual ULS per acre foot repayment rate for each acre foot of recycled water the District falls short of its annual goal for recycling of water for that year.
- In the third consecutive year and in each consecutive year thereafter that the District fails to achieve the annual progress, the surcharge shall equal (15%) fifteen percent of its annual ULS per acre foot repayment rate for each acre foot of recycled water the District falls short of its annual goal for recycling of water for that year.

E. By way of example, the required annual progress is 1,000 acre-feet. If during the reporting year the District recycles only 900 acre-feet of the required 1,000 acre-feet, the required surcharge will be at the stated rate on the 100 acre-feet the district fell short of reaching its annual progress goal. The surcharge shall continue to be levied until the short fall has been corrected and the required recycling has been achieved. The levying of this surcharge under this Article shall not affect in any way the District's obligation to make the payments provided for in Article VI above.

F. If the District determines that compliance has been accomplished within 12 months of the determination of substantial non-compliance, the District shall refund 100 percent (100%) of the collected surcharge, unless the ollected surcharge has been expended as authorized in paragraph (F) hereof.

G. The collected surcharge will be deposited into a segregated interest-bearing account ("Recycling Account") that will be maintained and managed by the District. Surcharges collected and deposited to the Recycling Account, together with accrued interest thereon, will be used by District to help fund water recycling projects developed under Section 207 of CUPCA within its service area.

- Determinations on the particular programs to be funded from the Recycling Account and the manner in which such account is administered shall be made by the District's Board of Trustees ("Trustees") and the Secretary's authorized representative(s).
- The decision of the Trustees shall be subject to the approval of the Secretary prior to disbursement of any funds from the Recycling Account. Any funds not disbursed in any single year shall be carried over in the Recycling Account for use in subsequent years.
- In any event, all funds in the Recycling Account must be disbursed by the end of 2055. At that time, the Recycling Account shall be discontinued and the Trustees shall no longer have responsibility for the administration thereof.

1.2.1.2.2 Jordan Valley Water Conservancy District. The Jordan Valley Water Conservancy District (JVWCD) was created in 1951 and is a regional water supply agency serving the south and southwest portions of Salt Lake County. It has 20 member contracting entities consisting of cities, companies, corporations, districts, and developments. JVWCD has prepared a water conservation plan describing its water conservation measures and the way its requested ULS water would be integrated with its local water sources. Elements of the plan include reduction in per capita water use, membrane treatment of brackish water from Utah Lake, recycling and reuse of wastewater, and public education on residential water conservation, including the creation of demonstration gardens to show the practicality and attractiveness of residential landscaping with low-water-demand vegetation.

1.2.1.2.2.1 Water Conservation Master Plan. In 1999 JVWCD adopted a water conservation plan in response to the "Water Conservation Plan Act" signed into Utah law in 1998. The water conservation master plan focused on demand-side conservation. The plan recommended the following eight water conservation measures.

- **A Public Education/Information Campaign.** With the adoption of the District's Water Conservation Plan in 1999, JVWCD retained a public relations/media consultant to assist in developing a water conservation information/education program. JVWCD created and implemented the "Slow the Flow, Save H_2O" and the campaign has continued to be developed, receiving significant recognition and media exposure statewide. The "Slow the Flow, Save H_2O" public education and information campaign represents the core of all District conservation programs and activities.
- **A Water Conservation Demonstration Garden.** JVWCD recognized that the greatest potential for water conservation is through a reduction in outdoor water use. JVWCD designed and constructed a water conservation demonstration garden to show waterwise alternatives to the traditional landscape. The Garden demonstrates water conservation principles by emphasizing proper landscape design, irrigation technologies, the use of hardscape and mulches, and a wide variety of low water use plants.
- **The Development of Model Landscape Ordinances.** In 2000 JVWCD formed a working group which included representatives from the landscape and irrigation industry, Utah State University, and the Utah Division of Water Resources to develop model commercial and residential landscape ordinances. With input from the working group, the model ordinances were developed over an 18-month period. The

purpose of these ordinances is to provide models which JVWCD's member agencies, cities, counties and others can adopt to promote water-efficient landscaping of all new and rehabilitated commercial landscapes, and new residential landscapes.

- **A Residential Water Auditing Program ("Water Check" Program).** Since adoption of the Water Conservation Master Plan in 1999, JVWCD and partnering agencies have pooled financial resources and contracted with Utah State University Extension to provide residential and commercial water audits (Water Checks) that are free to the public. Water audits target outdoor water usage and include an evaluation of the customer's soil type, plant root depth, sprinkler pressure, sprinkler distribution uniformity, and sprinkler precipitation rate. Following the audit, the customer is left with recommendations for sprinkler system repairs and adjustments to improve distribution uniformity and a customized irrigation schedule to improve watering efficiency. Water use records are obtained from each customer three years prior to and following the Water Check to measure the effectiveness of the water audit.

- **Ultra Low Flush Toilet Pilot Replacement Program.** In 2002 JVWCD implemented a pilot toilet replacement program within its retail service area. The program involved replacing 275 high flush toilets with flushing rates between 2.1 and 6.7 gallons per flush with new ultra low flush toilets (ULFTs) rated at 1.6 gallons per flush. The purpose of this program was to measure the water savings and calculate the cost effectiveness of replacing older high flush toilets with new ULFTs.

- **Waterwise Classes and Workshops.** In 2001, JVWCD hired a Conservation Horticulturalist as an addition to its Conservation Department staff. Among the duties included in this position are arranging for and teaching several waterwise landscaping classes throughout the spring and summer of each year. These classes are free to the public and include instruction on Utah native plants, designing efficient irrigation systems and waterwise landscapes, blue grass lawn care and alternatives and other topics emphasizing water conservation. 2003 marks the third year of these classes which are advertised through the "Slow the Flow, Save H_2O" campaign.

- **Conservation Programs Cost And Cost Effectiveness.** Table 1-3 shows the level of water conservation funding in terms of cost per capita during the fiscal years from 2000 through 2002.

Table 1-3
JVWCD Water Conservation Costs

Year	Total Conservation Programs Cost	JVWCD Service Area Population	Cost Per Capita
2000	$765,082	464,773	$1.65
2001	$938,548	471,967	$1.99
2002	$481,615	479,961	$1.00
2003[a]	$506,125	NA	NA

Notes:
[a] Total cost for 2003 is estimated.
NA = Not Available
Source: JVWCD 2004

- **CUPCA Section 207 Funding.** In 1999, JVWCD submitted an application to Central Utah Water Conservancy District (District) for CUPCA Section 207 funding under its Conservation Credit Program.

The application was approved for a 65 percent cost share of JVWCD's Water Conservation Demonstration Garden and other demand-side conservation programs.

1.2.1.2.2.2 JVWCD Water Conservation Goal. As part of the 1999 Water Conservation Plan, JVWCD's Board of Trustees adopted a conservation goal of reducing total water demand by 10 percent by the year 2020. This was based on a 20 percent savings in outdoor water use which would be approximately equivalent to a 10 percent overall savings. JVWCD's Board of Trustees subsequently adopted the State of Utah's goal of reducing water consumption statewide by 25 percent by the year 2050.

Based on additional studies in year 2002, JVWCD's Board adopted a new and more aggressive water conservation goal of reducing water demand within JVWCD's service area by 25 percent by year 2025. This goal would be measured in terms of per capita water use reduction beginning in year 2000. The water use per capita in year 2000 was calculated to be 250 gpcd. Therefore, in order for JVWCD to meet this goal, District-wide water use will need to be reduced to 188 gpcd by 2025.

1.2.1.2.2.3 JVWCD Water Conservation Results. In order to achieve the water conservation goal of 25 percent water use reduction by 2025, a reduction in per capita use of 1 percent per year must be achieved. Table 1-4 shows that the actual per capita water use reduction has exceeded JVWCD's goal of 1 percent per year.

Table 1-4
JVWCD Service Area Population and Water Usage

Year	Population[a]	System Demand (acre-feet)	Calculated Water Usage Rate (gpcd)	Water Usage Rate Goal[b] (gpcd)
2000	464,773 [c]	129,868	250	250
2001	471,967 [d]	128,617	243	248
2002	479,161	119,963	224	245
2005	517,584	NA	NA	238
2010	611,162	NA	NA	225
2020	752,604	NA	NA	200
2025	804,498	NA	NA	188
2030	856,392	NA	NA	188
2040	975,062	NA	NA	188
2050	1,119,779	NA	NA	188

Notes:
[a] Population based on data furnished by the Governor's Office of Planning and Budget and Wasatch Front Regional Council.
[b] JVWCD's conservation goal is to reduce per capita water use 25 percent by year 2025, or 1 percent per year.
[c] Sandy City population (88,418) was part of JVWCD service area in 2000, but to provide a common reference for future water usage rates, Sandy City population and water uses is omitted from this data.
[d] Population estimated by interpolation.
NA = Not Available

.2.1.2.3 Metropolitan Water District of Salt Lake and Sandy. The Metropolitan Water District of Salt Lake and Sandy (MWDSLS) was created on August 30, 1935 pursuant to the provisions of the Metropolitan Water District Act of Utah. Salt Lake City was the only member city of the District from 1935 to 1990. MWDSLS annexed Sandy City in 1990 and since that time those two cities have been member cities of the MWDSLS. MWDSLS functions primarily as a wholesale provider of water to its member cities. Customers of MWDSLS collectively provide retail service to over 800,000 persons in Salt Lake County. Salt Lake City and Sandy City, as member cities of the MWDSLS, have a statutory preferential right to purchase all of the MWDSLS water supplies for use within each city. Jordan Valley Water Conservancy District provides water to 500,000 persons within its legal boundaries, but treats and delivers water for the MWDSLS to an additional 300,000 persons.

1.2.1.2.3.1 Water Conservation Master Plan. In 2000, MWDSLS adopted a water conservation plan in response to the "Water Conservation Plan Act" signed into Utah law in 1998. The MWDSLS adopted an overall Master Plan in 2001 which provided for the development of additional water conveyance facilities and treatment capacity to enable the MWDSLS to supply water to its member cities to meet their anticipated needs through the year 2025. Water conservation is a key component of the Master Plan. The MWDSLS water conservation plan summarizes the water conservation measures it has undertaken within the MWDSLS service area, and the efforts to promote water conservation by MWDSLS member cities. The following are programs and activities included in the MWDSLS water conservation plan.

- **Public Education and Information Campaign**. MWDSLS has participated in funding the "Slow the Flow, Save H_2O" campaign. The campaign continues to be developed, receiving significant recognition and media exposure statewide.

- **Residential and Commercial Water Audits**. Since adoption of the 2000 Water Conservation Master Plan, partnering agencies have pooled financial resources and contracted with Utah State University Extension to provide residential and commercial water audits (Water Checks) which are free to the public. Water audits target outdoor water usage and include an evaluation of the customer's soil type, plant root depth, sprinkler pressure, sprinkler distribution uniformity, and sprinkler precipitation rate.

- **Water Conservation Pricing.** Both member cities of MWDSLS now have in place water rates that encourage water conservation through charging higher rates for higher water use on a seasonal basis. The following briefly describes each city's rates.

    - **Sandy City.** In 2001, Sandy City adopted a water rate structure to encourage conservation. The rate structure has a much higher rate (186 percent) during the summer months of May through September when the City is trying to encourage conservation of outside water use. Historically, the City's outside water use accounted for 65 percent of the water used by City customers. The rate structure has resulted in lower water use during the last two years as reflected by decreasing per capita consumption and total water deliveries.

    - **Salt Lake City.** The Salt Lake City Council adopted a seasonal water conservation rate structure for retail water deliveries for the 2003 water season. This seasonal rate structure was adopted to encourage long-term conservation and the efficient use of the City's water supply. In spring 2003, Salt Lake City adopted an inclining-block rate structure to encourage water conservation by means of increasing price for greater water use.

1.2.1.2.3.2 Salt Lake City Conservation Activities

- **Web-page Development.** In 2001, the Salt Lake City Public Utilities Department (Public Utilities) launched a water conservation web page, designed to provide information for saving water indoors and outdoors to Public Utilities customers, both commercial and residential.

- **High Performance Building Guidelines.** The City developed High Performance Building Guidelines, a tool to guide the design and construction of water and energy efficient buildings constructed in partnership with Salt Lake City. The water section addresses landscape design and maintenance, indoor efficiencies, stormwater protection, and reclaimed water opportunities.

- **Landscape Ordinance and Guidelines.** Public Utilities worked with the Planning Department to update the park strip ordinance, and is involved in evaluating existing landscape ordinances to ensure that those ordinances meet broader administrative goals of encouraging water conservation. Public Utilities is also updating the Water-wise Landscape Plant list, first published in 1995.

- **Water Efficiency Study.** The City performed a study which provided a planning-level evaluation of water conservation and efficiency opportunities with existing irrigation of City-owned open-space, secondary water system and source development, and landscaping requirements for new development. This report provided information as a planning resource for development, funding, and implementation of capital improvement programs needed to achieve the City's increased water conservation and efficiency goals.

- **Demonstration Gardens.** Public Utilities is constructing a number of demonstration gardens throughout its service area. Two gardens have been constructed, one at Washington Square and the second at Concord Lift Station. Three more gardens are in the planning or design stage. Public Utilities has partnered with other city or regional projects as a subject-specialist to ensure that water conservation and sustainability continue to be addressed in all landscape designs.

- **Water Audit Project.** Public Utilities conducted full irrigation audits at 17 City-owned sites, including six golf courses in order to 1) determine specific irrigation efficiency; 2) generate repair action-items lists; 3) develop long-term capital improvements goals; and 4) provide adequate data to establish economic incentives for improvements.

- **Water Shortage Contingency Plan.** The water shortage contingency plan was adopted by the City Council in July 2003, and includes the following four (4) components:

  - **Ordinance** authorizes the Mayor to declare one of five water shortage stages; compels Public Utilities to draft and maintain a Water Shortage Plan; establishes fines; authorizes Public Utilities to enforce mandatory actions; and establishes an appeals process.

  - **Water Shortage Plan** identifies and defines five stages of water shortage; establishes triggering criteria for the implementation and termination of the stages; outlines public education and notification process; defines terms; and describes the hearing and appeals process.

  - **Response Summary** provides quick reference to the five water shortage stages, dividing water customers into three categories (residential, commercial/industrial, and municipal), articulates specific response actions, assigns voluntary/mandatory status to each response action, and identifies Best Management Practices (BMP) (this has been designed to be web and brochure ready).

- **Appendices** provides a collection of BMP for a broad spectrum of water customers and uses, including residential; commercial carwashes; hotels and restaurants; pools; and the nursery and landscape industry.

- **Media.** Salt Lake City was the focus of several news stories relating to the drought and water conservation, and appeared in two Associated Press (AP) stories that appeared in Colorado newspapers.

    - Participated in a number of radio programs on KSL, KUER, and KCPW, and were featured on an hour-long syndicated morning news program which airs on all non-clear channel stations.

    - Provide weekly information, including water-use charts, to several local news networks for use on weather segments.

- **Brochure List.** The City developed brochures for customers that provide guidance to customers for the following subjects.

    - Lawn Watering Guide
    - Parkstrip Guide
    - Water Shortage Contingency Plan–BMP
    - Rate Restructuring
        - Residential
        - Commercial

- In 2003, Salt Lake City submitted an application to District for CUPCA section 207 funding under its Conservation Credit Program. The application was approved for a 65 percent cost share of Salt Lake City's demonstration gardens.

1.2.1.2.3.3 Sandy City Water Conservation Activities. Sandy City completed a Water Conservation Plan in 1996. The detailed plan was the first of its kind in Sandy City. As a result of the Plan, Sandy City implemented a number of water conservation measures to reduce water usage. Following are key water conservation activities.

- **Water Meters.** All residential, industrial and institutional connections to the City's water system are metered. Additionally, the City meters water that is used in public areas such as parks and streetscapes.

- **Pipeline Corrosion Protection.** Sandy City requires the installation of corrosion protection on all ductile iron pipes in acidic soil. This measure is designed to reduce leaks in pipelines.

- **Conjunctive Use of Surface and Groundwater.** Sandy City, by having membership in the MWDSLS, more efficiently utilizes surface waters when available and only uses groundwater supplies during periods of peak demand.

- **Public Education.** Sandy City constructed a xeriscape demonstration garden called Sego Lily Gardens at its Zone 5 water tank site to illustrate landscape practices that conserve water. The gardens are open to the public during the warm weather months. The gardens provide an opportunity for the City to inform the public of low-water uses that are available and landscaping techniques that promote water conservation.

In addition, the City and its residents are able to learn, by first-hand experience, which plant varieties and irrigation methods are the most effective at providing an aesthetically pleasing yet water-saving landscape for the sandy soils prevalent in the area.

- **Use of Secondary Water on Parks.** Sandy City has retrofitted two parks within the City (Lone Peak and Crescent) for use of secondary irrigation water for landscape watering. Two additional parks (Eastridge and Storm Mountain) are currently being considered for secondary water. The City continues to investigate other potential uses for secondary water.

- **Renewed Emphasis on Water Conservation.** The past few years have borne a renewed emphasis on water conservation in Sandy City and its neighboring communities. This is the result of both the recent period of drought and Sandy City's need to conserve water to meet future demands. The result of this renewed conservation effort is the implementation of the following additional conservation measures.

  - **Seasonal Rate Structure**. In December 2000, the City Council adopted a new water rate structure intended to provide an incentive for water users to conserve. The key element of the rate structure is an increased peak season overage rate during the months of May through September. The goal is to reduce peak system demands and reduce the waste of water on outdoor landscaping uses.

  - **Monthly Billing.** As part of the implementation of the water rate structure, the City has opted to begin billing customers on a monthly basis. Historically, the City billed on a bi-monthly basis. Monthly billing allows consumers to receive more frequent feedback on their water use habits and adjust their use accordingly.

1.2.1.2.3.4 MWDSLS Water Conservation Goal. The MWDSLS Water Conservation Master Plan assumes that MWDSLS will meet the State of Utah's goal of reducing water consumption statewide by 25 percent by the year 2050.

1.2.1.2.3.5 MWDSLS Water Conservation Results. Table 1-5 presents historic and projected municipal and industrial (M&I) water demand, in gallons per capita per day, for each of the service areas of MWDSLS. The projections assume that the State's water conservation goals would be met, which call for reductions in per capita use by 12.5 percent by 2020 and 25 percent by the year 2050. The 2002 numbers reflect the conservation efforts of the member cities during the last few years of drought. Salt Lake City's numbers reflect a seven percent reduction in per capita usage in past two years even with 2002 being an extremely dry summer. Sandy City essentially met the 25 percent goal for conservation between 2000 and 2002 because of increased water conservation awareness and a new water rate structure that promotes water conservation within the City's service area. MWDSLS will continue to work with Sandy City and Salt Lake City in achieving the State's water conservation goals into the future.

Table 1-5 MWDSLS Water Demand With Water Conservation (12.5 Percent by Year 2020 and 25 Percent by Year 2050) (Gallons per Capita per Day)							
	Year						
MWDSLS	2000 (actual)	2002 (actual)	2010	2020	2030	2040	2050
Sandy City	250	189	235	220	209	199	188
Salt Lake City	251	234	235	220	209	199	188
Source: Metropolitan Water District of Salt Lake and Sandy, 2004							

1.2.1.2.4 South Utah Valley Municipal Water Association. The population of southern Utah County lies primarily in the 10 cities that are members of the South Utah Valley Municipal Water Users Association (SUVMWA). The ten communities are Elk Ridge, Genola, Goshen, Mapleton, Payson, Salem, Santaquin, Spanish Fork, Springville, and Woodland Hills. The population projections, revised in 2002, for cities and unincorporated areas of southern Utah County are presented in Table 1-6. The shaded areas on Table 1-6 for Elk Ridge, Springville and Woodland Hills represent build-out populations, which are expected to occur prior to 2050. Build-out in most of the other communities will not occur until after 2050.

Table 1-6 Revised Population Projections for Southern Utah County						
Community	Year					
	2000 Census	2010	2020	2030	2040	2050
Incorporated Communities of SUVMWA						
Elk Ridge	1,838	3,093	4,391	5,024	6,000	6,000
Genola	965	1,565	2,392	4,744	11,467	18,191
Goshen	874	1,249	1,682	1,970	2,611	3,251
Mapleton	5,809	9,403	14,928	20,990	27,507	34,024
Payson	12,716	20,606	27,750	30,583	55,673	80,763
Salem	4,372	7,351	12,101	17,016	24,212	31,409
Santaquin	4,834	9,822	16,865	24,263	43,442	62,621
Spanish Fork	20,246	27,693	32,745	35,771	50,900	66,028
Springville	20,424	28,866	34,132	37,286	59,658	59,658
Woodland Hills	941	1,891	3,247	4,014	4,793	4,793
Total	73,019	111,539	150,233	181,661	286,263	366,738

1.2.1.2.4.1 Water Conservation Master Plan. The SUVMWA will prepare a water conservation plan describing its water conservation measures and the way its requested ULS water would be used in conjunction with its local water sources. Elements of the plan will include reduction in per capita water use, recycling and reuse of wastewater, and public education on residential water conservation. This plan will be developed for each participating city within SUVMWA and will provide the description of how the cities current water supply would be managed to meet the acceptable water usage rate goal. The water conservation plan is being prepared in response to the "Water Conservation Plan Act" signed into Utah law in 1998. The water conservation master plan will focus on demand-side conservation. The plan will recommend the following five water conservation measures to be implemented by the SUVMWA cities.

- **A Public Education/Information Campaign.** SUVMWA will retain a public relations/media consultant to assist in developing a water conservation information/education program.

- **The Development of Model Landscape Ordinances.** SUVMWA will form a working group that will include representatives from the landscape and irrigation industry, Utah State University, and the Division of Water Resources to develop model commercial and residential landscape ordinances. With input from the working group, the model ordinances will be developed over an 18-month period. The purpose of these ordinances will be to provide models which SUVMWA member cities and others can adopt to promote water-efficient landscaping of all new and rehabilitated commercial landscapes, and new residential landscapes.

- **A Residential Water Auditing Program ("Water Check" Program).** When the Water Conservation Master Plan is adopted, SUVMWA and member cities will pool financial resources and contract with Utah State University Extension to provide residential and commercial water audits (Water Checks) that are free to the public. Water audits will target outdoor water usage and include an evaluation of the customer's soil type, plant root depth, sprinkler pressure, sprinkler distribution uniformity, and sprinkler precipitation rate. Following the audit, the customer will be left with recommendations for sprinkler system repairs and adjustments to improve distribution uniformity and a customized irrigation schedule to improve watering efficiency. Water use records will be obtained from each customer three years prior to and following the Water Check to measure the effectiveness of the water audit.

- **Ultra Low Flush Toilet Pilot Replacement Program.** SUVMWA will implement a pilot toilet replacement program within its service area. The program will involve replacing high flush toilets with flushing rates between 2.1 and 6.7 gallons per flush with new ultra low flush toilets (ULFTs) rated at 1.6 gallons per flush. The purpose of this program will be to measure the water savings and calculate the cost effectiveness of replacing older high flush toilets with new ULFTs.

- **Waterwise Classes and Workshops.** SUVMWA will hire a Conservation Horticulturalist whose duties will include arranging for and teaching several waterwise landscaping classes throughout the spring and summer of each year. These classes will be free to the public and include instruction on Utah native plants, designing efficient irrigation systems and waterwise landscapes, blue grass lawn care and alternatives and other topics emphasizing water conservation.

1.2.1.2.4.2 SUVMWA Water Conservation Goal. As part of the water conservation plan, the SUVMWA cities will adopt a conservation goal of reducing total water demand by 12.5 percent by the year 2020. This is based on an estimated 20 percent savings in outdoor water use (or 1 percent per year) which would be approximately equivalent to a 10 percent overall savings.

\After completing the Water Conservation Master Plan, SUVMWA will adopt a new and more aggressive water conservation goal of reducing water demand within the SUVMWA service area by an overall 25 percent by 2050. This goal would be measured in terms of per capita water use reduction beginning in year 2005. Therefore, in order for the SUVMWA cities to meet this goal, water use will need to be reduced to 220 gpcd by 2050.

1.2.1.2.4.3 SUVMWA Water Conservation Results. In order to achieve the water conservation goal of 12.5 percent water use reduction by 2020, a reduction in per capita use must be achieved. Table 1-7 shows that the actual per capita water use reduction will exceed the SUVMWA goal of 1 percent per year if the elements of the Water Conservation Master Plan (Section 1.2.1.2.4.1) are successfully implemented.

Table 1-7
Achievement of SUVMWA Area-Wide Water Conservation of 25 Percent

Community	2000 Per Capita Use (gpcd)	2050 Per Capita Use (gpcd)	Percent Reduction
Elk Ridge	256	220	-14
Genola	234	220	-6
Goshen	413	220	-47
Mapleton	536	220	-59
Payson	275	220	-20
Salem	230	220	-4
Santaquin	344	220	-36
Spanish Fork	233	220	-6
Springville	311	220	-29
Woodland Hills	151	190	+26
Average Percent Reduction in Water Use for SUVMWA Communities			**-25**

1.2.1.3 Previous Environmental Commitments

As the Bonneville Unit was developed and features were constructed, environmental commitments were made in NEPA compliance documents, record of decision documents and biological opinions on features of the Bonneville Unit of the CUP. Many of the environmental commitments made in previous Bonneville Unit documents have been fulfilled or are ongoing. The remaining and incomplete environmental commitments associated with the Bonneville Unit are addressed in this EIS and the planning associated with the ULS. Appendix A presents the list of all Bonneville Unit environmental commitments, including those already completed and those to be completed. The list includes the environmental commitment, interpretive comments, the responsible agency, status, and a reference to the document(s) where the environmental commitment was made. The following sections briefly review the Bonneville Unit environmental commitments fulfilled and those to be completed.

1.2.1.3.1 Environmental Commitments Fulfilled. The Bonneville Unit environmental commitments fulfilled are incorporated into the SACS, M&I System and Diamond Fork System. Some environmental commitments are no longer valid or applicable because of changes in the Bonneville Unit of the CUP. Additional environmental commitments were fulfilled under the Wasatch County Water Efficiency Project, Daniel Replacement Project and the Provo River Restoration Project. The fulfilled environmental commitments involve stream flows for fish, land acquisition for wildlife habitat mitigation, water quality monitoring, and actions to benefit threatened and endangered species and their habitat.

1.2.1.3.2 Environmental Commitments to be Completed. The following summarizes the Bonneville Unit environmental commitments to be addressed as part of the ULS planning and NEPA compliance.

- The 1999 Diamond Fork System ROD commits and obligates the Joint-Lead Agencies to prepare a final EIS on the Bonneville Unit, Central Utah Project, associated with the Utah Lake System in compliance with Interior's Federal Register Notice (FR Doc. 98-27484) dated October 14, 1998. That ROD specified that this EIS would address the impacts associated with any additional Utah Lake System facilities, and will incorporate and address all remaining and incomplete commitments contained in the various CUP NEPA compliance documents and previous RODs.

- Complete all mitigation commitments for fish, wildlife and related recreation associated with the ULS project.

- Commitments involving Ute ladies'-tresses orchid habitat, ecology, population characteristics, and monitoring along Diamond Fork Creek (see Appendix A for the actual commitments)

- Any future development of the Bonneville Unit of CUP will be contingent on the Recovery Implementation Program making "sufficient progress" towards recovery of June sucker.

- The Joint-Lead Agencies will identify, acquire, and permanently provide a block of water for flows in the lower Provo River through critical habitat, in perpetuity, for June sucker.

- A monitoring program would be established to provide satisfactory water quality in Diamond Fork. Impacts of the recommended plan on Strawberry Reservoir, Utah Lake, Utah Valley streams, and the Jordan River would be addressed in the environmental statement on the I&D System (the I&D System has been replaced by the ULS).

- The water quality monitoring program committed to in the 1990 final supplement (Reclamation 1990) and the DOI 1995 Diamond Fork Pipeline ROD will be continued. The District has been collecting water quality and temperature data since July 1996. The Mitigation Commission will be responsible for continuing this monitoring program upon completion of the ULS (modified).

- Water quality monitoring will continue downstream of Strawberry Tunnel, Sixth Water Aqueduct, and Diamond Fork Creek Outlet to determine potential dissolved oxygen concentration impacts and how far downstream low DO levels are found.

- If low dissolved oxygen levels are found downstream from tunnel outlets, baffles or oxygen aerators should be installed to bring dissolved oxygen concentrations up to levels that are not detrimental to fish and other aquatic resources.

- The Diamond Fork System should be operated in the interim, after completion of the Diamond Fork System but prior to completion of the ULS, so that all sections of the Spanish Fork River receive the flows that are documented in the 1999 FS-FEIS that will benefit aquatic and terrestrial resources. This commitment will be maintained on a permanent basis only under the ULS No Action Alternative (modified).

- Under the Proposed Action and Bonneville Unit Water Alternative, water being delivered through the Spanish Fork River to Utah Lake would not require modification of the diversion structures. Significant impacts on aquatic resources from modifications made at the Spanish Fork River diversions under the No

Action Alternative will be mitigated. If the diversion structures are modified, fish passage will be built into each structure (modified).

- Fishery mitigation will consist of maintenance of minimum flows of 125 cfs between Jordanelle Dam and Deer Creek Reservoir, 100 cfs between the confluence of the Provo River and Provo Deer Creek (below Deer Creek Dam) and Olmsted Diversion, and 25 cfs during the winter from Olmsted Diversion to Utah Lake.

- Section 302(a) of CUPCA authorizes the District to acquire 25,000 acre-feet of water rights on the Provo River from willing sellers using funds provided by the Mitigation Commission for the purpose of establishing a minimum in-stream flow of seventy-five cubic feet per second on the Provo River from the Olmsted Diversion to Utah Lake. This 75-cfs in-stream flow is considered an objective due to limited funding and is contingent upon willing sellers. The District and Mitigation Commission are responsible for implementing this authorization to the extent possible. Each ULS alternative's capability to facilitate the objective of a 75-cfs in-stream flow will be described and evaluated in this EIS. To the extent that the alternative selected as the ULS Proposed Action can facilitate the implementation of this in-stream flow objective, it has been included in this EIS as a new environmental commitment.

- The FWS is preparing an amendment to incorporate new information into the Service's Final Biological Opinion, July 1998 for the Duchesne River Basin and to provide a revised reasonable and prudent alternative and a re-initiation notice. The final biological opinion on the Duchesne River System will be a factor in determining the use of the 44,400 acre-feet of the SACS in-stream flow water below the confluence of the Strawberry and Duchesne Rivers. Until it is resolved whether existing law will require the entire 44,400 acre-feet of water remain in the Duchesne River until its confluence with the Green River, the District will not re-divert above the confluence (modified).

- Post-project fishery studies will be conducted below Deer Creek Dam to more precisely examine the impacts of summer habitat loss and winter habitat gain on the overall Brown trout population and assess the feasibility of improving habitat through modification of streamflow regimens.

1.2.1.4 Full Utilization of Water Supplies

Current and future water supplies would be fully utilized for M&I uses associated with the Bonneville Unit. The ULS would fully utilize the 15,800 acre-feet of uncommitted Bonneville Unit water conveyed to the Wasatch Front from Strawberry Reservoir. The DOI would acquire 57,073 acre-feet of the District's secondary water rights in Utah Lake to make these supplies available by exchange to Jordanelle Reservoir for delivery as part of the ULS when this water is available as basin runoff. Return flows to Utah Lake from water delivered under the ULS would total approximately 9,660 acre-feet. These return flows would become part of the ULS water supply by exchange to Jordanelle Reservoir for delivery to M&I users in Salt Lake County. Approximately 18,000 acre-feet of Bonneville Unit M&I water return flows would be recycled from Salt Lake County wastewater treatment plant effluents and be re-used within the JVWCD and MWDSLS service areas. The use of project return flows would be coordinated with the DOI, operators of the wastewater treatment plants, municipalities from which the return flows occur at the wastewater plants, the State Engineer's office, the Utah Department of Environmental Quality, and the cities which would be receiving and using the project return flows.

1.3 Overview of the Alternatives

The following alternatives are described and addressed in this FEIS:

- Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)
- Bonneville Unit Water Alternative
- No Action Alternative

The two action alternatives would provide ULS water for M&I secondary use in southern Utah County. One of the action alternatives would provide ULS water for M&I use in Salt Lake County. Both of the action alternatives would include federal acquisition of some or all of the District's secondary water rights in Utah Lake.

The ULS water would be conveyed through new pipelines, existing canals and rivers under the two action alternatives. Up to 10,200 acre-feet of SVP water shares contractually assigned or made available to SUVMWA would be conveyed to member cities in southern Utah County through the new ULS pipelines under the two action alternatives. Identical hydropower generating facilities would be constructed and operated under the two action alternatives. Both action alternatives and the No Action Alternative include water conservation and fish and wildlife mitigation or enhancement measures.

The following sections describe the features, construction, and operation of each alternative. These sections are followed by a description of the Spanish Fork Canyon Pipeline Option, whereby this pipeline would be constructed by Utah Department of Transportation (UDOT) coincident with UDOT's planned expansion of U.S. Highway 6 to 4 lanes.

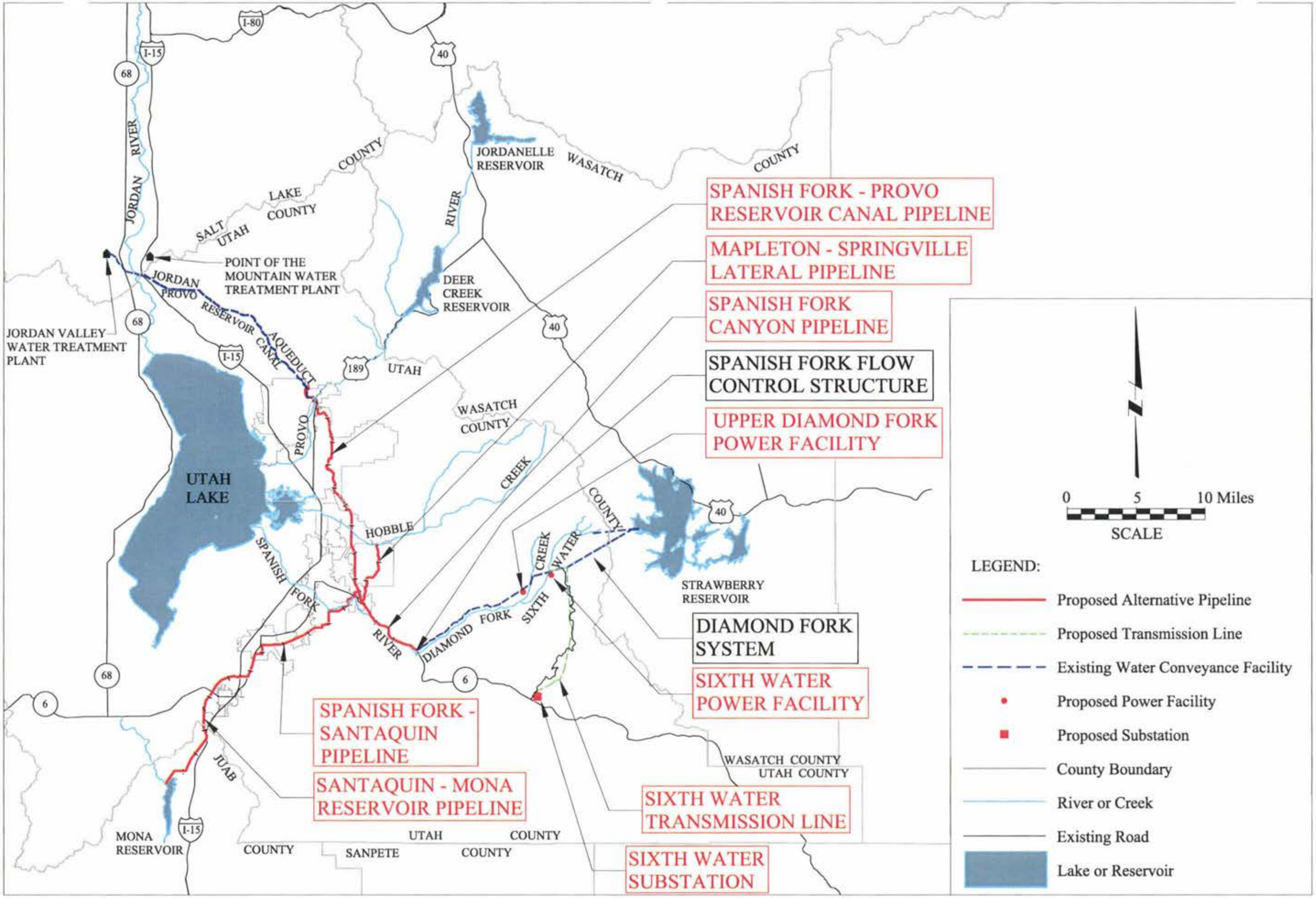
1.4 Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

1.4.1 Introduction

The Spanish Fork Canyon–Provo Reservoir Canal Alternative has an average transbasin diversion of 101,900 acre-feet, which consists of a delivery of: 30,000 acre-feet of M&I water to southern Utah County and 30,000 acre-feet of M&I water to Salt Lake County water treatment plants; 1,590 acre-feet of M&I water already contracted to southern Utah County cities, and 40,310 acre-feet of M&I water to Utah Lake for exchange to Jordanelle Reservoir. This alternative would involve construction of five new pipelines for delivery of water, and 2 new hydropower plants and associated transmission lines. The 30,000 acre-feet (less the water returned to DOI under the Section 207 Program) of M&I water utilized in southern Utah County would be used in the cities' secondary water systems which are non-potable outdoor irrigation systems typically developed as dual water systems. If sometime in the future it were proposed to convert this water to a potable, indoor water system, additional supplemental NEPA compliance would be required because such conversion is beyond the scope of this EIS and it would be speculative to guess what additional impacts might occur as a result of such a conversion.

1.4.2 Spanish Fork Canyon–Provo Reservoir Canal Alternative Features

The Spanish Fork Canyon–Provo Reservoir Canal Alternative would include the following features (see Map 1-3 or Map A-1 in map pocket): 1) Sixth Water Power Facility and Transmission Line, 2) Upper Diamond Fork Power Facility and Underground Transmission Cable, 3) Spanish Fork Canyon Pipeline, 4) Spanish Fork–Santaquin Pipeline, 5) Santaquin–Mona Reservoir Pipeline, 6) Mapleton–Springville Lateral Pipeline, and 7) Spanish Fork–Provo Reservoir Canal Pipeline. These features would deliver ULS M&I secondary water to southern Utah County cities, deliver water to Hobble Creek to provide June sucker spawning flows, and



Map 1-3

Features of the Spanish Fork Canyon - Provo Reservoir Canal Alternative (Proposed Action) supplemental flow during other times of the year, deliver water for supplemental flow in the lower Provo River, deliver M&I raw water to the Provo Reservoir Canal and the Jordan Aqueduct for conveyance to water treatment plants in Salt Lake County, and provide water to generate electric power at 2 hydropower plants. The Spanish Fork Canyon Pipeline and Spanish Fork–Santaquin Pipeline would convey up to 10,200 acre-feet of SVP water shares contractually assigned or made available to SUVMWA or its member cites/municipalities, on a space-available basis. The Mapleton-Springville Lateral Pipeline would convey annually an average of 8,831 acre-feet of SVP water owned by Springville and Mapleton irrigation districts that is presently conveyed through the existing Mapleton-Springville Lateral.

The primary features of the Spanish Fork Canyon–Provo Reservoir Canal Alternative are described in detail in the following subsections. Table 1-8 shows the feature name and details of each power feature. Table 1-9 shows the feature name and details of each pipeline feature. Map A-1 shows the location of these features and detailed insets of some features.

Table 1-8
Spanish Fork Canyon–Provo Reservoir Canal Alternative Power Features

Feature Name/Map A-1 Location	Transmission Line or Underground Cable Length (miles)	Capacity
Sixth Water Power Facility, Substation and Transmission Line(Insets 2 and 3; lower right)	15.5	45 MW Generator 138 kV Transmission Line
Upper Diamond Fork Power Facility and Underground Transmission Cable(Inset 4 and lower right)	1.5	5 MW Generator 25 kV Underground Cable (existing)
Total Transmission Line and Cable Length	**17.0**	

Notes:
MW = megawatt
kV = kilovolt

Table 1-9 Spanish Fork Canyon–Provo Reservoir Canal Alternative Pipeline Features			
Feature Name/Map A-1 Location	**Pipeline Length (miles)**	**Diameter (inches)**	**Design Capacity**
Spanish Fork Canyon Pipeline (Insets 1 and 5, lower middle)	7.0	84	365 cfs
Spanish Fork–Santaquin Pipeline (Insets 1 and 5, lower left)	17.5	60 to 36	120 to 50 cfs
Santaquin–Mona Reservoir Pipeline (Inset 1 and lower left)	7.7	24	20 cfs
Mapleton–Springville Lateral Pipeline (Insets 1 and 5, middle)	5.7	48	125 cfs
Spanish Fork–Provo Reservoir Canal Pipeline (Inset 1, 5, 6, 7, and 8; middle)	19.7	60 to 48	120 to 90 cfs
Total Pipeline Length	**57.6**		

Notes:
cfs = cubic feet per second

1.4.2.1 Sixth Water Power Facility, Substation and Transmission Line

The Sixth Water Power Facility would be a new hydroelectric generating plant located adjacent to the Sixth Water Flow Control Structure (see Inset 2, Map A-1). The 45 megawatt (MW) generator would be installed in a building at the Sixth Water Aqueduct outlet bifurcation to generate power from water flowing through the Syar Tunnel and down the aqueduct (Figure 1-1). Water passing through the generator would return to atmospheric pressure before continuing down the existing inlet shaft connecting to the Tanner Ridge Tunnel. The fenced power facility building and surrounding area would cover 0.7 acre.

A fenced substation would be constructed north of the Sixth Water Flow Control Structure and Power Facility (see Inset 2, Map A-1). The substation would consist of 13.8 kV switchgear, a 138/13.8 kV transformer, circuit switchers, motor-operated disconnect switches, metering instruments, line traps, and surge arresters. The substation would cover 0.3 acre.

The existing 15.5-mile long wood pole transmission line from the Sixth Water Flow Control Structure through Rays Valley and along Sheep Creek to Highway 6 would be upgraded from 46 to 138 kV, requiring about 100 new 81-foot-tall steel poles. Figure 1-2 shows the new steel power poles that would be installed in the same alignment over the existing transmission line. The poles and crossbars would be constructed with steel that is designed to rust at the surface as a protective layer, and non-reflective conductors would be installed on raptor-proof crossbars. The poles would carry two circuits, one single-phase 7.2 kV circuit line from the low-voltage line at Sixth Water Flow Control Structure and one-138 kV circuit for the power generated by the Sixth Water and Upper Diamond Fork Power Facilities. The old wood poles would be removed once the new poles and the upgraded power line is installed. The transmission lines would be connected to the Utah Power grid at U.S. Highway 6 through a new switching substation. The fenced substation would be located near the intersection of the Sheep Creek-Rays Valley Road and Highway 6 (see Inset 3 on Map A-1). The substation would consist of circuit switchers, motor-operated disconnect switches, metering instruments, line traps, and surge arresters covering a 0.5 acre site.

Figure 1-1
Sixth Water Power Facility Perspective

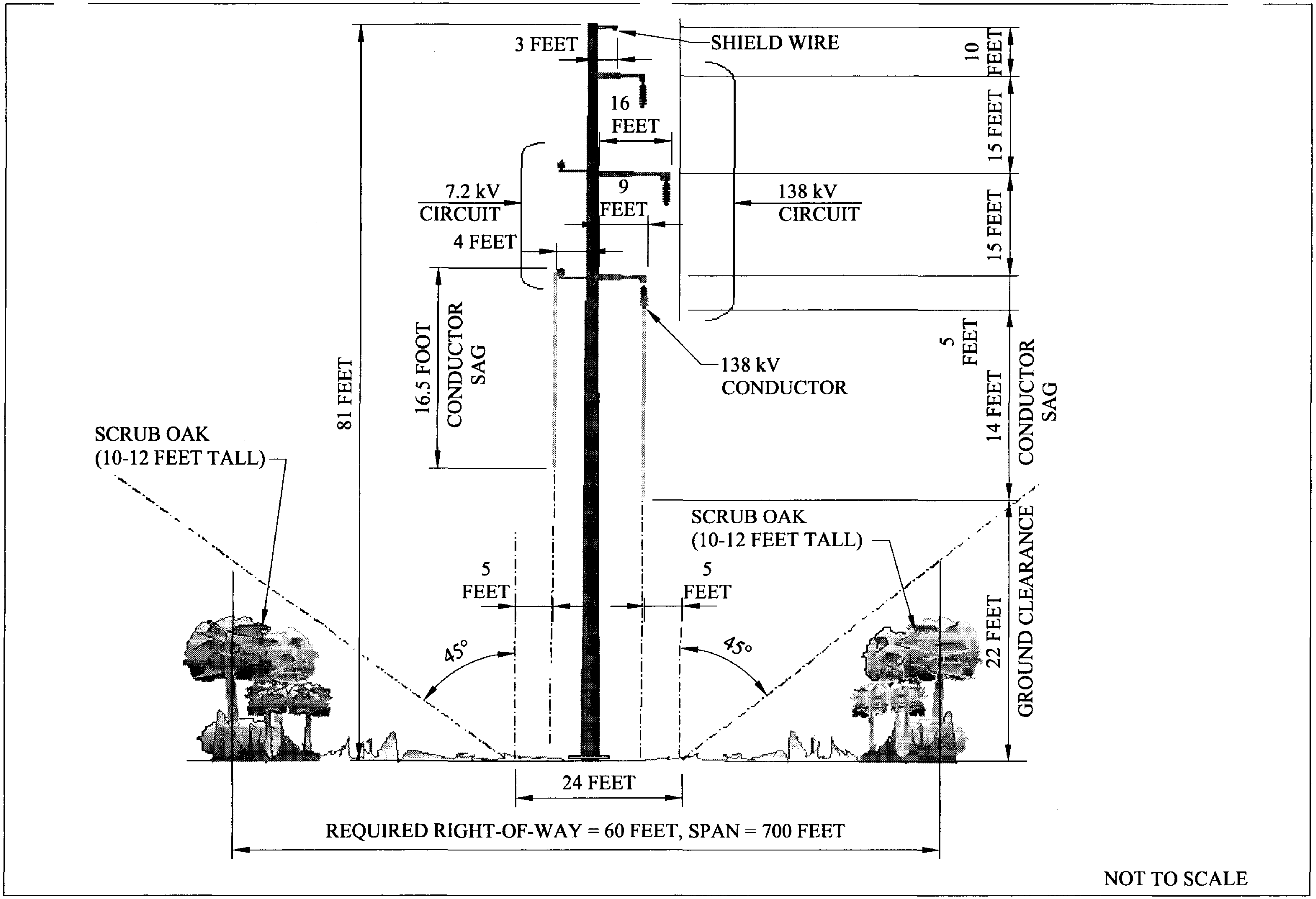


Figure 1-2

Upgraded Power Poles for the Sixth Water Transmission Line

1.4.2.2 Upper Diamond Fork Power Facility and Transmission Line

The Upper Diamond Fork Power Facility would be a new hydroelectric generating plant located adjacent to the Upper Diamond Fork Flow Control Structure (see Inset 4, Map A-1). The 5 MW generator would be installed in a building to generate power from water flowing through the Tanner Ridge Tunnel and Upper Diamond Fork Pipeline (Figure 1-3). Water passing through the generator would return to atmospheric pressure before continuing down the existing Diamond Fork Vortex Structure connecting to the Upper Diamond Fork Tunnel. The fenced power facility building and surrounding area would cover 0.3 acre.

The area around the Upper Diamond Fork Power Facility would be landscaped to partially screen the buildings, fence and parking areas as described in the 2002 Final EA for the Proposed Action Modifications. Large native tree stock (thin-leaf alder, cottonwood, and scrub oak) along with containerized shrubs (big sagebrush, rabbitbrush and snowberry) would be planted around the perimeter of the building pad and adjacent to Diamond Fork Creek to partially screen the facilities from view when travelling along Diamond Fork Road. A vegetation and rock screen would be installed where the access road joins the Diamond Fork Road to screen the flow control structure, access road and box culvert bridge from view along the road.

The power generated at the Upper Diamond Fork Power Facility would be transmitted through an existing 25 kV cable buried along the existing Upper Diamond Fork Pipeline and located in the ceiling of the existing Tanner Ridge Tunnel. The transmission cable would be connected through a 13.8 kV switchgear and a step-up transformer to the upgraded transmission line at the 6th Water Power Substation.

1.4.2.3 Spanish Fork Canyon Pipeline

The Spanish Fork Canyon Pipeline would connect to the existing 96-inch welded steel pipe bypass near the Spanish Fork Flow Control Structure at the mouth of Diamond Fork Canyon and follow the U.S. Highway 6 alignment to the mouth of Spanish Fork Canyon near the intersection with U.S. Highway 89 (see Insets 1 and 5, Map A-1). The 84-inch-diameter pipeline would be about 7.0 miles long, with a design capacity of 365 cfs. The pipeline would be constructed in the northeast shoulder of the U.S. Highway 6 and 0.8 mile of U.S. Highway 89.

The steel pipeline would descend about 300 feet in elevation from the Spanish Fork Flow Control Structure to the mouth of Spanish Fork Canyon. The pipeline would have about 16-air release valves, about 6 vacuum relief valves and about 6 drain valves and pipes located along its alignment. Valves would be located in concrete vaults offset from the pipeline alignment. The Spanish Fork Canyon Pipeline would connect with three pipelines near the Highway 6 and 89 junction: 1) Mapleton–Springville Lateral Pipeline; 2) Spanish Fork–Santaquin Pipeline; and 3) Spanish Fork–Provo Reservoir Canal Pipeline. The Spanish Fork Canyon Pipeline would cross the Wasatch Fault in Spanish Fork Canyon and would incorporate seismic design measures to minimize the risk of pipeline rupture.

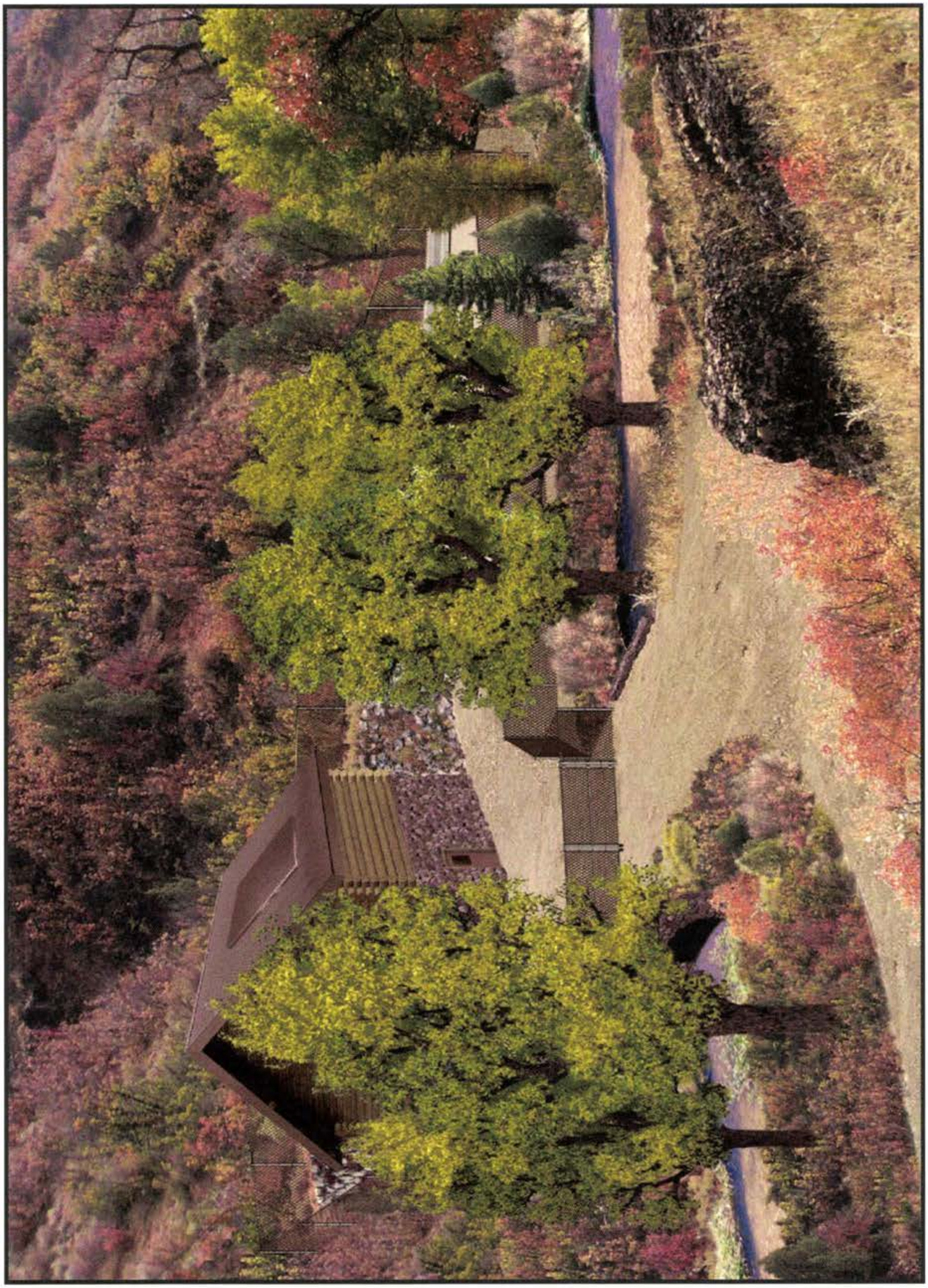


Figure 1-3
Upper Diamond Fork Power Facility Perspective

1.4.2.4 Spanish Fork–Santaquin Pipeline

The Spanish Fork–Santaquin Pipeline would connect to the Spanish Fork Canyon Pipeline at U.S. Highway 89 about 0.8 mile northwest of the Highway 6/Highway 89 junction (see Inset 5, Map A-1) and mostly run adjacent to existing roads and adjacent to the Union Pacific Railroad right-of-way southwest to Santaquin in southern Utah County (see Inset 1, Map A-1). The steel pipeline would range in size from 60- to 36-inch-diameter for 17.5 miles, with capacity ranging from 120 to 50 cfs. The pipeline would be buried in rights-of-way along existing roads and U.S. Highway 6 for about 12.1 miles and adjacent to the Union Pacific Railroad right-of-way (Pipeline milepost 13.9 to 17.5) through fruit orchards near Santaquin for about 3.6 miles. Four pipeline segments would be buried in non-road, open or farmed areas as follows (see Map A-1):

- 0.3 mile from U.S. Highway 89 to 2400 East at Sutro (Pipeline milepost 0 to 0.3)
- 0.4 mile from River Bottoms Road to Powerline Road along the western boundary of the Spanish Fork Golf Course (Pipeline milepost 1.3 to 1.7)
- 0.8 mile from Salem Canal Road to 700 South across Rocky Ridge and the Strawberry Highline Canal in Payson (Pipeline milepost 8.9 to 9.6)
- 3.6 miles from Interstate 15 to the end of the pipeline near Summit Creek Reservoir (Pipeline milepost 13.8 to 17.5)

The steel pipeline would have screened air release, vacuum relief, and drain valves located along the pipeline. The pipeline would have about 41 air release valves, about 20 vacuum relief valves and about 20 drain valves and pipes located along its alignment. Valves would be located in concrete vaults offset from the pipeline alignment. Figure 1-4 shows a typical cross section of an air release and vacuum relief vault. Figure 1-5 shows a typical cross section of a blowoff drain vault.

The SUVMWA member cities in southern Utah County would receive the ULS water via 8 pipeline turnouts. One additional turnout would be provided to the Santaquin–Mona Reservoir Pipeline at the end of the Spanish Fork–Santaquin Pipeline. Table 1-10 provides information about the 8 turnouts located along the pipeline for water delivery in southern Utah County and the Mona Reservoir turnout. Figure 1-6 shows a typical cross section of a pipeline turnout with a meter.

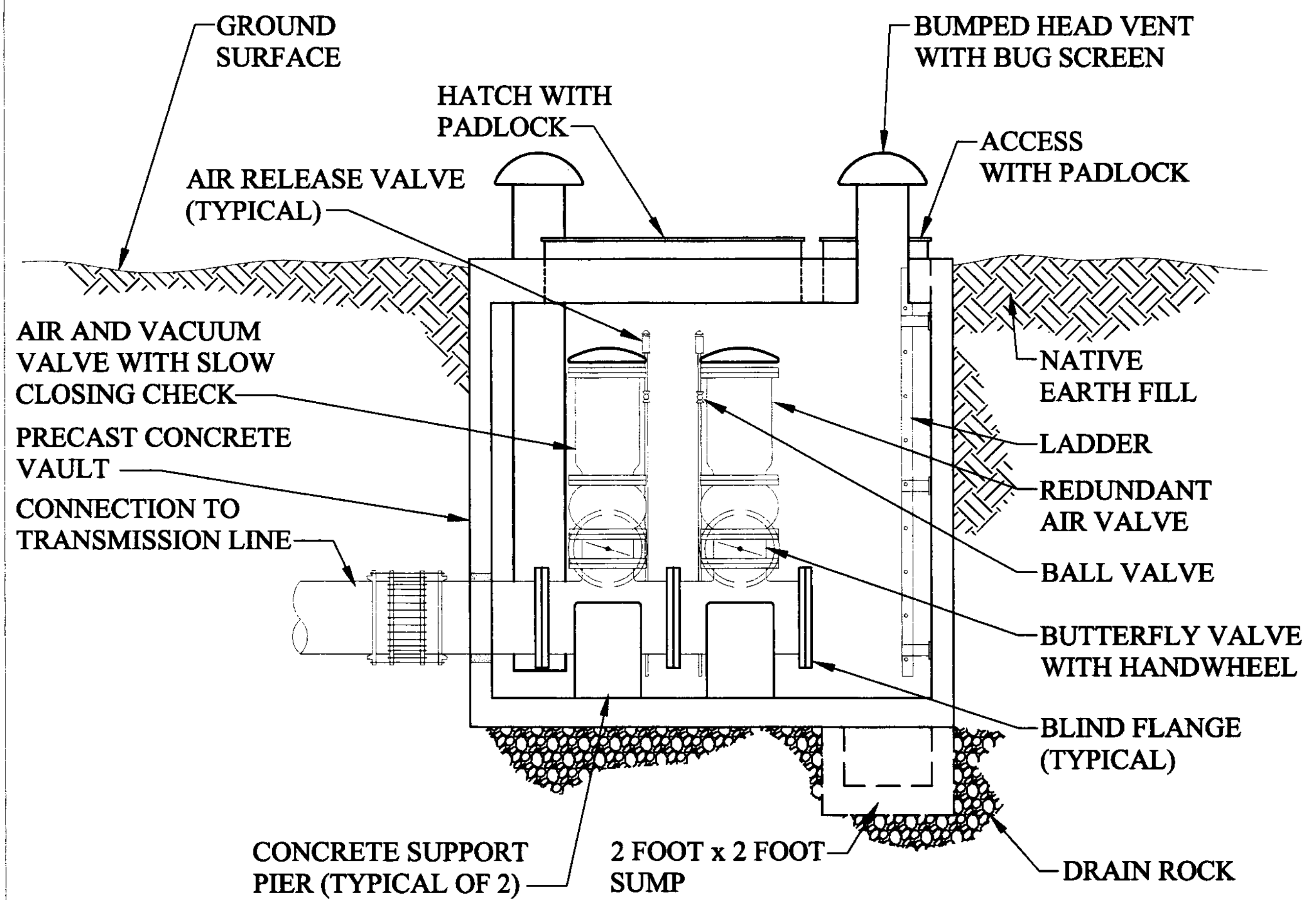


Figure 1-4

Typical Cross Section of Air Release and Vacuum Relief Vault

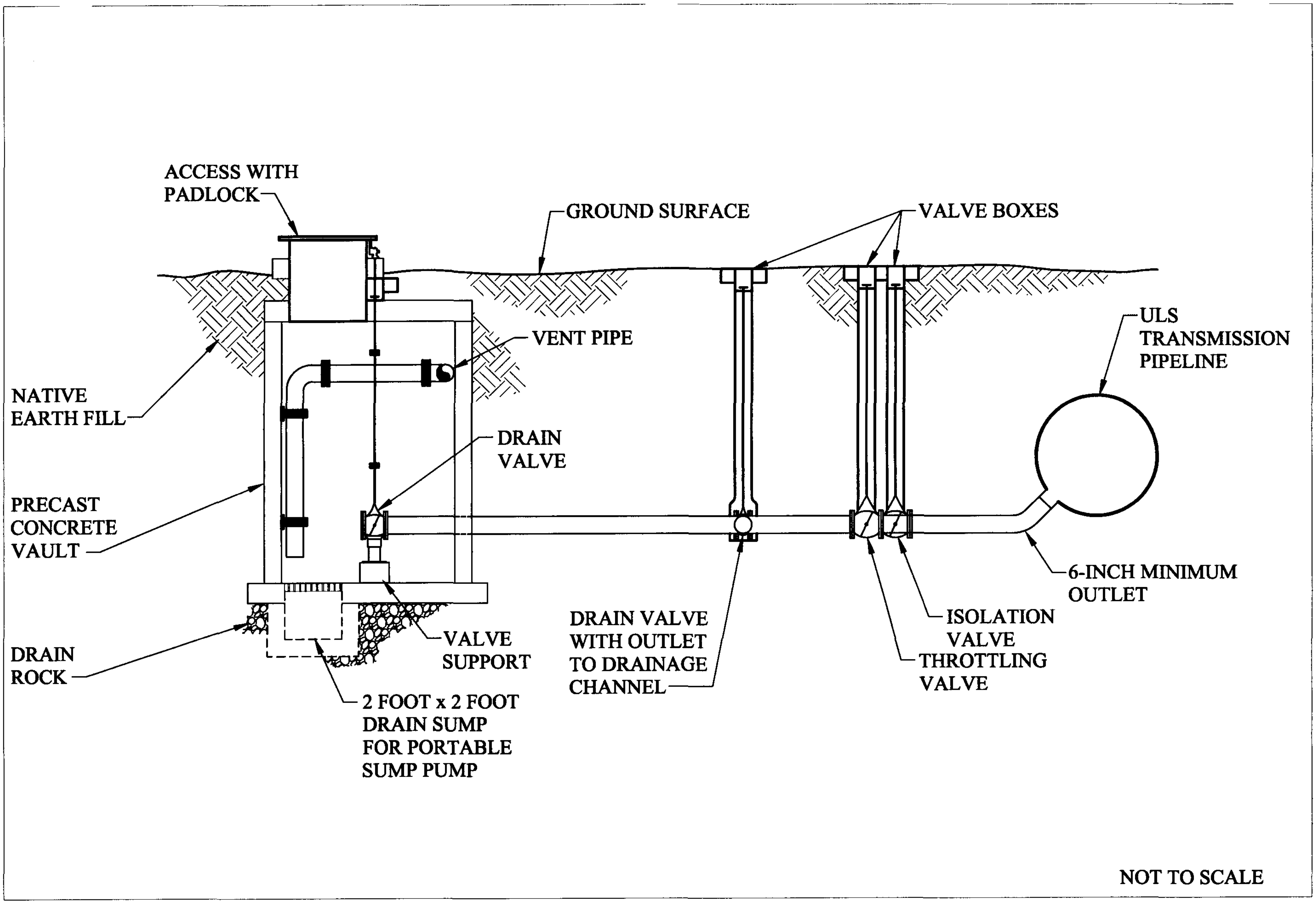


Figure 1-5

Typical Cross Section of Blowoff Drain Vault

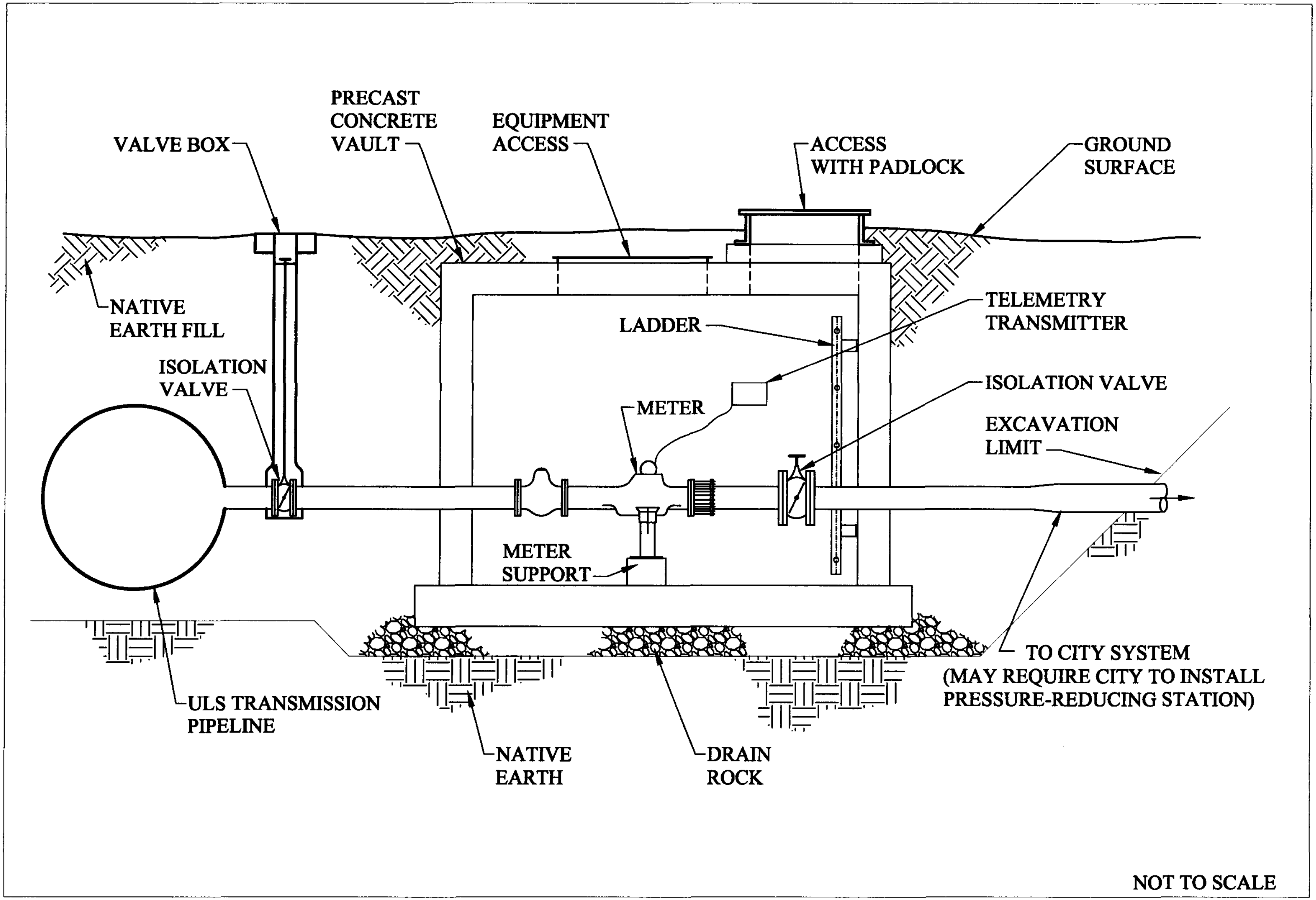


Figure 1-6

Typical Cross Section of Pipeline Turnout with Meter

Table 1-10 Turnouts From the Spanish Fork–Santaquin Pipeline in Southern Utah County					
Turnout	**Pipeline Milepost[1]**	**Pipe Diameter (inches)**	**Pipeline Capacity (cfs)**	**Dedicated Turnout Capacity (cfs)**	**Installed Turnout Capacity (cfs)**
Spanish Fork City	1.27	60	120	15	25
Woodland Hills	5.66	54	120	5	10
Salem City	6.46	54	120	25	25
Elk Ridge	7.20	48	110	5	10
Payson City	9.67	48	105	25	40
West Payson	14.73	48	70	10	20
Genola	16.34	42	60	5	20
Santaquin City	17.42	36	50	25	50
Santaquin-Mona Reservoir Pipeline[2]	17.48	30	20	5	35

Notes:
[1]Pipeline mileposts for each feature are shown on Map A-1.
[2]The Santaquin–Mona Reservoir Pipeline turnout would be installed as part of the construction to benefit the June sucker Recovery Implementation Program (JSRIP), but the pipeline would not be constructed or operated until a water supply has been identified and a carriage contract has been executed as part of the JSRIP.

1.4.2.5 Santaquin–Mona Reservoir Pipeline

The Santaquin–Mona Reservoir Pipeline would connect to a Spanish Fork–Santaquin Pipeline turnout and run parallel along the Union Pacific Railroad alignment south to Mona Reservoir in Juab County (see Map A-1). The 30 to 24-inch-diameter pipeline would be about 7.7 miles long, with design capacity to deliver 20 cfs to Mona Reservoir. The pipeline would be buried west of the railroad alignment except for the last 1.8 miles, which would head west and then south along the west side of Mona Reservoir to an outfall near the dam. The pipeline would be constructed as a ULS non-reimbursable facility. The purpose of the pipeline would be to provide a water supply for a conservation pool so that Mona Reservoir could be utilized as a refugia for the endangered June sucker. Before the steel pipeline could be constructed, a secure water supply would need to be identified and acquired and a carriage contract for such water executed by the June Sucker Recovery Implementation Program. A supplemental NEPA compliance document would be required to address the June sucker recovery implementation program's water supply, pipeline operation operational plan for the conservation pool in Mona Reservoir, and a determination that the pipeline is economically justified.

The pipeline would have about 17-air release valves, about 5 vacuum relief valves and about 5 drain valves and pipes located along its alignment. Valves would be located in concrete vaults offset from the pipeline alignment.

1.4.2.6 Mapleton–Springville Lateral Pipeline

The existing Mapleton–Springville Lateral, which is a SVP facility, would be replaced with a pipeline throughout most of its length. This new pipeline would become a Bonneville Unit facility that would result in conserved water by conveying annually an average of 8,831 acre-feet of SVP water that has been historically delivered to the Mapleton and Springville irrigation districts through the existing lateral. The pipeline would be funded under the

CUPCA ULS and Section 207 programs. The pipeline would be constructed from the connection with the Spanish Fork Canyon Pipeline (see Inset 5, Map A-1) and extend north to Hobble Creek, which flows through Mapleton and Springville before discharging into Hobble Creek, which would convey project water to Provo Bay on Utah Lake. The steel pipeline would be 48 inches diameter for about 5.7 miles, with a design capacity-of 125 cfs. The first 4.7 miles of pipeline would be buried in the existing Mapleton–Springville Lateral. The 48-inch pipeline would extend 4.7 miles from Spanish Fork Canyon Pipeline to the existing Maple Creek discharge into the canal at 400 North in Mapleton. The last mile of the existing lateral would be reconstructed and retained to convey the Maple Creek flows to Hobble Creek. The remaining one mile of 48-inch pipeline would be constructed parallel to the retained canal to convey water to the existing Hobble Creek siphon for the Springville Irrigation District. There would be 11 turnouts located along the pipeline for the Mapleton Irrigation District, sized to match existing canal turnouts, 2 with 14 cfs capacity and the remaining 9 turnouts each with 7 cfs capacity. The new pipeline turnouts would be located at the existing headgate turnouts from the canal. A 36 cfs turnout would be included in the pipeline for the Springville Irrigation District near the end of the existing lateral. The pipeline would include turnouts for future secondary systems by Mapleton City and Springville City. Figure 1-6 shows a typical cross section of a pipeline turnout with a meter.

The pipeline would have about 16 air release valves, about 4 vacuum relief valves and about 4 drain valves and pipes located along its alignment. Valves would be located in concrete vaults along the pipeline alignment (Figures 1-4 and 1-6).

1.4.2.7 Spanish Fork–Provo Reservoir Canal Pipeline

The Spanish Fork–Provo Reservoir Canal Pipeline would be constructed from the Spanish Fork Canyon Pipeline (see Inset 5, Map A-1) along U.S. Highway 89 through Mapleton, 400 East in Springville, back on Highway 89 to Provo, on residential streets in Provo, and discharge to the enclosed Provo Reservoir Canal, a Provo River Project Facility, at 800 North in Orem (see Insets 1 and 7, Map A-1). Construction of the interconnect would be accomplished in such a manner as to avoid any disruption in the operation and maintenance of the Provo Reservoir Canal. NEPA compliance for converting the Provo Reservoir Canal to an enclosed conveyance facility has been completed by Reclamation. The enclosed canal would convey ULS water to Salt Lake County water treatment plants when there is insufficient excess capacity in the existing Jordan Aqueduct. The ULS pipeline would continue along the enclosed Provo Reservoir Canal to 1200 North in Orem and then connect to the Jordan Aqueduct near the Utah Valley Water Treatment Plant (see Inset 8, Map A-1). This extended pipeline segment would allow conveyance of ULS water to Salt Lake County water treatment plants through the Jordan Aqueduct. The steel pipeline would range in size from 60- to 48-inches diameter for 19.7 miles, with capacity of 120 to 90 cfs. The pipeline would be buried in rights-of-way along portions of U.S. Highway 89 in Mapleton, Springville and Provo, city streets in Springville and Provo, and State Route 52 in Orem. Six pipeline segments would be buried in non-road, open or farmed areas as follows (see Map A-1):

- 0.5 mile across State Hospital land near Seven Peaks Center in Provo (Pipeline milepost 10.5 to 11.0)
- 0.5 mile across a semi-wooded area in Provo that is planned to be cleared for a city roadway (Pipeline milepost 11.8 to 12.3)
- 0.3 mile across Rock Canyon Park in Provo (Pipeline milepost 13.5 to 13.8)
- 0.6 mile from 4525 North at Canyon Road across a field and hillside to U.S. Highway 189 in Provo (Pipeline milepost 16.3 to 16.9)
- 0.2 mile from Heritage Road in Provo to State Route 52 (800 North) in Orem that is currently under construction for a city road (Pipeline milepost 18.0 to 18.2)
- 1.1 miles along the Provo Reservoir Canal to the Jordan Aqueduct in Orem (Pipeline milepost 18.6 to 19.7)

The steel pipeline would have about 48-air release valves, about 19 vacuum relief valves and about 19 drain valves and pipes located along its alignment. Valves would be located in concrete vaults offset from the pipeline alignment. Figure 1-4 shows a typical cross section of an air release and vacuum relief vault. Figure 1-5 shows a typical cross section of a blowoff drain vault.

The pipeline would have a turnout for discharging in-stream flow water to the lower Provo River at the crossing site near Heritage Park at pipeline milepost 17.7 (see Inset 6, Map A-1). Isolation valves and pressure-reducing valves would be installed in a concrete vault to reduce the pipeline water pressure for discharge to the river over a weir. The water discharged over the weir would flow over rock riprap to dissipate the energy and aerate the water.

1.4.3 Land Management Status and Right-of-Way Acquisition

The land that would be required to construct and operate the features of the Proposed Action consists of National Forest System land, Reclamation land, UDOT highway right of way, Division of Wildlife Resources land, State Hospital system land, city land, county land, canal company land, and private land. Permanent rights-of-way would be required for the features, and temporary rights-of-way would be required during construction to provide space for equipment operation and staging areas. Some of the National Forest System land that would be required has already been withdrawn by Reclamation for the Diamond Fork System (see Map 1-4). Additional National Forest System land would be withdrawn and some previously withdrawn land would be revoked, as shown on Map 1-4. The withdrawal and revocation of National Forest System lands would be achieved through application to the Bureau of Land Management and a subsequent Public Land Order. If the land withdrawal does not occur, then a Special Use Permit would have to be obtained from the Forest Service prior to construction. If the land is withdrawn before construction commences, the permits with the Forest Service listed in Table 1-37 (see Section 1.9.1) would not be necessary.

1.4.3.1 Permanent Easements

Permanent easements would be obtained from public and private entities to construct and operate the pipelines, transmission line, and power facility features. Permanent easements would range from 20 to 200 feet-wide. Many permanent easements would be obtained within existing road rights-of-way controlled by UDOT, cities and Utah County. New permanent easements ranging from 10 to 120 feet-wide would be purchased or obtained across private land and canal company land as necessary. The land surface would be restored to its pre-existing condition following construction. Prior uses could continue, except for permanent structures or uses that would interfere with pipeline operation and maintenance. Landowners would be compensated for loss of use or opportunity associated with permanent easements. Farmers would be compensated for temporary and permanent losses in crop and orchard production.

1.4.3.2 Temporary Easements

Temporary easements would be obtained from public and private entities to accommodate construction activities. New temporary easements ranging from 10 to 70 feet-wide would be purchased or negotiated with public and private property owners as necessary. New temporary easements for construction staging areas would cover up to 15 acres each. Landowners would be compensated for loss of use or opportunity associated with temporary easements. Farmers would be compensated for temporary losses in crop production.

1.4.4 Pipeline Construction Procedures

The following subsections describe the pipeline construction procedures that would be used to construct each pipeline. Figure 1-7 illustrates the general steps for constructing a buried pipeline. See Section 1.8.8 for descriptions of Standard Operating Procedures (SOPs) During Construction.

1.4.4.1 Construction Sequence

The following sequence would be used to construct pipelines:

- Clear and grade pipeline alignments
- Excavate trench or microtunnel or bore/jack for pipe installation
- Haul pipe to construction sites
- Place pipe along trenches
- Place pipe in trenches and connect pipe
- Backfill trenches and grade surface
- Clean up and restore areas disturbed by construction

1.4.4.2 Clearing and Grading

Clearing would be performed in accordance with the permits and conditions contained in easement agreements with public land managers and private landowners. Vegetation and obstacles would be cleared as necessary to allow safe and efficient use of construction equipment. Debris from right-of-way preparation would be disposed in accordance with any applicable regulations, permits or agreements. Right-of-way grading would be limited to that necessary to provide safe and efficient machinery movement and operation. Topsoil would be stripped where possible and stockpiled for use in site revegetation. Temporary bridges or culverts across creeks on the right-of-way may need to be constructed to provide vehicle safety and to reduce harmful environmental effects. Rights-of-way would be graded to minimize effects on drainage and slope stability. Steep terrain, where the right-of-way must be terraced to provide a level temporary work area, would be restored after construction to approximate original contours. Signs and markers along roads would be temporarily removed during construction and replaced following construction. Cross street and driveway pavements would be cut and temporarily covered during pipeline construction to maintain access.

1.4.4.3 Pipe Trench Excavation

The open trench method would be used for most of the pipeline construction (see Figure 1-8). Trenches would accommodate a range of steel pressure pipelines from 24- up to 84-inches diameter with cover ranging from 3- to 7 -feet. The pipeline trenches would be excavated with crawler-tracked excavators and sloped or shored to meet U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) standards to protect workers from cave-ins. Trench-boxes would be used in areas where trenches could not be sloped or where soils may be unstable for standard excavation techniques. The excavated material would be used for pipe backfill where suitable. Any unsuitable or excess material would be hauled away for disposal in local gravel pits and other existing material disposal sites. Much of the pipeline trench excavation would occur in road and highway shoulders, except in cities where the pipeline trench would be excavated in paved streets and in farmland where the pipeline trench would be excavated in soil. Trenches would be excavated deeper in cities where the pipelines would cross under existing utilities to minimize service disruptions. The maximum length of open pipeline trench would be 500 feet in any one construction area. There may be multiple construction areas along a pipeline. Open trenches would be covered with steel plates during periods when no active construction is occurring.

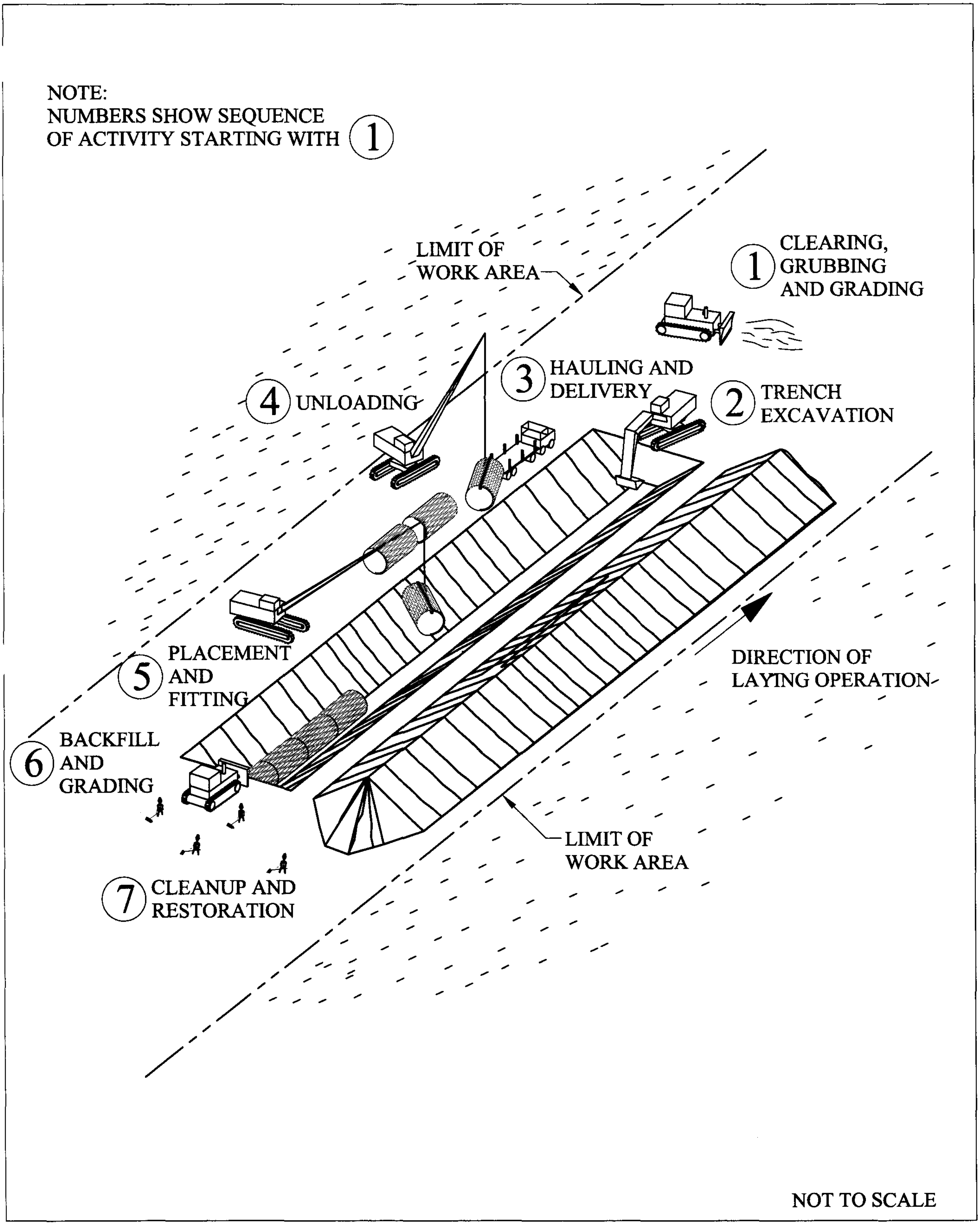


Figure 1-7

Schematic Drawing of Typical Pipeline Construction Procedures

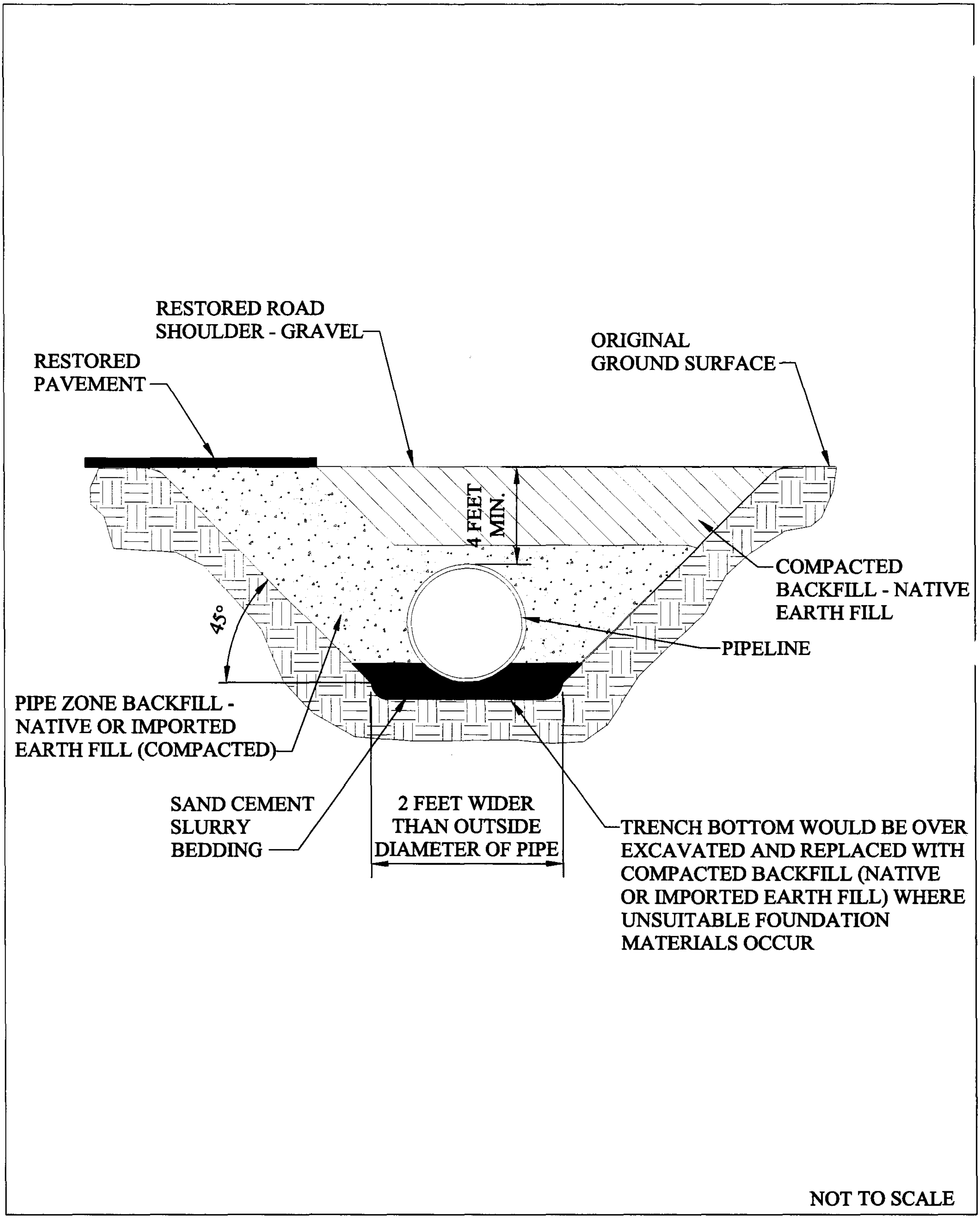


Figure 1-8

Schematic Drawing of Typical Pipe Trench Cross Section

Rippers, jackhammers, blasting or other specialized equipment may be required to excavate rock. Mechanical rippers would be used to excavate rock where appropriate, supplemented by jackhammers. Blasting would be used only in areas away from homes, schools, and businesses. If blasting is required, all blasting operations, including transportation, storage and handling of explosives and blasting materials, would comply with county, state and federal regulations. Blasting permits and authorizations would be obtained from regulatory agencies including the U.S. Bureau of Alcohol, Tobacco and Firearms and OSHA.

The pipe trench excavation technique would be used at all road crossings encountered along the pipeline alignment during construction. Pipe backfill would be heavily compacted all the way to the ground surface or pavement invert at road crossings to prevent the road surface from subsiding under repeated traffic loads during and after construction. Pavement at each road crossing would be restored to a condition better than or equal to existing conditions.

The pipe trench excavation technique would be used along Highway 6 in Spanish Fork Canyon for the Spanish Fork Canyon Pipeline. Figure 1-9 shows a cross section of the pipeline construction in the Highway 6 shoulder.

All canal crossings would be constructed as open cuts using the pipe trench excavation technique during the non-irrigation season. Canal linings excavated for pipe trenches would be restored to a condition better than or equal to existing conditions.

Groundwater encountered in excavated pipeline trenches would be collected and pumped into temporary retention pond or land application system or routed to appropriate storm drains. No turbid water would be discharged into streams or storm drains connected to streams without removing the turbidity to achieve water quality standards. Any water required to be discharged to natural streams would be performed under a UPDES permit.

1.4.4.4 Microtunneling and Bore/Jack Construction

Microtunneling and bore/jack construction techniques involve excavating underground from a jacking pit to a receiving pit to avoid disturbing surface features between the two pits. These techniques would be used to cross under highways, freeways, railroads, rivers, streams and associated wetlands. Microtunneling would be performed for distances up to 500 feet; bore/jack operations would be performed up to 300 feet. Both techniques would require shored and braced pits on each side of the area to be excavated underground. Pit shoring systems would consist of sheet piles with internal bracing or circular steel ribs with liner plates and internal bracing. Each jacking pit would be about 15-feet wide and 50-feet long; receiving pits would be about 10-feet wide and 20-feet long. Effluent from bore/jack and microtunneling would be disposed of in locations approved by the District's Construction Manager.

Microtunneling would be performed using a slurry process involving a microtunneling boring machine, pipe jacking frame set on a thrust block, slurry tanks and pumps, water cooling/jetting tanks and pumps, bentonite lubrication system, and operator station (see Figure 1-10). The laser-guided tunneling system would be operated from the ground surface and require adequate space for the operator station, slurry tanks, water tanks, bentonite lubrication units, a crane, generators and pipe storage. Special containment plans for bore/jack and microtunneling activity would be submitted to the District construction engineer for approval. As the microtunneling progresses, up to 40-foot-long pipes would be lowered into the jacking pit and jacked into the tunneled area following the machine.

Bore/jack operations would be performed using a jacking shield, steel casing, jacking station, hydraulic jacks pushing against steel pressure plates set in a concrete thrust wall (see Figure 1-11). The ground would be excavated at the jacking shield face using power tunneling equipment, excavated muck would be transported to the jacking pit and removed for off-site disposal. This tunneling technique would require adequate surface space for generators and equipment to operate the hydraulic jacks, a crane, access for trucks to haul excavated muck and

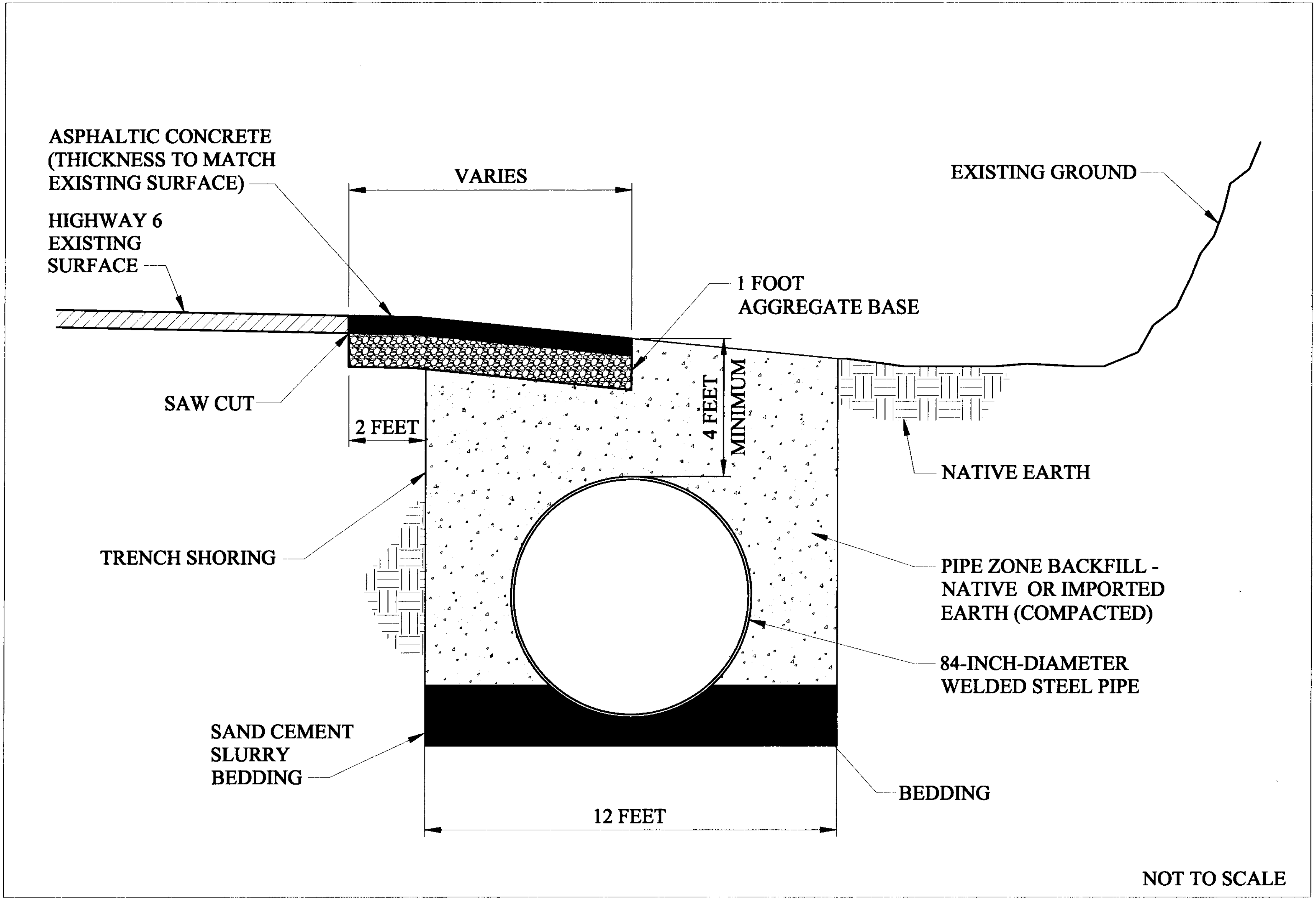


Figure 1-9

Schematic of Pipeline Construct^on in U.S. Highway 6 Shoulder

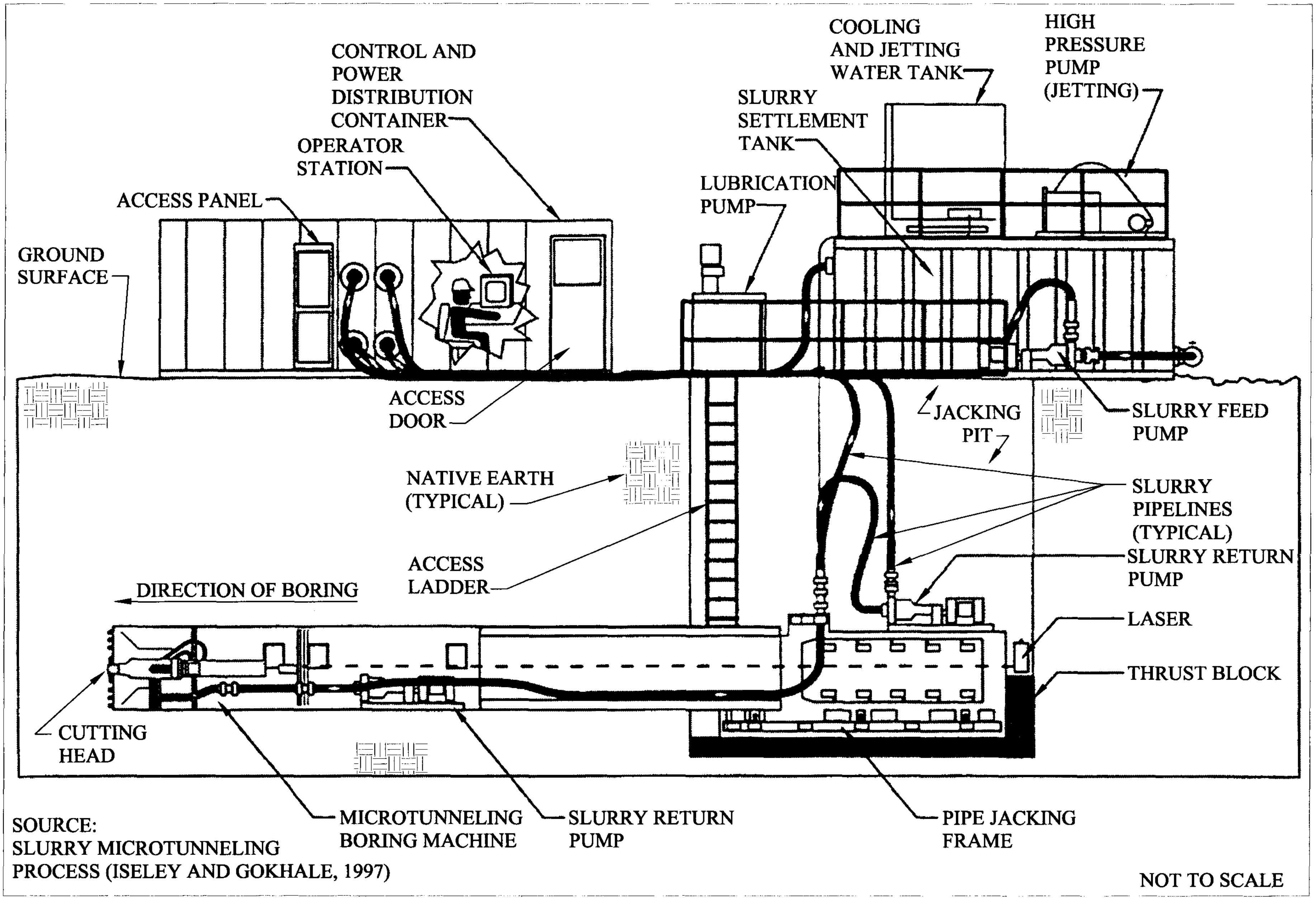
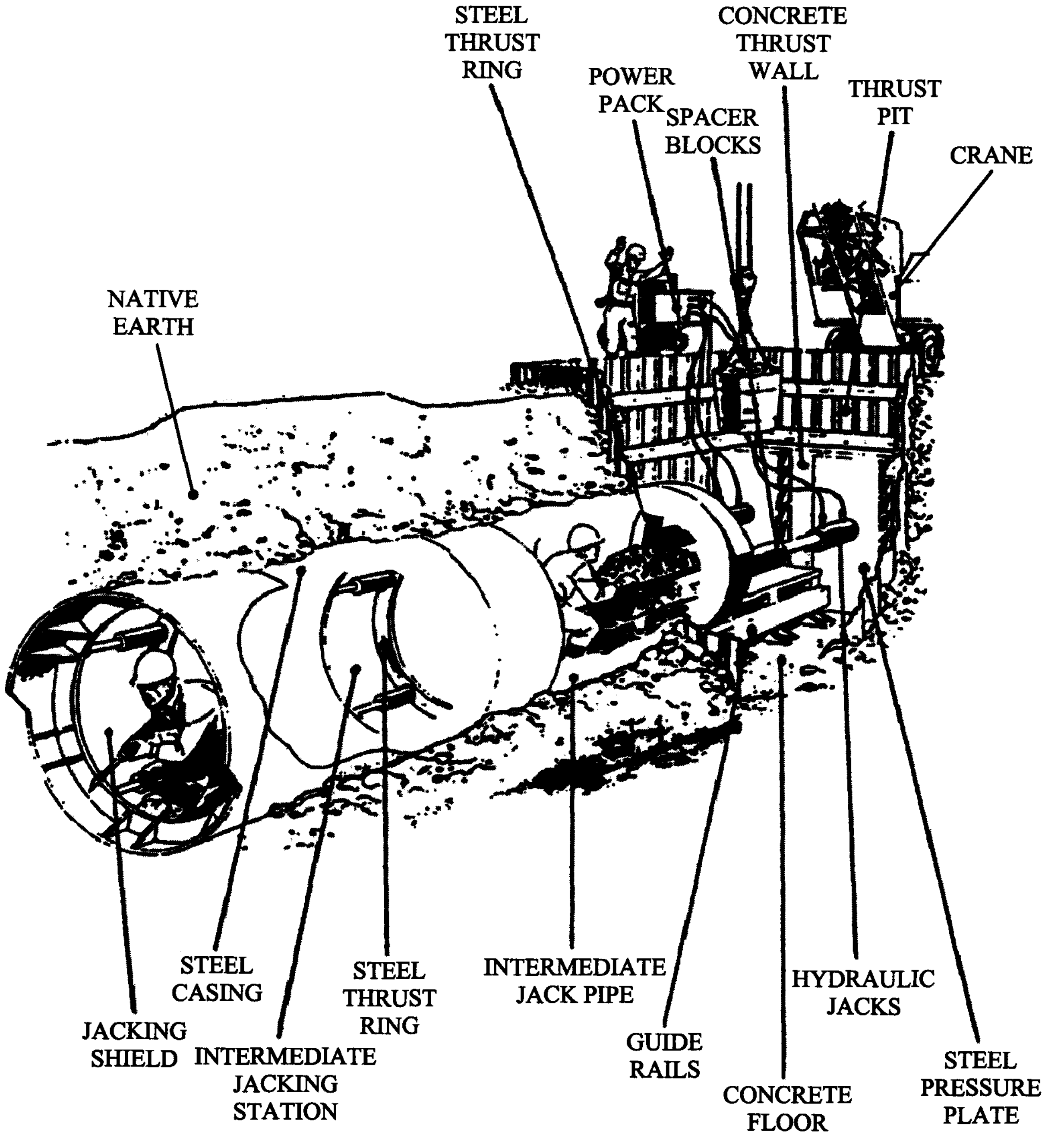


Figure 1-10

Typical Slurry Microtunneling Procedures



(COURTESY OF U.K. PIPE JACKING ASSOCIATION)

NOT TO SCALE

Figure 1-11

Typical Bore and Jack Procedures

ɔipe storage. As the tunneling progresses, up to 40-foot-long pipes would be lowered into the jacking pit and hydraulically jacked into place following the jacking equipment.

Table 1-11 shows the crossings that would be performed by microtunneling or bore/jack construction techniques. The table includes feature name, pipeline milepost, crossing name, and crossing type. Pipeline crossings of highways and Interstate 15 would be scheduled and coordinated with UDOT. Pipeline casings under the highways and interstate would be extended as appropriate to meet UDOT requirements outlined in the construction permit and easement conditions. Figure 1-12 shows a cross section of the Spanish Fork–Santaquin Pipeline bore and jack crossing under Interstate 15. Pipeline crossings of railroads would be scheduled and coordinated with Union Pacific Railroad. Pipeline casings under railroad tracks would be extended as appropriate to meet easement conditions and regulatory agency requirements in the construction permit. Pipeline crossings of streams and rivers would be scheduled and coordinated with appropriate regulatory agencies. Pipeline casings under streams and rivers would be extended as appropriate to meet easement conditions and regulatory agency requirements in the construction permit. Figure 1-13 shows a cross section of the microtunnel crossing of the Spanish Fork–Provo Reservoir Canal Pipeline under the Provo River.

Table 1-11
Pipeline Crossings Constructed by Microtunnel and Bore/Jack Techniques

Feature Name	Pipeline Milepost[1]	Crossing Name	Crossing Technique
Spanish Fork–Santaquin Pipeline	0	U.S. Highway 89	Bore/jack
Spanish Fork–Santaquin Pipeline	0	Railroad Grade	Bore/jack
Spanish Fork–Santaquin Pipeline	0.5	Railroad Grade	Bore/jack
Spanish Fork–Santaquin Pipeline	0.5	U.S. Highway 6	Bore/jack
Spanish Fork–Santaquin Pipeline	1.6	Spanish Fork River	Microtunnel
Spanish Fork–Santaquin Pipeline	9.9	Peteetneet Creek	Bore/jack
Spanish Fork–Santaquin Pipeline	13.2	U.S. Highway 6/State Route 198	Bore/jack
Spanish Fork–Santaquin Pipeline	12.8	Spring Creek	Bore/jack
Spanish Fork–Santaquin Pipeline	13.8	Interstate 15	Bore/jack
Spanish Fork–Santaquin Pipeline	16.5	U.S. Highway 6	Bore/jack
Santaquin–Mona Reservoir Pipeline	0	Railroad Grade	Bore/jack
Spanish Fork–Provo Reservoir Canal Pipeline	4.8	Hobble Creek	Bore/jack
Spanish Fork–Provo Reservoir Canal Pipeline	5.8	Spring Creek	Bore/jack
Spanish Fork–Provo Reservoir Canal Pipeline	17.6	U.S. Highway 189	Bore/jack
Spanish Fork–Provo Reservoir Canal Pipeline	18.5	Provo River	Microtunnel
Spanish Fork–Provo Reservoir Canal Pipeline	18.9	State Route 52	Bore/jack

Notes:
[1]Pipeline mileposts for each feature are shown on Map A-1.

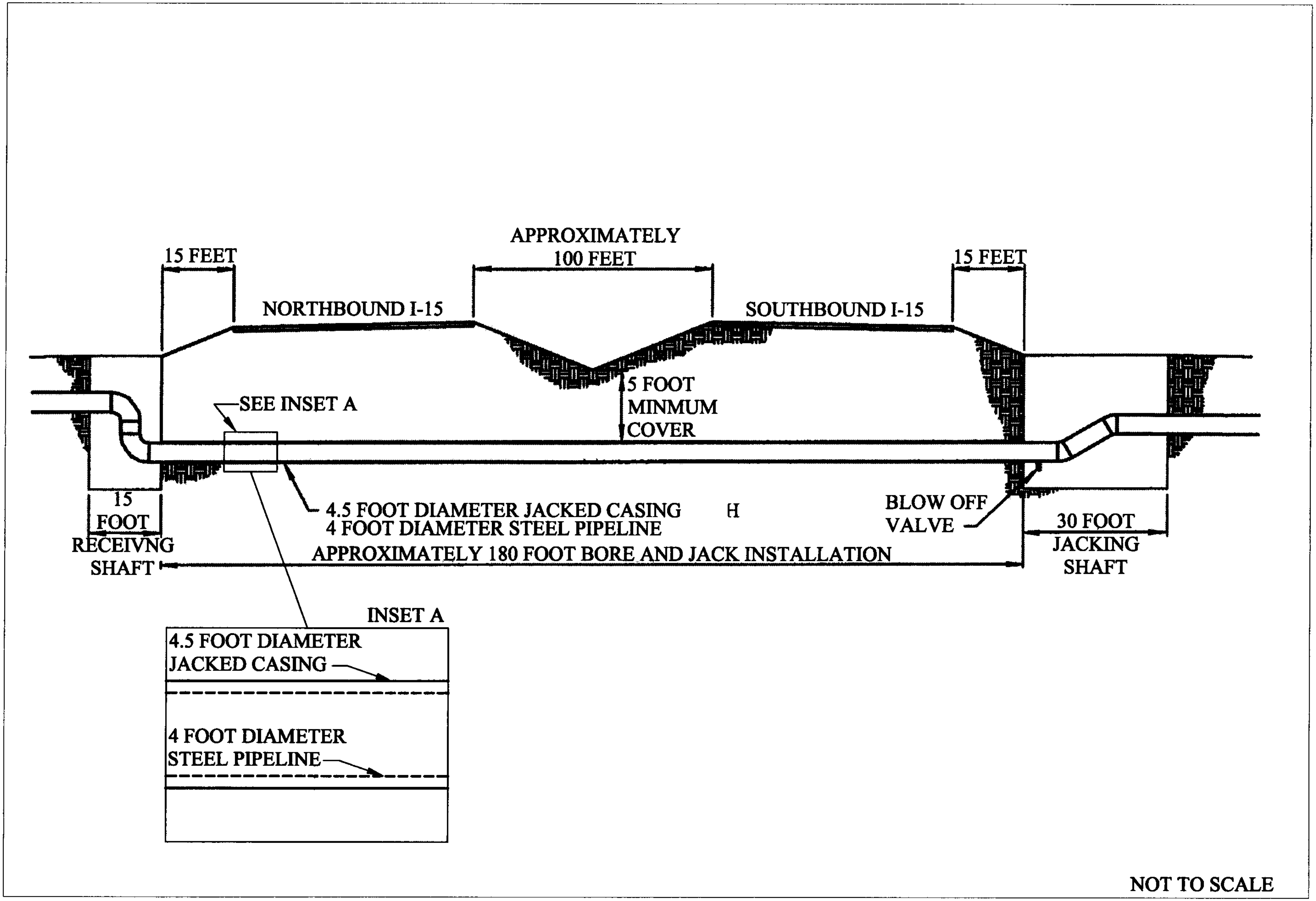


Figure 1-12

Cross Section of I-15 Bore and Jack Crossing

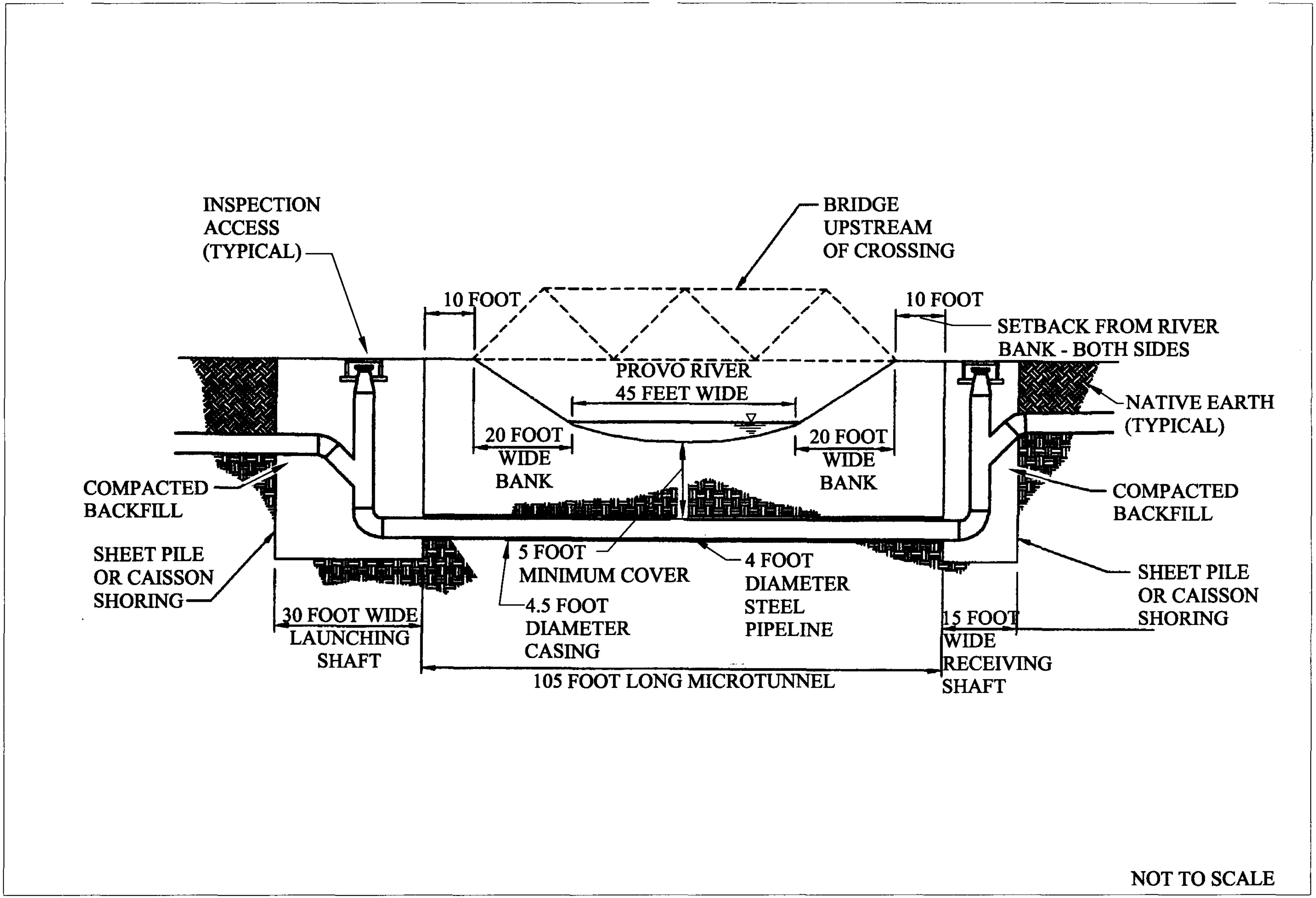


Figure 1-13

Cross Section of Microtunnel Crossing of Spanish Fork - Provo Reservoir Canal Pipeline Under the Provo River

Groundwater may be encountered using microtunneling and jack/bore techniques. Dewatering would be an important design consideration and could involve portable pumps to extract groundwater, cut-offs to isolate groundwater from the construction areas, ground freezing to temporarily immobilize the water, or other groundwater management measures. All groundwater would be disposed in compliance with regulatory requirements. Any groundwater discharges to natural streams would be performed under a UPDES permit.

1.4.4.5 Pipe Installation

The steel, concrete-coated and mortar-lined pipe would be shipped from the manufacturer by truck in lengths up to 40 feet and unloaded by crane along the within the construction work area or in the nearest designated construction staging area for temporary storage. Pipe would transported from the staging area to the work site by flatbed truck and unloaded by crane (see Figure 1-7).

Pipe would be installed in lengths up to 40 feet. Pipe bedding and special backfill material would be imported from existing commercial sources. Trench excavation for the five pipelines would produce an estimated 1,075,300 cubic yards of earth and rock material, some of which would be replaced as backfill and some would be disposed in local gravel pits and other existing disposal facilities. Suitable topsoil and native earth stockpiled from the trench excavation would be retained on site for surface restoration. Figure 1-14 shows a plan view of the typical pipeline construction area with earth stockpiles, requiring a 100-foot-wide work area. Figure 1-15 shows a plan view of a restricted pipeline construction area with spoil removal by truck, requiring a 60-foot wide work area.

Pipe would be placed in the excavated trench by crane and connected to previously laid sections by pushing it into place on temporary supports for alignment and welding the pipes together. Protective coating would be applied to each weld after it is inspected. Cathodic protection consisting of test stations, anode beds, rectifiers, or impressed current facilities would be installed to further protect the pipeline from corrosive soil conditions. After the pipe sections are connected, sand cement slurry would be carefully placed around the pipe and allowed to cure to form a secure bed for the pipe. Imported pipe bedding material would be placed around the remainder of the pipeline and over the concrete slurry bed (see Figure 1-8). The bedding material would be compacted to 90 percent in undeveloped areas and 95 percent in developed areas subject to traffic and other human uses. The bedding material would be mechanically compacted with a vibratory compactor. Mechanical compaction would be used near the ground surface along roadways. All pipeline backfill and bedding would be subject to quality control testing to meet compaction specifications.

Following pipeline installation, the contractor would remove all debris. Excess backfill material would be removed and disposed in an approved site. Stockpiled topsoil would be spread evenly over the work area and revegetated if the work area was previously vegetated.

1.4.4.6 Utility Relocations

Pipeline construction along highways and city streets would involve crossing various types of utilities (water, sewer, and gas pipelines, buried communications lines, underground power cables, etc.). The pipeline trenches would be excavated deeper where possible to cross under existing utilities. However, some utilities would have to be relocated to maintain consistent pipeline grades. Where necessary, existing utilities would be relocated before the start of pipeline construction to minimize service interruptions. The District's construction contractor would coordinate relocations directly with the utility companies. Potentially affected residents and businesses would be notified thirty days in advance of utility relocations that would temporarily disrupt service.

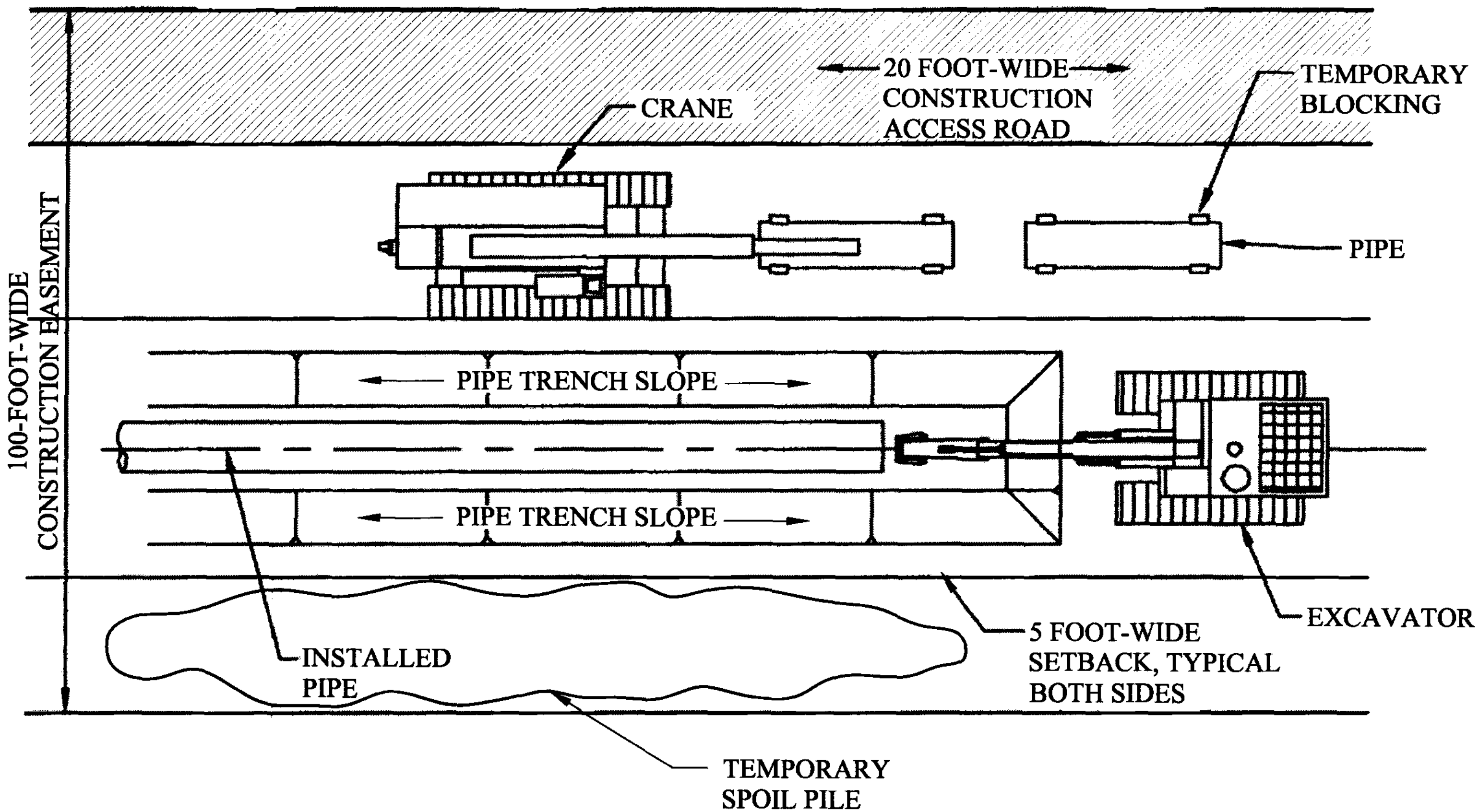


Figure 1-14

Plan View of Typical Pipeline Construction Work Area with 100-Foot Construction Easement

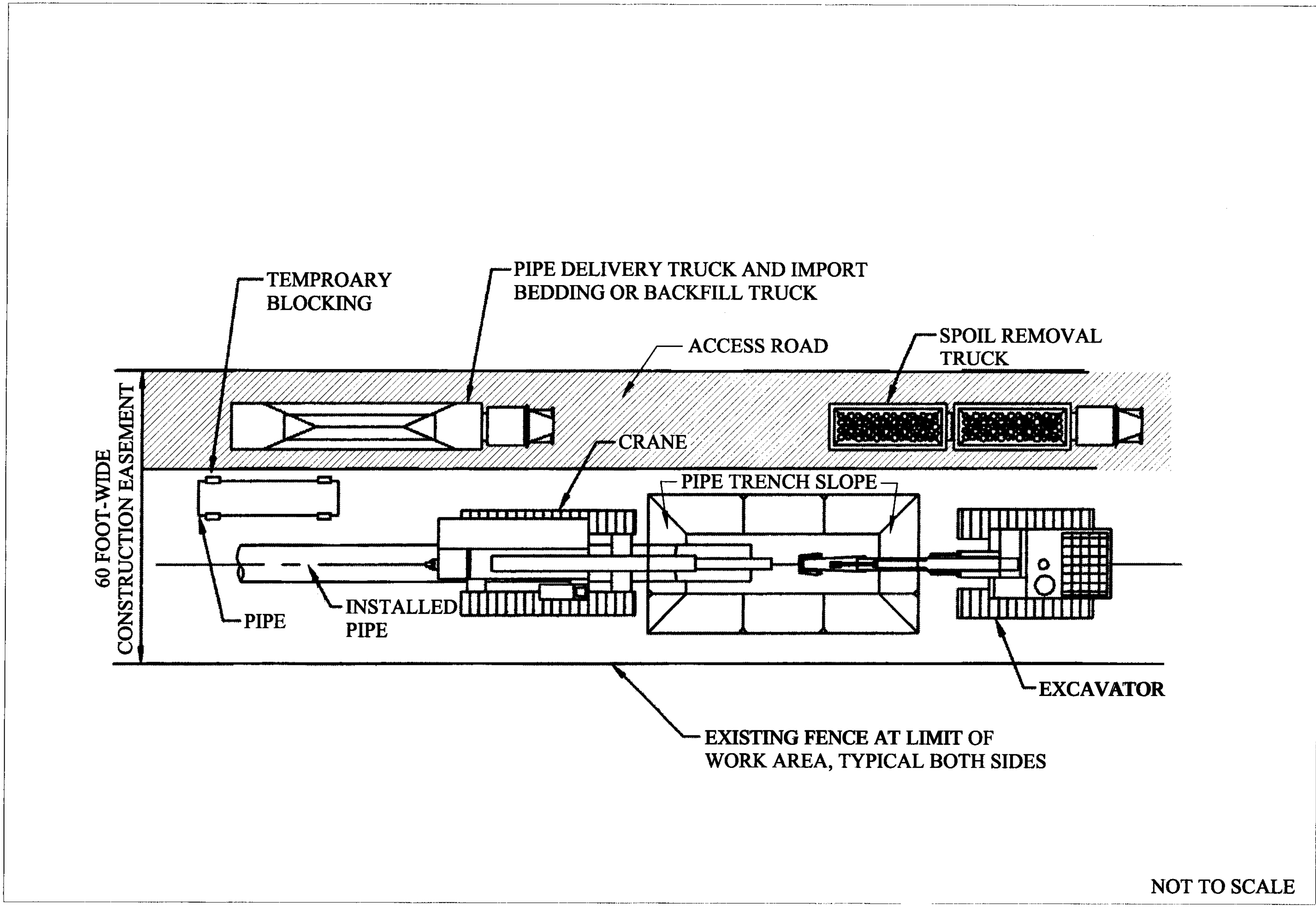


Figure 1-15

Plan View of Restricted Pipeline Construction Work Area with 60-Foot Construction Easement

1.4.4.7 Street and Property Restoration

Portions of streets excavated to install pipelines would be compacted and the pavement would be restored to a condition equal to or better than the pre-construction condition. All surplus construction material and debris would be removed and disposed in facilities approved by the District. Curbs, gutters and sidewalks would be restored to a condition equal to or better than the pre-construction condition.

Private property that may be affected by the construction could include driveways, fences, gates, curbs, gutters, survey monuments, lawns and landscaping, and other vegetated areas. All private property affected by pipeline construction would be restored to a condition equal to or better than the pre-construction condition. Lands with orchards would be restricted from replanting trees over the pipeline; other vegetation would be planted in these areas. Land contours would be restored to original conditions as possible. Landscaped areas would be prepared with soil amendments in consultation with the landowners. Owners of private property disturbed by the construction would be given the option to be compensated for private property restoration as part of the right-of-way acquisition.

Pipeline markers would be installed at fence lines, river and stream crossings, road crossings, and other designated locations. The markers would identify the pipeline operator and telephone numbers for emergencies and public inquiries.

1.4.4.8 Quality Control Procedures

After backfill and all construction work is completed, the contractor would provide quality control of pipeline construction through visual inspection and hydrostatic testing. Pressure would be developed for hydrotesting through contractor-supplied pumps to make sure that the system operates to design specifications. If the pipeline leaks, it would be repaired and re-tested until it meets specifications. Test segment lengths would be determined by topography and availability of water through agreements consistent with federal, state and local regulations and codes. After testing a segment, the water may be pumped into the next segment for testing or released into turnouts and drains for disposal in accordance with water quality regulations.

1.4.5 Power Facility Construction Procedures

The following subsections describe the construction procedures that would be used to construct each power facility. Access for power facility construction would require the road to the Diamond Fork facility to be open in the winter for construction traffic and for safety reasons would be closed to the public during this construction period. The construction of the Sixth Water Power Facility would require the Rays Valley road to the turnoff to Sixth Water to be open in winter but would not restrict public access. Construction of these facilities is estimated to take two years.

1.4.5.1 Construction Sequence

The following sequence would be used to construct each power station.

- Clear and grade the power station site
- Excavate foot print of powerhouse down to foundation level
- Excavate the trench for the steel pipe connecting the municipal and industrial pipeline to the powerhouse
- Excavate foot print of tailrace chamber down to the foundation level
- Construct powerhouse building and tailrace chamber;
- Install steel pipe in trench

- Install electrical and mechanical equipment in powerhouse
- Make electrical connections
- Backfill, grade and pave
- Clean up and restore areas disturbed by construction

1.4.5.2 Clearing and Grading

Clearing would be performed in accordance with the permits and conditions contained in agreements with public land managers. Vegetation and obstacles would be cleared as necessary to allow for safe and efficient use of construction equipment. Cleared debris would be disposed in an approved disposal site in accordance with applicable regulations, permits or agreements. Topsoil would be stripped and stockpiled for use in site revegetation. Grading beyond the limits of the permanent power facility site would be limited to that necessary to provide safe and efficient machinery movement and operation and to provide adequate storage area for materials and equipment during construction.

Excavation of existing slopes would be accomplished using backhoes, bulldozers, rippers and/or controlled blasting according to the material being excavated. Material suitable for use as backfill would be stockpiled adjacent to the site. Unsuitable or excess material would be hauled to a local gravel pit or other existing disposal area.

1.4.5.3 Power Facility Structures

The entire power facility area would be fenced, including the powerhouse, tailrace chamber and alignment of the connecting steel pipe. Foundation excavation for the powerhouse structure and tailrace chamber would be accomplished using excavators, rippers or controlled blasting according to the material being excavated. Excavations would be sloped or shored to meet OSHA standards and protect workers. Material suitable for use as backfill would be stockpiled adjacent to the powerhouse site. Unsuitable or excess material would be hauled to a local gravel pit or other existing disposal area.

Rippers, jackhammers, blasting or other specialized equipment may be required to excavate rock. Mechanical rippers would be used to excavate rock where appropriate, supplemented by jackhammers. Blasting would be used only in areas away from homes, schools, and businesses. If blasting is required, all blasting operations, including transportation, storage and handling of explosives and blasting materials, would comply with county, state and federal regulations. Blasting permits and authorizations would be obtained from regulatory agencies including the U.S. Bureau of Alcohol, Tobacco and Firearms and OSHA.

Groundwater encountered in the excavated area would be collected and temporarily stored in holding ponds. No turbid water would be discharged into streams or storm drains connected to streams without removing the turbidity to achieve water quality standards. Any water required to be discharged to natural streams would be performed under a UPDES permit.

After the tailrace chamber excavation is completed, a thin layer of lean concrete would be placed over the entire foundation area, and the foundation slab forms and reinforcement steel would be installed. The foundation slab concrete would be placed, allowed to cure and the forms stripped. The walls would be completed by the same construction process.

Steel pipe would be installed to connect the power facility to the Diamond Fork System pipeline. The connecting pipe would be relatively short (less than 150 ft) and would be installed in a trench excavated by the open trench method described in Section 1.4.4.3.

1.4.5.4 Power Facility Buildings

A concrete powerhouse building would be constructed at each site to house the power generation facility. After completing the foundation excavation, a thin layer of lean concrete would be placed over the entire foundation area, forms would be constructed, and steel reinforcement would be placed for the equipment foundations. The foundation concrete would be placed, allowed to cure and the forms stripped. The slab-on-grade would be completed by the same process, followed by construction of the walls and columns. All concrete would be obtained from a local supplier and a concrete mix truck would be used to transport it to the site. A concrete pump truck would be required to place all concrete. A split-face concrete masonry veneer would be constructed on the three sides of the building that would be visible from Diamond Fork Road. The masonry veneer texture and color(s) would be selected to blend with surrounding colors and textures in the landscape. The purpose of the architectural veneer finish would be to reduce the visual impact of the structure. The mezzanine framing would be erected with a metal deck welded in place. Concrete would be placed over the metal deck. The roof framing would be bolted in place after the concrete work is complete. A metal deck would be welded in place and concrete would be placed on the deck to construct the roof. A roof hatch or bridge crane, louvers, doors and insulation would be installed to complete the building. Following completion of the concrete work, the contractor would remove all construction debris. Excess backfill material would be removed and disposed in an approved site. Power facility construction sites would be cleaned up and restored with natural vegetation. Non-road surfaces would be graded and ripped, and seeded with perennial grasses.

1.4.5.5 Electrical and Mechanical Equipment Installation

Equipment installation in the powerhouse building would start with the embedded parts for the turbine spiral case/distributor and the steel lining for the turbine wheel pit liner (the latter is applicable to Pelton-type turbines). These embedded parts would be installed and concreted in the first stage concrete. In addition, an overhead traveling crane would be installed in the Sixth Water powerhouse upon completion of the first stage concrete (including the roof installation).

Trucks would be used to transport the electrical and mechanical equipment to the powerhouse site in their factory packaging boxes. Cranes would be used to unload the equipment from the trucks on to the unloading bay in the powerhouse. The equipment would be assembled in the powerhouse and installed using mobile cranes, except in the case of Sixth Water Power Facility where the overhead traveling crane would be used instead. Electrical equipment installation in the powerhouse would require a dust free environment, particularly in the case of the generator and electrical panels. Therefore, electrical equipment installation would start after all first stage concrete has been finished and the powerhouse doors and windows have been installed.

1.4.5.6 Electrical Connections and Controls

A step up transformer would be installed in a fenced substation adjacent to the powerhouse, which would contain the high voltage switchgear and an emergency diesel generator. The step up transformer would be connected by an isolated phase-bus to the electrical generator installed in the powerhouse by an isolated phase-bus. The substation associated with the Upper Diamond Fork power station would not require a step up transformer given that this power station would be connected with the transformer in the substation at the Sixth Water power station by a medium voltage cable. Therefore, no main power transformer would be necessary at the Upper Diamond Fork substation.

1.4.5.7 Quality Control Procedures

Quality control for turbines, turbine inlet valves, generators, step up transformers, and other equipment would include factory inspection and testing during and after the manufacturing process by the construction manager or a third-party inspector. Additional testing would be conducted after installation of the equipment and during start-up.

Quality control for the concrete would include material certification for the cement, aggregate and additives, laboratory testing of a trial batch and inspection of excavations, formwork and reinforcing steel prior to placement of the concrete by the construction manager or a third-party inspector. During placement of the concrete, testing would be performed to determine the amount of entrained air and cylinders would be placed for compression tests to be performed at 7, 14 and 28 days.

Quality control for structural steel would include material certification for all steel, welders certification for all welders working on the job and spot testing of both welded and bolted connections by a third party inspector.

Quality control procedures for the piping can be found in Section 1.4.4.8 of this chapter.

1.4.6 Transmission Line Construction Procedures

The following subsections describe the transmission line construction procedures that would be used to construct each transmission line. Figure 1-16 shows a plan view of a typical 138 kV transmission line work area with vehicle access. Figure 1-17 shows a plan view of a typical 138 kV transmission line work area without vehicle access.

1.4.6.1 Construction Sequence

The following sequence would be used to construct each overhead transmission line.

- Locate and Stake Line
- Clear Right-of-Way and Vehicle Access
- Install Pole Footings
- Erect Transmission Poles
- String and Sag Line Conductors
- Clip In Conductors and Shield Wires
- Restore Site

1.4.6.2 Overhead Transmission Lines

1.4.6.2.1 Locate and Stake Line. The transmission line route would be surveyed after the line alignment is finalized. The survey would be used to develop plan and profile drawings and determine the exact pole positions. A narrow strip of land would be cleared along the transmission centerline to locate and drive stakes in the pole positions. The clearing would involve cutting and trimming brush and trees.

1.4.6.2.2 Clear Right-of-Way and Vehicle Access. The right-of-way would be cleared of all obstructions that would interfere with transmission line operation. Natural vegetation clearing would be limited. A strip of land would be cleared on each side of transmission centerline by cutting and/or trimming the trees and brush. All trees and brush would be cut 3 inches or less from the ground line to enable truck and tractor passage. The cut trees and brush would be disposed of by chipping and spreading, or hauling away. The right-of-way would be treated with chemical spray to retard the growth of brush or trees that could endanger the operation of the transmission line.

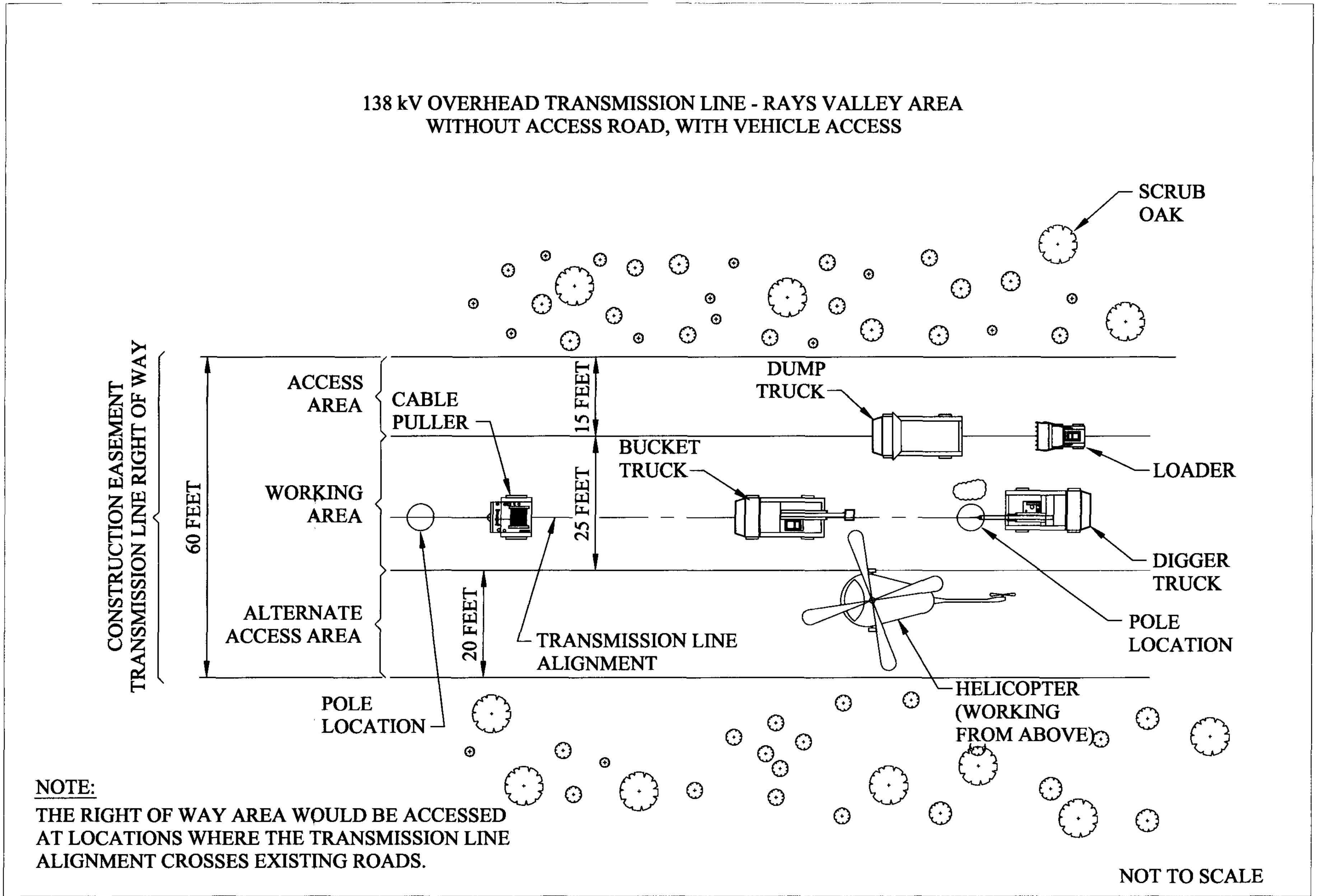


Figure 1-16

Plan View of Typical 138 kV Transmission Line Construction Work Area With Vehicle Access

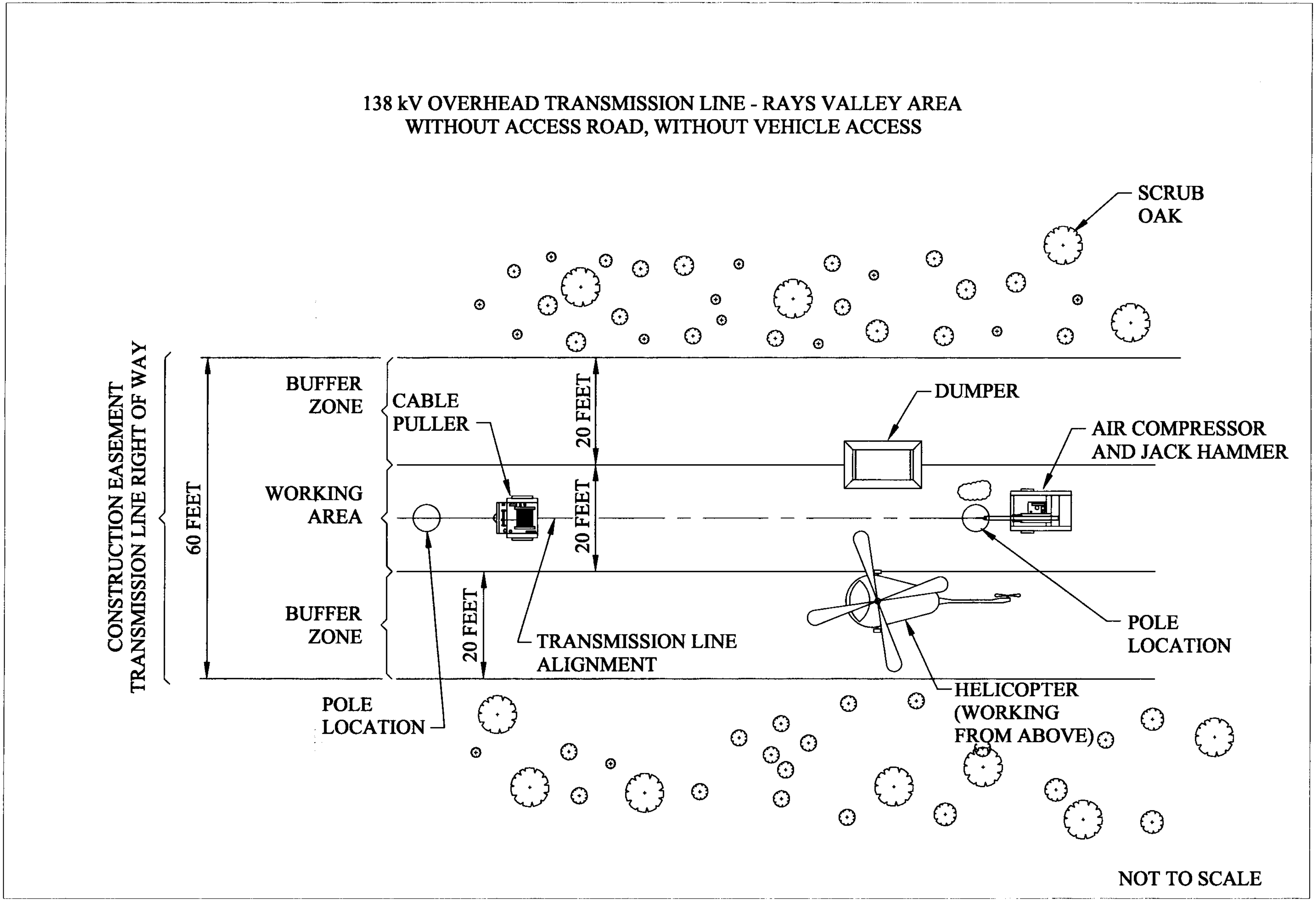


Figure 1-17

Plan View of Typical 138 kV Transmission Line Construction Work Area Without Vehicle Access

1.4.6.2.3 Install Pole Footings. All topsoil would be removed prior to grading the pole footing area. Pole sites would be graded to a slope not steeper than 3 feet horizontal to 1 foot vertical. Footing excavations would be braced and shored to guard against movement or settlement of adjacent structures, roadways or utilities. Concrete would be transported to each footing site by truck or helicopter to remote sites with no road access. The concrete would be consolidated using high-frequency internal vibrations and hand-spading and rodding during placement. The topsoil would be replaced after the pole foundation and footing areas are backfilled. Any excess graded material would be removed from the right-of-way.

1.4.6.2.4 Erect Transmission Poles. The steel poles would be fabricated in a factory and shipped to the transmission line staging area in sections. The sections would be bolted together at the staging area. A helicopter would be used to transport and erect the steel poles on the pole foundations. Ground crews would guide the poles onto the foundation bolts and bolt them down.

1.4.6.2.5 String and Sag Line Conductors. The wire reels would be mounted on a vehicle and would be free to rotate. The ends of the conductors would be fastened to a pole or other fixed object. The vehicle would be slowly driven along the line route, allowing the conductors to unwind as the reels are moved forward.

The conductor installation would require linemen to install conductor stringing blocks on the transmission-line insulator strings to permit pulling the conductor under tension. The sheaves on the stringing blocks would be lined with a conductive-type neoprene to protect the phase conductor. The conductive neoprene lining of the stringing block would allow the conductor to be effectively grounded by a jumper from the stringing block to a ground wire on the metal pole. Effectively grounded stringing blocks would eliminate induced, static, or impulse voltages that could be present during construction.

As the linemen install the stringing blocks on the insulators, they would place a lightweight rope called a finger line over the traveler, which would be used to pull the pilot line through the traveler from the ground. The conductor reels, tensioners, and pulling machines would be in the same line before pulling the conductor.

Sagging operations would be completed after the conductor stringing is completed to establish the proper conductor tension for the ambient conditions. The correct conductor tension and sag for various sag or control spans would be specified for the transmission line construction to provide proper clearances. The weather conditions, including temperature and wind velocity, would be considered to complete the process. Sag sections would be selected before the operations are started, and they would not be longer than 4.5 miles.

The conductor sag would be determined by timing the mechanical wave returns with a standard stopwatch and converting the time measured to sag using a mathematical equation.

1.4.6.2.6 Clip in Conductors and Shield Wires. Conductors and shield wires would be clipped in after the sagging is completed. In all cases the conductors and static wires, or ground wires, would be clipped in within 2 days after the sagging is completed. This task would be performed using bucket trucks.

1.4.6.2.7 Restore Site. All construction-disturbed areas, with the exception of farmland under cultivation and any other designated areas, would be stabilized as follows unless the property owner and transmission line owner specify a different method.

- The subsoil would be loosened to a minimum depth of 6 inches if possible and worked to remove unnatural ridges and depressions.
- If needed, appropriate soil amendments would be added.
- All disturbed areas would be seeded to promote growth of perennial natural vegetation.

1.4.6.3 Power Substation

The power substation would be constructed as a transmission substation that would serve as an interconnection and switching point for transmission and sub-transmission circuits. The construction would begin with site excavation and grading, fencing, and foundation trench work for connection supports, current and voltage transformers, switching devices, cable trenches and below-grade conduits. Concrete would be placed in the foundation areas resulting in a slab-on-grade. Structural steel would be installed including connection supports, switching device supports, and steel towers. Insulators, connection tubing, and fittings would be installed, followed by a lightning protection system consisting of masts and shielding wires. Small enclosures would be installed on the concrete slab to protect specific equipment and instruments. Insulated power cables and control and instrumentation cables would be pulled through the conduits and connected. Instruments would be installed for monitoring the substation load and circuits. An outdoor lighting system would be installed around the substation. A grounding system consisting of cables and rods would be installed to ground the substation to the site. The completed substation would have a gravel access road and the fenced area surrounding the substation pad and equipment would have a gravel surface.

1.4.6.4 Quality Control Procedures

Quality control for switching devices, transformers, instruments, and other equipment would include factory inspection and testing by the construction manager or a third-party inspector during and after the manufacturing process. Additional testing would be conducted after the electrical equipment and cables are installed and during start-up.

Quality control for the concrete would include material certification for the cement, aggregate and additives, laboratory testing of a trial batch and inspection by the construction manager or a third-party inspector of excavations, formwork and reinforcing steel prior to concrete placement. Testing would be performed during concrete placement to determine the amount of entrained air. Cylinders would be prepared for compression tests performed at 7, 14 and 28 days after concrete placement.

Quality control for structural steel would include material certification for all steel, welder's certification for all welders working on the job, and spot testing of welded and bolted connections by a third-party inspector.

1.4.7 Access Roads

Existing and new roads would provide access to proposed construction sites (see Map A-1). The following sections describe the access roads for each feature.

1.4.7.1 Pipeline Access Roads

Existing roads would be used where possible to provide access to pipeline construction areas, except where pipelines would cross open or farmed land. Temporary construction access roads would be built parallel and adjacent to the pipeline alignment within the right-of-way where existing roads do not exist.

The Spanish Fork Canyon Pipeline would be accessed directly from Highway 6. The Spanish Fork–Santaquin Pipeline would be accessed from existing roads along the pipeline alignment (see Table 1-12). Temporary construction access roads would be built where needed. The Santaquin–Mona Reservoir Pipeline would be accessed from existing dirt roads parallel to the Union Pacific Railroad tracks. The Mapleton–Springville Lateral Pipeline would be accessed from the road along the Mapleton Lateral and roads that cross the canal. The Spanish Fork–Provo Reservoir Canal Pipeline would be accessed from existing roads along the pipeline alignment (see Table 1-13). Temporary construction access roads would be built parallel to the pipeline within the right of way across the State Hospital property, Rock Canyon Park, and other lands as needed in Provo and Orem.

Table 1-12
Construction Access Roads for the Spanish Fork–Santaquin Pipeline

City or County	Road Name
Spanish Fork	Powerhouse Road
Spanish Fork	River Bottoms Road
Spanish Fork	8800 South
Utah County	800 East
Utah County	9600 South
Utah County	9650 South
Utah County	400 East
Utah County	9800 South
Salem	Salem Canal Road
Utah County	Salem Canal Road
Payson	700 South
Payson	East Main Street
Payson	1400 South
Payson	Highway 6/State Route 198
Utah County	Highway 6/State Route 198
Utah County	12800 South

Table 1-13
Construction Access Roads for the Spanish Fork–Provo Reservoir Canal Pipeline

City or County	Road Name
Spanish Fork	Highway 89
Mapleton	Highway 89
Springville	Highway 89
Springville	400 East
Springville	1400 North
Provo	Highway 89
Provo	Slate Canyon Drive
Provo	300 South
Provo	Seven Peaks Boulevard
Provo	4800 North
Provo	Highway 189
Provo	1450 East
Provo	Foothill Drive
Provo	Iroquois Drive
Provo	Piute Drive
Provo	4525 North
Provo	5600 North
Provo	Heritage Drive
Orem	State Route 52/800 North

1.4.7.2 Power Facility Access Roads

Existing roads would provide construction access to the Sixth Water Power Facility and Upper Diamond Fork Power Facility. The Sixth Water Power Facility would be accessed from Highway 6, along Sheep Creek–Rays Valley Road to the existing unpaved maintenance road to the Sixth Water Flow Control Structure. The Upper Diamond Fork Power Facility would be accessed from Highway 6, along Diamond Fork Road past Three Forks to the unpaved access road into the Upper Diamond Fork Flow Control Structure. No improvements would need to be made on any existing access roads for power facility construction.

1.4.7.3 Transmission Line Access Roads

Existing roads would provide construction access for the Sixth Water Transmission Line upgrade. The transmission line would be accessed from Highway 6 and the Sheep Creek–Rays Valley Road and along a short unpaved access road to the upper end of the Sixth Water Shaft. Portions of the transmission line and about 55 new power pole sites would be accessed directly from the Sheep Creek–Rays Valley Road, the unpaved road, and overland access for short distances from the existing roads. A helicopter would be used for construction access along remote sections of the transmission line and about 45 new power pole sites that cannot be reached easily from existing roads. All of the transmission poles would be transported to foundation sites and installed by helicopter.

1.4.8 Construction Staging Area Locations

Four primary construction staging area locations would be utilized for the Proposed Action (see Map A-1). These fenced staging areas would be needed to provide parking space for vehicles and equipment, storage for construction materials and fuel, space for equipment maintenance, reporting locations for workers and construction management offices. The following sections briefly describe the construction staging area locations.

1.4.8.1 Syar Tunnel Staging Area

The Syar Tunnel Staging Area is a previously used staging area that would cover about 2 acres near the Syar Tunnel Outlet. The proposed site was used as a construction staging area for the Syar Tunnel, Sixth Water Aqueduct and Flow Control Structure, and the Sixth Water Shaft. This site would be used for staging construction of the Sixth Water Power Facility and Transmission Line. This site was analyzed in the 1999 Diamond Fork System FS-FEIS and is not included in the ULS impact analysis. The site is still being used for Diamond Fork System construction staging and has not been restored to pre-disturbance conditions.

1.4.8.2 Upper Diamond Fork Staging Area

The Upper Diamond Fork Staging Area is a previously used staging area that would cover about 2 acres immediately southwest of the Diamond Fork Bridge. The proposed site is an existing construction staging area for the Tanner Ridge Tunnel, Upper Diamond Fork Pipeline, Upper Diamond Fork Flow Control Structure, and Upper Diamond Fork Shaft and would continue to be used in conjunction with the proposed construction of the ULS project. This site would be used for staging construction of the Upper Diamond Fork Power Facility. This site was analyzed in the 1999 Diamond Fork System FS-FEIS and is not included in the ULS impact analysis.

1.4.8.3 Spanish Fork Canyon Staging Area

The Spanish Fork Canyon Staging Area would cover about 11.5 acres near the intersection of Highway 6 and Highway 89. The proposed site is a former gravel pit located along the south boundary of Section 27 and would e accessed from Highway 89. This site would be used for staging construction of the Spanish Fork–Santaquin Pipeline, Mapleton–Springville Lateral Pipeline, and Spanish Fork–Provo Reservoir Canal Pipeline.

1.4.8.4 Santaquin Staging Area

The Santaquin Staging Area would cover about 7.9 acres along 5950 West and the Union Pacific Railroad tracks within the Santaquin City limits. The proposed site is an existing agricultural area located near the center of Section 35 and would be accessed from Highway 6 in Santaquin, 300 West, 550 North, 350 West and 5950 West. This site would be used to stage construction of the Spanish Fork–Santaquin Pipeline and Santaquin–Mona Reservoir Pipeline.

1.4.9 Water Sources

ULS water sources would consist of transbasin diversion water stored in Strawberry Reservoir, District water rights in Utah Lake to be acquired by DOI, return flows of Bonneville Unit M&I water, and conserved water developed from features of the ULS project and Section 207 projects. The following sections describe the ULS water sources.

1.4.9.1 Transbasin Diversion

ULS water deliveries would consist of a transbasin diversion from Strawberry Reservoir in the Strawberry River drainage basin for conveyance through the Syar Tunnel and Sixth Water Aqueduct into the Diamond Fork System to the Utah Lake drainage basin (Figure 1-18). An average of 101,900 acre-feet of Bonneville Unit water would be conveyed from Strawberry Reservoir each year, with an average of about 93,127 acre-feet flowing through the Syar Tunnel, and approximately 8,773 acre-feet flowing through the Strawberry Tunnel to provide in-stream flows in Upper Sixth Water and Diamond Fork creeks. The annual transbasin diversion would include 61,000 acre-feet of SVP water and an average 101,900 acre-feet of Bonneville Unit water for a total diversion of 162,900 acre-feet. The SVP water is delivered to farmers for irrigation, to cities for outside irrigation use, and used for incidental power generation in southern Utah County.

Of the average 101,900 acre-feet: 30,000 acre-feet of M&I water would be delivered into Salt Lake County; 30,000 acre-feet of M&I water would be delivered to SUVMWA member cities in southern Utah County, who would assign about 3,000 acre-feet to DOI for in-stream flows; 1,590 acre-feet has already been contracted for by the SUVMWA, of which 1,000 acre-feet has been assigned for in-stream flows; and 40,310 acre-feet, minus conveyance losses, would be delivered to Utah Lake for exchange to Jordanelle Reservoir under the M&I system. Of the 40,310 acre-feet, about 16,273 acre-feet would be released down the Spanish Fork River during the winter months, an average of 16,000 acre-feet would be conveyed through new pipelines to the lower Provo River to assist in meeting in-stream flows, and about 8,037 acre-feet would be conveyed to Hobble Creek to assist in the recovery of the June sucker.

Approximately 84,510 acre-feet would be required in Utah Lake to complete the exchange to Jordanelle Reservoir. This includes: 40,310 acre-feet that would be released from Strawberry Reservoir as described above; 9,660 acre-feet of Bonneville Unit water return flows to Utah Lake; and DOI acquiring the District's secondary water rights in Utah Lake to yield a firm average annual of at least 34,540 acre-feet. The exchanged water would be stored in Jordanelle Reservoir for M&I delivery to Salt Lake County and northern Utah County under existing contracts.

The following water quantities would comprise the Bonneville Unit transbasin diversion:

- 30,000 acre-feet of Bonneville Unit M&I water to Salt Lake County
- 30,000 acre-feet of Bonneville Unit M&I water to southern Utah County
- 1,590 acre-feet M&I water already contracted to southern Utah County cities
- 40,310 acre-feet of Bonneville Unit M&I water to Utah Lake for exchange to Jordanelle Reservoir

101,900 acre-feet total Bonneville Unit transbasin diversion

1.4.9.2 District Water Rights

The District owns primary and secondary water rights in Utah Lake. Under the Proposed Action, the DOI would acquire all of the District's secondary rights. These rights would amount to 57,073 acre-feet. The acquired water rights would be used to convert or exchange water to Jordanelle Reservoir under approved water rights used in conjunction with the State Engineer's Utah Lake Distribution Plan. The secondary water rights would amount to at least 34,540 acre-feet of firm yield.

1.4.9.3 Return Flows and Recycled Water

Bonneville Unit M&I System water delivered from Jordanelle Reservoir to Salt Lake, Utah and Wasatch counties and Bonneville Unit agricultural water delivered to Wasatch and Summit counties would return flows in the form of municipal wastewater from culinary water, drainage from M&I secondary water used for outdoor irrigation, and drainage from sprinkler and flood irrigation practices. Return flows accruing to the hydrologic system are either credited as Bonneville Unit return flows or are considered natural flows in the system. The distinction is specified by the State Engineer in the administration of various project water rights, whether they involve transbasin water, basin water, or a combination of both. Return flows that are credited as Bonneville Unit return flows are available to the project to be used for downstream deliveries or for Bonneville Unit exchanges. Some Bonneville Unit water from both classes (Bonneville Unit or natural flows) of return flows accruing from project M&I System water is available for recycling by the District petitioners. Return flows from the use of Bonneville Unit M&I System water would occur as municipal wastewater in Salt Lake County and drainage via surface and groundwater pathways in southern Utah County. The treatment and recycling of return flows from municipal wastewater, as quantified by the State Engineer in his administration of the water rights, is an important part of ULS and would extend the water supply available to the District's petitioners in the ULS project planning area.

The amount of return flows credited as Bonneville Unit water by the State Engineer from M&I and agricultural use of Bonneville Unit transbasin water is considered by the DOI to be Bonneville Unit water and thus available for recycling as a federal water supply. An official estimate of the amount of Bonneville Unit return flow that can be credited to the Bonneville Unit would need to be determined by the State Engineer. In the case of Salt Lake County, an unofficial estimate of 21,000 acre-feet has been made.

The hydrology presented in previous Bonneville Unit NEPA and planning documents has consistently assumed that historical inflows to Utah Lake, including return flows, would continue in the future. The hydrology models that were used throughout the planning process for ULS are based on the historical data, levels, and operations of Utah Lake. Instead of identifying the thousands of components of water that historically occurred in Utah Lake, the models use key data elements, including evaporation, inflow, outflow, and the historic variability of Utah Lake to predict future project operations.

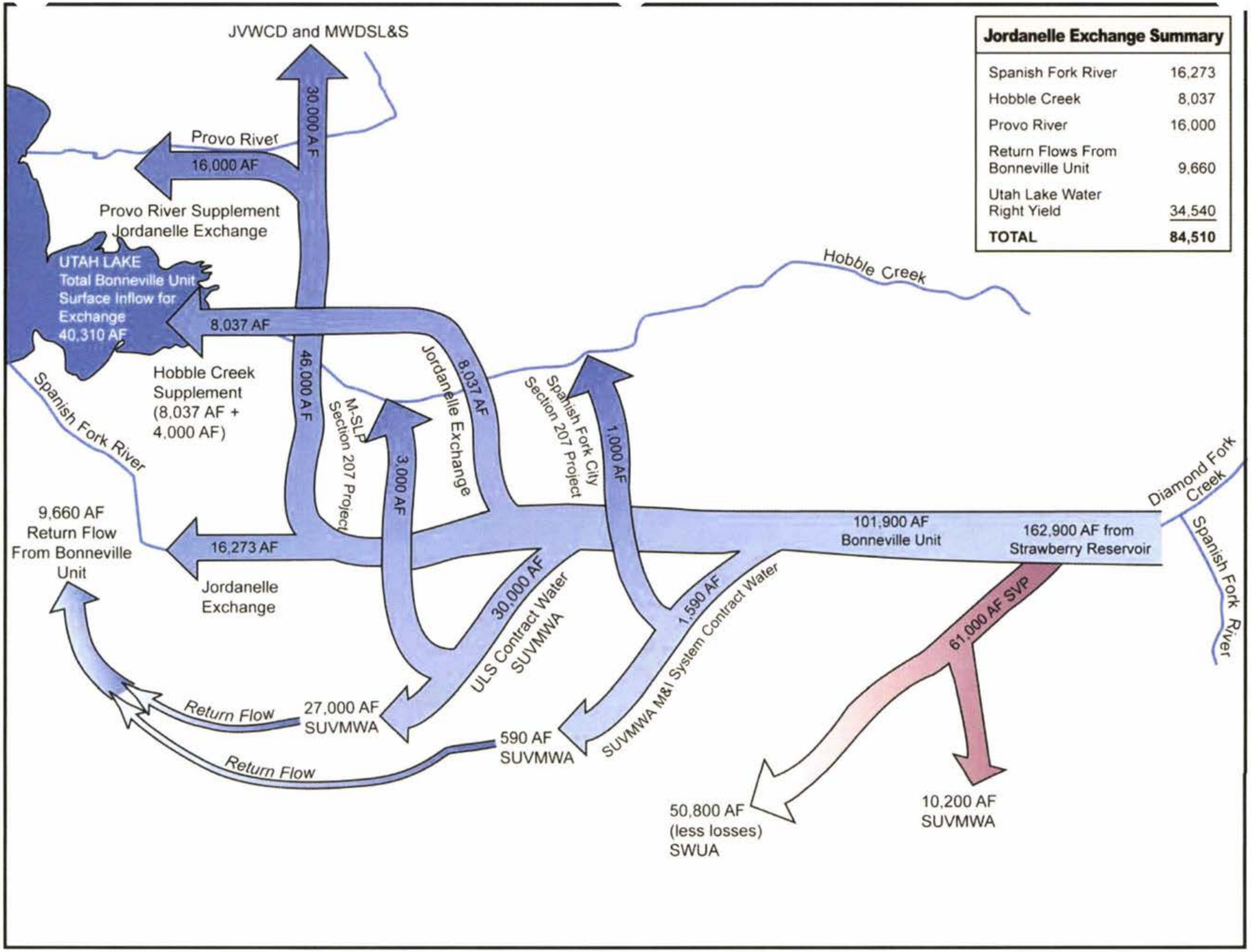


Figure 1-18
Utah Lake System Water Deliveries
Under the Proposed Action

1.4.9.3.1 ULS Return Flows to Utah Lake (Southern Utah County Secondary Systems). Return flows from the groundwater basin to Utah Lake from M&I secondary water delivered to southern Utah County would be approximately 9,660 acre-feet. These return flows would become part of the Bonneville Unit water supply to be used for exchange to Jordanelle Reservoir under the State Engineer's Utah Lake Distribution Plan for delivery to the District's petitioners in Wasatch, Utah, and Salt Lake counties.

1.4.9.3.2 Bonneville Unit Return Flows. In northern Utah County, the delivery and use of 20,000 acre-feet of Bonneville Unit M&I water for municipal and secondary system use would produce a return flow of 7,000 acre-feet to Utah Lake. In previous Bonneville Unit documents, it was stated that this return flow to Utah Lake would be credited and exchanged to Jordanelle Reservoir. However, the State Engineer issued a decision in November 2002 that return flows from in-basin water would accrue to the Utah Lake as part of the water rights of those individuals and entities that have Utah Lake water rights. Consequently, return flows from the 20,000 acre-foot delivery in north Utah County are not available to the project.

The Salt Lake County return flows available for reuse from the Bonneville Unit M&I System are calculated as 15 percent of the 70,000 acre-feet delivered under the Bonneville Unit M&I System and 35 percent of the 30,000 acre-feet that would be delivered through the ULS features of the Bonneville Unit. Thus, the total of the estimated return flows that may be approved by the Utah State Engineer for re-use is about 21,000 acre-feet. The 21,000 acre-feet of return flows includes 15,000 acre-feet from the Jordan Valley service area and 6,000 acre-feet from the Metropolitan Water District of Salt Lake and Sandy service area.

Approximately 18,000 acre-feet of the 21,000 acre-feet would return to the South Valley and Central Valley wastewater treatment facilities. Recycling of this water would help meet the municipal and industrial needs in the Jordan Valley Water Conservancy District service area. Recycling would involve the DOI, District, District's petitioners, and the owners of the wastewater treatment plants. The remaining 3,000 acre-feet of the 21,000 acre-feet would return to the Salt Lake City Wastewater Treatment Plant, which is located on the south shore of the Great Salt Lake at a point too far below the M&I service area to be economically recycled. The 18,000 acre-feet to be recycled would not be part of the ULS supply per-se but would be included in the overall Bonneville Unit water supply.

1.4.9.4 Conserved Water

1.4.9.4.1 Provo Reservoir Canal Enclosure. In early 2002 the Provo River Water Users Association requested the authority to enclose the Provo Reservoir Canal. In response to this request, Reclamation prepared an Environmental Assessment. The final EA and Finding of No Significant Impact on the canal enclosure was signed by Reclamation on April 30, 2003 (Reclamation 2003a). Under this plan the Provo River Water Users Association would enclose the Provo Reservoir Canal. Under the Proposed Action described in this FEIS, the ULS project would deliver about 24,490 acre-feet of the total 30,000 acre-feet of ULS M&I to Salt Lake County for treatment and distribution as culinary supply via the Provo Reservoir Canal. The remaining 5,510 acre-feet of M&I water would be delivered via the Jordan Aqueduct. The water conserved by enclosing the Provo Reservoir Canal would total 8,000 acre-feet in seepage-loss savings. It is anticipated that the Provo Reservoir Canal enclosure project would receive Section 207 funding. If the enclosure project does proceed with Section 207 funding, this EIS provides the necessary NEPA compliance and would require 8,000 acre-feet of water to be returned to DOI. The conserved water is included in the amounts discussed in Section 1.4.9.4.3.

1.4.9.4.2 Mapleton–Springville Lateral Piping. The existing Mapleton–Springville Lateral would be replaced with a Bonneville Unit, ULS pipeline throughout most of its length, resulting in conserved water by conveying annually an average of 8,831 acre-feet of SVP water that has been historically delivered through the existing lateral. A portion of the cost of piping the lateral would be funded under the CUPCA Section 207 program. In addition to the canal piping, other Section 207 water conservation projects would be implemented in the Springville-Mapleton area. These projects would result in 3,000 acre-feet of ULS M&I water returned to DOI for use as Hobble Creek in-stream flows. This would be added to 1,000 acre-feet already conserved under the Spanish Fork City Section 207 water conservation project, and about 8,037 acre-feet of transbasin ULS water released from Strawberry Reservoir to Utah Lake. In almost all years, this approximate 12,037 acre-feet of water would be released from Strawberry Reservoir as needed to satisfy the June sucker flow requirements in April, May, and June (most frequently in April), until it is gone. During extremely wet springs (such as occurred in the early 1950s, and in 1982), when the naturally occurring water is adequate to meet the June sucker requirements, the water may not be released until later in the summer.

The following water quantities and sources comprise the water that would be conveyed through the Mapleton–Springville Lateral to Hobble Creek for June sucker spawning and rearing flows, and for delivery to Utah Lake for exchange to Jordanelle Reservoir:

- 3,000 acre-feet from Section 207 projects in the Springville-Mapleton area that is returned to DOI
- 1,000 acre-feet Spanish Fork City Section 207 water already returned to DOI
- 8,037 acre-feet transbasin ULS water released to Utah Lake for exchange to Jordanelle Reservoir

12,037 acre-feet total water released to Hobble Creek

1.4.9.4.3 Other Section 207 Project Water. Other Section 207 project water would provide a total of 12,165 acre-feet of conserved water in the Provo River. This includes about 2,875 acre-feet of existing contracted Bonneville Unit M&I System water conserved from Section 207 projects in northern Utah County, about 1,000 acre-feet of water conserved from Section 207 piping of the Upper East Union and East River Bottom canals, and about 290 acre-feet of water conserved from Section 207 piping of the Timpanogos Canal, and 8,000 acre-feet from enclosing the Provo Reservoir Canal or other 207 projects.

The following water quantities and sources comprise the water that would be released to the lower Provo River annually for June sucker spawning and rearing flows under the Proposed Action:

- 2,875 acre-feet Northern Utah County 207 project savings already assigned to DOI
- 1,000 acre-feet Upper East Union and East River Bottom canals piping to be assigned to DOI
- 290 acre-feet Timpanogos Canal piping already assigned to DOI
- 8,000 acre-feet Provo Reservoir Canal savings or other future 207 project savings to be assigned to DOI

12,165 acre-feet total water released to the lower Provo River

1.4.9.5 Mitigation Commission Water Acquisition in the Lower Provo River

The District has acquired irrigation water company shares representing 3,300 acre-feet of water for the Mitigation Commission towards the amount necessary to meet the 75-cfs target flow in the lower Provo River. This water comes from the following sources and is available only during the irrigation season:

- Timpanogos Canal Section 207 Project — 714 acre-feet
- Timpanogos Canal Water Rights — 223 acre-feet
- Upper East Union Canal Water Rights — 93 acre-feet
- East River Bottom Canal Water Rights — 474 acre-feet
- Fort Field/Little Dry Creek Water Stock — 295 acre-feet
- Provo Bench/Tanner Deed Water Stock — 353 acre-feet

- West Union/West Smith Water Stock 925 acre-feet
- North Union/Tanner Deed Water Stock 223 acre-feet

Total 3,300 acre-feet

Unlike the Section 207 project water, none of the water acquired by the District for the Mitigation Commission is storage water and cannot be regulated by reservoir operations. Instead, the water would be allowed to flow past the diversion location associated with the original water right or share, and the water would continue to flow to Utah Lake. Figure 1-19 displays how the individual elements would combine to increase the flow of the lower Provo River. This water would increase the flow in the river only during the April 15 to October 15 summer irrigation season because these are irrigation water rights. The water flowing to Utah Lake is shown on Figure 1-19. An appropriate change application would be filed with the State Engineer to implement this action.

1.4.10 Operations and Maintenance of the Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

1.4.10.1 Introduction

The Proposed Action would be operated and maintained by the District under agreements with the federal government, local water districts, water companies, associations, and municipalities. Bonneville Unit M&I and ULS water would be released from Strawberry Reservoir, conveyed through the Syar Tunnel, Sixth Water Aqueduct and Diamond Fork System to the Spanish Fork River, and delivered to Salt Lake County for M&I water, to southern Utah County for M&I secondary water, to member cities for existing M&I water supply contracts, and to Utah Lake for exchange to Jordanelle Reservoir as part of the M&I System. Water would be provided to the lower Provo River for in-stream flows and to supplement June sucker spawning and rearing flows, and to Hobble Creek for June sucker flows and in-stream flows for fish and wildlife. Up to 10,200 acre-feet of SVP water shares acquired by or contractually made available to SUVMWA or member cities would be conveyed to member cities in southern Utah County through new ULS pipelines. Hydroelectric project power would be generated by Bonneville Unit and SVP water passing through turbines at two project power facilities in the Diamond Fork System.

1.4.10.2 ULS Operations

The following sections describe the ULS water delivery operations under the Proposed Action.

1.4.10.2.1 Water Delivery Operations. Bonneville Unit water deliveries would be made through normal operations. The following describes annual normal operations under the Proposed Action.

- 30,000 acre-feet of ULS M&I water would be conveyed through the Spanish Fork – Provo Reservoir Canal Pipeline to the Provo Reservoir Canal (or enclosure) and the Jordan Aqueduct to Salt Lake County water treatment plants as a culinary supply.

- An annual average of 16,273 acre-feet of Bonneville Unit water from Strawberry Reservoir would be released for in-stream flows in Sixth Water Creek and Diamond Fork Creek and flow down the Spanish Fork River to Utah Lake mainly during the winter months, as previously described in the 1990 Diamond Fork System Final Supplement to the Final Environmental Impact Statement (Reclamation 1990). This water is included in the annual average of 40,310 acre-feet that would be exchanged from Utah Lake to Jordanelle Reservoir.

- As the ULS facilities are completed, but not later than 2030, 30,000 acre-feet of ULS M&I water would be delivered through the Spanish Fork–Santaquin Pipeline and the Mapleton–Springville Lateral Pipeline in southern Utah County under a contract with SUVMWA. Of this amount, an estimated 3,000 acre-feet would be conserved under Section 207 projects, assigned to DOI, conveyed through the Mapleton–Springville Lateral Pipeline, and is included in the 12,037 acre-feet delivered to Hobble Creek for June sucker spawning and rearing flows and other in-stream flows as provided by deliveries from Strawberry Reservoir to Utah Lake. This 12,037 acre-feet of water would then be exchanged from Utah Lake to Jordanelle Reservoir.

- Up to 10,200 acre-feet of SVP water shares acquired by SUVMWA cities would be conveyed to these cities in southern Utah County through the new ULS pipelines on a space-available basis. This water is part of the overall 61,000 acre-feet of SVP water stored in Strawberry Reservoir. An additional 8,831 acre-feet of SVP water would be delivered to the Mapleton and Springville irrigation companies through the Mapleton-Springville Lateral Pipeline. The balance of the SVP water supply would be released through the Strawberry Tunnel and Syar Tunnel to the Diamond Fork System and released to the Spanish Fork River.

- Of the 1,590 acre-feet of M&I water already under contract to SUVMWA, 590 acre-feet would be used by SUVMWA member cities as secondary M&I water. This water would be delivered through the Spanish Fork Canyon Pipeline and Spanish Fork–Santaquin Pipeline to the SUVMWA member cities. The remaining 1,000 acre-feet has been assigned to DOI and is part of the 12,037 acre-feet released to Hobble Creek (see Section 1.4.9.4.2).

- An annual average of 16,000 acre-feet of Bonneville Unit water would be delivered to the lower Provo River to assist in meeting the in-stream flow objectives and would be subsequently exchanged from Utah Lake to Jordanelle Reservoir. This water would be conveyed through the Spanish Fork–Provo Reservoir Canal Pipeline and discharged to the Provo River at the pipeline crossing when needed to make the Utah Lake–Jordanelle Reservoir exchange and when flows in the Provo River are less than 75 cfs (Figure 1-20). A minimum 75 cfs flow normally occurs in the river between the Olmsted and Murdock diversions during the summer months when releases are made from Deer Creek Reservoir for conveyance through the Provo Reservoir Canal.

  CUPCA Section 303(c)(4) states that "Upon the acquisition of the water rights in the Provo Drainage identified in section 302, in the Provo River from the Olmsted Diversion to Utah Lake, a minimum of seventy-five cubic feet per second" shall be provided from the yield and operating plans for the Bonneville Unit of the CUP. The Act states the purchases would be limited to willing sellers below Heber Valley. Toward this goal, CUPCA has authorized funds for acquiring up to 25,000 acre-feet of water rights in the Utah Lake Drainage Basin. The District has acquired with Mitigation Commission funds irrigation company water shares representing about 3,300 acre-feet, which would allow such water to flow undiverted to Utah Lake, thereby increasing the summertime flow in the lower Provo River.

Table of Net Change on Utah Lake

Water Purchase	Volume	Baseline Return Flow	Net Impact
Timpanogos Canal Section 207 Water	714	714	0
Timpanogos Canal Water Rights Purchase	223	112	111
Provo Bench/Tanner Deed Water Stock	353	177	176
North Union/Tanner Deed Water Stock	223	112	111
Upper East Union Water Rights Purchase	93	47	46
East River Bottom Water Rights Purchase	474	237	237
West Union/West Smith Water Stock	925	463	462
Fort Field/Little Dry Creek Water Rights Purchase	295	148	147
Total	**3300**	**2010**	**1290**

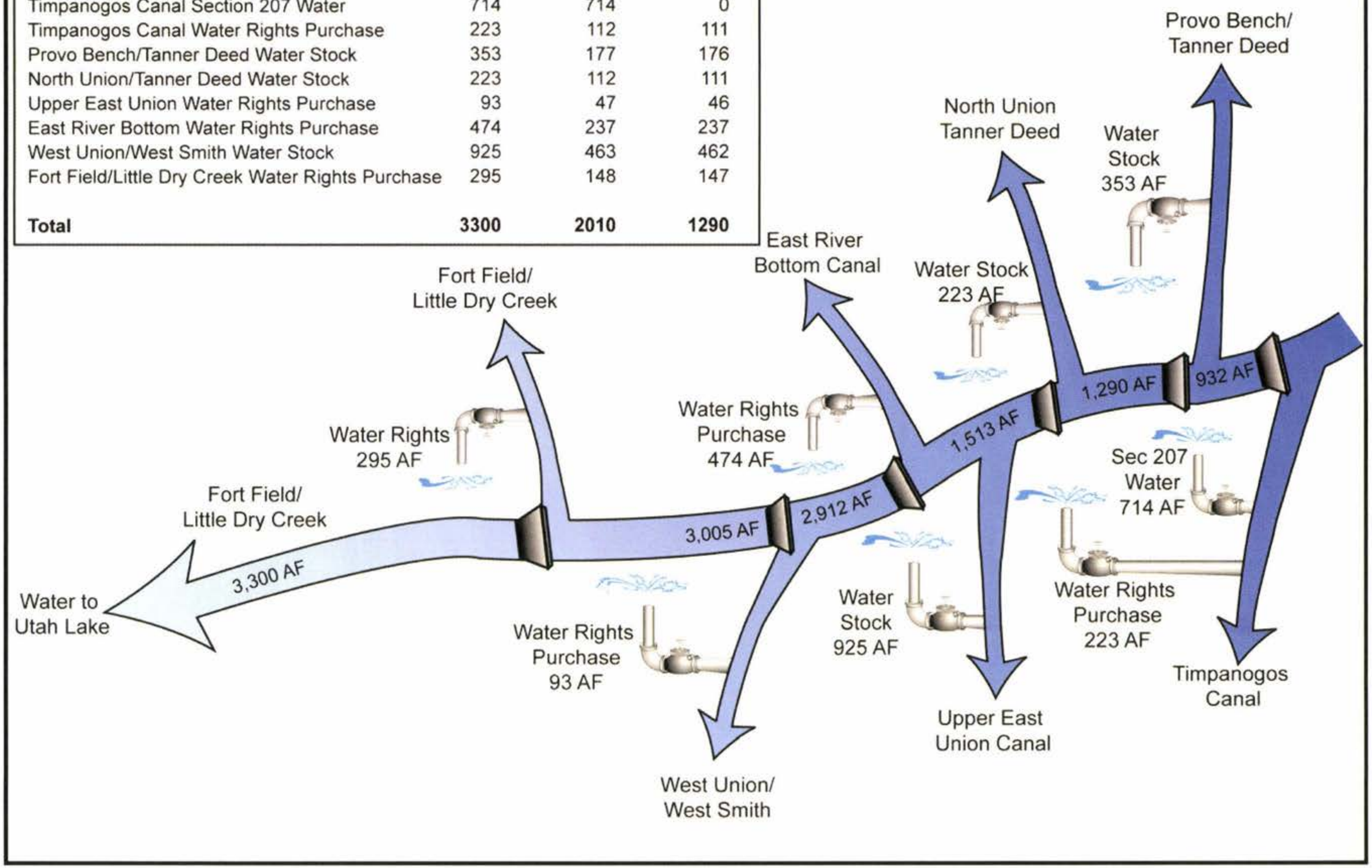


Figure 1-19
Water Acquired With Mitigation Commission Funds
For 75-cfs Target Flow in the Lower Provo River

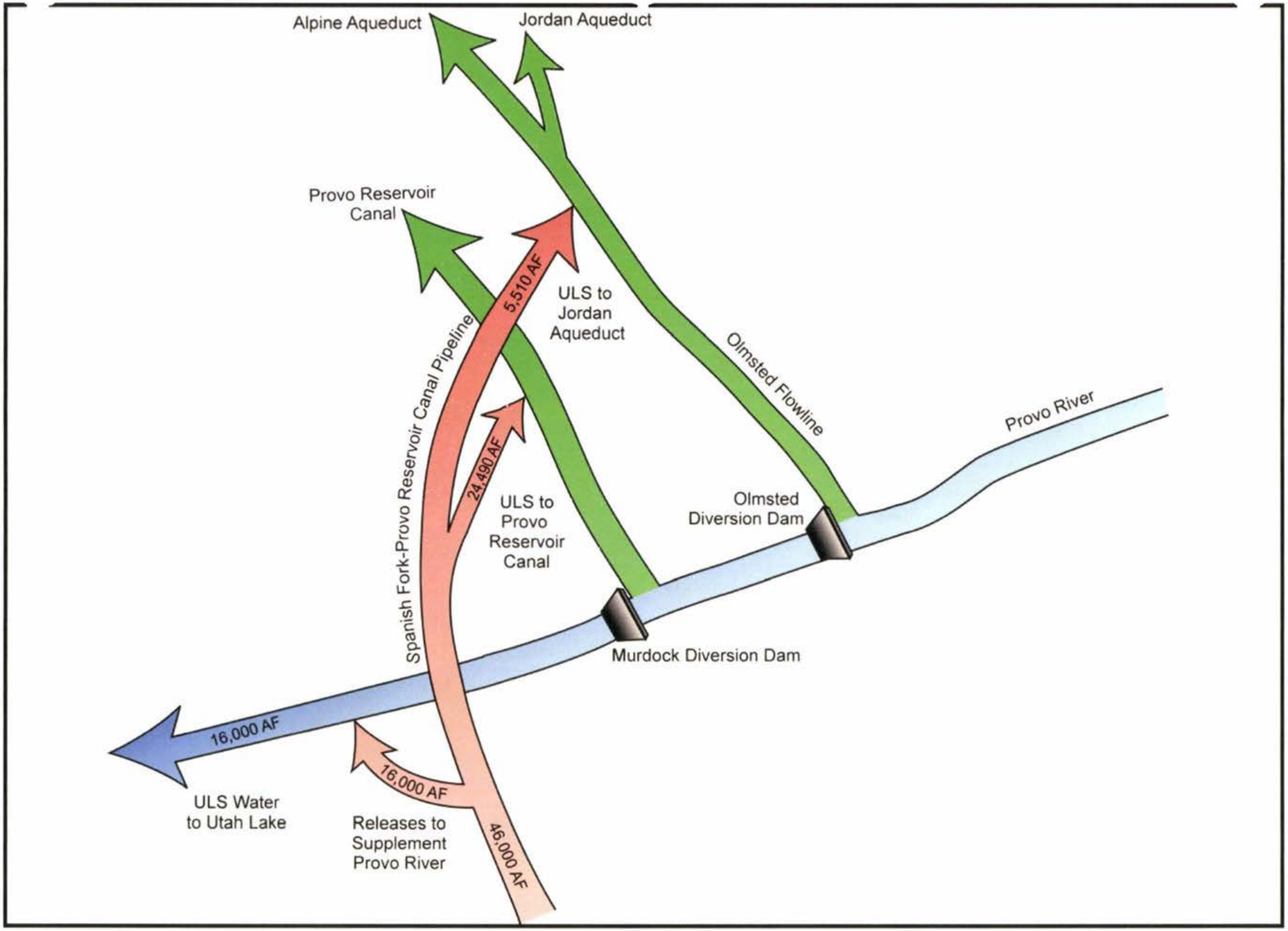


Figure 1-20
Utah Lake System Provo River Releases
Under the Proposed Action

- As allowed under the Deer Creek Reservoir-Jordanelle Reservoir Operating Agreement, an annual 12,165 acre-feet of water would be provided as flows for June sucker spawning and rearing in the lower Provo River to meet JSRIP goals annually. This water would be comprised of the conserved water as shown in Table 1-14.

Table 1-14
Sources of Water for June sucker Spawning and Rearing in the Lower Provo River

Source of Water Savings	Quantity (acre-feet)	Comments
CUP M&I Water N. Utah County (District)[1]	2,875	Northern Utah Co. 207 project savings
Timpanogos Canal Piping (District)[1]	290	Water saved by piping canal
Upper East Union/East River Bottom Canals Piping (District)	1,000	Water saved by piping canals and connecting them to the Timpanogos pipe
Section 207 water conservation measures	8,000	Conserved water returned to DOI
Total	**12,165**	Available for June sucker spawning in lower Provo River

Note:
[1]Does not include all conserved water. A portion of the conserved water is included in the 3,300 acre-feet of water acquired by the District with Mitigation Commission funds toward meeting the 75 cfs target flow.

- An average annual delivery of 12,037 acre-feet of project water would be available through the Mapleton-Springville Lateral Pipeline to Hobble Creek for June sucker spawning and rearing flows (April through July) and to provide other fish and wildlife benefits throughout the year. This water would be part of 40,310 acre-feet of Utah Lake inflow from Strawberry Reservoir and would be subsequently exchanged from Utah Lake to Jordanelle Reservoir. Of the 12,037 acre-feet, 4,000 acre-feet would be provided in every year because this is the amount of water saved each year through Section 207. An average of 8,037 acre-feet also would be provided when water is being delivered from Strawberry Reservoir to Utah Lake for exchange up to Jordanelle Reservoir. Hobble Creek supplemental water would not be delivered during high runoff years when Utah Lake is above compromise level. The high runoff years correspond with years when natural runoff would be sufficient to attract June sucker spawning.

- Hydroelectric power would be generated from the Bonneville Unit and SVP water conveyance and contracted to the Western Area Power Administration (see Appendix J) (see Table 1-15 for generating capacities and quantities). The hydroelectric power would be generated from water conveyed through Diamond Fork System features. Water would not be released only for power generation purposes.

Table 1-15
Spanish Fork–Provo Reservoir Canal Alternative
Power Facility Generation

Power Facility	Generating Capacity (megawatts)	Energy Output (kilowatt hours/year)
Sixth Water	45	134,00,000
Upper Diamond Fork	5	31,000,000
Total	**50**	**165,000,000**

1.4.10.2.2 Maintenance Operations. Maintenance operations would normally involve two annual inspection shutdowns of one week or less involving all ULS pipelines and power facilities. Typically these inspections would occur in the spring and fall of the year when in-stream flows for fishery commitments would not be interrupted. Winter operation and maintenance visits to the project facilities would normally be via snowmobile and by vehicle during the rest of the year. If unusual maintenance problems at the project facilities occur during the winter, this could require removal of the snow for vehicular access.

Personnel would be assigned to the conveyance systems on a full-time basis for routine operation, inspection and maintenance activities. Various routine maintenance and operations procedures would be followed, such as calibration; grounds, building and equipment maintenance; and inspection of equipment as well as the monitoring of flow pressure, temperature, and vibration data. Maintenance personnel would visit and inspect project facilities on a regularly scheduled basis.

Regularly scheduled ground inspection would be conducted of surface areas above all buried project facilities for evidence of excavation and/or other encroachment activity on or near the right-of-way by landowners or other parties. Additional surface inspection would examine the possibilities of erosion and wash-out areas, areas of sparse vegetation, damage to permanent erosion control devices, exposed pipe, and other potential problems that may affect the safety and operation of the pipeline. Pipeline markers and signs would be inspected and maintained or replaced, as necessary. Repairs to the right-of-way could include regrading and reseeding with appropriate plant materials or installing other soil stabilization measures.

In upland areas, permanent rights-of-way would be maintained in a grassy or early successional stage. Vegetation in these segments of the right-of-way would be cut as necessary. However, where needed to facilitate periodic surveys to detect leaks from pipeline facilities, a 10-foot-wide strip centered over the pipeline would be maintained annually in a herbaceous state. If needed, herbicides would be applied in compliance with applicable laws and regulations. In agricultural, open, and residential areas, landowners would be allowed to continue pre-construction land uses, with the exception of certain activities that could be restricted within project transmission line rights-of-way. The erection of permanent structures within the permanent rights-of-way of any project features would not be permitted. The planting of trees within the right-of-way would not be allowed.

At water crossings, a 25-foot-wide riparian strip (measured from the mean high water mark) would be allowed to revert to native vegetation. However, in riparian areas as well as in wetlands, a 10-foot-wide strip centered over the pipeline would be maintained in a herbaceous state to facilitate corrosion and leak surveys. In addition, trees would be removed from a zone within 15 feet of the pipeline. No trees would be allowed to grow over the pipeline. No herbicides would be used within 100 feet of a wetland or waterbody except as specified by the appropriate land management or state agency.

The proposed features would be constructed to current standards taking into account the need to minimize maintenance activities. Minor repairs would include replacement to cathodic protection systems, repair of electrical equipment, re-coating of exposed metal in vaults, repair of air-vac valves, repairs to erosion control structures, replacement of pipeline marker posts, and removal of debris from the permanent pipeline right-of-way. Other repairs could require reducing pipeline pressure and some excavation, with limited service interruption. Pipeline damage needing major repairs could require extended interruption of water deliveries. Access for major repairs in areas with no permanent access would be on temporary roads that would be restored following completion of repair work.

1.4.10.2.3 Emergency Operations. Emergency operations could involve shutdowns of the ULS pipelines and power facilities. Water deliveries through ULS pipelines could cease during emergency operations, depending on where the emergency shutdown occurs.

1.4.10.2.4 Automated Control System. A Supervisory Control and Data System (SCADA) would be installed to control and monitor ULS facilities operations from the operations center at District offices in Orem, Utah. The SCADA System would consist of Remote Telemetry Units (RTUs) linked to computers at the operations center. The RTUs would be located at the following ULS features:

- Sixth Water Power Facility and Flow Control Structure
- Upper Diamond Fork Power Facility and Flow Control Structure
- Spanish Fork Flow Control Structure
- Mapleton–Springville Lateral Pipeline turnouts and outlet to Hobble Creek
- Spanish Fork–Santaquin Pipeline turnouts
- Spanish Fork–Provo Reservoir Canal Pipeline discharge structure to the Provo River
- Spanish Fork–Provo Reservoir Canal Pipeline discharge structure to the Provo Reservoir Canal
- Spanish Fork–Provo Reservoir Canal Pipeline discharge to the Jordan Aqueduct

The RTUs would be connected to instruments or sensors to monitor pressure, flow, valve position, and other parameters, and would facilitate remote control of valves and turnouts. The SCADA would have an alarm system capable of notifying key personnel when emergency situations occur and would store operational data for accounting purposes.

1.4.10.3 Streamflows

This section presents the streamflows and water volumes that would occur under the Proposed Action in the Provo River, Hobble Creek, Spanish Fork River, and Jordan River. Additional streamflow details are presented in the Surface Water Hydrology Technical Report for the Utah Lake Drainage Basin Water Delivery System (CUWCD 2004a).

The ULS baseline streamflows of the Provo River have been compared in detail with the streamflows that were documented in the 1979 M&I System Final Environmental Statement (FES) (Reclamation, 1979 a&b) and the 1987 Final Supplement (Reclamation 1987). The results of this comparison are documented in "ULS Baseline Provo River Flows Compared with CUP M&I System FES Conditions", (Thurin 2003). The document concludes, "differences between ... ULS Baseline and the CUP M&I System's post-project condition are relatively minor, and should not affect results of the analysis of ULS impacts."

The Provo River Water Commissioner is ultimately responsible for monitoring Provo River flows, but flows were compared by the Reclamation hydrologist responsible for the M&I System stream flow modeling. The hydrologist concluded that the flows were essentially the same, given the differences in the hydrologic period and the more detailed methods used in the ULS studies (Reclamation 2003b).

Table 1-16 shows two sets of numbers to describe the streamflows at selected points in the rivers. The first set shows monthly average flows in cfs and acre-feet averaged over the entire 50-year analysis period (1950 to 1999). The second set shows monthly average flows from the average of three extreme dry years (1961, 1977, 1992) and the average of three extreme wet years (1952, 1983, 1986). The maximum and minimums for the full 50-year study period are shown in the Surface Water Hydrology Technical Report for the Utah Lake Drainage Basin Water Delivery System (CUWCD 2004a).

Table 1-16
Monthly Average Streamflow and Volume for the Spanish Fork Canyon – Provo Reservoir Pipeline Alternative (Proposed Action)
Page 1 of 2

Stream & Reach	Monthly Flow (cfs) and Volume (acre-feet) Averages	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Monthly Flow Average (cfs)	Annual Volume Total (acre-feet)
Provo River Outlet Deer Cr. Reservoir to N.F. Provo River	Flow	165	106	105	105	119	186	305	798	904	648	542	448	370	
	Volume	10,117	6,321	6,449	6,459	6,639	11,421	18,150	49,066	53,816	39,840	33,320	26,666		268,263
	Flow Dry year[a]	152	101	100	101	103	108	250	493	396	443	464	321	253	
	Flow Wet year[b]	123	111	104	100	202	1,078	637	1,293	1,610	821	524	473	590	
Provo River N.F. Provo River to Olmsted Diversion Dam	Flow	178	121	117	115	129	197	327	856	972	694	569	469	396	
	Volume	10,942	7,179	7,164	7,093	7,197	12,136	19,429	52,621	57,830	42,644	35,006	27,915		287,155
	Flow Dry year[a]	158	113	109	109	110	115	260	511	406	458	472	337	263	
	Flow Wet year[b]	153	124	128	121	230	1,105	685	1,380	1,763	905	578	503	640	
Provo River Olmsted Diversion Dam to Murdock Diversion Dam	Flow	113	70	57	55	72	148	287	765	813	430	299	281	283	
	Volume	6,967	4,167	3,488	3,369	4,031	9,112	17,089	47,021	48,369	26,459	18,398	16,725		205,196
	Flow Dry year[a]	84	53	42	43	50	37	157	323	213	123	157	155	120	
	Flow Wet year[b]	119	84	88	77	211	1,079	707	1,338	1,642	687	345	343	560	
Provo River Murdock Diversion Dam to Interstate 15	Flow	129	90	77	74	86	158	251	553	563	231	196	182	216	
	Volume	7,914	5,363	4,722	4,524	4,833	9,717	14,926	34,004	33,506	14,174	12,080	10,818		156,582
	Flow Dry year[a]	108	67	69	65	52	39	137	189	130	104	136	138	103	
	Flow Wet year[b]	100	86	92	80	215	1,083	707	1,204	1,381	347	153	147	466	
Provo River Interstate 15 to Utah Lake	Flow	77	94	75	69	81	153	222	445	433	110	61	62	157	
	Volume	4,735	5,589	4,581	4,252	4,535	9,421	13,223	27,362	25,774	6,791	3,744	3,694		113,702
	Flow Dry year[a]	56	60	59	57	45	29	82	107	74	46	77	50	62	
	Flow Wet year[b]	87	85	95	81	212	1,082	719	1,145	1,276	210	27	21	420	
Hobble Creek Mapleton Lateral to Utah Lake	Flow	20	35	32	32	35	46	111	145	65	13	10	10	46	
	Volume	1,257	2,099	1,978	1,965	1,957	2,815	6,609	8,892	3,841	782	630	590		33,416
	Flow Dry year[a]	6	20	19	20	22	20	96	92	40	6	6	6	30	
	Flow Wet year[b]	26	36	33	32	58	78	209	346	183	43	26	25	91	

Table 1-16
Monthly Average Streamflow and Volume for the Spanish Fork Canyon – Provo Reservoir Pipeline Alternative (Proposed Action)

Stream & Reach	Monthly Flow (cfs) and Volume (acre-feet) Averages	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Monthly Flow Average (cfs)	Annual Volume Total (acre-feet)
Spanish Fork River Diamond Fk. Cr. to Spanish Fk. Diversion	Flow	134	130	124	125	138	171	296	578	452	356	305	180	250	
	Volume	8,238	7,726	7,622	7,703	7,734	10,539	17,589	35,538	26,881	21,907	18,733	10,712		180,921
	Flow Dry year[a]	101	104	100	102	111	111	141	209	315	227	210	119	154	
	Flow Wet year[b]	163	152	144	145	203	272	746	1,338	947	460	376	270	435	
Spanish Fork River Spanish Fk. Diversion to E. Bench Diversion	Flow	34	48	53	54	53	46	60	189	99	54	43	29	64	
	Volume	2,098	2,841	3,272	3,290	2,994	2,835	3,594	11,631	5,866	3,316	2,668	1,739		46,142
	Flow Dry year[a]	40	51	55	54	59	56	72	30	39	24	22	16	43	
	Flow Wet year[b]	39	44	49	49	52	36	264	765	406	115	66	54	161	
Spanish Fork River E. Bench Diversion to Mill Race Canal	Flow	31	48	53	54	53	46	53	147	51	17	14	15	49	
	Volume	1,934	2,841	3,272	3,290	2,994	2,808	3,158	9,046	3,039	1,030	869	914		35,194
	Flow Dry year[a]	38	51	55	54	59	55	58	10	10	7	5	11	35	
	Flow Wet year[b]	37	44	49	49	52	36	264	732	328	55	29	21	141	
Spanish Fork River Mill Race Canal to Lakeshore Diversion	Flow	108	133	128	130	143	175	260	324	121	38	35	31	135	
	Volume	6,643	7,925	7,880	7,972	7,987	10,752	15,462	19,903	7,224	2,361	2,128	1,862		98,099
	Flow Dry year[a]	89	107	105	107	116	110	72	24	39	25	26	22	70	
	Flow Wet year[b]	141	155	147	149	208	277	750	1,160	495	61	48	68	305	
Jordan River Outlet of Utah Lake to Jordan Narrows	Flow	228	152	192	242	305	411	541	805	867	846	702	508	484	
	Volume	14,027	9,063	11,809	14,867	17,069	25,285	32,174	49,473	51,611	52,035	43,183	30,228		350,825
	Flow Dry year[a]	181	14	14	4	5	5	121	448	534	576	430	222	213	
	Flow Wet year[b]	208	273	647	721	1,043	1,455	1,665	2,010	2,011	1,656	1,265	906	1,155	

Notes:
[a]The three driest years (1961, 1977, 1992) were averaged to calculate the values shown in the table.
[b]The three wettest years (1952, 1983, 1986) were averaged to calculate the values shown in the table.

1.4.10.4 Reservoirs

This section presents the reservoir volumes that would occur under the Proposed Action in Strawberry Reservoir, Deer Creek Reservoir, and Utah Lake. Strawberry Reservoir has a total storage capacity of 1,106,500 acre-feet. Deer Creek Reservoir has a total capacity of 152,400 acre-feet. Utah Lake has a total storage capacity of about 870,000 acre-feet at the compromise elevation. Additional reservoir volume details are presented in the Surface Water Hydrology Technical Report for the Utah Lake Drainage Basin Water Delivery System (CUWCD 2004a).

Table 1-17 shows the average monthly volumes in acre-feet over the entire 50-year analysis period (1950 to 1999). The table shows maximum and minimum monthly volumes over the 50-year analysis period.

Figure 1-21 shows the Utah Lake and Jordan River water balance under the ULS Proposed Action. There would be no net change in Jordan River flows below Jordan Narrows. The change in average Utah Lake storage would be a minus 15,400 acre-feet.

1.5 Bonneville Unit Water Alternative

1.5.1 Introduction

The Bonneville Unit Water Alternative would have an average transbasin diversion of 101,900 acre-feet consisting of: 1,590 acre-feet of M&I water already contracted to the southern Utah County cities; 15,800 acre-feet of M&I water to southern Utah County to be used in secondary water systems; and 84,510 acre-feet of M&I water delivered to Utah Lake for exchange to Jordanelle Reservoir. It would: conserve water in a Mapleton-Springville Lateral Pipeline; conserve water in the Provo River basin and deliver it along with acquired water to assist June sucker spawning and rearing; convey water to support in-stream flows in Hobble Creek to assist recovery of the June sucker; and develop hydropower. It would involve construction of three new pipelines and two new hydropower plants with associated transmission lines. Under this alternative, DOI would acquire ~~up to~~ 15,000 acre-feet of the District's secondary water rights in Utah Lake to provide a firm annual yield of 15,800 acre-feet of M&I water.

1.5.2 Bonneville Unit Water Alternative Features

The Bonneville Unit Water Alternative would include the following features (see Map 1-5 or Map A-2), which would be the same as described under the Proposed Action:

- Sixth Water Power Facility, Substation and Transmission Line (see Section 1.4.2.1)
- Upper Diamond Fork Power Facility and Transmission Line (see Section 1.4.2.2)
- Spanish Fork Canyon Pipeline (see Section 1.4.2.3, except as noted in Table 1-19)
- Spanish Fork–Santaquin Pipeline (see Section 1.4.2.4, except as noted in Table 1-19; the pipeline would be constructed as a combined ULS/Section 207 feature)
- Mapleton–Springville Lateral Pipeline (see Section 1.4.2.6)

These features would deliver ULS M&I secondary water to southern Utah County cities, deliver water to Hobble Creek to provide June sucker flows, and generate and deliver electric power from 2 hydropower plants. Up to 10,200 acre-feet of SVP water shares held by SUVMWA would be conveyed to member cities in southern Utah County through the Spanish Fork Canyon Pipeline and Spanish Fork-Santaquin Pipeline.

Table 1-17
Average Monthly Reservoir Volume for the Spanish Fork Canyon – Provo Reservoir Canal Alternative (Proposed Action)
(1,000 acre-feet)

Reservoir	Average Monthly Volume (acre-feet)	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Average
Strawberry Reservoir	Average	618	615	613	610	608	609	619	656	662	645	619	611	624
	Wet Years[1]	729	729	730	733	733	737	762	844	872	876	861	863	789
	Dry Years[2]	617	614	610	605	602	600	597	585	552	523	496	478	573
Deer Creek Reservoir	Average	79	86	93	100	107	115	118	112	107	96	86	76	98
	Wet Years[1]	111	122	129	137	147	146	149	148	141	123	112	107	131
	Dry Years[2]	34	40	46	53	59	66	60	46	34	24	15	10	41
Utah Lake	Average	597	628	661	696	729	755	770	781	751	676	615	587	687
	Wet Years[1]	764	799	827	848	873	938	985	1072	1065	977	909	854	909
	Dry Years[2]	458	492	529	559	594	620	617	594	531	455	396	387	519

Notes:
All values rounded to nearest 1,000 acre-feet
[1] The three wettest years (1952, 1983, and 1986) were averaged to calculate the values shown in the table.
[2] The three driest years (1961, 1977, and 1992) were averaged to calculate the values shown in the table.

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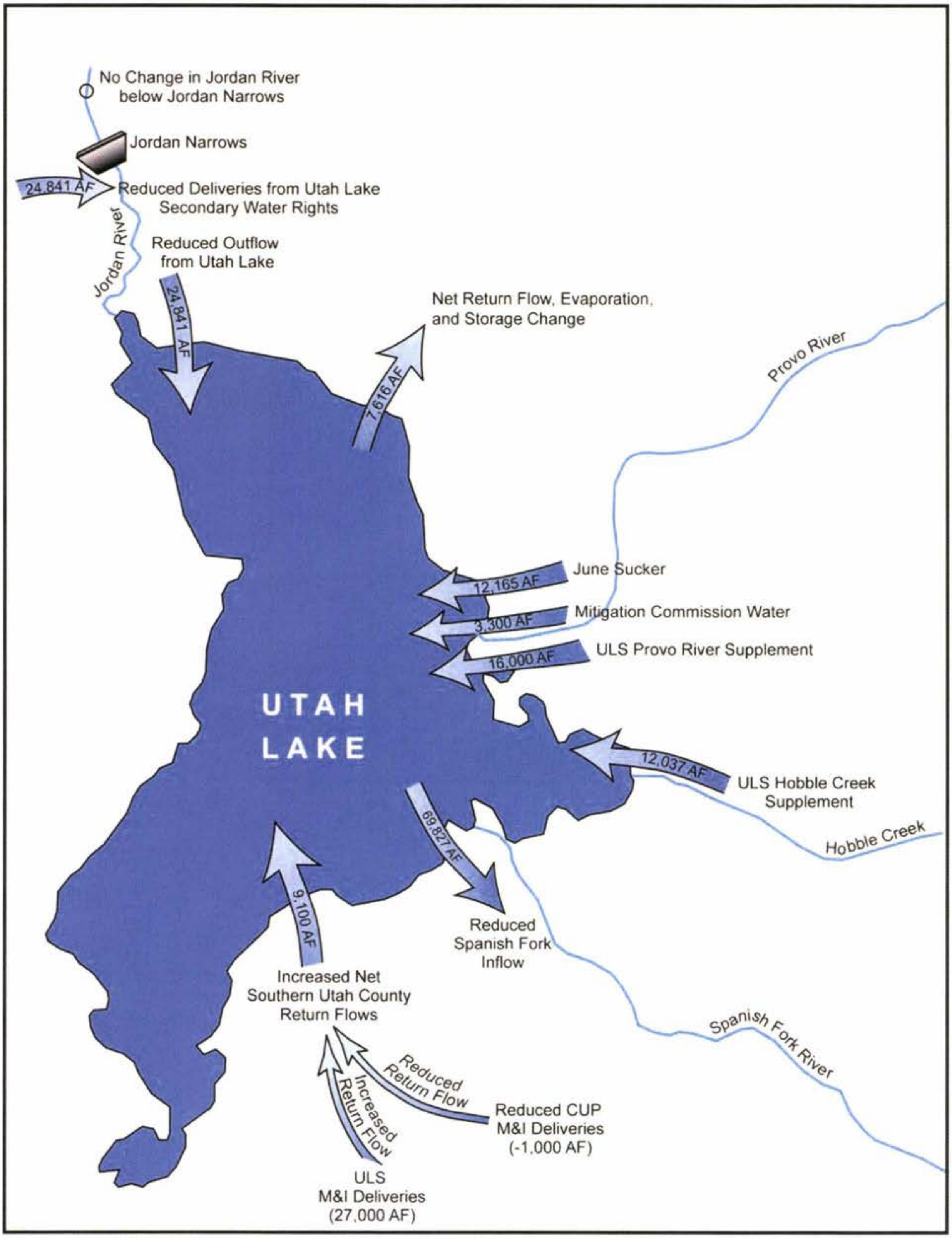
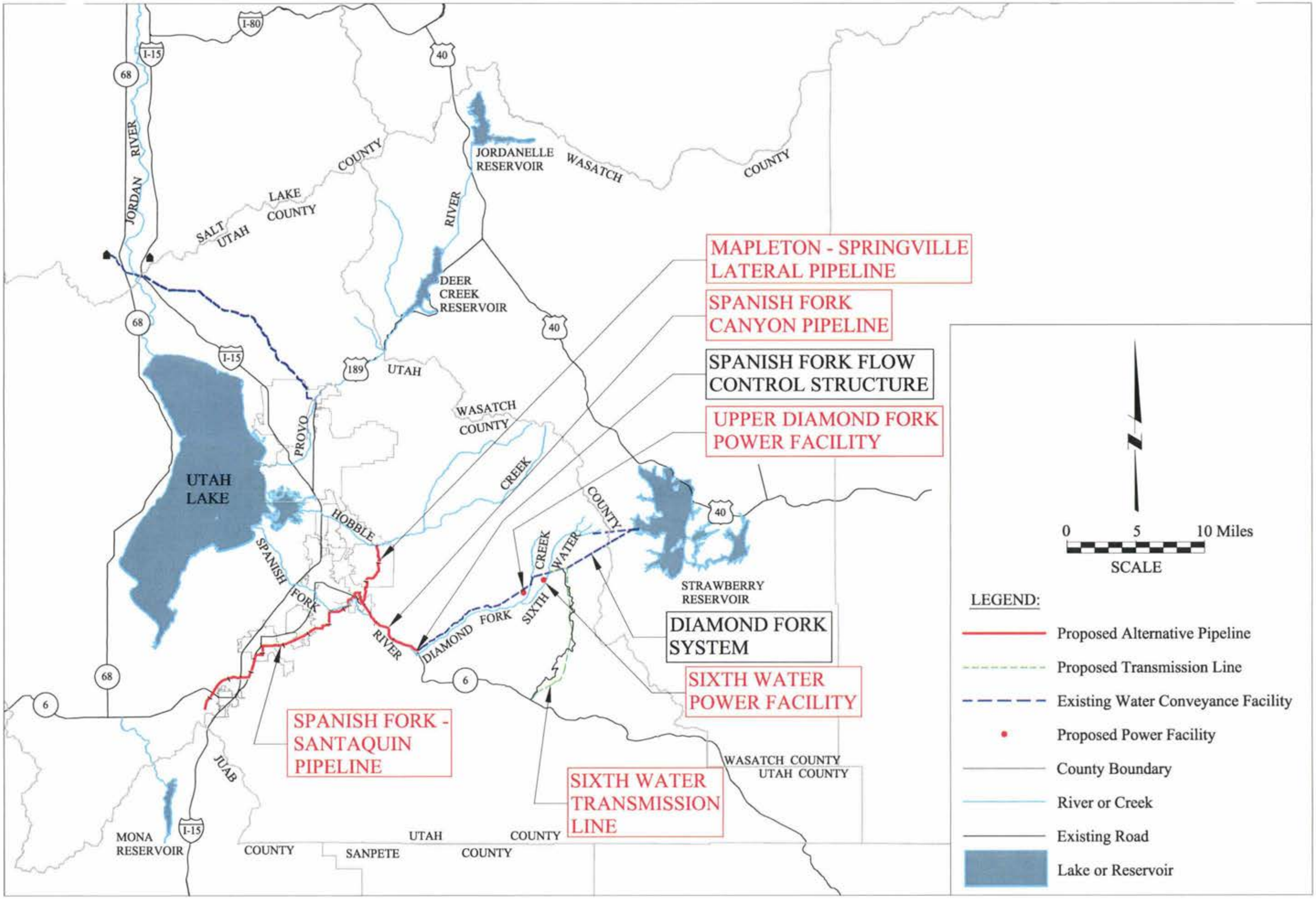


Figure 1-21
Utah Lake and Jordan River Water Balance Under the ULS Proposed Action



Map 1-5

Features of the Bonneville Unit Water Alternative

Table 1-18 shows the feature name and details of each power feature. Table 1-19 shows the feature name and details of each pipeline feature. Map A-2 shows the location of these features and detailed insets of some features.

Table 1-18
Bonneville Unit Water Alternative Power Features

Feature Name/Map A-2 Location	Transmission Line or Underground Cable Length (miles)	Capacity
Sixth Water Power Facility, Substation and Transmission Line(Insets 2 and 3; lower right)	15.5	45 MW Generator 138 kV Transmission Line
Upper Diamond Fork Power Facility and Underground Transmission Cable(Inset 3 and lower right)	1.5	5 MW Generator 25 kV Underground Cable (existing)
Total Transmission Line and Cable Length	**17.0**	

Notes:
MW = megawatt
kV = kilovolt

Table 1-19
Bonneville Unit Water Alternative Pipeline Features

Feature Name/Map A-1 Location	Pipeline Length (miles)	Diameter (inches)	Design Capacity
Spanish Fork Canyon Pipeline (Insets 1 and 4; lower middle)	7.0	72	240 cfs
Spanish Fork–Santaquin Pipeline (Insets 1 and 4; lower left)	17.5	48 to 36	115 to 35 cfs
Mapleton–Springville Lateral Pipeline (Insets 1 and 4; middle)	5.7	48	125 cfs
Total Pipeline Length	**30.2**		

Notes:
cfs = cubic feet per second

1.5.3 Land Management Status and Right-of-Way Acquisition

The land management status and right-of-way acquisition for the Bonneville Unit Water Alternative would be the same as described in Section 1.4.3, except that a 40-acre parcel in T. 7 S., R. 3 E., Section 21 would not be withdrawn.

1.5.3.1 Permanent Easements

Permanent easements for the Bonneville Unit Water Alternative would be the same as described in Section 1.4.3.1 except no easements would be acquired for the Spanish Fork-Provo Reservoir Canal Pipeline or for the Santaquin-Mona Pipeline.

1.5.3.2 Temporary Easements

Temporary easements for the Bonneville Unit Water Alternative would be the same as described in Section 1.4.3.2 except no easements would be acquired for the Spanish Fork-Provo Reservoir Canal Pipeline or for the Santaquin-Mona Pipeline.

1.5.4 Pipeline Construction Procedures

The pipeline construction procedures for the Bonneville Unit Water Alternative would be the same as described in Section 1.4.4, except that the trench excavation for the three pipelines would produce an estimated 579,600 cubic yards of earth and rock material.

1.5.5 Power Facility Construction Procedures

Power facility construction procedures for the Bonneville Unit Water Alternative would be the same as described in Section 1.4.5.

1.5.6 Transmission Line Construction Procedures

Transmission line construction procedures for the Bonneville Unit Water Alternative would be same as described in Section 1.4.6.

1.5.7 Access Roads

Access roads for constructing features of the Bonneville Unit Water Alternative would be the same as described in Section 1.4.7, except that the access roads for the Spanish Fork–Provo Reservoir Canal Pipeline would not be used as described and shown in Table 1-13 because this pipeline would not be a feature of the Bonneville Unit Water Alternative.

1.5.8 Construction Staging Areas

Construction staging areas for the Bonneville Unit Water Alternative would be the same as described in Section 1.4.8.

1.5.9 Water Sources

ULS water sources would consist of transbasin diversion water stored in Strawberry Reservoir, return flows of Bonneville Unit M&I water, and conserved water developed from features of the ULS project and other related projects. The following sections describe the ULS water sources.

1.5.9.1 Transbasin Diversion

ULS water deliveries would consist of a transbasin diversion from Strawberry Reservoir in the Strawberry River drainage basin for conveyance through the Syar Tunnel into the Diamond Fork System to the Utah Lake drainage basin (Figure 1-22). An average of 101,900 acre-feet of Bonneville Unit water would be conveyed from Strawberry Reservoir each year, with about 93,127 acre-feet flowing through the Syar Tunnel, and approximately 8,773 acre-feet flowing through the Strawberry Tunnel to provide in-stream flows in upper Sixth Water and Diamond Fork creeks. The annual transbasin diversion would include 61,000 acre-feet of SVP water and 101,900 acre-feet of Bonneville Unit water for a total diversion of 162,900 acre-feet. The SVP water is delivered to the

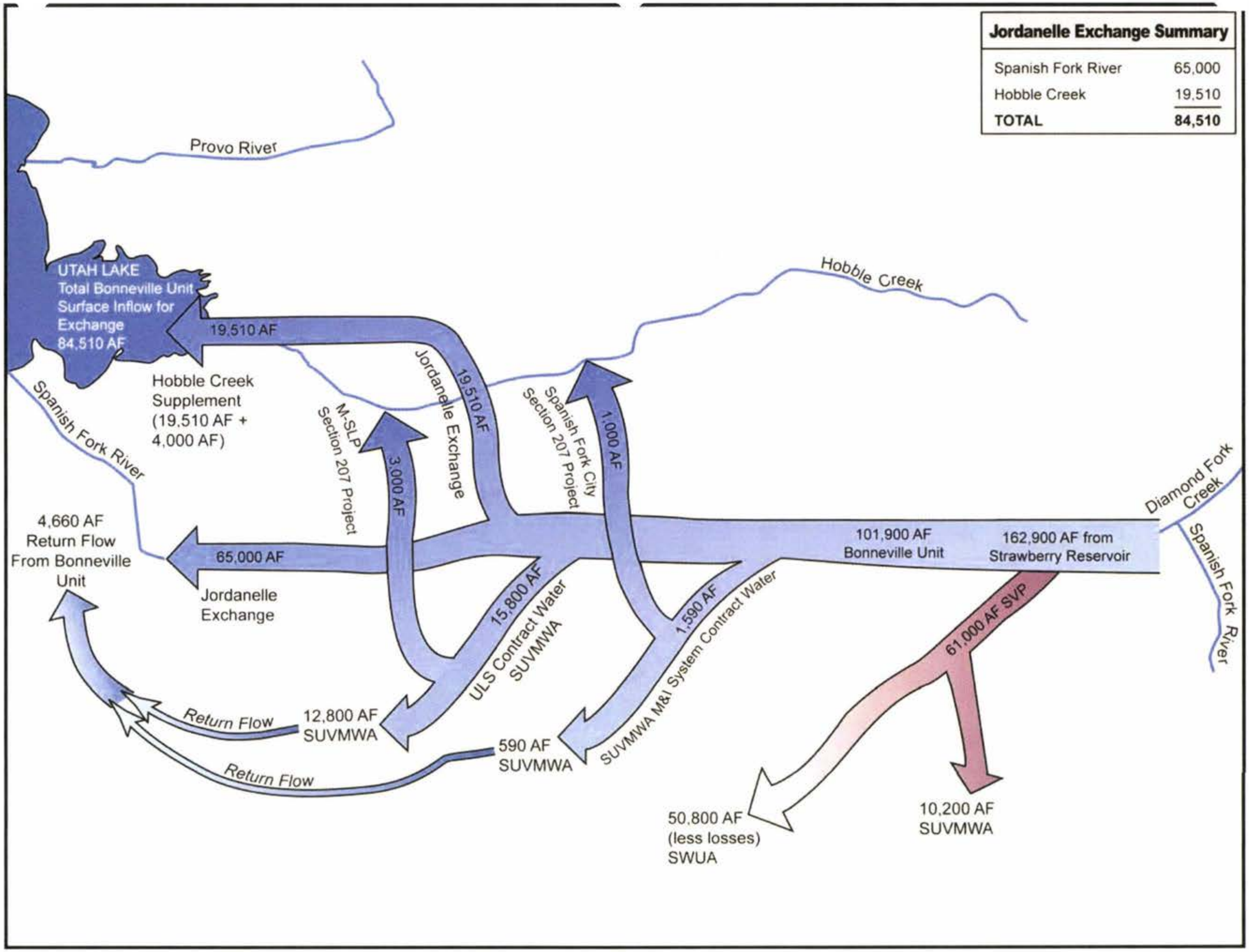


Figure 1-22
Utah Lake System Water Deliveries
Under the Bonneville Unit Water Alternative

Spanish Fork River for diversion to farmers in southern Utah County for irrigation, incidental hydropower and secondary irrigation.

Of the average 101,900 acre-feet, 15,800 acre-feet of secondary M&I water would be delivered to SUVMWA member cities in southern Utah County, who would assign about 3,000 acre-feet to DOI for in-stream flows; 1,590 acre-feet of M&I water has already been contracted for by the SUVMWA, of which 1,000 acre-feet has been assigned to the DOI for in-stream flows; and 84,510 acre-feet, minus conveyance losses, would be delivered to Utah Lake for exchange to Jordanelle Reservoir under the M&I System. Of the 84,510 acre-feet, about 65,000 acre-feet would be released down the Spanish Fork River during the non-irrigation months and an average of 19,510 acre-feet would be conveyed to Hobble Creek to assist in the recovery of the June sucker and for in-stream flows and habitat improvement. Fifteen thousand acre-feet of the District's Utah Lake secondary water rights would be acquired by DOI to provide the firm yield of 15,800 acre-feet.

1.5.9.2 Return Flows and Recycled Water

Bonneville Unit M&I water delivered from Jordanelle Reservoir to Utah and Wasatch counties and Bonneville Unit agricultural water delivered to Wasatch and Summit counties would return flows in the form of municipal wastewater from culinary water, drainage from M&I secondary water used for outdoor irrigation, and drainage from sprinkler and flood irrigation practices. Return flows accruing to the hydrologic system are either credited as Bonneville Unit return flows or are considered natural flows in the system. The distinction is specified by the State Engineer in the administration of various project water rights, whether they involve trans-basin water, basin water, or a combination of both. Return flows that are credited as Bonneville Unit return flows are available to the project to be used for downstream deliveries or for Bonneville Unit exchanges. Some Bonneville Unit water from both classes of return flows accruing from project M&I water is available for recycling by the District petitioners. Return flows from the use of ULS M&I water would occur as municipal wastewater in Salt Lake County and drainage via surface and groundwater pathways in southern Utah County. The treatment and recycling of return flows from municipal wastewater, as quantified by the State Engineer in his administration of the water rights, is an important part of ULS and would extend the water supply available to the District's petitioners in the ULS project planning area.

The amount of return flows credited as Bonneville Unit water by the State Engineer from M&I and agricultural use of Bonneville Unit transbasin water is considered by the DOI to be Bonneville Unit water and thus available for recycling as a federal water supply. An official estimate of the amount of Bonneville Unit return flow that can be credited to the Bonneville Unit would need to be determined by the State Engineer. In the case of Salt Lake County, the return flow from the existing 70,000 acre-feet of M&I System water that may be credited by the State Engineer is estimated to be approximately 10,500 acre-feet.

The hydrology presented in previous Bonneville Unit NEPA and planning documents has consistently assumed that historical inflows to Utah Lake, including return flows, would continue in the future. The hydrology models that were used throughout the planning process for ULS are based on the historical data, levels, and operations of Utah Lake. Instead of identifying the thousands of components of water that historically occurred in Utah Lake, the models use key data elements, including evaporation, inflow, outflow, and the historic variability of Utah Lake to predict future project operations.

1.5.9.2.1 Direct Return Flows to Utah Lake (Southern Utah County Secondary Systems). Direct return flows to Utah Lake from ULS M&I secondary water delivered to southern Utah County would be approximately 4,660 acre-feet.

1.5.9.2.2 Bonneville Unit Return Flows. In northern Utah County, the delivery and use of 20,000 acre-feet of Bonneville Unit M&I water for municipal and secondary system use would produce a return flow of 7,000 acre-feet to Utah Lake. In previous Bonneville Unit documents, it was stated that an estimated 13,000 acre-foot return flow to Utah Lake would be credited to Utah Lake for exchange to Jordanelle Reservoir. However, the State Engineer issued a decision in November 2002 that return flows from in-basin water would accrue to Utah Lake as part of the water rights of those individuals and entities that have Utah Lake water rights. This is the case even if the supplied water is the result of an exchange of imported water delivered to Utah Lake. Consequently, return flows from the 20,000 acre-foot delivery in northern Utah County are not directly available to the project.

The Salt Lake County return flows from the Bonneville Unit are calculated as 15 percent of the 70,000 acre-feet delivered under the Bonneville Unit M&I System. The total of the estimated return flow credit that likely would be approved by the State Engineer for recycling is about 10,500 acre-feet. The 10,500 acre-feet to be recycled would not be part of the ULS supply per-se but would be included in the overall Bonneville Unit water supply.

1.5.9.3 Conserved Water

1.5.9.3.1 Provo Reservoir Canal Enclosure. In early 2002 under an inter-related action, the Provo River Water Users Association requested the authority to enclose the Provo Reservoir Canal to conserve water that is lost by canal seepage. In response to this request, Reclamation prepared an Environmental Assessment. The final EA and Finding of No Significant Impact on the canal enclosure was signed by Reclamation on April 30, 2003 (Reclamation 2003a). Under this plan, the Provo River Water Users Association would enclose the Provo Reservoir Canal. The water conserved by enclosing the Provo Reservoir Canal would total 8,000 acre-feet in seepage-loss savings. It is anticipated that the Provo Reservoir Canal enclosure project would receive Section 207 funding to accomplish the water conservation savings of 8,000 acre-feet per year. If the enclosure project does proceed with Section 207 funding, this EIS provides the necessary NEPA compliance and would require 8,000 acre-feet of water to be returned to DOI. The conserved water is included in the amounts discussed in Section 1.5.9.3.3.

1.5.9.3.2 Mapleton–Springville Lateral Piping. The existing Mapleton–Springville Lateral would be replaced with a Bonneville Unit, ULS facility pipeline throughout most of its length, resulting in conserved water by conveying annually an average of 8,831 acre-feet of SVP water that has been historically delivered through the existing lateral. A portion of the cost of piping the lateral would be funded under the CUPCA Section 207 program. Piping the canal would result in 3,000 acre-feet of ULS M&I water returned to DOI for Hobble Creek in-stream flows. This would be added to about 1,000 acre-feet already conserved under the Spanish Fork City Section 207 water conservation project, and about 19,510 acre-feet of transbasin ULS water released from Strawberry Reservoir to Utah Lake. The ULS project would use the new pipeline to convey approximately 23,510 acre-feet of water to Hobble Creek for June sucker spawning and rearing flows to meet JSRIP goals in the months of April, May and June and supplemental flows at other times of the year.

The following water quantities and sources comprise the water that would be conveyed through the Mapleton–Springville Lateral to Hobble Creek for June sucker spawning and rearing flows, and for delivery to Utah Lake for exchange to Jordanelle Reservoir:

- 3,000 acre-feet from Section 207 projects in the Springville-Mapleton area that is returned to DOI
- 1,000 acre-feet Spanish Fork City Section 207 water already returned to DOI
- 19,510 acre-feet transbasin ULS water released to Utah Lake for exchange to Jordanelle Reservoir
  23,510 acre-feet total water released to Hobble Creek

1.5.9.3.3 Other Section 207 Project Water. The Bonneville Unit Water Alternative would have the same other Section 207 project water as the Proposed Action (see Section 1.4.9.4.3).

1.5.9.4 Mitigation Commission Water Acquisition in the Lower Provo River

The Bonneville Unit Water Alternative would have the same Mitigation Commission water acquisition in the lower Provo River as the Proposed Action (see Section 1.4.9.5).

1.5.10 Operation and Maintenance of the Bonneville Unit Water Alternative

1.5.10.1 Introduction

The Bonneville Unit Water Alternative would be operated and maintained by the District under operating agreements with the federal government, local water districts, water companies, associations, and municipalities. Bonneville Unit M&I and ULS water would be released from Strawberry Reservoir, conveyed through the Diamond Fork System to the Spanish Fork River, and delivered to southern Utah County for M&I secondary water, to SUVMWA member cities for existing M&I water supply contracts, and to Utah Lake for exchange to Jordanelle Reservoir as part of the M&I System. Water would be provided to Sixth Water and Diamond Fork creeks for in-stream flows, to the lower Provo River to supplement June sucker spawning and rearing flows, and to Hobble Creek for June sucker flows and in-stream flows for fish and wildlife. Up to 10,200 acre-feet of SVP water acquired by or contractually made available to SUVMWA or member cities would be conveyed through ULS pipelines to SUVMWA. Hydroelectric project power would be generated by Bonneville Unit and SVP water passing through turbines at two project power facilities in the Diamond Fork System.

The following sections describe the ULS operations under the Bonneville Unit Water Alternative.

1.5.10.2 ULS Operations

The following sections describe the ULS operations under the Bonneville Unit Water Alternative.

1.5.10.2.1 Water Delivery Operations. CUP Bonneville Unit water deliveries would be made through normal operations. The following describes annual normal operations under the Bonneville Unit Water Alternative.

- As the ULS facilities are completed, 15,800 acre-feet of ULS M&I water would be delivered through the Spanish Fork–Santaquin Pipeline in southern Utah County under a contract with SUVMWA. Of the 15,800 acre-feet, it is anticipated that 3,000 acre-feet would be conserved under 207 projects and returned to DOI for in-stream flows, and would be included in the 23,510 acre-feet conveyed through the Mapleton-Springville Lateral pipeline.

- An annual average of 16,273 acre-feet of Bonneville Unit water from Strawberry Reservoir would be released for in-stream flows in Sixth Water Creek and Diamond Fork Creek and flow down the Spanish Fork River to Utah Lake on a year-round basis. This water would be exchanged from Utah Lake to Jordanelle Reservoir.

- Up to 10,200 acre-feet of SVP water shares acquired by SUVMWA cities would be conveyed to member cities by SUVMWA in southern Utah County through the new ULS pipelines. This water is part of the overall 61,000 acre-feet of SVP water stored in Strawberry Reservoir. The balance of the SVP water would be released through the Strawberry Tunnel and Syar Tunnel to the Diamond Fork System for conveyance to the Spanish Fork River (except for SVP water in the Mapleton-Springville Lateral).

- Of the 1,590 acre-feet already under contract to SUVMWA, 590 acre-feet would be used by SUVMWA member cities as secondary M&I water. This water would be delivered through the ULS pipelines to the SUVMWA member cities. The remaining 1,000 acre-feet has been assigned to DOI and would be part of the 23,510 acre-feet released to Hobble Creek.

- About 84,510 acre-feet of Bonneville Unit water would be conveyed to Utah Lake primarily from October through April (winter months) when the radial gates are up at the five diversion dams on the Spanish Fork River, thus completing the M&I exchange between Strawberry Reservoir and Jordanelle Reservoir. Of this 84,510 acre-feet, about 65,000 acre-feet would be conveyed to Utah Lake via the Spanish Fork River and 19,510 acre-feet would be conveyed to Utah Lake via Hobble Creek.

- Under the Deer Creek Reservoir-Jordanelle Reservoir Operating Agreement, an annual 12,165 acre-feet of water would be provided as flows for June sucker spawning and rearing in the lower Provo River to meet JSRIP goals annually. This water would be comprised of the conserved water as shown in Table 1-14 in Section 1.4.10.2.1.

- An annual average of 23,510 acre-feet of water would be conveyed through the Mapleton-Springville Lateral pipeline to Hobble Creek for June sucker spawning and rearing flows to meet JSRIP goals and to provide other fish and wildlife benefits throughout the year. This water would be subsequently exchanged from Utah Lake to Jordanelle Reservoir. Of the 23,510 acre-feet, 4,000 acre-feet would be provided in every year that it is needed. About 3,000 acre-feet of this amount is ULS M&I water that would be available for release in the spring and 1,000 acre-feet is conserved Bonneville Unit M&I water that would occur during the summer season. The remaining annual average 19,510 acre-feet only would be brought when water is being delivered from Strawberry Reservoir to Utah Lake for exchange up to Jordanelle Reservoir. Hobble Creek supplemental water would not be delivered during high runoff years when Utah Lake is above compromise level. The high runoff years correspond with years when natural runoff would be sufficient to attract June sucker spawning. An additional 8,831 acre-feet of SVP water would be delivered through the Mapleton-Springville Lateral Pipeline to the Springville and Mapleton irrigation companies.

- Hydroelectric power would be generated from the M&I water conveyance and contracted to the Western Area Power Administration (see Table 1-20 for generating capacities and quantities). The hydroelectric power would be generated from Bonneville Unit water conveyed through Diamond Fork System features. Water would not be released only for power generation purposes.

Table 1-20
Bonneville Unit Water Alternative
Power Facility Generation

Power Facility	Generating Capacity (megawatts)	Energy Output (kilowatt hours/year)
Sixth Water	45	142,000,000
Upper Diamond Fork	5	37,000,000
Total	**50**	**179,000,000**

1.5.10.2.2 Maintenance Operations. The Bonneville Unit Water Alternative would have the same maintenance operations as the Proposed Action (see Section 1.4.10.2.2).

1.5.10.2.3 Emergency Operations. The Bonneville Unit Water Alternative would have the same emergency operations as the Proposed Action (see Section 1.4.10.2.3).

1.5.10.2.4 Automated Control System. The Bonneville Unit Water Alternative would have the same type of automated control system as the Proposed Action (see Section 1.4.10.2.4). However, the RTUs would be located only at the following features:

- Sixth Water Power Facility and Flow Control Structure
- Upper Diamond Fork Power Facility and Flow Control Structure
- Spanish Fork Flow Control Structure
- Mapleton–Springville Lateral Pipeline turnouts and outlet to Hobble Creek
- Spanish Fork–Santaquin Pipeline turnouts

1.5.10.3 Streamflows

This section presents the streamflows and water volumes that would occur under the Bonneville Unit Water Alternative in the Provo River, Hobble Creek, Spanish Fork River, and Jordan River. Additional streamflow details are presented in the Surface Water Hydrology Technical Report for the Utah Lake Drainage Basin Water Delivery System (CUWCD 2004a).

The ULS baseline streamflows of the Provo River have been compared in detail with the streamflows that were documented in the 1979 M&I System Final Environmental Statement (FES) (Reclamation, 1979 a&b) and the 1987 Final Supplement (Reclamation 1987). The results of this comparison are documented in "ULS Baseline Provo River Flows Compared with CUP M&I System FES Conditions", (Thurin 2003). The document concludes, "differences between … ULS Baseline and the CUP M&I System's post-project condition are relatively minor, and should not affect results of the analysis of ULS impacts."

The Provo River Water Commissioner is ultimately responsible for monitoring Provo River flows, but flows were compared by the Reclamation hydrologist responsible for the M&I System stream flow modeling. The hydrologist concluded that the flows were essentially the same, given the differences in the hydrologic period and the more detailed methods used in the ULS studies (Reclamation 2003b).

Table 1-21 shows two sets of numbers to describe the streamflows at selected points in the rivers. The first set shows monthly average flows in cfs and acre-feet averaged over the entire 50-year analysis period (1950 to 1999). The second set shows monthly average flows from the average of three extreme dry years (1961, 1977, 1992) and the average of three extreme wet years (1952, 1983, 1986).

1.5.10.4 Reservoirs

This section presents the reservoir volumes that would occur under the Bonneville Unit Water Alternative in Strawberry Reservoir, Deer Creek Reservoir and Utah Lake. Strawberry Reservoir has a total storage capacity of 1,106,500 acre-feet. Deer Creek Reservoir has a total capacity of 152, 400 acre-feet. Utah Lake has a total storage capacity of about 870,000 acre-feet at the compromise elevation. Additional reservoir volume details are presented in the Surface Water Hydrology Technical Report for the Utah Lake Drainage Basin Water Delivery System (CUWCD 2004a).

Table 1-22 shows the average monthly volumes in acre-feet over the entire 50-year analysis period (1950 to 1999). The table shows maximum and minimum monthly volumes over the 50-year analysis period.

Table 1-21
Monthly Average Streamflow and Volume for the Bonneville Unit Water Alternative

Stream & Reach	Monthly Flow (cfs) and Volume (acre-feet) Averages	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Monthly Flow Average (cfs)	Annual Volume Total (acre-feet)
Provo River Outlet Deer Cr. Reservoir to N.F. Provo River	Flow	165	106	105	105	119	186	305	798	904	648	542	448	369	
	Volume	10,117	6,321	6,449	6,459	6,639	11,421	18,150	49,066	53,816	39,840	33,320	26,666		268,263
	Flow Dry year[a]	152	101	100	101	103	108	250	493	396	443	464	321	253	
	Flow Wet year[b]	123	111	104	100	202	1,078	637	1,293	1,610	821	524	473	590	
Provo River N.F. Provo River to Olmsted Diversion Dam	Flow	178	121	117	115	129	197	327	856	972	694	569	469	395	
	Volume	10,942	7,179	7,164	7,093	7,197	12,136	19,429	52,621	57,830	42,644	35,006	27,915		287,155
	Flow Dry year[a]	158	113	109	109	110	115	260	511	406	458	472	337	263	
	Flow Wet year[b]	153	124	128	121	230	1,105	685	1,380	1,763	905	578	503	640	
Provo River Olmsted Diversion Dam to Murdock Diversion Dam	Flow	113	70	57	55	72	148	287	765	813	430	299	281	283	
	Volume	6,967	4,167	3,488	3,369	4,031	9,112	17,089	47,021	48,369	26,459	18,398	16,725		205,196
	Flow Dry year[a]	84	53	42	43	50	37	157	323	213	123	157	155	120	
	Flow Wet year[b]	119	84	88	77	211	1,079	707	1,338	1,642	687	345	343	560	
Provo River Murdock Diversion Dam to Interstate 15	Flow	93	72	59	56	73	150	242	512	544	213	166	145	194	
	Volume	5,688	4,292	3,599	3,462	4,116	9,217	14,403	31,467	32,388	13,101	10,203	8,645		140,582
	Flow Dry year[a]	70	55	43	44	51	38	113	125	99	78	122	101	78	
	Flow Wet year[b]	100	86	92	80	215	1,083	707	1,204	1,381	347	153	147	466	
Provo River Interstate 15 to Utah Lake	Flow	41	76	56	52	68	145	213	404	414	93	30	26	135	
	Volume	2,510	4,518	3,458	3,191	3,817	8,921	12,700	24,825	24,657	5,718	1,867	1,521		97,702
	Flow Dry year[a]	19	49	34	37	44	28	58	42	44	21	63	13	38	
	Flow Wet year[b]	87	85	95	81	212	1,082	719	1,145	1,276	210	27	21	420	
Hobble Creek Mapleton Lateral to Utah Lake	Flow	39	55	53	52	56	67	104	147	72	35	33	32	62	
	Volume	2,373	3,288	3,235	3,196	3,116	4,131	6,171	9,034	4,258	2,153	2,014	1,920		44,889
	Flow Dry year[a]	33	47	47	47	49	47	88	92	40	33	33	33	49	
	Flow Wet year[b]	26	39	36	36	61	81	202	346	186	45	28	26	92	

Table 1-21
Monthly Average Streamflow and Volume for the Bonneville Unit Water Alternative

Stream and Reach	Monthly Flow (cfs) and Volume (acre-feet) Averages	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Monthly Flow Average (cfs)	Annual Volume Total (acre-feet)
Spanish Fork River Diamond Fk. Cr. to Spanish Fk. Diversion	Flow	193	256	246	247	272	294	417	581	454	357	307	184	317	
	Volume	11,837	15,219	15,115	15,196	15,226	18,067	24,801	35,698	26,986	21,981	18,880	10,961		229,967
	Flow Dry year[a]	164	240	232	234	255	248	272	209	315	228	214	125	228	
	Flow Wet year[b]	182	191	182	183	244	310	784	1,341	950	461	378	272	456	
Spanish Fork River Spanish Fk. Diversion to E. Bench Diversion	Flow	93	174	175	175	187	169	182	192	100	55	46	33	132	
	Volume	5,697	10,334	10,765	10,784	10,486	10,363	10,806	11,790	5,971	3,390	2,815	1,988		95,188
	Flow Dry year[a]	104	187	187	186	203	193	203	30	39	25	25	21	117	
	Flow Wet year[b]	57	83	87	87	92	74	303	768	410	117	68	55	183	
Spanish Fork River E. Bench Diversion to Mill Race Canal	Flow	90	174	175	175	187	168	174	150	53	18	17	20	117	
	Volume	5,533	10,334	10,765	10,784	10,486	10,336	10,370	9,206	3,144	1,104	1,015	1,163		84,240
	Flow Dry year[a]	101	187	187	186	203	193	189	11	10	9	8	17	108	
	Flow Wet year[b]	55	83	87	87	92	74	303	735	331	57	31	23	163	
Spanish Fork River Mill Race Canal to Lakeshore Diversion	Flow	167	259	250	252	276	297	381	326	123	40	37	35	204	
	Volume	10,242	15,418	15,373	15,465	15,480	18,280	22,674	20,063	7,329	2,435	2,274	2,111		147,144
	Flow Dry year[a]	152	243	237	239	259	247	203	25	39	27	29	28	144	
	Flow Wet year[b]	160	194	185	187	248	315	789	1,163	498	63	50	69	327	
Jordan River Outlet of Utah Lake to Jordan Narrows	Flow	264	188	223	285	367	474	608	843	911	902	775	570	534	
	Volume	16,215	11,184	13,734	17,511	20,549	29,129	36,155	51,826	54,200	55,437	47,669	33,939		387,548
	Flow Dry year[a]	215	16	15	5	6	6	123	471	559	590	443	260	226	
	Flow Wet year[b]	227	272	600	699	1,113	1,489	1,669	2,030	2,050	1,647	1,306	905	1,167	

Notes:
[a]The three driest years (1961, 1977, 1992) were averaged to calculate the values shown in the table.
[b]The three wettest years (1952, 1983, 1986) were averaged to calculate the values shown in the table.

Table 1-22
Average Monthly Reservoir Volume for the Bonneville Unit Water Alternative
(1,000 acre-feet)

Reservoir	Average Monthly Volume (acre-feet)	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Average
Strawberry Reservoir	Average	612	602	593	584	575	569	574	618	631	623	605	605	599
	Wet Years[1]	696	695	694	695	694	697	721	796	829	838	832	840	752
	Dry Years[2]	618	607	594	582	570	561	553	551	526	506	486	475	552
Deer Creek Reservoir	Average	79	86	93	100	107	115	118	112	107	96	86	76	98
	Wet Years[1]	111	122	129	137	147	146	149	148	141	123	112	107	131
	Dry Years[2]	34	40	46	53	59	66	60	46	34	24	15	10	41
Utah Lake	Average	593	630	667	707	745	775	792	796	762	682	616	583	696
	Wet Years[1]	758	800	832	855	881	947	996	1081	1071	980	910	856	914
	Dry Years[2]	430	472	517	556	600	634	636	604	537	461	402	392	520

Notes:
All values rounded to nearest 1,000 acre-feet
[1] The three wettest years (1952, 1983, and 1986) were averaged to calculate the values shown in the table.
[2] The three driest years (1961, 1977, and 1992) were averaged to calculate the values shown in the table.

Figure 1-23 shows the Utah Lake and Jordan River water balance under the Bonneville Unit Water Alternative. There would no net change in Jordan River flows below Jordan Narrows. The change in average Utah Lake storage would be a minus 6,900 acre-feet.

1.6 No Action Alternative

1.6.1 Introduction

No new water conveyance features would be constructed under the No Action Alternative. The 15,800 acre-feet of available Bonneville Unit water would remain in Strawberry Reservoir to make sure that the delivery of the Bonneville Unit M&I exchange water would be made without any shortages. Some of the Bonneville Unit M&I exchange water would be routed through the Strawberry Tunnel to meet in-stream flow needs in Sixth Water and Diamond Fork creeks. The remaining Bonneville Unit M&I exchange water would conveyed through the Syar Tunnel and Diamond Fork System and discharged into Diamond Fork Creek at the outlet near Monks Hollow or discharged from the Diamond Fork Pipeline into the Spanish Fork River at the mouth of Diamond Fork Canyon. The irrigation diversions on lower Spanish Fork River would be modified to bypass and measure the 86,100 acre-feet into Utah Lake, and to allow fish passage as previously agreed by the DOI and District in the 1999 Diamond Fork FS-FEIS and ROD. The DOI would not acquire any of the District's secondary water rights in Utah Lake and no water would be conveyed to Hobble Creek or to lower Provo River. The No Action Alternative water delivery would operate the same as the Interim Proposed Action in the Diamond Fork FS-FEIS.

1.6.2 No Action Alternative Water Conveyance

Bonneville Unit M&I exchange water released from Strawberry Reservoir into the Diamond Fork System would be discharged at the Spanish Fork Flow Control Structure and flow down the Spanish Fork River. This water would be conveyed past all downstream diversion dams to Utah Lake.

1.6.3 Water Sources

Water sources would consist of transbasin diversion water stored in Strawberry Reservoir, return flows of Bonneville Unit M&I water, and conserved water from other related projects. The following sections describe the water sources.

1.6.3.1 Transbasin Diversion

Water deliveries would consist of a transbasin diversion from Strawberry Reservoir in the Strawberry River drainage basin for conveyance through the Syar Tunnel into the Diamond Fork System to the Utah Lake drainage basin (Figure 1-24). An average of 86,100 acre-feet of Bonneville Unit water would be conveyed from Strawberry Reservoir each year, with an average of about 77,327 acre-feet flowing through the Syar Tunnel, and approximately 8,773 acre-feet flowing through the Strawberry Tunnel to provide in-stream flows. The annual transbasin diversion would include 61,000 acre-feet of SVP water and an average 86,100 acre-feet of Bonneville Unit water for a total diversion of 147,100 acre-feet. Of the average of 86,100 acre-feet, 1,590 acre-feet of Bonneville Unit M&I water has already been contracted for by the SUVMWA and 590 acre-feet of this water is available for exchange to wells through pumping. The 85,510 acre-feet (i.e., 86,100 minus 590) delivery to Utah Lake would offset the Provo River estimated depletion of 84,510 acre-feet. The exchange water from Strawberry Reservoir would be stored in Jordanelle Reservoir for M&I delivery to Salt Lake County and northern Utah County under existing contracts.

1.6.3.2 Return Flows and Recycled Water

Bonneville Unit M&I water delivered from Jordanelle Reservoir to Salt Lake, Utah and Wasatch counties and Bonneville Unit agricultural water delivered to Wasatch and Summit counties would return flows in the form of municipal wastewater from culinary water, drainage from M&I secondary water used for outdoor irrigation, and drainage from sprinkler and flood irrigation practices. Return flows accruing to the hydrologic system are either credited as Bonneville Unit return flows or are considered natural flows in the system. The distinction is specified by the State Engineer in the administration of various project water rights, whether they involve transbasin water, basin water, or a combination of both. Return flows that are credited as Bonneville Unit return flows are available to the project to be used for downstream deliveries or for Bonneville Unit exchanges. Some Bonneville Unit water from both classes of return flows accruing from project M&I water is available for recycling by the District petitioners. Return flows from the use of Bonneville Unit M&I water would occur as municipal wastewater in Salt Lake County and drainage via surface and groundwater pathways in southern Utah County. The treatment and recycling of return flows from municipal wastewater, as quantified by the State Engineer in his administration of the water rights, is an important part of ULS and would extend the water supply available to the District's petitioners in the ULS project planning area.

The amount of return flows credited as Bonneville Unit water by the State Engineer from M&I and agricultural use of Bonneville Unit transbasin water is considered by the DOI to be Bonneville Unit water and thus available for recycling as a federal water supply. An official estimate of the amount of Bonneville Unit return flow that can be credited to the Bonneville Unit would need to be determined by the State Engineer. In the case of Salt Lake County, the return flow from the existing 70,000 acre-feet of M&I System water that may be credited by the State Engineer is estimated to be approximately 10,500 acre-feet.

1.6.3.2.1 Direct Return Flows to Utah Lake (Southern Utah County Secondary Systems). Direct return flows to Utah Lake from Bonneville Unit M&I water delivered to southern Utah County would be approximately 210 acre-feet.

1.6.3.2.2 Bonneville Unit Return Flows. The No Action Alternative would have the same Bonneville Unit return flows as the Bonneville Unit Water Alternative (see Section 1.5.9.2.2).

1.6.3.3 Conserved Water

1.6.3.3.1 Provo Reservoir Canal Enclosure. The Provo Reservoir Canal enclosure would be the same as described for the Bonneville Unit Water Alternative (see Section 1.5.9.3.1).

1.6.3.3.2 Other Section 207 Project Water. The other Section 207 project water would be the same as the Proposed Action (see Section 1.4.9.4.3).

1.6.3.4 Mitigation Commission Water Acquisition in the Lower Provo River

The No Action Alternative would have the same Mitigation Commission water acquisition in the lower Provo River as the Proposed Action (see Section 1.4.9.5).

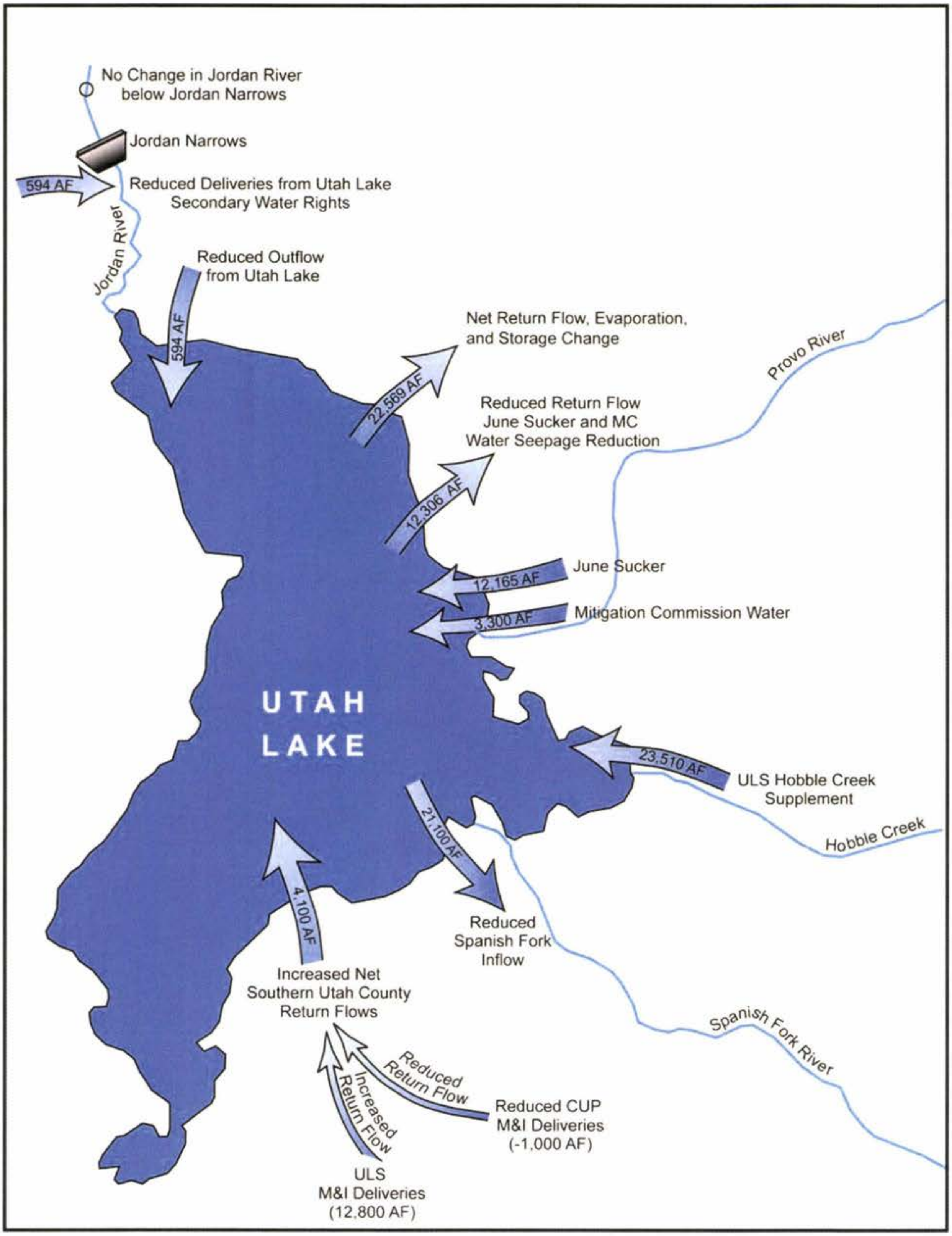


Figure 1-23
Utah Lake and Jordan River Water Balance Under the Bonneville Unit Water Alternative

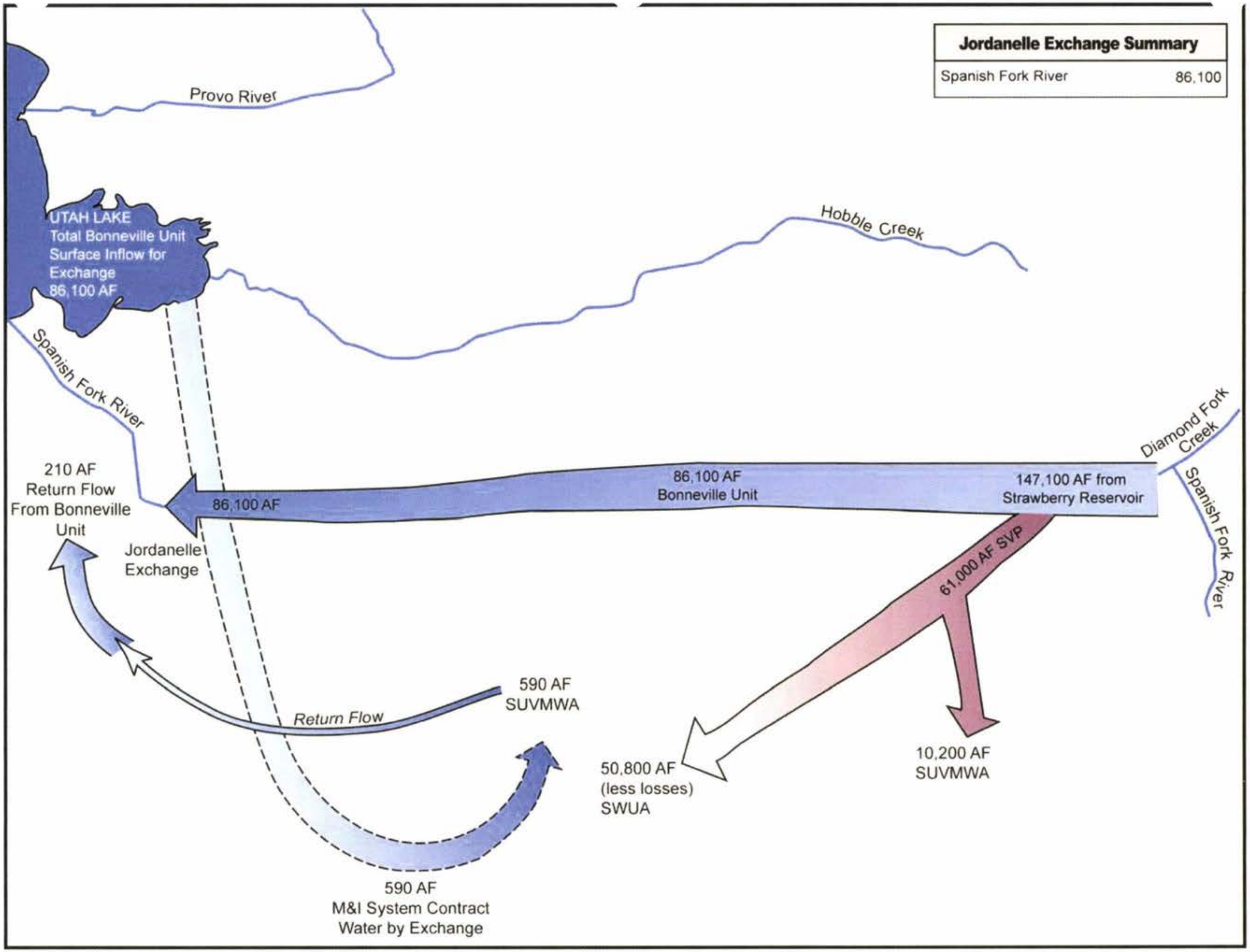


Figure 1-24
Water Deliveries Under the No Action Alternative

'.6.4 Operation of the No Action Alternative

1.6.4.1 Introduction

The No Action Alternative would be operated by the District under agreements with the federal government, local water districts, water companies, and associations. Bonneville Unit water would be released from Strawberry Reservoir, conveyed through the Diamond Fork System to the Spanish Fork River and Utah Lake for exchange to Jordanelle Reservoir as part of the M&I System. Water would be provided to Sixth Water and Diamond Fork creeks for in-stream flows, and to the lower Provo River to supplement June sucker spawning and rearing flows. The No Action Alternative would require maintenance operations and emergency operations of existing facilities (Diamond Fork System).

The following sections describe the ULS operations under the No Action Alternative.

1.6.4.2 ULS Operations

The following section describes the ULS operations under the No Action Alternative.

1.6.4.2.1 Water Delivery Operations. Bonneville Unit water deliveries would be made through normal operations. The following describes annual normal operations under the No Action Alternative.

- Approximately 16,273 acre-feet of Bonneville Unit water from Strawberry Reservoir would be released for in-stream flows in Sixth Water Creek and Diamond Fork Creek and flow down the Spanish Fork River to Utah Lake during the non-irrigation season. This water would be exchanged from Utah Lake to Jordanelle Reservoir.

- 590 acre-feet of the total 1,590 acre-feet of existing Bonneville Unit M&I System water already contracted would be used by SUVMWA member cities as M&I water. This water would be made available to SUVMWA member cities by existing wells and through exchange to Utah Lake. The remaining 1,000 acre-feet already returned to the DOI under the Spanish Fork City Section 207 project would flow down the Spanish Fork River to Utah Lake.

- 86,100 acre-feet of Bonneville Unit water would be conveyed through the Spanish Fork River to Utah Lake on a year-round basis, thus completing the M&I exchange between Strawberry Reservoir and Jordanelle Reservoir.

- Under the Deer Creek Reservoir-Jordanelle Reservoir Operating Agreement, an annual 12,165 acre-feet of water would be provided as flows for June sucker spawning and rearing in the lower Provo River to meet JSRIP goals annually. This water would be comprised of the conserved water as shown in Table 1-14 in Section 1.4.10.2.1.

1.6.4.3 Streamflows

This section presents the streamflows and water volumes that would occur under the No Action Alternative in the Provo River, Spanish Fork River, and Jordan River. Additional streamflow details are presented in the Surface Water Hydrology Technical Report for the Utah Lake Drainage Basin Water Delivery System (CUWCD 2004a).

The ULS baseline streamflows of the Provo River have been compared in detail with the streamflows that were documented in the 1979 M&I System Final Environmental Statement (FES) (Reclamation, 1979 a&b) and the

1987 Final Supplement (Reclamation 1987). The results of this comparison are documented in "ULS Baseline Provo River Flows Compared with CUP M&I System FES Conditions", (Thurin 2003). The document concludes, "differences between ... ULS Baseline and the CUP M&I System's post-project condition are relatively minor, and should not affect results of the analysis of ULS impacts."

The Reclamation hydrologist responsible for the M&I System stream flow modeling compared flows. The hydrologist concluded that the flows were essentially the same, given the differences in the hydrologic period and the more detailed methods used in the ULS studies (Reclamation 2003b).

Table 1-23 shows two sets of numbers to describe the streamflows at selected points in the rivers. The first set shows monthly average flows in cfs and acre-feet averaged over the entire 50-year analysis period (1950 to 1999). The second set shows monthly average flows from the average of three extreme dry years (1961, 1977, 1992) and the average of three extreme wet years (1952, 1983, 1986).

1.6.4.4 Reservoirs

This section presents the reservoir volumes in that would occur under the No Action Alternative in Strawberry Reservoir, Deer Creek Reservoir and Utah Lake. Strawberry Reservoir has a total storage capacity of 1,106,500 acre-feet. Deer Creek Reservoir has a total capacity of 152,400 acre-feet. Utah Lake has a total storage capacity of about 870,000 acre-feet at the compromise elevation. Additional reservoir volume details are presented in the Surface Water Hydrology Technical Report for the Utah Lake Drainage Basin Water Delivery System (CUWCD 2004a).

Table 1-24 shows the average monthly volumes in acre-feet over the entire 50-year analysis period (1950 to 1999). The table shows maximum and minimum monthly volumes over the 50-year analysis period.

Figure 1-25 shows the Utah Lake and Jordan River water balance under the No Action Alternative. There would be no net change in Jordan River flows below Jordan Narrows. The change in average Utah Lake storage would be a plus 5,600 acre-feet.

Table 1-23
Monthly Average Streamflow and Volume for the No Action Alternative

Stream & Reach	Monthly Flow (cfs) and Volume (acre-feet) Averages	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Monthly Flow Average (cfs)	Annual Volume Total (acre-feet)
Provo River Outlet Deer Cr. Reservoir to N.F. Provo River	Flow	165	106	105	105	119	186	305	798	904	648	542	448	369	
	Volume	10,117	6,321	6,449	6,459	6,639	11,421	18,150	49,066	53,816	39,840	33,320	26,666		268,263
	Flow Dry year[a]	152	101	100	101	103	108	250	493	396	443	464	321	253	
	Flow Wet year[b]	123	111	104	100	202	1,078	637	1,293	1,610	821	524	473	590	
Provo River N.F. Provo River to Olmsted Diversion Dam	Flow	178	121	117	115	129	197	327	856	972	694	569	469	395	
	Volume	10,942	7,179	7,164	7,093	7,197	12,136	19,429	52,621	57,830	42,644	35,006	27,915		287,155
	Flow Dry year[a]	158	113	109	109	110	115	260	511	406	458	472	337	263	
	Flow Wet year[b]	153	124	128	121	230	1,105	685	1,380	1,763	905	578	503	640	
Provo River Olmsted Diversion Dam to Murdock Diversion Dam	Flow	113	70	57	55	72	148	287	765	813	430	299	281	283	
	Volume	6,967	4,167	3,488	3,369	4,031	9,112	17,089	47,021	48,369	26,459	18,398	16,725		205,196
	Flow Dry year[a]	84	53	42	43	50	37	157	323	213	123	157	155	120	
	Flow Wet year[b]	119	84	88	77	211	1,079	707	1,338	1,642	687	345	343	560	
Provo River Murdock Diversion Dam to Interstate 15	Flow	93	72	59	56	73	150	242	512	544	213	166	145	194	
	Volume	5,688	4,292	3,599	3,462	4,116	9,217	14,403	31,467	32,388	13,101	10,203	8,645		140,582
	Flow Dry year[a]	70	55	43	44	51	38	113	125	99	78	122	101	78	
	Flow Wet year[b]	100	86	92	80	215	1,083	707	1,204	1,381	347	153	147	466	
Provo River Interstate 15 to Utah Lake	Flow	41	76	56	52	68	145	213	404	414	93	30	26	135	
	Volume	2,510	4,518	3,458	3,191	3,817	8,921	12,700	24,825	24,657	5,718	1,867	1,521		97,702
	Flow Dry year[a]	19	49	34	37	44	28	58	42	44	21	63	13	38	
	Flow Wet year[b]	87	85	95	81	212	1,082	719	1,145	1,276	210	27	21	420	

Table 1-23
Monthly Average Streamflow and Volume for the No Action Alternative

Stream and Reach	Monthly Flow (cfs) and Volume (acre-feet) Averages	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Monthly Flow Average (cfs)	Annual Volume Total (acre-feet)
Spanish Fork River Diamond Fk. Cr. to Spanish Fk. Diversion	Flow	158	191	201	215	248	285	425	740	645	546	457	258	364	
	Volume	9,693	11,355	12,373	13,211	13,870	17,527	25,299	45,527	38,374	33,569	28,069	15,326		264,195
	Flow Dry year[a]	132	190	174	214	243	259	345	492	544	380	356	188	293	
	Flow Wet year[b]	163	204	276	171	278	326	751	1,351	990	546	454	296	484	
Spanish Fork River Spanish Fk. Diversion to E. Bench Diversion	Flow	58	109	130	143	163	160	190	339	242	176	134	88	161	
	Volume	3,548	6,470	8,024	8,798	9,130	9,823	11,301	20,827	14,420	10,850	8,250	5,214		116,656
	Flow Dry year[a]	73	138	129	167	191	203	275	272	189	120	119	75	163	
	Flow Wet year[b]	39	96	181	74	126	90	269	770	414	146	90	65	197	
Spanish Fork River E. Bench Diversion to Mill Race Canal	Flow	54	109	130	143	163	159	182	295	187	127	93	70	143	
	Volume	3,338	6,470	8,024	8,798	9,130	9,796	10,849	18,108	11,103	7,816	5,713	4,164		103,308
	Flow Dry year[a]	69	138	129	167	191	203	260	244	145	95	94	69	150	
	Flow Wet year[b]	37	96	181	74	126	90	269	735	332	80	47	28	175	
Spanish Fork River Mill Race Canal to Lakeshore Diversion	Flow	131	194	205	219	252	289	389	471	257	149	113	86	230	
	Volume	8,047	11,555	12,631	13,480	14,124	17,740	23,154	28,966	15,287	9,147	6,972	5,111		166,213
	Flow Dry year[a]	120	193	179	219	248	257	274	258	174	113	115	80	186	
	Flow Wet year[b]	141	207	279	174	283	331	755	1,164	499	87	66	74	338	
Jordan River Outlet of Utah Lake to Jordan Narrows	Flow	252	158	197	245	313	434	587	858	924	921	794	585	522	
	Volume	15,492	9,400	12,100	15,086	17,504	26,700	34,922	52,756	54,964	56,658	48,796	34,780		379,158
	Flow Dry year[a]	227	16	16	5	6	6	123	476	565	592	440	228	225	
	Flow Wet year[b]	239	339	704	718	1,081	1,498	1,673	2,029	2,040	1,652	1,271	907	1,179	

Notes:
[a]The three driest years (1961, 1977, 1992) were averaged to calculate the values shown in the table.
[b]The three wettest years (1952, 1983, 1986) were averaged to calculate the values shown in the table.

Table 1-24
Average Monthly Reservoir Volume for the No Action Alternative
(1,000 acre-feet)

Reservoir	Average Monthly Volume (acre-feet)	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Average
Strawberry Reservoir	Average	727	723	718	713	707	704	710	743	749	738	721	721	723
	Wet Years[1]	849	847	841	843	840	842	869	936	966	972	969	975	896
	Dry Years[2]	680	673	667	658	648	640	633	623	594	573	553	544	624
Deer Creek Reservoir	Average	79	86	93	100	107	115	118	112	107	96	86	76	98
	Wet Years[1]	111	122	129	137	147	146	149	148	141	123	112	107	131
	Dry Years[2]	34	40	46	53	59	66	60	46	34	24	15	10	41
Utah Lake	Average	610	642	677	714	751	781	797	806	777	701	637	604	708
	Wet Years[1]	769	802	834	856	883	948	994	1079	1070	978	910	855	915
	Dry Years[2]	487	524	562	597	639	671	673	649	586	512	455	445	567

Notes:
All values rounded to nearest 1,000 acre-feet
[1] The three wettest years (1952, 1983, and 1986) were averaged to calculate the values shown in the table.
[2] The three driest years (1961, 1977, and 1992) were averaged to calculate the values shown in the table.

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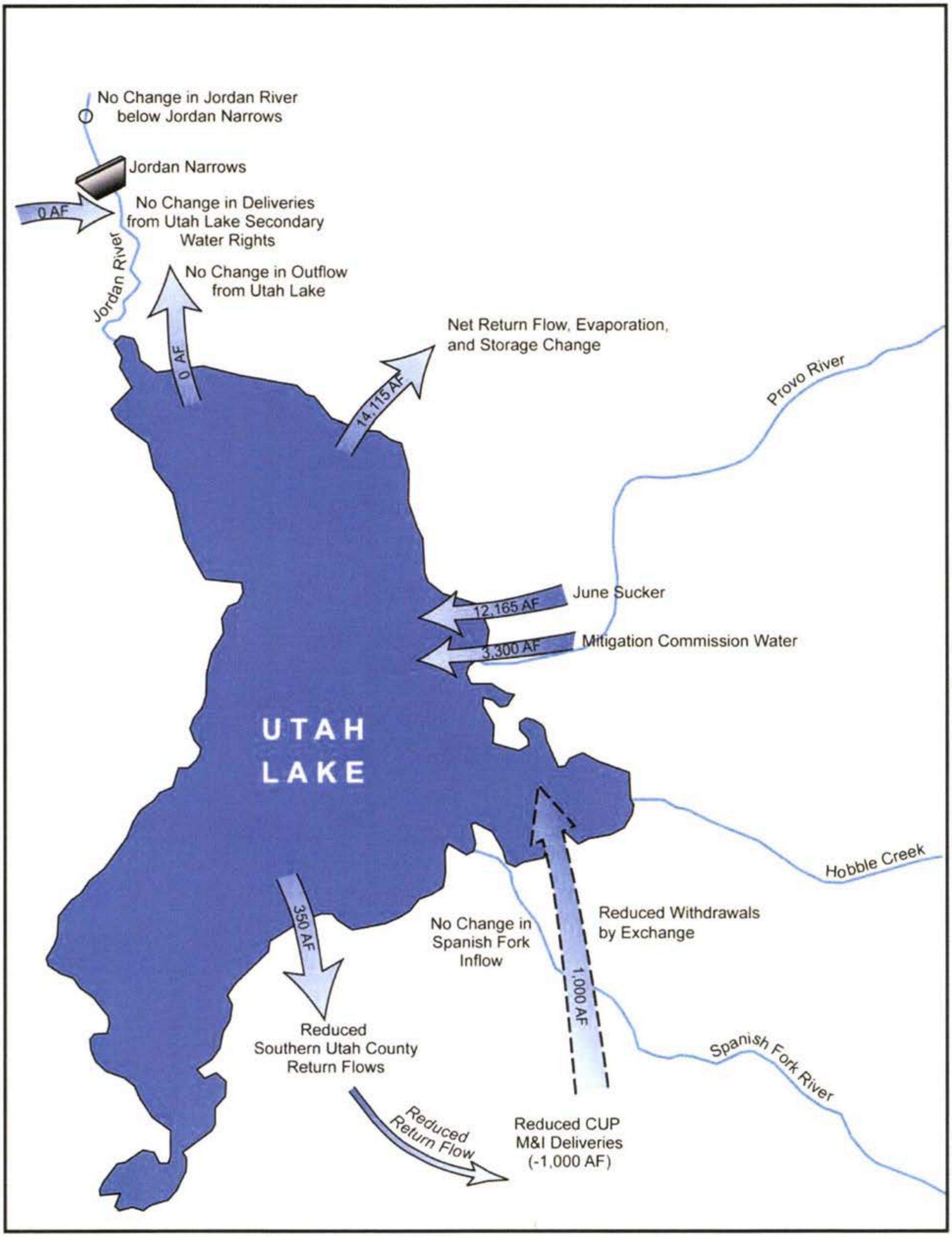

Figure 1-25
Utah Lake and Jordan River Water Balance Under the No Action Alternative

1.7 Spanish Fork Canyon Pipeline Option

The description of each action alternative includes a description of the Spanish Fork Canyon Pipeline with the assumption that construction of the pipeline would occur independent of reconstruction of U.S. Highway 6 by UDOT. This section describes a Spanish Fork Canyon Pipeline option whereby the pipeline down the canyon would be constructed by UDOT, under District and DOI oversight, as UDOT reconstructs U.S. Highway 6. UDOT is currently preparing an EIS on reconstructing Highway 6 from Interstate 15 to Interstate 70. A UDOT decision and funding may not be available until after the ULS construction would be completed in 2016 for reconstructing the portion of Highway 6 where the Spanish Fork Canyon Pipeline would be installed. If the District were to construct the Spanish Fork Canyon Pipeline before the Highway 6 reconstruction, the District would work with UDOT in constructing the pipeline in a location and grade that avoids potential conflict with any future highway expansion. However, if UDOT's schedule and funding for Highway 6 were accelerated to match the ULS construction schedule, UDOT could construct the Spanish Fork Canyon Pipeline as it reconstructs the highway, which would minimize environmental impacts, reduce traffic disruptions, maximize construction efficiency, and result in cost savings compared to constructing the pipeline and reconstructing the highway separately. The District and UDOT have been coordinating during their separate planning and NEPA compliance processes, and have agreed that the Spanish Fork Canyon Pipeline Option would have many advantages over two separate construction projects and periods.

The Spanish Fork Canyon Pipeline Option would be identical in all respects of design and construction to that described for the Proposed Action (see Section 1.4.2.3) or Bonneville Unit Water Alternative (see Section 1.5.2 and Table 1-19).

Pipeline construction within Spanish Fork Canyon would proceed under the direct control and supervision of the District and DOI. UDOT would be paid for the pipeline construction with ULS funds. The District and DOI would agree that UDOT's contractor would perform the work in accordance with District designs and specifications, and the contractor would comply with all standard operating procedures (SOPs) in this FEIS to minimize environmental impacts. The District and DOI will continue to coordinate the ULS FEIS with UDOT on the Highway 6 DEIS to achieve a coordinated design and construction on both projects, if possible.

1.8 Summary of Other Characteristics

1.8.1 Construction Schedule and Workers

1.8.1.1 Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

After obtaining necessary permits, approvals, preparing designs and specifications, and obtaining federal funding, the Proposed Action construction is projected to take about 10 years. Table 1-25 presents a construction summary and schedule, respectively. Table 1-25 includes the average number of construction personnel required per month for each project feature. The projections are subject to change as the construction program is refined.

Table 1-25
Construction Summary for the
Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

Feature	Segment Length (feet)	Average Production (feet/day)	Construction Duration (# work days)	Construction Schedule	Average Personnel (persons/month)
Spanish Fork Canyon Pipeline	36,808	91	404	October 2006 to March 2016	48
Spanish Fork–Santaquin Pipeline	92,278	250	369	October 2006 to March 2016	48
Santaquin–Mona Reservoir Pipeline	40,910	250	164	October 2006 to March 2016	48
Mapleton–Springville Lateral Pipeline	30,040	250	120	October 2006 to March 2016	40
Spanish Fork–Provo Reservoir Canal Pipeline	103,903	100	1,039	October 2006 to March 2016	96
Sixth Water Power Facility	NA	NA	312	October 2006 to March 2016	16
Sixth Water Power Facility Transmission Line	81,840	531	154	October 2006 to March 2016	10
Upper Diamond Fork Power Facility	NA	NA	312	October 2006 to March 2016	16

Note:
NA = Not applicable

1.8.1.2 Bonneville Unit Water Alternative

After obtaining necessary permits, approvals, preparing designs and specifications, and obtaining federal funding, the Bonneville Unit Water Alternative construction is projected to take about 10 years. Table 1-26 presents a construction summary and schedule, respectively. Table 1-26 includes the average number of construction personnel required per month for each project feature. The projections are subject to change as the construction program is refined.

Table 1-26
Construction Summary for the
Bonneville Unit Water Alternative

Feature	Segment Length (feet)	Average Production (feet/day)	Construction Duration (# work days)	Construction Schedule	Average Personnel (persons/month)
Spanish Fork Canyon Pipeline	36,808	91	404	October 2006 to March 2016	48
Spanish Fork–Santaquin Pipeline	92,278	250	369	October 2006 to March 2016	48
Mapleton–Springville Lateral Pipeline	30,040	250	120	October 2006 to March 2016	40
Sixth Water Power Facility	NA	NA	312	October 2006 to March 2016	16
Sixth Water Power Facility Transmission Line	81,840	531	154	October 2006 to March 2016	10
Upper Diamond Fork Power Facility	NA	NA	312	October 2006 to March 2016	16

Note:
NA = Not applicable

1.8.2 Employment Opportunities

1.8.2.1 Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

Table 1-27 shows the employment opportunities and estimated pay rates for construction and maintenance of the Proposed Action. The project would employ both skilled and unskilled workers.

Table 1-27
Employment Opportunities and Estimated Pay Rates for Construction and Maintenance of the Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

Category	Compensation ($)	Work Months
Construction Contractor Forces		
Administrative	63,100/yr	281
Supervisory	51,650/yr	464
Skilled Labor	26.35/hr	2,582
Unskilled Labor	12.35/hr	3,964
Total Contractor Work Force[a]		**7,291**
Construction Management Staff		
Administrative	68,850/yr	287
Professional	91,800/yr	287
Technical	45,900/yr	963
Total Construction Management Work Force		**1,537**
Total Construction Work–Months		**8,828**
Maintenance Staff		
District Engineer	74,600/yr	2.5
Clerical	32,100/yr	2.5
Field Supervisor	57,400/yr	10
Field Operation and Maintenance Laborer	40,200/yr	10
Annual O&M Work-Months		**25**

Note:
[a] Does not include off-site material hauling workforce time.

1.8.2.2 Bonneville Unit Water Alternative

Table 1-28 shows the employment opportunities and estimated pay rates for construction and maintenance of the Bonneville Unit Water Alternative. The project would employ both skilled and unskilled workers.

Table 1-28
Employment Opportunities and Estimated Pay Rates for Construction and Maintenance of the Bonneville Unit Water Alternative

Category	Compensation ($)	Work Months
Construction Contractor Forces		
Administrative	63,100/yr	183
Supervisory	51,650/yr	300
Skilled Labor	26.35/hr	1109
Unskilled Labor	12.35/hr	1668
Total Contractor Work Force[a]		**3260**
Construction Management Staff		
Administrative	68,850/yr	137
Professional	91,800/yr	137
Technical	45,900/yr	460
Total Construction Management Work Force		**734**
Total Construction Work–Months		
Maintenance Staff		
District Engineer	74,600/yr	1.25
Clerical	32,100/yr	1.25
Field Supervisor	57,400/yr	4.75
Field Operation and Maintenance Laborer	40,200/yr	4.75
Annual O&M Work-Months		**12**

Note:
[a] Does not include off-site material hauling workforce time.

1.8.3 Transportation Requirements

1.8.3.1 Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

Construction transportation requirements of the Proposed Action include a maximum of 316 trips per day for 1.5 years during the construction period. Construction corridors and construction transportation routes would include I-15, Highway 6, Sheep Creek–Rays Valley Road, Sixth Water Flow Control Structure Access Road, Diamond Fork Road, Highway 178 in Payson, River Bottoms Road, Powerhouse Road, 8800 South, 800 East, 9600 South, 9650 South, 400 East, 9800 South, Salem Canal Road, 700 South, East Main Street in Salem, 1400 South, State Route 198 in Payson, 12800 South, County Roads around Mona Reservoir, Highway 89, 1600 North, 1200 North, Maple Street, Maple Road, Highway 75, 800 North in Orem, 400 East, 1400 North, Slate Canyon Drive, Seven Peaks Boulevard, 1450 East, Foothill Drive, 4525 North, Heritage Drive, 300 South, Iroquois Drive, Piute Drive, and 5600 North. Construction management staff and workers would use pickup trucks and other passenger vehicles to commute to the project site.

1.8.3.2 Bonneville Unit Water Alternative

Construction transportation requirements of the Bonneville Unit Water Alternative include a maximum of 170 trips per day for 1 year during the construction period. Construction corridors and construction transportation routes would include I-15, Highway 6, Sheep Creek–Rays Valley Road, Sixth Water Flow Control Structure, Diamond Fork Road, Highway 178 in Payson, River Bottoms Road, Powerhouse Road, 8800 South, 800 East, 9600 South, 9650 South, 400 East, 9800 South, Salem Canal Road, 700 South, East Main Street, 1400 South, State Route 198 in Payson, 12800 South, Highway 89, 1600 North, 1200 North, Maple Street, and Maple Road. Construction management staff and workers would use pickup trucks and other passenger vehicles to commute to the project site.

1.8.4 Materials Used During Construction

1.8.4.1 Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

Table 1-29 lists construction material requirements for the Proposed Action. Concrete for pipe lining, coating and bedding would be batched at existing local suppliers and trucked to each construction site. Gravel for pipe backfill would be obtained from commercial sources in Utah County.

Table 1-29
Construction Material Requirements for the
Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

Type of Material	Use of Material	Quantity
Concrete (cubic yards)	Pipe Lining, Coating and Bedding	20,400
	Flow Control and Power Structures	975
	Miscellaneous Structures	5,400
	Total	**26,775**
Steel (pounds)	Concrete Reinforcing	1,275,000
	Pipe Cylinder	76,500,000
	Casing	79,300
	Total	**77,854,300**
Riprap (cubic yards)	Erosion Protection	300

1.8.4.2 Bonneville Unit Water Alternative

Table 1-30 lists construction material requirements for the Bonneville Unit Water Alternative. Concrete for pipe lining, coating and bedding would be batched at existing local suppliers and trucked to each construction site. Gravel for pipe backfill would be obtained from commercial sources in Utah County.

Table 1-30
Construction Material Requirements for the
Bonneville Unit Water Alternative

Type of Material	Use of Material	Quantity
Concrete (cubic yards)	Pipe Lining, Coating and Bedding	10,800
	Flow Control and Power Structures	275
	Miscellaneous Structures	3,000
	Total	**14,075**
Steel (pounds)	Concrete Reinforcing	655,000
	Pipe Cylinder	39,900,000
	Total	**40,555,000**
Riprap (cubic yards)	Erosion Protection	220

1.8.5 Projected Project Life and Cost

1.8.5.1 Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

Table 1-31 shows the standard operational life of primary features of the Proposed Action. The typical operational life of the Proposed Action pipelines would be at least 75 years before major rehabilitation work would be required. The pipeline, hydropower plant, and transmission line features would be replaced as they wear out. Rehabilitation and ongoing maintenance would indefinitely prolong the operational life of the ULS. The Proposed Action would have an estimated construction cost of $458,800,000.

Table 1-31
Standard Operational Life of
Spanish Fork Canyon-Provo Reservoir Canal Alternative
(Proposed Action) Features

Feature	Standard Life (years)
Pipelines	75
Generating Stations	50
Transmission Lines	25
Flow Control Structures	15 to 25
Turnouts	15 to 25

1.8.5.2 Bonneville Unit Water Alternative

The standard operational life of primary features of the Bonneville Unit Water Alternative would be the same as described for the Proposed Action in Section 1.8.5.1 and as shown in Table 1-31. The Bonneville Unit Water Alternative would have an estimated construction cost of $184,000,000.

1.8.5.3 No Action Alternative

The No Action Alternative would have no construction costs because no ULS features would be constructed. The diversion dam modifications that were committed to in the Diamond Fork System FS-FEIS (CUWCD 1999a) would be completed because the project water deliveries to Utah Lake would be made year-round.

1.8.6 Land Disturbance

1.8.6.1 Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

Table 1-32 shows the land disturbance that would result from construction and operation of the Proposed Action (Spanish Fork–Provo Reservoir Pipeline Alternative) features.

Table 1-32
Land Disturbance Resulting From the Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)
(acres)

Project Feature	Land Area Disturbed During Construction	Land Area to be Revegetated	Vegetated Land Area Permanently Disturbed	Existing Disturbed Areas Returned to Previous Use	Vegetation Type Changed
Sixth Water Power Facility and Transmission Line	3.7[a,b]	1.9[c]	1.1[d]	0.7[e]	93.7[f]
Upper Diamond Fork Power Facility	0.3[g]	0	0.3	0	0
Spanish Fork Canyon Pipeline[h]	106.0	38.4	0	67.6	0
Spanish Fork–Santaquin Pipeline	175.7[i]	78.3[j]	0.3[k]	97.1[l]	35.4[m]
Santaquin–Mona Reservoir Pipeline	77.4	70.9[n]	0.2[k]	6.3	0
Mapleton–Springville Lateral Pipeline	60.3[o]	60.2[p]	0.1[k]	0	0
Spanish Fork–Provo Reservoir Canal Pipeline	211.8[q]	20.0	0.4[k]	191.4	17.7[r]
Total	**635.2**	**269.7**	**2.4**	**363.1**	**146.8**

Notes:
[a]Includes 0.5 acre for the substation at Highway 6 and 0.7 acre for the Sixth Water Power Facility
[b]Excludes construction staging area 1, which was analyzed in the 1999 Diamond Fork System FS-FEIS
[c]Revegetated to grasses and shrubs within the 60-foot-wide transmission line right-of-way
[d]Includes substation at Sixth Water (0.3 acre), Highway 6 (0.5 acre) and power pole footings (0.3 acre)
[e]Includes previously disturbed area that would be covered by the Sixth Water Power Facility
[f]Includes 37.5 acres changed from trees, shrubs and grass to grass directly under the transmission lines, and 56.2 acres changed from trees, shrubs and grass to shrubs and grass within the 60-foot-wide transmission line right-of-way
[g]Excludes staging area 2, which was analyzed in the 1999 Diamond Fork System FS-FEIS
[h]This pipeline would be constructed by the District; UDOT would not construct Highway 6 modifications until after 2016.
[i]Includes pipeline construction (156.3 acres), Spanish Fork Canyon Staging Area (11.5 acres) and Santaquin Staging Area (7.9 acres)
[j]Includes open area, agricultural crop land (43.3 acres), and urban landscaping; no trees replanted in permanent easement
[k]Includes concrete vaults for air release, vacuum relief and drain valves, flow control valves and turnouts where applicable
[l]Includes paved and gravel roads, shoulders, and Spanish Fork Canyon Staging Area (11.5 acres)
[m]Includes open area and agricultural crop land (22.9 acres of orchards)
[n]Includes agricultural crop land (28.8 acres)
[o]Includes existing Mapleton–Springville Lateral
[p]Includes agricultural crop land (3.1 acres); entire pipeline alignment would be revegetated except for turnout and valve vaults
[q]Includes pipeline construction (211.8 acres)
[r]Includes permanent easement areas that would change to grass and shrubs only

1.8.6.2 Bonneville Unit Water Alternative

Table 1-33 shows the land disturbance that would result from construction and operation of the Bonneville Unit Water Alternative features.

Table 1-33
Land Disturbance Resulting From the Bonneville Unit Water Alternative
(acres)

Project Feature	Land Area Disturbed During Construction	Land Area to be Revegetated	Vegetated Land Area Permanently Disturbed	Existing Disturbed Areas Returned to Previous Use	Vegetation Type Changed
Sixth Water Power Facility and Transmission Line	3.7[a,b]	1.9[c]	1.1[d]	0.7[e]	93.7[f]
Upper Diamond Fork Power Facility	0.3[g]	0	0.3	0	0
Spanish Fork Canyon Pipeline[h]	106.0	38.4	0	67.6	0
Spanish Fork–Santaquin Pipeline	175.7[i]	78.3[j]	0.3[k]	97.1[l]	35.4[m]
Mapleton–Springville Lateral Pipeline	60.3[n]	60.2[o]	0.1[k]	0	0
Total	**346.0**	**178.8**	**1.8**	**165.4**	**129.1**

Notes:
[a]Includes 0.5 acre for the substation at Highway 6 and 0.7 acre for the Sixth Water Power Facility
[b]Excludes construction staging area 1, which was analyzed in the 1999 Diamond Fork System FS-FEIS
[c]Revegetated to grasses and shrubs within the 60-foot-wide transmission line right-of-way
[d]Includes substation at Sixth Water (0.3 acre), Highway 6 (0.5 acre) and power pole footings (0.3 acre)
[e]Includes previously disturbed area that would be covered by the Sixth Water Power Facility
[f]Includes 37.5 acres changed from trees, shrubs and grass to grass directly under the transmission lines, and 56.2 acres changed from trees, shrubs and grass to shrubs and grass within the 60-foot-wide transmission line right-of-way
[g]Excludes staging area 2, which was analyzed in the 1999 Diamond Fork System FS-FEIS
[h]This pipeline would be constructed by the District; UDOT would not construct Highway 6 modifications until after 2016.
[i]Includes pipeline construction (156.3 acres), Spanish Fork Canyon Staging Area (11.5 acres) and Santaquin Staging Area (7.9 acres)
[j]Includes open area, agricultural crop land (43.3 acres), and urban landscaping; no trees replanted in permanent easement
[k]Includes concrete vaults for air release, vacuum relief and drain valves, and turnouts
[l]Includes paved and gravel roads, shoulders, and Spanish Fork Canyon Staging Area (11.5 acres)
[m]Includes open area and agricultural crop land (22.9 acres of orchards)
[n]Includes existing Mapleton–Springville Lateral
[o]Includes agricultural crop land (3.1 acres); entire pipeline alignment would be revegetated except for turnout and valve vaults

1.8.7 Construction Equipment, Noise Levels and Emissions

Table 1-34 shows required construction equipment and typical noise levels for construction of all alternatives. Table 1-35 shows monthly emission levels for construction equipment under any of the alternatives.

Table 1-34
Construction Equipment and Typical Noise Levels for Construction of the ULS Alternatives

Equipment	Nominal Noise Level at 50 Feet (in dBA)
Backhoe	85
Bucket Truck	83
Cable Puller	78
Compactor	74
Compressor	81
Concrete Pump	82
Crane	83
Dewatering Pump	76
Digger Truck	91
Dozer	80
Dump Truck	91
Forklift	79
Grader	85
Haul Truck	91
Helicopter	105
Loader	79
Pickup Truck	60
Pipelayer/Crane	83
Roller	74
Truck	91
Tunnel Loader	91
Water Truck	91
Welder	78
Paver	89

Table 1-35
Construction Equipment and Emissions Levels for ULS Typical Construction Sites

Construction Equipment	Engine Type	Horse-power	Hydro-carbons (from Exhaust) (grams/hp-hour)	CO (grams/hp-hour)	NO_2 (grams/hp-hr)	PM_{10} (grams/hp-hour)	SO_2 (grams/hp-hour)
Pickup Truck[a]	Gas	--	0.3 (g/mile)	3.4 (g/mile)	0.4 (g/mile)	0.1 (g/mile)	0.0 (g/mile)
Backhoe (Cat 235)	Diesel	200	1.4	6.8	10.1	1.05	0.85
Backhoe (Cat 320)	Diesel	140	1.4	6.8	10.1	1.05	0.85
Cable Puller (bull-wheel)	Diesel	150	1.41	9.2	11.01	1.44	0.93
Cable Puller (Hogg-Davis 985)	Diesel	33	1.41	9.2	11.01	1.44	0.93
Compactor (Cat 815F)	Diesel	240	0.8	3.1	9.3	0.9	0.91
Compressor[b] (Air-750 cfm)	Diesel	200	1.12	3.03	14.06	1.00	0.93
Concrete Pump[b]	Diesel	150	1.12	3.03	14.06	1.00	0.93
Crane (Cat 572R)	Diesel	250	1.26	4.2	10.3	1.44	0.93
Crane (Grove RT 875C)	Diesel	250	1.26	4.2	10.3	1.44	0.93
Crane (Grove TMS 700E)	Diesel	400	1.26	4.2	10.3	1.44	0.93
Dewatering Pump	Diesel	40	1.2	5.00	6.00	1.00	0.91
Dozer (Cat D5N)	Diesel	120	1.26	4.30	10.3	1.11	0.85
Dozer (Cat D8)	Diesel	340	1.26	4.30	10.3	1.11	0.85
Dump Truck (Cat 725)	Diesel	300	0.84	2.00	9.6	0.8	0.89
Dump Truck (Cat 740)	Diesel	440	0.84	2.00	9.6	0.8	0.89
Forklift (Cat IT12F)	Diesel	80	1.65	10.00	8.00	1.60	0.93
Grader (Cat 12-H)	Diesel	160	1.54	3.80	9.60	1.00	0.87
Loader (Cat 216)	Diesel	50	2.1	9.00	9.60	1.44	0.93
Loader (Cat 928)	Diesel	150	0.84	4.8	10.3	1.29	0.86
Loader (Cat 966G)	Diesel	260	0.84	4.8	10.3	1.29	0.86
Paver (Blaw-Knox PF-3200)	Diesel	185	1.01	4.6	11.01	0.90	0.93
Roller (Cat PS-150B)	Diesel	70	0.8	3.1	9.3	0.78	1.00
Roller (Hyster C350C)	Diesel	80	0.8	3.1	9.3	0.78	1.00
Water Truck	Diesel	400	0.84	2.00	9.6	0.8	0.89
Welder (300 Amp)	Diesel	30	1.2	5.00	8.00	1.00	0.93

Source (USEPA 1991)
[a]Source (FHWA 1999)
[b]Source (USEPA 1995a)

1.8.8 Standard Operating Procedures (SOPs) During Construction

This section defines standard operating procedures (SOPs) for the Proposed Action. SOPs will be followed (not withstanding unforeseen conditions that would require modifications) during construction, operation and maintenance of the project to avoid or minimize adverse impacts on people and natural resources. Chapter 3 identifies mitigation measures designed to avoid or minimize impacts after SOPs have been successfully implemented.

1.8.8.1 Erosion Control and Restoration

The contractor will be required to prepare an erosion control plan for District approval prior to the start of any construction work. The plan will specifically document methods to protect streams, wetlands and riparian vegetation from construction impacts as well as all other areas.

Erosion control procedures will be implemented in areas disturbed during construction of project components, including temporary access roads and access roads that are upgraded to construction traffic standards. The contractor will be required to restore disturbed surfaces to pre-construction conditions and avoid and minimize erosion.

Temporary slope breakers will be used to reduce runoff velocity and divert waste from the construction right-of-way. They will be constructed with materials such as soil, silt fence, staked hay or straw bales, or sandbags, using the written recommendations of local land managing agencies and soil conservation authorities. In the absence of these recommendations, temporary slope breakers will be installed at the following spacing:

Slope	Spacing
5 percent to 15 percent	300 feet
More than 15 percent to 30 percent	200 feet
More than 30 percent	100 feet

Slope breakers will be constructed with a 2 to 8 percent outslope to divert surface flow to stable, well-vegetated areas. Slope breakers will comply with all applicable survey requirements if they extend beyond the edge of the construction right-of-way. Appropriate energy-dissipating devices will be built in the absence of a stable area, or at the end of the slope breaker, if necessary. Slope breakers, sediment barriers, mulch, erosion control fabric and thatching will be used whenever necessary to stabilize slopes and disturbed areas to prevent erosion.

Sediment barriers will be installed to keep wetlands and water bodies free of possible sedimentation resulting from construction. The barriers will be constructed of materials such as silt fence, staked rice wattles, or sandbags. They will be installed as necessary and maintained at the base of slopes adjacent to road crossings and at construction locations near water bodies or wetlands where siltation could occur.

Weed free mulch will be used on sites with low annual precipitation or high erosion potential, on slopes exceeding 15 percent, or on windy sites. Mulch will consist of noxious weed-free straw or hay, erosion control fabric or a functional equivalent. It will be applied before seeding if final cleanup (including final grading and installation of permanent erosion control measures) is not completed in an area within 10 days after the trench has been backfilled or if construction or restoration activity is delayed for extended periods, such as a seeding period restriction.

Weed free straw mulch will be applied at the following rates: 1 ton per acre on level ground; two tons per acre over at least 75 percent of the ground surface on all dry, sandy sites and sites with slopes greater than 8 percent; and three tons per acre if slopes are within 100 feet of water bodies and wetlands. When woodchips are used as mulch, a maximum of 1 ton per acre is applied.

Weed free mulch will be anchored to help stabilize erodible soils by using a mulch crimper or disk with notched coulters to crimp the mulch to a depth of 2 to 3 inches. If a blower is used, mulching materials should be at least 8 inches long to allow anchoring. Liquid mulch binders will be used at recommended manufacturer rates and will not be used within 100 feet of wetlands or water bodies.

Erosion control fabric such as jute thatching or bonded fiber blankets will be used on water body banks during final re-contouring or on extremely steep slopes. The fabric will be anchored with staples or other anchoring devices.

Existing topsoil will be carefully removed and stored during trenching operations and replaced after trenches are backfilled. Where drainage occurs, gaps will be left between topsoil piles to prevent increased water saturation. Topsoil stripping activities will cease during excessively wet weather, and topsoil will not be stockpiled for longer than 2 years. Additional topsoil will be added, if needed, to allow vegetation growth.

Final cleanup of an area (including replacement of topsoil, final grading, and installation of permanent erosion-control structures) will be completed within 10 days after backfilling. If unavoidable delays occur, final cleanup will be completed as soon as possible and always before the end of the next recommended seeding season.

If necessary, a travel lane could be left open to allow access by construction traffic. When access is no longer required, the lane will be removed and the right-of-way restored.

After construction, soil will be replaced and worked with a disc, chisel plow, or other appropriate implement as practical to reduce compaction and leave soil in proper revegetation condition.

Permanent trench breakers will be built to stop the flow of subsurface water along trenches. These will be constructed of such materials as concrete, sandbags or polyurethane foam. Trench breakers will be installed at the base of slopes adjacent to water bodies and wetlands. When necessary, an engineer or similarly qualified professional will determine the need for and spacing of trench breakers. Topsoil will not be used in trench breakers.

Seedbeds will be prepared in disturbed areas to a depth of 3 to 4 inches using appropriate equipment. If hydroseeding is used, the seedbed will be scarified to facilitate lodging and germination of seed. Seeding will be done in consultation with the local, State or Federal land managing entity.

To maximize the success of revegetation, planting will occur during appropriate climatic periods in properly prepared soil. Planting and fertilizer application techniques will be chosen for specific conditions at each site and the needs of selected plant species. Temporary erosion control measures will be used at any site where seeding has been delayed.

Where possible, natural seed mixes of local origin will be used along with mulching and no, or low, amounts of fertilizer. The criteria for selecting species to plant in disturbed areas will include hardiness, capacity to self-perpetuate, and rooting characteristics that help stabilize soil.

Temporary traffic barriers will be placed as necessary to keep vehicles from traveling over areas that have been revegetated. Traffic barriers may include temporary fencing, concrete jersey barriers, berms and boulders.

Trench boxes will be used whenever a buried pipeline or upgraded transmission line passes through an urban area, particularly where there would be a narrow ROW.

Pipeline and road construction right-of-way through open areas will be delineated by yellow or orange construction fencing.

In urban areas, wherever possible, removal of large trees with developed root structure will be minimized, and a minimal number of plant roots will be cut to minimize plant damage.

Where trees are removed and cannot be re-planted directly over the pipeline, indigenous ground cover will be planted to minimize invasion of noxious species.

Areas used for agricultural crops will be ripped and left bare for the landowner to cultivate and plant at the same time as adjacent farmland.

Temporary fencing will be erected and maintained in areas where livestock or wildlife will likely interfere with revegetation and erosion control. The temporary fencing will be kept in place until the revegetation activities are complete.

Landowners will be compensated during the ROW acquisition if any ornamental trees or shrubs need to be removed or disturbed.

1.8.8.2 Wetlands and Riparian Areas

The contractor will be required to prepare a pipeline construction plan for approval by the District before starting any pipeline construction that may affect wetlands and riparian vegetation adjacent to roadways. The plan will document methods to protect wetlands and riparian vegetation from construction impacts.

Direct and indirect impacts on wetlands will be avoided, unless there are no other practical alternatives (as defined in 40 CFR 230.3). Procedures to avoid impacts will include protecting wetlands with silt fencing during construction and avoiding quantity and quality impacts on surface water and groundwater resources that serve as a source of water for wetlands.

Where impacts on wetlands cannot be avoided, they will be minimized to the extent possible. Heavy equipment in wetland areas will be operated on temporary earth fills placed on geotextile mats (or other appropriate measures) to minimize soil disturbance. Construction barriers will be installed to prevent unnecessary damage to adjacent wetlands.

Materials excavated from the pipeline trench will be placed on the adjacent roadway or in other upland areas. No excavated material will be placed in any wetlands. Where not practical to avoid wetland impacts, wetland soils will be removed, segregated and stockpiled in upland areas. Wetland topsoil will be replaced in the top 6 to 12 inches of the pipeline trench, and the disturbed area will be graded to match previous contour elevations and revegetated with a mixture of adapted wetland plant species.

Construction of pipeline trenches will incorporate erosion control SOPs to avoid or minimize adverse ground and surface water quality impacts.

Pipelines will be installed using construction measures such as cutoff walls if a bedding material is used that could otherwise cause wetlands to be drained.

Power poles and electrical distribution line access roads will not be located or constructed in wetlands or riparian corridors.

1.8.8.3 Aquatic Resources

When necessary, work in channels will be accomplished during low flow periods to the extent possible. When necessary, work in channels resulting in sediment and turbidity will be minimized.

Impacts on aquatic resources can be avoided and minimized by following hazardous materials procedures included under the health and safety SOPs, the restoration and erosion control SOPs, and wetlands SOPs.

1.8.8.4 Groundwater Resources

Direct and indirect impacts on springs and seeps will be avoided, unless there are no other practical alternatives (as defined in 40 CFR 230.3). Procedures to avoid impacts will include protecting springs with silt fencing during construction and avoiding quantity and quality impacts on the groundwater resources that serve as a source of water for springs and seeps.

Pipelines will be installed using construction measures such as cutoff walls to minimize groundwater dewatering in adjacent areas.

1.8.8.5 Wildlife and TES Resources

The construction manager will be required to review the TES Section 7 information for TES locations before commencing work on any ULS feature. If the feature may potentially approach a recorded TES location or critical habitat, the appropriate agency will be contacted to perform a field survey prior to commencing construction in that area.

To the extent feasible, construction activities on or around important wildlife habitat (e.g., deer fawning areas) will be scheduled to avoid the periods of greatest use.

Impacts on wildlife resources can be avoided and minimized by following hazardous materials procedures included under the health and safety SOPs, the restoration and erosion control SOPs, and wetlands SOPs.

As a condition of employment, contractor personnel will not be allowed to have firearms in possession while on construction sites.

Trenches will be covered or backfilled at the completion of each day and no more than 500 feet of trench will be open at any one location.

If a threatened, endangered or sensitive species is encountered during any facet of construction or operation or if critical habitat cannot be protected, the District will immediately contact the U.S. Fish and Wildlife Service or Utah Division of Wildlife Resources to determine the appropriate action.

New overhead power transmission lines will be constructed to meet the *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996* (Edison Electric Institute, Washington, D.C.).

1.8.8.6 Agricultural Resources

To minimize conflicts between pipeline construction and other land activities, the following will be completed before construction begins:

- owners, tenants, lessees and managers of public lands will be informed of the construction schedule
- grazing permitees will be consulted and informed of fence openings, disturbances to range improvements and other range-related activities
- utilities will be contacted if their facilities will be crossed by features of any alternative

Fences along the right-of-way will be braced before they are opened. Access and livestock will be controlled with temporary fencing and gates during construction to reduce impacts on other land uses. If damaged, barriers (such as cattle guards) for livestock control, watering facilities (such as pipelines and ditches) will be replaced by measures that are equally effective. Construction will not inhibit existing livestock access to water and adjacent grazing areas unless agreed to by the owner and/or permittee in advance. Fences, gates and cattle guards will be restored to their original condition or replaced when construction is completed. Measures will be taken to not disrupt any water supplies or delivery structures to crop lands.

On National Forest System lands, construction contractor will work with the owner, Forest Service representative and livestock permittees to minimize conflicts with the annual entry and removal of livestock on the public lands.

Farm and ranch owners affected by project construction will be notified of construction procedures and schedules to prevent conflicts with agricultural operations. Procedures to avoid conflicts with agricultural operations will be followed during construction to the maximum extent possible. Unavoidable damage to facilities will be replaced or restored during the project construction. Farmers and/or landowners that experience additional unavoidable impacts on agricultural facilities and operations will be compensated for their direct cost of moving or reconstructing facilities.

1.8.8.7 Water Quality

The District's construction contractor(s) will be required to prepare a spill prevention containment and control plan (SPCCP), and report spills to local, state and federal agencies. The possibility of accidental releases of contaminants into surface and possibly ground waters will be managed according to spill containment and countermeasure requirements of the District's construction specifications. Such specifications include worker education, incident reporting and remediation provisions in the event of a spill.

In the event of a toxic spill, the National Response Center (800-424-8802) and the Utah Division Environmental Response and Remediation (801-536-4100) will be promptly notified.

Appropriate Utah water quality permits will be obtained prior to construction in or near water resources.

Construction activities will be performed according to the Final Draft Nonpoint Source Water Pollution Control Plan of Hydrologic Modifications in Utah (Robinson 1994). The measures identified in this plan specify construction practices where there is potential for disturbing stream channels, riparian areas and floodplains. These practices are designated as Utah's Best Management Practices for nonpoint source water pollution control.

Construction workers will be careful to avoid allowing wet concrete to escape into waterways and other sensitive fish and wildlife habitat.

Concrete trucks and equipment will be washed only in areas approved by the Contracting Officer that will not impact streams or sensitive fish and wildlife habitat.

Maintenance and refueling of equipment used during construction or maintenance will be performed only in approved areas.

All maintenance and refueling areas will be constructed with an impermeable layer, and all drainage will be collected and processed through an oil/water separator before release.

All portable toilet facilities will be placed on an impermeable layer to prevent contact with surface or groundwater.

The contractor will enforce usage of portable toilets by all personnel.

1.8.8.8 Cultural Resources

The following SOPs are from Appendix C of the Memorandum of Agreement between the Joint-Lead Agencies and Utah State Historic Preservation Office dated August 23, 2004.

During the environmental review process for the Utah Lake System project, a number of cultural resources and historical sites were identified within the proposed area of potential effects (APE) and were evaluated for their eligibility to the National Register of Historic Places. Those properties that could be mitigated are detailed in a separate Research Design and report that document the procedures followed during the mitigation process, which include testing and/or excavation, as necessary. However, several properties were identified during the environmental process that could be avoided during construction by flagging and/or monitoring. In addition, not all construction staging areas, access roads, material source sites, and other construction-related sites were covered during the environmental review process. The following are the procedures and guidelines for the Contractor to follow concerning the management of these cultural resources and historic properties, as well as undiscovered resources, prior to and during the construction of the proposed pipeline.

After the award of contract and prior to the start of construction, the Contractor will be responsible to have all staging areas, material resource areas, access roads, and any other associated construction sites not covered in the environmental process surveyed for cultural resources. These new disturbance areas are to be inventoried in a manner consistent with the Standard Operating Instruction standards and guidelines for this project. The results of the surveys must be submitted to the Central Utah Water Conservancy District (District) Project Manager, who will be responsible for submittal to the Utah State Historic Preservation Office (USHPO) and the appropriate Native American Tribes for review and concurrence.

Prior to the commencement of construction, the Contractor, his Project Manager, Field Supervisors, and Heavy Equipment Operators, as well as the District Project Manager will be required to attend a training and orientation class on the laws and regulations regarding the treatment of cultural and historical resource sites, procedures to follow when a human burial, or cultural material is encountered, and procedures to follow to avoid a flagged site, along with the treatment and avoidance of Traditional Cultural Properties. This class will be conducted by a qualified professional archaeologist.

Monitoring

Once construction begins, the potential to adversely affect those historic properties located with the APE that were determined eligible for National Register of Historic Places (NRHP) during the environmental review process and that were also determined could be avoided remains a possibility. In order to avoid these sites, each cultural property will be identified by staking the area with lath and easily visible flagging. The stakes and flagging will at minimum be placed in each of the four cardinal directions and at a distance five feet from the outer boundary of the site. In addition, an archaeologist will be on site to monitor all construction activities in and around each flagged site. Once construction activities conclude in the area, the stakes and flagging will be removed and no subsequent disturbance is to occur in the area.

Since the project passes through some areas of cultural sensitivity, it will be necessary to implement a construction monitoring program. It is anticipated that this program will consist of a combination of construction worker training, as outlined above, excavation monitoring and trench inspection. This program will specifically require the training of field supervisors and equipment operators in the recognition of cultural resource material and features. It will also involve the monitoring of excavation by qualified professional archaeologists. In addition, trench inspection will be carried out in culturally sensitive areas by qualified professional archaeologists.

Traditional Cultural Properties

Consultation is ongoing concerning identification of traditional cultural properties and cultural and religious significance attributed by the tribes to the already identified archaeological resources. Since these areas are considered sacred or culturally sensitive by the Native Americans, information on their location can be restrictive, which will require close cooperation between the Contractor, District, and the Project Consulting Archaeologist. These areas may have to be identified in broad terms and closely monitored by qualified professional archaeologists.

Discovery

In accordance with 36 CFR 800.11(a) and (b) (1), the District has provided for the protection, evaluation, and treatment of any historic property discovered prior to or during construction. This document outlines the procedures and instructions to the Contractor for the protection of any archaeological and historical resources discovered in the course of construction. Specifically, upon discovery, construction operations shall be immediately stopped in the vicinity and the District Project Manager shall be verbally notified of the nature and exact locations of the findings. The Contractor shall not damage the discovered objects and shall provide written confirmation of the discovery to the District Project Manager within two (2) calendar days. The District Project Manager will inform the Contractor when the restriction is terminated, with written confirmation following within two (2) calendar days.

Should a discovery occur, the District will consult with the USHPO in accordance with 36 CFR 800.11(b)(2)(ii) toward developing and implementing as appropriate research design or specific treatment plan prior to resuming construction.

Discovery of Human Remains

In addition, the potential for the discovery of subsurface resources is also possible, including human remains, which are protected under federal legislation, such as the Native American Graves Protection and Repatriation Act (NAGPRA) and state laws protecting the discovery of human remains. In the unlikely event that human remains are encountered in the course of construction, all work in the area must cease and the District Project Manager be contacted immediately. The District Project Manager will make sure that the remains and any grave-associated artifacts are treated in a manner consistent with applicable federal and state laws and with the ACHP's *Policy Statement Regarding Treatment of Human Remains and Grave Goods.*

1.8.8.9 Paleontological Resources

Prior to project construction work, a consulting paleontologist will be contracted to handle possible discovery of paleontological resources. The paleontologist will have available personnel and resources to deal with both small and large paleontological excavations if needed. Prior arrangements must be made by the paleontologist with an approved repository for curation of any material resulting from discoveries made.

If Critical, Significant or Important (Class 1, 2, or 3) paleontological resources are discovered during construction, the following procedures will be followed:

- Work in the immediate area of discovery will be stopped and work may not begin again until approved by the consulting paleontologist.

- The consulting paleontologist will be contacted for evaluation of material found.
- Based on the evaluation made by the paleontologist (who may need to consult with the State Paleontologist and other professionals), either of the following can happen:
    - Small discoveries (isolated bones, plant material, invertebrates, etc.), when appropriate, can be removed or sampled in the work area at the time of evaluation and then construction work can resume. Construction observation by the paleontologist should be strongly considered if there is a high potential for discovery of additional significant material.
    - For large, more complex discoveries with multiple elements such as partial or whole vertebrate specimens, an excavation, collection, and research plan will be developed and followed. This will require more time and resources to accomplish before construction work can resume. Construction observation by the paleontologist should be strongly considered if there is a high potential for discovery of additional significant material.

A detailed monitoring plan will be developed by the consulting paleontologist identifying significantly impacted formations and/or sites that may require monitoring follow-up after project construction is over and during the operational phase.

1.8.8.10 Visual Resources

The preliminary design of the Upper Diamond Fork Power Facility has incorporated concepts from the *U.S. Forest Service Built Environment Image Guide* (USFS 2001b) to the extent possible.

Disturbed areas will be landscaped to match existing and characteristic landforms. When feasible, they will be re-contoured and slopes rounded along maintenance roads, pipeline alignments and streambanks to blend with surrounding natural contours.

New plantings will be blended with natural vegetation at the edges, and configured to match existing vegetation patterns and provide horizontal and vertical diversity.

Existing vegetation that screens pipeline alignments, flow-control facilities, parking lots and other features from key viewing areas will be retained to the extent feasible. Indigenous trees will be planted to screen disturbed areas at gaps in existing vegetation where pipeline corridors, flow control facilities, parking lots and other features may be visible from key viewing areas.

The exterior finish, color and texture of buildings and other structures will be selected to blend with the characteristic landscape.

1.8.8.11 Health and Safety

The Utah Occupational Safety and Health Act and federal Occupational Safety and Health Standards will be followed during construction. Copies of these publications and the health and safety SOPs will be provided to project workers at construction sites.

Warning signs and temporary barriers will be provided in areas used by permitees and other public land users where construction activities are underway.

Onsite and offsite construction activities will fully conform to standards in the Reclamation safety and health standards manual (Reclamation 1993).

1.8.8.12 Transportation Networks and Utilities

Staging areas for construction material and equipment will be sited to minimize or avoid traffic impacts in public access areas.

Traffic control and other safety measures will be followed in construction and maintenance areas to minimize the risk of vehicle and pedestrian accidents.

Construction in residential and commercial areas will be performed only after residents and businesses have been notified that construction activities will disrupt vehicle access and parking.

All measures will be used to the extent possible to maintain vehicle access to residences, businesses, schools and parks that would be affected by the construction activities.

The shortest acceptable transportation routes will be used to dispose of spoil and waste.

Construction and traffic control procedures will be designed to local or State standards to minimize the length of delays and/or detours. Emergency vehicles will be given priority for access through construction activity zones.

Trained project personnel will provide traffic control in affected areas.

If disturbed, all highway and road surfaces and driveways will be restored to their former condition.

Salt will not be used in snow removal efforts on National Forest System roads.

Snow, ice and debris will be removed from currently functioning culverts to keep the drainage system functioning efficiently. Ditches will be kept functional.

All debris, except snow and ice, which is removed from the road surface and ditches, shall be deposited away from stream channels.

During snow removal operations, banks shall not be undercut and gravel or other selected surfacing material will not be bladed off the roadway surface.

Snow berms shall not be left on the road surface. Berms left on the shoulder of the road shall be removed and/or drainage holes shall be opened and maintained. Drainage holes shall be spaced as required to obtain satisfactory surface drainage without discharge on erodible fills.

Any damage resulting from snow removal will be repaired to at least the pre-construction condition.

Pipe materials passing through urban areas, requiring the use of heavy equipment for construction, will be transported during off-peak hours (those times when traffic volume is less than the highest Annual Average Daily Traffic).

Traffic control and other safety measures in construction and maintenance areas will be followed to minimize the risks of accidents to vehicles and pedestrians during construction and maintenance of the project.

Construction and traffic control procedures will be designed to minimize the length and duration of the detours.

All existing utilities will be identified, located and protected or relocated as required prior to starting pipeline construction.

When pipeline placement occurs in urban areas, measures will be taken to avoid, wherever possible, buried power lines, sewage lines and underground storage tanks (USTs) and any other buried city infrastructure features. The appropriate city authorities and affected neighborhoods and businesses will be notified when power needs to be turned off. If these features need to be relocated, they will be performed at the District's expense.

Travel routes where construction will alter traffic flow will be clearly marked and safety barriers will be placed appropriately in addition to signage directing people to the alternate access routes provided. The public bus system will be notified at least 30 days before construction to allow sufficient time to develop alternate routes and notify their riders.

1.8.8.13 Air Quality

The contractor will be required to follow Utah air quality regulations.

The District will follow, to the extent feasible, the EPA's recommendations for aggregate storage pile emissions (AP-42, Section 11.2.3) to minimize dust generation (i.e., periodic watering of equipment staging areas and dirt roads).

Construction machinery will be routinely maintained to make sure that engines remain tuned and emission-control equipment is properly functioning as required by law.

There will be no unnecessary idling of vehicles or construction equipment allowed.

1.8.8.14 Noise

The District's contractor will follow noise exposure and hearing conservation standards and practices in the Reclamation safety and health standards manual to protect workers and the public from potential harmful noise.

Mufflers on construction equipment will be checked regularly to minimize noise.

1.8.8.15 Energy Conservation

Standard energy conservation measures will be used during construction, operation and maintenance (e.g., avoiding unnecessary idling and keeping vehicles and equipment tuned and maintained).

The shortest possible transportation routes will be used during construction to conserve fuel.

1.8.8.16 Miscellaneous

Old power transmission lines, power poles, waste, or leftover construction materials, debris and garbage will be promptly cleaned up and removed to a disposal site approved by the District's Construction Manager.

The contractor will be required to submit a plan for the location and management of all construction staging areas to the District for approval before starting any construction activities.

Prior to construction, the contractor will be required to submit a fire prevention and control plan for approval that meets all state, local and U.S. Forest Service requirements.

Property outside of the authorized construction area will be posted by signs and protected from damage during construction.

The procedures outlined in the Noxious Weed Control Plan (Appendix B) will be followed.

1.8.9 Post-Construction Standard Operating Procedures

The following SOPs will be applied after construction is completed and during operation and maintenance of the project.

1.8.9.1 Monitoring and Follow-Up

Revegetation and erosion control areas will be monitored and repairs made as necessary. Revegetated areas will be monitored for invasion of noxious weeds and other weed species, as required by Section 4.17.3 of the Utah Noxious Weed Act, and appropriate weed control measures implemented. These measures will include establishing a cover of desirable plant species as quickly as possible after construction, interim seeding of topsoil stockpiles if they would remain barren for lengthy periods of time, conducting weed surveys during the fall and spring after initial seeding, applying herbicides or removing the weeds by mechanical or hand techniques before they develop seeds or spread roots, applying herbicides in accordance with federal application record keeping requirements, and washing equipment prior to arriving on the area. Monitoring for revegetation success will be conducted for a period of three years following completion of initial revegetation. Appendix B provides the details of a noxious weed control program.

Temporary fencing will be erected in areas where livestock or wildlife will likely interfere with successful revegetation and erosion control.

Revegetation will be considered successful if visual surveys indicate density and non-nuisance vegetation are similar in intensity and cover to adjacent, undisturbed lands and all temporary erosion control devices are no longer required and have been removed.

Restoration will be considered successful when revegetation is successful and the right-of-way surface condition is similar to surrounding undisturbed land.

1.8.9.2 Air Quality

Operation and maintenance vehicles will be routinely maintained to make sure that engines remain tuned and emission-control equipment is properly functioning as required by law.

1.8.9.3 Energy Conservation

Standard conservation measures will be used during the project's operation and maintenance (e.g., avoiding unnecessary idling and keeping vehicles and equipment tuned and maintained).

1.8.9.4 Health and Safety

The Utah Occupational Safety and Health Act and federal Occupational Safety and Health Standards will be followed during operation and maintenance. Copies of these publications and the health and safety SOPs will be provided to project workers.

Operation and maintenance activities will conform fully to the Reclamation safety and health standards manual.

1.8.9.5 Land Use

Existing land uses can continue in the rights-of-way of buried pipelines after construction, except trees and shrubs will not be allowed to re-grow above the pipelines.

No permanent structures may be constructed within the permanent easement without an encroachment permit (permanent easements acquired outside roadways. Any cross fencing would require gates or be removable.

1.9 Authorizing Actions, Permits and Licenses

Construction and operation of the ULS features would require various contracts and agreements, which would be negotiated by the District with federal agencies, water districts, associations, counties and cities. The District would need to obtain various permits, licenses and approvals from federal, state and local regulatory agencies to construct and operate the project features. This section summarizes these contracts, agreements, permits, licenses, etc.

1.9.1 Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

Table 1-36 lists the contracts and agreements needed to construct and operate the Proposed Action. Some of the agreements in Table 1-36 must be publicly negotiated. Some of the agreements have been negotiated between the DEIS and Final EIS, then signed by all parties except the United States. Final execution of all agreements, including signature by the United States, would be accomplished after issuing a Record of Decision.

Table 1-37 lists the federal, state, and local permits, licenses and approvals required to construct and operate the ULS, along with the agencies or entities that administer them.

Table 1-36
Contracts and Agreements Needed by District for the Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

Contract or Agreement	Purpose
Repayment Contract between DOI and District for M&I water	To repay the reimbursable construction costs of project features to the federal government. associated with 60,000 acre-feet of M&I water
M&I water petition between District and JVWCD and approved by DOI	To govern the sale of ULS M&I water to Jordan Valley Water Conservancy District
M&I water petition between District and MWD and approved by DOI	To govern the sale of ULS M&I water to Metropolitan Water District of Salt Lake and Sandy
M&I water petition between District and SUVMWA and approved by DOI	To govern the sale of ULS M&I water to South Utah Valley Municipal Water Association
Project Water Contract between DOI and the District for Utah Lake water	To provide for the acquisition of District Utah Lake water rights by DOI
Master construction agreement among UDOT, DOI, and District for Spanish Fork Canyon Pipeline	To provide for construction of ULS features along highways and roads controlled by Utah Department of Transportation
Funding agreement under the Drainage and Minor Construction Act (D&MC) program guidelines between DOI and the District for Spanish Fork Canyon Pipeline	To provide federal funding and local cost sharing under which the District would construct the Spanish Fork Canyon Pipeline
Funding agreement under D&MC guidelines between DOI and the District for Spanish Fork–Santaquin Pipeline	To provide federal funding and local cost sharing under which the District would construct the Spanish Fork–Santaquin Pipeline
Funding agreement under D&MC guidelines between DOI and the District for the Spanish Fork–Provo Reservoir Canal Pipeline	To provide federal funding and local cost sharing under which the District would construct the Spanish Fork–Provo Reservoir Canal Pipeline to the Provo Reservoir Canal (enclosure) and Jordan Aqueduct
Funding agreement under D&MC guidelines between DOI and District for the Santaquin-Mona Pipeline	To provide federal funding and local cost-sharing under which the District would construct the Santaquin-Mona Pipeline and conveyance of JSRIP water supplies to Mona Reservoir
Agreement between Mitigation Commission and the District for funding the Spanish Fork Canyon and Spanish Fork–Provo Reservoir Canal pipelines	To provide transfer of Section 8 funds from the Mitigation Commission to the District to construct the Spanish Fork Canyon and Spanish Fork–Provo Reservoir Canal pipelines
Warren Act Contract among DOI, Reclamation, District, PRWUA, JVWCD, and MWD	To provide authorization whereby JVWCD and MWD could convey Bonneville Unit water through PRP facilities
Implementation Agreement among DOI, District and Mitigation Commission for the Spanish Fork Canyon and Spanish Fork-Provo Reservoir Canal pipelines	To provide for the assignment of cost share among the Joint-Lead Agencies for construction and operation and maintenance of the Spanish Fork Canyon and Spanish Fork-Provo Reservoir Canal pipelines
Implementation Agreement among DOI, District, Reclamation, and Springville and Mapleton Irrigation Districts and Springville/Mapleton Cities for the Mapleton-Springville Lateral Pipeline.	To provide for replacement of the Mapleton-Springville Lateral with the Mapleton- Springville Lateral Pipeline, necessary rights of way to construct the pipeline, various water deliveries, and conserved water provided for in-stream flows
Funding agreement under D&MC guidelines between DOI and the District for Mapleton- Springville Lateral Pipeline	To provide federal funding and local cost sharing under which the District would construct the Mapleton- Springville Lateral Pipeline
Section 207 agreement between DOI and District for Mapleton-Springville Lateral Pipeline	To provide a federal grant and local cost sharing under which the District would construct the Mapleton- Springville Lateral Pipeline
Section 207 agreement between DOI and the District	To provide a Section 207 federal grant and local cost sharing under which the District would construct Section 207 Water Conservation Projects and provide DOI with 8,000 acre-feet for in-stream flows
Funding agreement under D&MC guidelines between DOI and the District for Diamond Fork Power Facilities	To provide federal funding and local cost sharing under which the District would construct the Diamond Fork Power Facilities
Operation and maintenance agreement with Utah Power	To provide for operation and maintenance of the Sixth Water Transmission Line from Highway 6 to the Sixth Water Power Facility
Power sale contract with Western Area Power Administration	To provide for the sale of project power to Western Area Power Administration
Public Land Order for withdrawal of National Forest System lands by BLM	To withdraw National Forest System lands for construction, operation and maintenance of ULS project features, by application to the Bureau of Land Management
Memorandum of Agreement with the State Historic Preservation Officer	To provide for documentation, conservation and mitigation of any cultural resources encountered during construction
Warranty deeds	To acquire permanent rights-of-way for ULS features
Easement agreements	To provide temporary easements for construction activities

Table 1-36
Contracts and Agreements Needed by District for the Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action)

Contract or Agreement	Purpose
Construction crossing agreements with Union Pacific Railroad	To provide for construction crossings under Union Pacific Railroad right-of-way
Warren Act Contract among DOI, District, and SUVMWA	To provide authorization whereby SUVMWA could convey up to 10,200 acre-feet of SVP water through ULS facilities
Water Service Contract between DOI and District for ULS irrigation water	To provide supplemental irrigation water in southern Utah County until 2030

Table 1-37
Permits and Approvals Required for Construction of the Spanish Fork-Provo Reservoir Canal Alternative (Proposed Action)

Agency/Department	Permit/Approval	Required for
Federal Agencies		
U.S. Congress (in lieu of U.S. Army Corps of Engineers)	Section 404(r), Clean Water Act, 33 USC 1341 (Exemption from 404 permit process administered by Corps of Engineers), see Appendix C	Discharge of dredge/fill materials into waters of the United States, including wetlands; impacts on aquatic ecosystems
U.S. Fish and Wildlife Service	Section 7 Consultation, Biological Opinion (Endangered Species Act, 16 USC 15311544)	Compliance with Endangered Species Act of 1973
	Contaminants Report (CUPCA 205(e)3)	Discuss potential for harmful contamination of waters and develop prevention measures if determined necessary
	Fish and Wildlife Coordination Act, 16 USC 661-667	Documenting that fish and wildlife resources receive equal consideration with other environmental values; coordinated with Utah Division of Wildlife Resources
U.S. Forest Service	If lands are not withdrawn, a special-use permit (Federal Land Policy and Management Act, 43 USC 17011784; 16 USC 522 et seq.) would be required prior to construction	Construction of pipelines, power facilities and transmission lines on National Forest System lands
	Cultural resource use permit (16 USC 470 et seq.)	Survey/excavation on USFS-managed lands
U.S. Bureau of Reclamation	Construction access permit	Construction of pipeline across and connection to Provo Reservoir Canal and to Jordan Aqueduct
Federal Highway Administration	Encroachment permits (23 USC 109, 116, 123)	Encroachments of federal highway rights-of-way
State Agencies		
Department of Natural Resources Division of Water Rights	Water rights filed but not yet approved Water right change applications	Perfecting water rights for ULS operation, protection of water rights to maintain in-stream flows in lower Provo River and Hobble Creek
	Stream channel alteration permit (Utah Code Annotated Section 73329)	Change in river or stream (includes pipeline construction under or near a streambed)

Table 1-37
Permits and Approvals Required for Construction of the Spanish Fork-Provo Reservoir Canal Alternative (Proposed Action)

Agency/Department	Permit/Approval	Required for
State Agencies (continued)		
Department of Natural Resources Division of Wildlife Resources	Certificate of Registration	Golden eagle nest protection
	Certificate of Registration	Reptile protection
	Concurrence	Fish and Wildlife Coordination Act Planning Aid Memorandum
	Easement on Division of Wildlife Resources land	Pipelines crossing through Division of Wildlife Resources land
Department of Environmental Quality, Division of Water Quality	General construction activity stormwater permit, UPDES	Stormwater discharges associated with construction activity
	401 Certification (Clean Water Act, 33 USC 1341), see Appendix C	Discharge into waters and wetlands (see U.S. Congress, Clean Water Act Section 404(r), exemption from 404 permit process)
	UPDES Permit (Section 402 Clean Water Act)	Discharge of water to streams, lakes, reservoirs, other water bodies
Utah State Historic Preservation Office	Section 106 Consultation (National Historic Preservation Act, 16 USC 470) MOU	Historic, architectural, archaeological or cultural characteristics of properties that meet National Register criteria (State Historic Preservation Officer responsible for administration). Note: Also refer to National Landmarks Program (36 CFR and National Historic Landmarks Program [36 CFR 65])
	Cultural resource use permit (Utah Code Annotated Section 631825)	Surveys or disturbance to archaeological or paleontological sites on state lands
Utah Department of Transportation	Right–of-way and encroachment permit	Using state highway land encroachment on state highway rights-of-way
Occupational Safety and Health Administration	Construction permit	Worker safety and health
Utah Department of Public Safety Utah Highway Patrol	Transportation permit (Utah Code Annotated Section 2712155)	Transporting overloads
Local Agencies		
Orem City Public Works	Construction permit	Utility construction within Orem City limits
Provo City Public Works	Construction permit	Utility construction within Provo City limits
Springville City	Construction permit	Construction within Springville City limits
Mapleton City	Construction permit	Construction within Mapleton City limits
Spanish Fork City Public Works	Construction permit	Utility construction within Spanish Fork City limits
Salem City	Construction permit	Construction within Salem City limits
Payson City	Construction permit	Construction within Payson City limits
Santaquin City	Construction permit	Construction within Santaquin City limits
County Planning Department, Utah County	Use permit	Activities where use is conditional in a particular zone
County Public Works Department Utah County	Grading permit	Excavation and fill activities
	Road encroachment	Activities within county rights-of-way
	Transportation permit	Transport of overloads on county road rights-of-way

1.9.2 Bonneville Unit Water Alternative

Table 1-38 lists the contracts and agreements needed to construct and operate the Bonneville Unit Water Alternative. The first contract listed in this table is the DOI's authorization to construct the ULS, which is a federal project subject to federal oversight by the DOI. Some of the agreements in Table 1-38 must be publicly negotiated. Some of the agreements have been negotiated between the DEIS and Final EIS, then signed by all parties except the United States. Final execution of all agreements, including signature by the United States, would be accomplished after issuing a Record of Decision.

Table 1-39 lists the federal, state, and local permits, licenses and approvals required to construct and operate the ULS under the Bonneville Unit Water Alternative, along with the agencies or entities that administer them.

Table 1-38
Contracts and Agreements Needed by District for the Bonneville Unit Water Alternative

Page 1 of 2

Contract or Agreement	Purpose
Repayment Contract between DOI and District for M&I water	To repay the reimbursable construction costs of project features to the federal government. associated with 15,800 acre-feet of M&I water
M&I water petition between District and SUVMWA and approved by DOI	To govern the sale of ULS M&I water to South Utah Valley Municipal Water Association
Project Water Contract between DOI and the District for Utah Lake water	To provide for the acquisition of District Utah Lake water rights by DOI
Master construction agreement among UDOT, DOI, and District for Spanish Fork Canyon Pipeline	To provide for construction of ULS features along highways and roads controlled by Utah Department of Transportation
Funding agreement under the Drainage and Minor Construction Act (D&MC) program guidelines between DOI and the District for Spanish Fork Canyon Pipeline	To provide federal funding and local cost sharing under which the District would construct the Spanish Fork Canyon Pipeline
Funding agreement under D&MC guidelines between DOI and the District for Spanish Fork–Santaquin Pipeline	To provide federal funding and local cost sharing under which the District would construct the Spanish Fork–Santaquine Pipeline
Section 207 agreement between DOI and District for Spanish Fork-Santaquin Pipeline	To provide a federal grant and local cost sharing under which the District would construct the Spanish Fork-Santaquin Pipeline
Master construction agreement among DOI, District, Reclamation, and Springville and Mapleton Irrigation Districts, SUVMWA and Springville/Mapleton Cities for the Mapleton- Springville Lateral Pipeline	To provide for replacement of the Mapleton-Springville Lateral with the Mapleton- Springville Lateral Pipeline, necessary rights of way to construct the pipeline, various water deliveries, and conserved water provided for in-stream flows
Funding agreement under D&MC guidelines between DOI and the District for Mapleton- Springville Lateral Pipeline	To provide federal funding and local cost sharing under which the District would construct the Mapleton- Springville Lateral Pipeline
Section 207 agreement between DOI and District for Mapleton-Springville Lateral Pipeline	To provide a federal grant and local cost sharing under which the District would construct the Mapleton- Springville Lateral Pipeline
Section 207 agreement between DOI and the District	To provide a Section 207 federal grant and local cost sharing under which the District would construct Section 207 Water Conservation Projects and provide DOI with 8,000 acre-feet for in-stream flows
Funding agreement under D&MC guidelines between DOI and the District for Diamond Fork Power Facilities	To provide federal funding and local cost sharing under which the District would construct the Diamond Fork Power Facilities
Operation and maintenance agreement with Utah Power	To provide for operation and maintenance of the Sixth Water Transmission Line from Highway 6 to the Sixth Water Power Facility
Power sale contract with Western Area Power Administration	To provide for the sale of project power to Western Area Power Administration
Public Land Order for withdrawal of National Forest System lands by BLM	To withdraw National Forest System lands for construction, operation and maintenance of ULS project features, by application to the Bureau of Land Management
Memorandum of Agreement with the State Historic Preservation Officer	To provide for documentation, conservation and mitigation of any cultural resources encountered during construction
Warranty deeds	To acquire permanent rights-of-way for ULS features
Water Service Contract between DOI and District for ULS irrigation water	To provide supplemental irrigation water in southern Utah County until 2030

Table 1-38
Contracts and Agreements Needed by District for the Bonneville Unit Water Alternative

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Contract or Agreement	Purpose
Easement agreements	To provide temporary easements for construction activities
Construction crossing agreements with Union Pacific Railroad	To provide for construction crossings under Union Pacific Railroad tracks
Warren Act Contract among DOI, District, and SUVMWA	To provide authorization whereby SUVMWA could convey up to 10,200 acre-feet of SVP water through ULS facilities

Table 1-39
Permits and Approvals Required for Construction of the Bonneville Unit Water Alternative

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Agency/Department	Permit/Approval	Required for
Federal Agencies		
U.S. Congress (in lieu of U.S. Army Corps of Engineers)	Section 404(r), Clean Water Act, 33 USC 1341 (Exemption from 404 permit process administered by Corps of Engineers)	Discharge of dredge/fill materials into waters of the United States, including wetlands; impacts on aquatic ecosystems
U.S. Fish and Wildlife Service	Section 7 Consultation, Biological Opinion (Endangered Species Act, 16 USC 15311544)	Compliance with Endangered Species Act of 1973
	Contaminants Report (CUPCA 205(e)3)	Discuss potential for harmful contamination of waters and develop prevention measures if determined necessary
	Fish and Wildlife Coordination Act, 16 USC 661-667	Documenting that fish and wildlife resources receive equal consideration with other environmental values; coordinated with Utah Division of Wildlife Resources
U.S. Forest Service	If lands are not withdrawn, a special-use permit (Federal Land Policy and Management Act, 43 USC 17011784; 16 USC 522 et seq.) would be required prior to construction	Construction of pipelines, power facilities and transmission lines on National Forest System lands
	Cultural resource use permit (16 USC 470 et seq.)	Survey/excavation on USFS-managed lands
Bureau of Land Management	Withdrawal application with DOI and USFS	Construction of pipelines, power facilities, access roads, and transmission lines on National Forest System lands
Federal Highway Administration	Encroachment permits (23 USC 109, 116, 123)	Encroachments of federal highway rights-of-way
State Agencies		
Department of Natural Resources Division of Water Rights	Water rights filed but not yet approved Water right change applications	Perfecting water rights for ULS operation, protection of water rights to maintain lower Provo River in-stream flows and Hobble Creek flows
	Stream channel alteration permit (Utah Code Annotated Section 73329)	Change in river or stream (includes pipeline construction under or near a streambed)

Table 1-39
Permits and Approvals Required for Construction of the Bonneville Unit Water Alternative

Page 2 of 2

Agency/Department	Permit/Approval	Required for
State Agencies (continued)		
Department of Natural Resources Division of Wildlife Resources	Certificate of Registration	Golden eagle nest protection
	Certificate of Registration	Reptile protection
	Concurrence	Fish and Wildlife Coordination Act Planning Aid Memorandum
Department of Environmental Quality, Division of Water Quality	General construction activity stormwater permit, UPDES	Stormwater discharges associated with construction activity
	401 Certification (Clean Water Act, 33 USC 1341)	Discharge into waters and wetlands (see U.S. Congress, Clean Water Act Section 404(r), exemption from 404 permit process)
	UPDES Permit (Section 402 Clean Water Act)	Discharge of water to streams, lakes, reservoirs, other water bodies
Utah State Historic Preservation Office	Section 106 Consultation (National Historic Preservation Act, 16 USC 470)	Historic, architectural, archaeological or cultural characteristics of properties that meet National Register criteria (State Historic Preservation Officer responsible for administration). Note: Also refer to National Landmarks Program (36 CFR and National Historic Landmarks Program [36 CFR 65])
	Cultural resource use permit (Utah Code Annotated Section 631825)	Surveys or disturbance to archaeological or paleontological sites on state lands
Utah Department of Transportation	Right–of-way and encroachment permit	Using state highway land encroachment on state highway rights-of-way
Occupational Safety and Health Administration	Construction permit	Worker safety and health
Utah Department of Public Safety Utah Highway Patrol	Transportation permit (Utah Code Annotated Section 2712155)	Transporting overloads
Local Agencies		
Springville City	Construction permit	Construction within Springville City limits
Mapleton City	Construction permit	Construction within Mapleton City limits
Spanish Fork City Public Works	Construction permit	Utility construction within Spanish Fork City limits
Salem City	Construction permit	Construction within Salem City limits
Payson City	Construction permit	Construction within Payson City limits
Santaquin City	Construction permit	Construction within Santaquin City limits
County Planning Department, Utah County	Use permit	Activities where use is conditional in a particular zone
County Public Works Department Utah County	Grading permit	Excavation and fill activities
	Road encroachment	Activities within county rights-of-way
	Transportation permit	Transport of overloads on county road rights-of-way

1.9.3 No Action Alternative

Only one permit/approval would be required under the No Action Alternative. The District would be responsible for obtaining the necessary water right change applications for the Provo River June sucker flows, with the Utah Department of Natural Resources, Division of Water Rights for approval.

1.9.4 Spanish Fork Canyon Pipeline Option

The Spanish Fork Canyon Pipeline option would be constructed by UDOT. All contracts, agreements, and permits for construction would be obtained by UDOT. Applicable operating agreements and contracts for the Spanish Fork Canyon Pipeline would be the same as described in Section 1.9.1.

1.10 Interrelated Projects

This section describes projects that could cause cumulative impacts from construction and operation of the proposed completed ULS. These projects are referred to as interrelated projects.

The NEPA and the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500 through 1508) require federal agencies to consider the cumulative impacts of their actions. These are defined as the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from actions that are individually minor but collectively significant over a period of time (40 CFR 1508.7).

Cumulative impacts are based on net impacts (i.e., impacts left after mitigation has been applied), not gross impacts. If the ULS would not impact a resource, there would be no potential for cumulative impacts on that resource. Basing the cumulative impact analysis on gross impact would have resulted in a misrepresentation of the actual cumulative impact.

The following entities were contacted to develop a list of projects with potential cumulative impacts: U.S. Fish and Wildlife Service, U.S. Forest Service, Utah Division of Wildlife Resources, Utah Department of Transportation, planning and public works departments of the cities of Orem, Provo, Springville, Mapleton, Spanish Fork, Salem, Payson, and Santaquin, Utah County, Wasatch County, Jordan Valley Water Conservancy District, Metropolitan Water District of Salt Lake and Sandy, SUVMWA, and railroads.

Section 1.10.2 describes possible future actions that are not included in the cumulative impact analysis and the reasons for not being included. Section 1.10.3 describes projects that have been included in the cumulative impact analysis. These interrelated projects could combine with the actions proposed for completing the ULS to create a cumulative impact on the environment. A discussion of the cumulative impacts that these projects may cause in conjunction with the ULS is presented in Section 3.27 of Chapter 3 of this FEIS.

1.10.1 Past Projects and Actions

The historic development of Utah Valley, Provo Canyon and Heber Valley follow the same basic pattern as most of northern Utah, beginning with exploration and fur trapping in 1776, continuing with settlement by Mormon pioneers through the latter half of the nineteenth century, and economic growth spurred by arrival of the transcontinental railroad. Population and economic growth was accompanied by ranching and agriculture, the latter growing rapidly as irrigation diversions from rivers and streams were developed to bring water to cropland, orchards, hayfields and pastures.

Construction of the Strawberry Valley Project (SVP) including Strawberry Reservoir, the Strawberry Tunnel, and the Strawberry Highline Canal early in the twentieth century, was the first major water resources project in the region, supplying water stored from spring runoff high in the mountains to thirsty crops in Utah Valley during the summer months. In 1991, the United States, the Central Utah Water Conservancy District (District) and the

Strawberry Water Users Association (SWUA) entered into an operating agreement covering storage in, and delivery of SVP water from Strawberry Reservoir. Although some of the provisions of this agreement are currently a matter of litigation, it does address the operation of the enlarged Strawberry Reservoir, Syar Tunnel and the Diamond Fork System. The enlarged Strawberry Reservoir provides long-term storage of both Bonneville Unit and Strawberry Valley Project (SVP) water in a common pool of active storage. The 1991 Operating Agreement guaranteed the SWUA with a permanent right to 50,000 acre-feet of holdover storage capacity, with an initial (one-time) allocation of 50,000 acre-feet of stored water. The steady growth in population and ongoing need for irrigation water have increased demands on groundwater aquifers in southern Utah County, with initial groundwater development following the 1961 drought and more water supply wells being added each year.

The Bonneville Unit of the Central Utah Project was originally authorized in 1956 and has since been in various stages of planning, design, development and construction. It consists of several systems that have influenced the patterns of population and economic growth in northern Utah County and Salt Lake County. These Bonneville Unit systems are described in Section 1.1.2.1 of this FEIS, and include the Starvation Collection System, Strawberry Aqueduct and Collection System (SACS), Diamond Fork System, and Municipal and Industrial (M&I) System. Strawberry Reservoir was enlarged by construction of Soldier Creek Dam to store water collected and conveyed through the SACS. The Bonneville Unit water stored in Strawberry Reservoir flows as a transbasin diversion through the Diamond Fork System of tunnels and pipelines, and includes water for Utah Lake in exchange for water in the upper Provo River stored in Jordanelle Reservoir, which is the primary feature of the M&I System. Construction of Jordanelle Dam on the Provo River at the upstream end of Heber Valley in the 1990s allowed M&I System operations to begin delivering part of the 107,500 acre-feet of water contracted to Summit, Wasatch, northern Utah and Salt Lake counties. The full 107,500 acre-feet of agricultural and M&I water will be deliverable in 2005 when the Diamond Fork System begins to operate. The M&I System water is delivered to communities in northern Utah County and Salt Lake County through the Salt Lake Aqueduct, Olmsted Flowline, Alpine Aqueduct, and Jordan Aqueduct from diversions on the Provo River in Provo Canyon.

SVP water will be conveyed through the Diamond Fork System tunnels and pipelines starting in spring 2005 for discharge to Diamond Fork Creek near its confluence with Spanish Fork River. The SVP water has been conveyed down Sixth Water Creek from the Sixth Water Aqueduct outlet and Diamond Fork Creek since the Syar Tunnel began operating in 1996. Between 1913 and 1996, the SVP water flowed through the Strawberry Tunnel and was conveyed down Sixth Water Creek and Diamond Fork Creek to the Spanish Fork River. Removal of the excess high flows SVP water from Sixth Water Creek and Diamond Fork Creek, and conveyance of the SVP water through the Diamond Fork System, will be part of normal operations in 2005 and beyond.

A major water resources project that has provided water for the population and economic growth along the Wasatch Front is the Provo River Project. It collects water from the Provo River basin and brings transbasin water from the Duchesne River and Weber River through tunnels into the upper Provo River for delivery to communities, irrigation districts and water districts along the Wasatch Front. Deer Creek Reservoir on the Provo River, at the downstream end of Heber Valley and the upstream end of Provo Canyon, stores Provo River Project water that is conveyed down the Provo River to the Murdock Diversion and into the Provo Reservoir Canal.

The upgrade of U.S. Highway 189 in Provo Canyon has been in various stages of planning, design and construction since a Final EIS was issued in 1978. A Final Supplemental EIS was issued in 1989 on improvements and upgrades for 22 miles of the highway from the intersection with State Route 52 in Orem to the intersection with U.S. Highway 40 in Heber City. Highway upgrades consisting of widening to 4 lanes and realignment have occurred from State Route 52 to north of Wildwood in Provo Canyon. Traffic volumes continue to increase on the highway as more people move into Heber Valley and commute to and from Utah County and Salt Lake County.

The upgrade of State Highway 198 from Payson to Highway 6 in Spanish Fork is expected to be constructed and completed by 2005. The highway will be widened to include a continuous two-way left turn lane and complete houlders, sidewalks in urban areas, and pavement rehabilitation. The construction is scheduled to be completed before the ULS construction starts.

The Point of the Mountain Water Treatment Plant is presently under design and construction by the Metropolitan Water District of Salt Lake and Sandy. The new treatment plant will conventionally treat Provo River water conveyed through the Provo Reservoir Canal, operating as a peaking plant during April through September each year. The plant is scheduled to begin operation after spring 2006. A portion of the ULS water conveyed to Salt Lake County through the enclosed Provo Reservoir Canal will be treated in this plant when the ULS becomes operational.

The Provo River Restoration Project involves restoring sinuosity and aquatic and riparian habitats to the Provo River between Jordanelle Dam and Deer Creek Reservoir. Project planning started in 1992, and a Final EIS and Record of Decision was issued in December 1997. Construction started in 1999 and has continued, with the work progressing from upstream to downstream reaches. The Mitigation Commission is performing construction on the project, and all in-channel work is expected to be completed by summer 2006.

The District has acquired, with Mitigation Commission funds, irrigation water company shares representing 3,300 acre-feet of water towards the amount necessary to meet the 75-cfs target flow in the lower Provo River. Unlike the Section 207 project water, the water acquired by the District using Mitigation Commission funds is not storage water and cannot be regulated by reservoir operations. Instead, the water would be allowed to flow past the diversion location associated with the original water right or share, and the water would continue to flow to Utah Lake. The 3,300 acre-foot water volume has been incorporated into the ULS alternatives and impacts of these flows have been addressed in the FEIS.

1.10.2 Possible Future Actions Not Included in the Cumulative Impact Analysis

SUVMWA Regional Wastewater Treatment Plant. This regional wastewater treatment plant has recently been studied and would treat wastewater collected from several southern Utah County communities. SUVMWA would develop, construct and operate the treatment plant. There are no definitive plans for the SUVMWA treatment plant at this writing and the potential project is too speculative to be included in the cumulative impact analysis.

UDOT Highway 6 Upgrade. UDOT plans to upgrade Highway 6 through Spanish Fork Canyon and all the way from Interstate 15 to Interstate 70. The highway would be upgraded to 4 lanes with a center turn lane or barrier. UDOT expects to complete the EIS in 2004. Funding for phased construction has not been secured at this writing, and potential construction is considered too speculative to be included in the cumulative impact analysis.

UDOT Highway 73 Upgrade. UDOT is preparing an EIS on reconstruction of Highway 73 or construction of a new roadway to solve east-west transportation demands in northern Utah County. A programmatic EIS is presently being prepared, and no funding for construction has been secured at this writing. Although Highway 73 is located in Utah County, it is outside of the ULS impact area of influence and the potential construction project is too speculative to be included in the cumulative impact analysis.

UDOT State Route 114 Upgrade. UDOT is preparing an environmental assessment on potential upgrade of State Route 114 (Geneva Road) from Provo to Pleasant Grove. Widening of this road would have high costs and may have significant impacts, which would require preparation of an EIS. UDOT estimates that the project would take up to 10 years to construct, after funding is secured following NEPA compliance and subsequent design. The potential project is too speculative to be included in the cumulative impact analysis.

Mountain View Corridor. The Mountain View Corridor EIS is presently being prepared to examine transportation alternatives in an area extending from Interstate 80 at the Salt Lake City International Airport to the north shore of Utah Lake. The Federal Highway Administration, Federal Transit Administration, UDOT, Utah

Transit Authority, Mountainland Association of Governments, and Wasatch Front Regional Council are project partners. The EIS and Record of Decision are expected to be complete in spring 2006. Design and construction of transportation facilities identified in the EIS could start before 2016, however, alternatives have not been identified or developed and any construction is too speculative to be included in the cumulative impact analysis.

Additional Groundwater Development Program. Jordan Valley Water Conservancy District plans to complete 10 new high-capacity groundwater wells during the next 10 years to increase water supplies by 5,000 acre-feet per year. The 10 new wells would be developed using the District's senior groundwater rights to firm up the production capacity of 27 existing wells. The wells would be located north of the ULS impact area of influence for groundwater and were not considered for inclusion in the cumulative impact analysis.

Southwest Groundwater Remediation and Shallow Groundwater Development Project. Jordan Valley Water Conservancy District plans to develop 9,000 acre-feet of water during the next 10 years through a joint project with Kennecott Utah Copper Corporation. Groundwater contaminated by past mining activities would be reclaimed by pumping water to the surface and using a membrane treatment process known as reverse osmosis to remove the contaminants. The treated water would be used to supplement the District's water supplies. This potential project would be located north of the ULS impact area of influence for groundwater and was not considered for inclusion in the cumulative impact analysis.

Future Section 207 Projects. The District and DOI have an authorization to continue planning and funding the Section 207 water conservation program and encourage municipalities, canal companies, irrigation districts, water districts, and other eligible entities to propose, plan, design and implement water conservation projects. Future 207 projects will be completed that will result in conserving water, however, no specific plans have been submitted other than those incorporated into the ULS or described in this section. Therefore, future Section 207 projects are undefined and are not considered in the cumulative impact analysis.

Provo Reservoir Canal Trail. The Provo Reservoir Canal Trail is proposed as a 12-mile-long trail from Orem to Lehi following the Provo Reservoir Canal. The timing of construction of this trail is unknown at this time but would likely be after construction of the Spanish Fork-Provo Reservoir Canal Pipeline along the canal in Orem has been completed. The potential project was not included in the cumulative impact analysis.

FWS Biological Opinion for the Duchesne River Project. The FWS is preparing a revised biological opinion, pursuant to Section 7 of the Endangered Species Act, on the impacts of Federal water development projects in the Uinta Basin on endangered Colorado River fish. Included in this evaluation will be the 44,400 acre-feet of water per year of CUP project water allocated for stream flows in the Strawberry Aqueduct and Collection System under the 1980 Streamflow Agreement (as amended). The final biological opinion on the Duchesne River System will be a factor in determining the use of the 44,400 acre-feet of water. Until this amended opinion is finalized, the cumulative impacts of options for use of this water cannot be addressed.

Utah Lake Total Maximum Daily Load. The Utah Department of Environmental Quality is beginning to prepare an analysis of Utah Lake water quality that will be used to determine a total maximum daily load (TMDL) for certain contaminants for the lake. The TMDL analysis will focus on total dissolved solids and total phosphorus, both of which are constituents in the lake that have led to designating the lake water quality as impaired under the Clean Water Act. The TMDL analysis is expected to be completed in 2005 and submitted to the EPA for review. Therefore, it is too speculative to determine if there would be any cumulative impacts under the ULS project.

Diamond Fork Creek Restoration. The Mitigation Commission and numerous Federal, State and local partners have been studying the potential for restoring Diamond Fork Creek riparian and aquatic habitat. The Diamond Fork System tunnels and pipelines are scheduled to begin operating in 2004, which will remove the excess irrigation high flows and Bonneville Unit flows from Sixth Water and Diamond Fork creeks except for the ninimum instream flows mandated in CUPCA. After the stream flows are stabilized and restored to a more natural hydrograph, the Mitigation Commission is responsible for developing a plan for restoring Diamond Fork Creek (see Appendix A, Environmental Commitment 30 for additional information). The details of the plan are not yet developed, therefore, this potential future action is not included in the cumulative impact analysis. When the plan is developed by the Mitigation Commission and its partners, it will prepare appropriate NEPA compliance documentation.

Strawberry Water Users Association's Use of SVP Return Flows. The Strawberry Water Users Association filed Exchange Application 3760 with the Utah State Engineer on December 12, 1997. The quantity of water shown on the proposed exchange portion of the water right is 15,600 acre-feet of SVP water. The application was advertised, and was protested by Reclamation, the District, and the Provo River Water Users Association.

1.10.3 Future Projects Included in the Cumulative Impact Analysis

The following projects have been evaluated for potential cumulative impacts associated with the ULS alternatives. The cumulative impact analysis for each resource topic is presented in Chapter 3 of this document. The level of detail to which a project is analyzed within each resource section corresponds with the amount of information available for the project and the significance of potential cumulative impacts.

1.10.3.1 June Sucker Recovery Implementation Program

The June Sucker Recovery Implementation Program (RIP) was conceived in 1999 and a final environmental assessment and FONSI on the program were issued in April 2002. The RIP is working to accelerate implementation of approved June sucker recovery plans. Participants include U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, Mitigation Commission, Department of the Interior, District, Utah Department of Natural Resources, Provo River Water Users Association, Provo Reservoir Water Users Company, and environmental/outdoor interests. The RIP consists of the following six recovery elements. Specific tasks that could result in cumulative impacts under the ULS are briefly described within the applicable recovery elements.

1.10.3.1.1 Nonnative and Sportfish Management. This element consists of a nonnative fish control feasibility study. The study describes the history and status of nonnative fish species, identifies nonnative fish species with potential to limit recovery of June sucker, evaluates past successes and failures of nonnative removal and control efforts, reviews potential methods of nonnative fish species control, and identifies potential pilot projects to test nonnative fish species removal and control techniques. No specific methods or techniques have been implemented or proposed, however, the ULS would improve flow conditions on the lower Provo River that favor increases in some nonnative fish species that may prey on June sucker larva. Potential implementation of nonnative fish species control could have a cumulative impact with the ULS project.

1.10.3.1.2 Habitat Development and Maintenance. This element includes investigating habitat enhancement alternatives in the lower Provo River flood plain to benefit June sucker recruitment and coordinating Utah Lake water quality with state agencies. The JSRIP proposes to plan and implement stream restoration projects along the lower Provo River as an element of the June sucker RIP. A plan was completed in 2002 establishing the feasibility of habitat alterations in the lower Provo River for June sucker spawning, incubation and rearing as part of the recovery program. The cumulative impact analysis assumes that stream habitat restoration measures would be implemented at some level in the lower Provo River when the ULS begins to operate in 2016.

1.10.3.1.3 Water Management and Protection to Benefit June sucker. This element includes the following five specific tasks that have been analyzed as part of the impacts under the ULS alternatives. There would be no cumulative impacts from the tasks under this element because these inter-related actions have been incorporated into the ULS alternatives to meet the needs and purposes identified in Section 1.2 of this FEIS. The impacts have been analyzed and documented under each alternative.

- **Feasibility analysis of establishing an additional spawning location.** Hobble Creek was identified as a high priority additional spawning location for June sucker in the feasibility analysis, and ULS flows are proposed for discharge into Hobble Creek under the action alternatives. Existing diversion dams on Hobble Creek west of Springville are expected to be modified by the JSRIP to be able to measure the June sucker flows and bypass June sucker.

- **Refine flow requirements to maintain and enhance June sucker spawning and recruitment in the Provo River.** The ULS alternatives have been formulated to include refined flow requirements consistent with the operational scenarios committed to in the Diamond Fork System FS-FEIS and referenced in the Diamond Fork System Biological Opinion. These flow requirements are may need to be refined in the future as the RIP continues to be implemented.

- **Operational flexibility and limitations to providing spawning and nursery flows for June sucker in the lower Provo River.** The ULS alternatives have been formulated to include operational flexibility and recognize limitations to providing spawning and nursery flows, consistent with the operational scenarios committed to in the Diamond Fork System FS-FEIS and referenced in the Diamond Fork System Biological Opinion.

- **Utah Lake level fluctuation under future water operation scenarios: considerations for tributary enhancement projects.** The ULS alternatives have been formulated to have no affect on Utah Lake operational levels that have occurred under historical and baseline conditions.

- **Acquire and protect flows in the Provo River.** A volume of 12,165 acre-feet of water has been identified and would be acquired to provide June sucker flows in the lower Provo River. These water volumes have been incorporated into the ULS alternatives and impacts of these flows have been addressed in the FEIS. The District has acquired, using Mitigation Commission funds, irrigation company water shares representing 3,300 acre-feet, to be used toward meeting the 75 cfs target flows, which would flow undiverted to Utah Lake, thereby contributing to the summertime flow in the lower Provo River. Some of this water would flow down the lower Provo River during the period of June sucker spawning and larval migration down to Utah Lake.

1.10.3.1.4 Genetic Integrity and Augmentation. This element includes nine specific tasks, one of which has been addressed in part by two of the ULS alternatives. The task is investigation and development of Mona Reservoir as a June sucker refuge. The Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action) includes a pipeline to Mona Reservoir from Santaquin. The water supply and pipeline operation to deliver water to Mona Reservoir for a June sucker refuge have not been identified or determined, and these actions would require separate NEPA compliance in the future. Delivery of water to Mona Reservoir is too speculative now to determine cumulative impacts of this RIP task under the two ULS alternatives. There would be no cumulative impacts from the other tasks under this element because they involve actions that would not be within the impact area of influence or would not affect resources potentially changed by the ULS. This District has completed, in cooperation with the Corps of Engineers, an EA/FONSI for stabilization of Red Butte Dam and Reservoir, which is currently used as a refugia for June sucker. Federal legislation will transfer Red Butte Dam and Reservoir to the District for management to maintain the reservoir as a refugia for June sucker.

1.10.3.1.5 Research, Monitoring, and Data Management. This element includes six specific tasks, none of which would result in cumulative impacts on resources analyzed for impacts under the ULS alternatives.

1.10.3.1.6 Information and Education. This element includes three specific tasks, none of which would result in cumulative impacts on resources analyzed for impacts under the ULS alternatives.

1.10.3.2 Provo Reservoir Canal Enclosure

Impacts of enclosing the Provo Reservoir Canal were analyzed in an environmental assessment and Reclamation issued a Finding of No Significant Impact (FONSI) in April 2003. Construction of the enclosure is expected to be completed, at the earliest by April 2010, which would occur even if the enclosure is reasonably close to schedule, several years prior to expected completion of ULS construction. Operation of the enclosed Provo Reservoir Canal would include ULS water conveyance during periods when there is insufficient capacity in the Jordan Aqueduct to convey ULS water, which is described in Section 1.4.9.4.1 of this FEIS. There would be no cumulative impacts during ULS construction because the Provo Reservoir Canal enclosure would be completed prior to ULS construction. The cumulative impacts of operating the enclosed Provo Reservoir Canal have been incorporated into the analysis presented in this FEIS because the canal seepage-loss savings of 8,000 acre-feet per year has been included in the conserved water (see Sections 1.4.9.4.1 and 1.4.9.4.3) modeled for the alternatives for June sucker flows.

1.10.3.3 Provo River Parkway Trail

The Provo River Parkway Trail would be extended for 1.4-miles along the lower Provo River in Provo City, providing increased public and angler access along the river. The proposed trail extension could be constructed between 2011 and 2020. Two ULS alternatives would deliver water to the lower Provo River for fish and wildlife benefits, however, their construction would not affect any of the land along this river reach. The proposed trail extension would potentially provide increased recreational fishing opportunities along the river and could have cumulative impacts with the ULS project.

1.10.3.4 Hobble Creek Trail

The Hobble Creek Trail is proposed as a 3.5-mile-long bike trail along Hobble Creek through urban Springville. The proposed trail could be constructed between 2011 and 2020. The ULS action alternatives would deliver water to Hobble Creek, however, their construction would not affect any of the land along the creek in Springville. The proposed trail would provide public and angler access along the creek, which in turn could provide recreational fishing opportunities not presently available, and could have cumulative impacts with the ULS project.

1.10.3.5 Lower Provo River Diversion Dam Modifications

The Mitigation Commission has been evaluating diversion dams on the lower Provo River for potential modification. The Mitigation Commission's five-year plan includes planning and implementing diversion dam modifications, and a final draft report has been prepared. No diversion dam modifications have been completed on the lower Provo River to date. Planning that could result in combining or eliminating one or more diversions on the lower Provo River is included in the JSRIP program for 2004. The cumulative impact analysis assumes that modifications would be made to the lower Provo River diversion dams when the ULS begins to operate in 2016.

1.10.3.6 Utah Lake Wetland Preserve

The Mitigation Commission has been acquiring land for the Utah Lake Wetland Preserve. Land and water acquired for the preserve will be managed by the Utah Division of Wildlife Resources for protection of migratory birds, wildlife habitat and wetland values, and will be compatible with surrounding agricultural land uses. The Utah Lake Wetland Preserve Land Acquisition and Protection Plan was completed in 1995. A Final Environmental Assessment and a Finding of No Significant Impact for establishment of the Preserve were issued in May 1996. Under the Mitigation Commission's plan, private property is being acquired in the Goshen Bay and Benjamin Slough areas along the southern end of Utah Lake. About 4,041 and 17,750 acres have been identified for preservation in the Benjamin Slough and Goshen Bay units, respectively. About 13,020 acres of the Goshen Bay unit are presently under management by the Mitigation Commission, Bureau of Land Management, and State of Utah. The Mitigation Commission is continuing to acquire land and water from willing sellers, which is expected to continue through 2016. The continued land and water acquisition and management of the Preserve could have cumulative impacts on several resources under the ULS alternatives.

1.10.3.7 Interstate 15 Widening From Point of the Mountain through Utah County

UDOT is planning to widen Interstate 15 from the Point of the Mountain south through Utah County. An EIS will be prepared beginning in late 2003 and is expected to take approximately three years to complete. Construction activities associated with the freeway widening would likely occur during the same time period that ULS would be under construction, potentially causing cumulative impacts under the ULS action alternatives.

1.10.3.8 State Route 52 Upgrade From Geneva Road to U.S. Highway 189

UDOT is planning to widen and upgrade State Route 52 (800 North in Orem) from Geneva Road to the intersection with U.S. Highway 189 at the mouth of Provo Canyon. An environmental assessment is presently being prepared and could lead to an EIS. Planning and impact analysis are being performed to determine solutions for meeting the transportation demand on State Route 52. Alternatives being analyzed include widening the roadway to 7 lanes, reconstructing the interchange at Interstate 15, and reconstructing the interchange at Highway 189. The upgrade construction could start during ULS construction, potentially causing cumulative impacts under the Spanish Fork Canyon–Provo Reservoir Canal Alternative (Proposed Action).

1.10.3.9 Diamond Fork Campground

The Spanish Fork Ranger District of the U.S. Forest Service and the Mitigation Commission completed reconstruction of the Diamond and Palmyra campgrounds into one campground in September 2000. The new Camp Diamond reduced the camping capacity by 33 percent, including closing group-site camping facilities. The group-site facilities will be reconstructed in a more suitable location. Planning for a group-site facility began in fall 1999, and a draft environmental assessment was issued for public review in May 2003. A revised draft environmental assessment was re-issued in July, 2004. One potential location for a new group-site camping facility is the waste disposal area at Monks Hollow along Diamond Fork Creek, which was used to dispose excavated earth material from the Diamond Fork Tunnel and Shaft. Construction of the group-site camping facility at this site or another site in Diamond Fork Canyon could occur at the same time as construction of the Upper Diamond Fork Power Facility and could cause potential cumulative impacts under the ULS project.

1.10.3.10 Temporary Supplemental Irrigation Water

Temporary supplemental irrigation water has been provided for several years to southern Utah County in varying amounts by DOI. It will continue to be provided on a temporary basis to irrigators in southern Utah County until the ULS begins to operate in 2016. DOI prepares a categorical exclusion NEPA document each year to authorize this use and will continue to do so into the future. The amount of water delivered each year is dependent on the amount available and irrigator needs and can not be quantified. Therefore, a specific cumulative analysis will not be possible.

1.10.3.11 Title Transfer of Provo Reservoir Canal and Salt Lake Aqueduct

The Metropolitan Water District of Salt Lake and Sandy and the Provo River Water Users Association have proposed to accept title to the Provo Reservoir Canal and the Salt Lake Aqueduct, presently owned by the United States. Reclamation is currently evaluating this proposed action under its authorities and procedures. Legislation to authorize the transfer of the canal and aqueduct is moving through the U.S. Congress. The Bureau of Reclamation issued a Draft Environmental Assessment for public review on the title transfer in May 2004. The Final EA is expected in September and a FONSI October 2004 which would complete the NEPA process.

1.11 Alternatives Considered But Eliminated From Detailed Analysis

During the study of methods to distribute the ULS water supply, numerous alternatives were identified and studied that would develop and deliver the remaining Bonneville Unit water supply plus District-owned water in Utah Lake that would be acquired by the DOI. The following alternatives were found to be infeasible, too costly, publicly unacceptable, and/or would have adverse impacts on environmental resources and thus eliminated from further detailed analysis. This section summarizes these alternatives and the reasons for their elimination, as required by 40 CFR 1502.14(a).

The alternatives considered in this section may have met the need and some of the purposes, but were eliminated because of one or more of the following: 1) it would not be economically acceptable, 2) the construction and long-term maintenance would be technically difficult and pose long-term operation and maintenance unknowns, 3) it would not be reliable over the project life, 4) it would be unacceptable to the public and resource management agencies, and 5) it would have adverse impacts on environmental resources. In addition to the narrative in Sections 1.11.1 through 1.11.8 that explains the reasons each of these alternatives were eliminated from detailed analysis, Table 1-40 summarizes information related to estimated construction and water costs for each alternative.

Table 1-40
Estimated Costs for Alternatives Considered but Eliminated from Detailed Analysis

Alternative	Construction Cost ($1,000,000)	Volume of Water (acre-feet)	Estimated Cost of Water ($/acre-foot)
Spanish Fork-Bluffdale Alternative	658.9	60,000	$352
Bonneville Shoreline Trail Pipeline Alternative	520.7	60,000	$336
Provo Canyon-American Fork Tunnel Alternative	705.7	60,000	$359
Provo City-Orem City Pipeline Alternative	591.2	60,000	$341
Utah Lake Perimeter Alternative	619.7	60,000	$346
Strawberry Reservoir-Daniels Summit Alternative	499.3	60,000	$335
Upper Strawberry River Pipeline Alternative	505.7	60,000	$335
Strawberry Reservoir-Deer Creek Reservoir Alternative	604.7	60,000	$343

1.11.1 Spanish Fork-Bluffdale Alternative

Under this alternative, ULS water would be conveyed through a steel pipeline for about 15 miles from Moark Junction to Lincoln Point, through a ductile iron pipeline for about 5.7 miles across Utah Lake to its west shore at "The Knolls" area south of Pelican Point, and through a steel pipeline for about 22.5 miles along State Route 68 to the Jordan Valley Water Treatment Plant.

The Spanish Fork–Bluffdale Alternative was considered but eliminated from detailed analysis in the ULS EIS because:

- This alternative would cost at least $200 million more than the Proposed Action, it would include a pipeline about 22 miles longer than any other alternative, and it would include about 5.7 miles of ductile iron pipe costing an estimated $2800 per foot to cross Utah Lake to address feasibility and reliability concerns.
- The pipeline would not provide M&I water to communities it would pass through or near, including Saratoga Springs, Eagle Mountain and Lehi since no need for the water was expressed during scoping. The amount of traffic disruption and other inconveniences that would be caused by construction of this alternative, which would not directly benefit the people living in these communities, would be unpopular and there would be little or no public acceptance of this alternative.
- Pipeline construction would cause adverse impacts on water quality in Utah Lake and wetlands adjacent to Utah Lake. Secondary impacts would occur on aquatic resources and wildlife. The only way to avoid these impacts would be to not construct this alternative.

The Spanish Fork–Bluffdale Alternative was eliminated from detailed analysis because it would have a significantly higher construction cost than comparable alternatives, it has technical feasibility and reliability concerns, it would have poor public acceptance in northern Utah County communities the pipeline would pass through, and it would have unavoidable impacts on waters of the United States and associated resources in crossing Utah Lake.

1.11.2 Bonneville Shoreline Trail Pipeline Alternative

This alternative would be an alternate route for the Spanish Fork–Provo Reservoir Canal Pipeline described in Section 1.4.2.7. Under this alternative, ULS water would be conveyed through a steel pipeline buried in the Bonneville Shoreline Trail alignment for about 19.0 miles from near Moark Junction to Foothill Boulevard in Provo, and then would follow the same alignment as the Spanish Fork–Provo Reservoir Canal Pipeline across the Provo River, up to the Provo Reservoir Canal, and up to the connection with the Jordan Aqueduct.

The Bonneville Shoreline Trail Pipeline Alternative was considered but eliminated from detailed analysis in the ULS EIS because:

- The Bonneville Shoreline Trail provides recreation opportunities for foot travel, horse travel and bicycle travel that would be adversely impacted during construction, causing significant short-term impacts on recreation. Pipeline construction would result in long-term significant impacts on recreation because of access road requirements along the pipeline, leading to opportunities for undesired off-road vehicle usage along the trail. Secondary impacts would occur on wildlife and habitat. Visual resources would be significantly impacted because the construction scar would be visible from numerous points in the Utah Valley.

- The Bonneville Shoreline Trail generally follows the Wasatch Fault and other minor related faults along the base of the Wasatch Front mountain range. Construction and operation of pipeline along the Wasatch Fault would substantially increase the risk of a pipeline rupture and failure in numerous locations throughout the 19-mile alignment. The reliability of this pipeline alternative would be substantially lower than other similar alternatives for conveying water from the Spanish Fork Canyon Pipeline to the Provo Reservoir Canal. This alternative would have a high potential for public health and safety impacts caused by pipeline ruptures.

- The construction cost of this alternative pipeline alignment would be about $62 million higher than for the Proposed Action. The higher costs would be incurred for seismic control features, more difficult working conditions on steep mountain slopes, and potentially higher mitigation costs.

- A portion of this pipeline would be located on National Forest System land that would increase the amount of land withdrawal from Forest Service management.

- The Utah Division of Wildlife Resources and Forest Service indicated significant concerns about this alternative alignment during public and agency scoping performed before the alternatives were formulated. The agency concerns were focused on potential impacts on wildlife and habitat, recreation, and visual resources.

The Bonneville Shoreline Trail Pipeline Alternative was eliminated from detailed analysis because it has technical and reliability concerns, it would have a higher cost than comparable alternative pipelines, it would result in potentially significant short-term and long-term impacts on environmental resources including wildlife and habitat, recreation and visual resources, it would not be supported by cooperating agencies, and it would require additional land withdrawals.

1.11.3 Provo Canyon–American Fork Tunnel Alternative

Under this alternative, ULS water conveyed from Strawberry Reservoir to Deer Creek Reservoir would flow through a short pipeline out of Deer Creek Reservoir connected to an 11.8-mile-long tunnel under Mount Timpanogos to the mouth of American Fork Canyon. A 4.1-mile-long steel pipeline would convey the ULS water from the tunnel outlet through Highland City to the Provo Reservoir Canal and Jordan Aqueduct.

The Provo Canyon–American Fork Tunnel Alternative was considered but eliminated from detailed analysis in the ULS EIS because:

- This alternative would cost at least $247 million more than the Proposed Action, it would require an 11.8-mile-long tunnel under Mount Timpanogos and a 4.1-mile-long steel pipeline through Highland City to the Provo Reservoir Canal. The construction costs of these additional features to convey the 30,000 acre-feet of M&I water to existing conveyance facilities for delivery to Salt Lake County would be prohibitive.

- The tunnel alignment would come within 1-mile of the Timpanogos Cave National Monument, and although the tunnel would be at a lower elevation than the caves, potential construction de-watering of the tunnel could change the groundwater levels around the caves and have significant direct or indirect impacts on the Timpanogos Cave National Monument. This alternative would not be supported by the National Park Service.

- The tunnel could intercept groundwater that would affect springs and resources dependent on the spring water. Mount Timpanogos has numerous springs that drain various geologic formations known to contain groundwater. Constructing an 11.8-mile-long tunnel through unknown hydrogeologic conditions would increase the risk of encountering large volumes of groundwater, potentially affect spring discharges, and have subsequent impacts on wetlands, wildlife resources and habitat, aquatic resources, recreation resources, visual resources, and other environmental resources.

- The tunnel and pipeline would cross through potentially active faults, including the Wasatch Fault, leading to potential failure during earthquakes from seismic shaking and displacement. Potential failure of the tunnel and/or pipeline would affect the reliability of this alternative.

- Most of the tunnel would be located on National Forest System land that would increase the amount of land withdrawal from Forest Service management.

The Provo Canyon–American Fork Tunnel Alternative is eliminated from detailed analysis because it has technical and reliability concerns, it would have a substantially higher cost than comparable alternatives, it could affect the flow of groundwater in the Timpanogos Cave National Monument, it would not be supported by the National Park Service, it could cause springs to be dewatered on Mount Timpanogos and have adverse effects on water-dependent resources, and it would require additional land withdrawals.

1.11.4 Provo City–Orem City Pipeline Alternative

This alternative consists of 3 alternative pipeline alignments through Provo City and Orem City. One pipeline alignment would follow 900 East, Timpview Drive, and Canyon Road through Provo City, crossing under the Provo River near 800 North. A second alignment would turn west from U.S. Highway 89 at 500 South, 500 West, and Carterville Road in Provo, continue on Carterville Road in Orem, and would follow 400 South, 1000 East, and 800 North to the Provo Reservoir Canal in Orem. A third alignment would turn west from U.S. Highway 89 in Springville at 500 South, then follow 750 East and Kuhni Road into Provo, continuing along Industrial Parkway, 350 East, 900 South, 100 East, 500 South, 800 West, 900 North, 1000 West, Grandview Lane, and Carterville Road in Provo, and then would continue on Carterville Road in Orem, and would follow 400 South, 1000 East, and 800 North to the Provo Reservoir Canal in Orem.

The Provo City–Orem City Pipeline Alternative was considered but eliminated from detailed analysis in the ULS EIS because:

- The alternative construction cost would be about $132 million more than the Proposed Action because of right-of-way acquisition, major utility relocations, and increased microtunneling, directional drilling, bore and jack operations, and other special measures to construct the pipeline.

- The pipeline would have significant conflicts with existing underground utilities such as sewer, water, storm drains, power, and telecommunications in Provo City and require extensive utility relocations. There would be more than 3,000 utility connections that would have to be relocated, affecting residents, businesses, schools, and city facilities.

- One segment of the pipeline would be constructed along a narrow city street that would close the street and encroach on residential properties.

- The depth of existing utilities along the pipeline alternative would require rebuilding the entire width of the roadways.

- Existing storm drain facilities west of University Boulevard would be displaced by pipeline construction, and there is no feasible alternative to rebuild and relocate these city facilities.

- The pipeline would be constructed along one or more major streets in Provo City, causing short-term impacts on traffic and interrupting access to businesses, homes and schools. Roads closed for construction would have very high traffic control costs.

The Provo City–Orem City Pipeline Alternative was eliminated from detailed analysis because it would have a higher cost than other comparable alternatives, it would have significant conflicts with underground utilities, it would have adverse construction impacts on traffic and interrupt access to residential property, city streets, businesses, and schools, portions of the pipeline would be infeasible, and Provo City would not support any of the three alternative pipeline alignments.

1.11.5 Utah Lake Perimeter Alternative

This alternative would include a 56-mile-long steel pipeline from the mouth of Spanish Fork Canyon, southeast toward Payson, west across the southern flank of West Mountain through the Goshen Gap, west through the Goshen Valley, and then north along State Route 68 to the Jordan Valley Water Treatment Plant in Bluffdale.

The Utah Lake Perimeter Alternative was considered but eliminated from detailed analysis in the ULS EIS because:

- The alternative construction cost would be about $161 million more than the Proposed Action because of the longer distance around the south and west sides of Utah Lake.

- The pipeline would pass through two cities (Saratoga Springs and Lehi) that would not receive any ULS water. This alternative would not be publicly supported in these two cities.

- The pipeline would be constructed across wetlands near Holladay Springs, along Spring Creek, and extensive wetlands in the Goshen Valley. There would be adverse impacts on aquatic ecosystems (wetlands, ponds, springs, and streams), riparian areas, wildlife habitat and other associated environmental resources in southern Utah County.

The Utah Lake Perimeter Alternative was eliminated from detailed analysis because it would have a higher cost than other comparable alternatives, it would not provide water to northern Utah County communities the pipeline would pass through, and it would have adverse impacts on waters of the United States and associated resources around Utah Lake.

1.11.6 Strawberry Reservoir–Daniels Summit Alternative

This alternative would include a 12.5-mile-long steel pipeline from a pump station at Strawberry Reservoir near the Syar Tunnel inlet to Daniels Summit. Up to 120 cfs would be discharged into Daniels Creek throughout the year and flow down Daniels Canyon to the Heber Valley, continuing on to Deer Creek Reservoir. Daniels Creek crosses under U.S. Highway 40 twelve times in the 20 miles from Daniels Summit to Deer Creek Reservoir. Daniels Creek crosses under U.S. Highway 189 once in Heber Valley. Approximately 2 cfs per mile would seep into the creek bed along the lower 7.5 miles of Daniels Creek, returning to Deer Creek Reservoir as groundwater inflow.

The Strawberry Reservoir–Daniels Summit Alternative was considered but eliminated from detailed analysis in the ULS EIS because:

- The alternative construction cost would be about $41 million more than the Proposed Action.
- Discharge of ULS water in Daniels Creek throughout the year would cause channel and bank erosion, and potentially undermine portions of U.S. Highway 40. Some of the Daniels Creek crossings under Highway 40 could require enlargement or reconstruction to convey the flows. The potential bank erosion along Highway 40 could affect transportation facilities and traffic flow. The effects of this alternative would be similar to those that have occurred in Sixth Water Creek during the past century and are contrary to the fish and wildlife mitigation provisions of CUPCA and amendments.
- Discharge of ULS water from Daniels Creek into Deer Creek Reservoir would cause erosion and sedimentation in the reservoir bottom when the water surface elevation is below full pool.
- Discharge of ULS water into Daniels Creek during the winter months could cause ice jams and localized flooding in the reaches through Heber Valley down to Deer Creek Reservoir.
- Discharge of ULS water into Deer Creek Reservoir via Daniels Creek would adversely affect water quality and aquatic resources in the reservoir because of the increased total phosphorus load, which would exceed the Total Maximum Daily Load (TMDL) established for the reservoir.
- The increased total phosphorus load in Deer Creek Reservoir could not be reasonably mitigated.

The Strawberry Reservoir–Daniels Summit Alternative was eliminated from detailed analysis because it would cost more than comparable alternatives, cause stream channel, bank, and reservoir bottom erosion, sedimentation, adverse impacts on wetlands, riparian areas, aquatic resources, wildlife, and water quality.

1.11.7 Upper Strawberry River Basin Pipeline Alternative

This alternative would include two pipeline segments in the upper Strawberry River basin: 1) a 2.9-mile long steel pipeline overland from a Pump Station to Forest Route 131 about ½-mile north of the Strawberry Bay Road intersection; and 2) a 5.1-mile-long steel pipeline in the from Forest Route 131, about 2000 feet south of the Clyde Creek Road intersection, extending northwest along the west side of Doe Knoll, to U.S. Highway 40 about 2000 feet west of the Strawberry River crossing. The 60-inch diameter pipelines would cross 17 streams, each with a blowoff drain, and require a permanent access road for maintenance and operations.

The Upper Strawberry River Basin Pipeline Alternative was considered but eliminated from detailed analysis in the ULS EIS because:

- The alternative construction cost would be about $47 million more than the Proposed Action.
- The pipeline construction and operation would have adverse impacts on wetlands, riparian areas, aquatic resources and associated habitat, wildlife and associated habitat, and potentially could affect flows and water quality in springs that support aquatic resources
- The pipeline construction and operation could have adverse impacts on sensitive wildlife species
- Pipeline construction would have adverse impacts on recreation in the Uinta National Forest
- Pipeline construction and operation would have adverse impacts on visual resources in the Uinta National Forest
- Deer Creek Reservoir water quality would be adversely affected, primarily by increasing the total phosphorus load. The total phosphorus load of water conveyed from Strawberry Reservoir into the Provo River above Deer Creek Reservoir would exceed the total maximum daily load (TMDL) established for the reservoir and would not be in compliance with the updated and approved Deer Creek Reservoir Water Quality Management Plan.
- The increased total phosphorus load in Deer Creek Reservoir could not be reasonably mitigated.

The Upper Strawberry River Basin Pipeline Alternative was eliminated from detailed analysis because it would cost more than comparable alternatives, and would cause adverse impacts on wetlands, riparian areas, aquatic resources, sensitive species, wildlife, water quality, recreation and visual resources.

1.11.8 Strawberry Reservoir-Deer Creek Reservoir Alternative

The Strawberry Reservoir-Deer Creek Reservoir Alternative would deliver 30,000 acre-feet of secondary M&I water to southern Utah County and 30,000 acre-feet of M&I water to Salt Lake County. It would involve construction of five new pipelines, including four the same as described for the Proposed Action: 1) from the mouth of Diamond Fork Canyon to the mouth of Spanish Fork Canyon along U.S. Highway 6; 2) from the mouth of Spanish Fork Canyon to Santaquin in southern Utah County; 3) from Santaquin to Mona Reservoir; and 4) from the mouth of Spanish Fork Canyon to Hobble Creek along the Mapleton-Springville Lateral canal alignment. The fifth new pipeline would convey water from Strawberry Reservoir over Daniels Summit to the Provo River upstream of Deer Creek Reservoir. A new pump station would pump water from the Syar Tunnel near Strawberry Reservoir to Daniels Pass. Under this alternative, the DOI would acquire up to 57,003 acre-feet of the District's secondary water rights in Utah Lake as part of the water supply. Three hydroelectric generating facilities would be constructed along the Strawberry Reservoir–Deer Creek Reservoir Pipeline, in addition to two hydroelectric generating facilities constructed in the Diamond Fork System.

The Strawberry Reservoir-Deer Creek Reservoir Alternative was considered but eliminated from detailed analysis in the ULS EIS because:

- The alternative construction cost would be about $146 million more than the Proposed Action.

- Pipeline construction in the upper Strawberry River valley and Daniels Canyon would adversely affect wetlands and riparian areas adjacent to existing roads along the pipeline alignment.

- Deer Creek Reservoir water quality would be adversely affected, primarily by increasing the total phosphorus load. The total phosphorus load of water conveyed from Strawberry Reservoir into the Provo River above Deer Creek Reservoir would exceed the total maximum daily load (TMDL) established for the reservoir and would not be in compliance with the updated and approved Deer Creek Reservoir Water Quality Management Plan.

- The increased total phosphorus load in Deer Creek Reservoir could not be reasonably mitigated.

The Strawberry Reservoir – Deer Creek Reservoir Alternative was eliminated from detailed analysis because it would cost more than comparable alternatives, and would cause adverse impacts on wetlands, riparian areas, aquatic resources, and water quality.