

3.2.2 Purple Alternative: LHPS Canal POD to 1500 North

3.2.2.1 Location and Operation

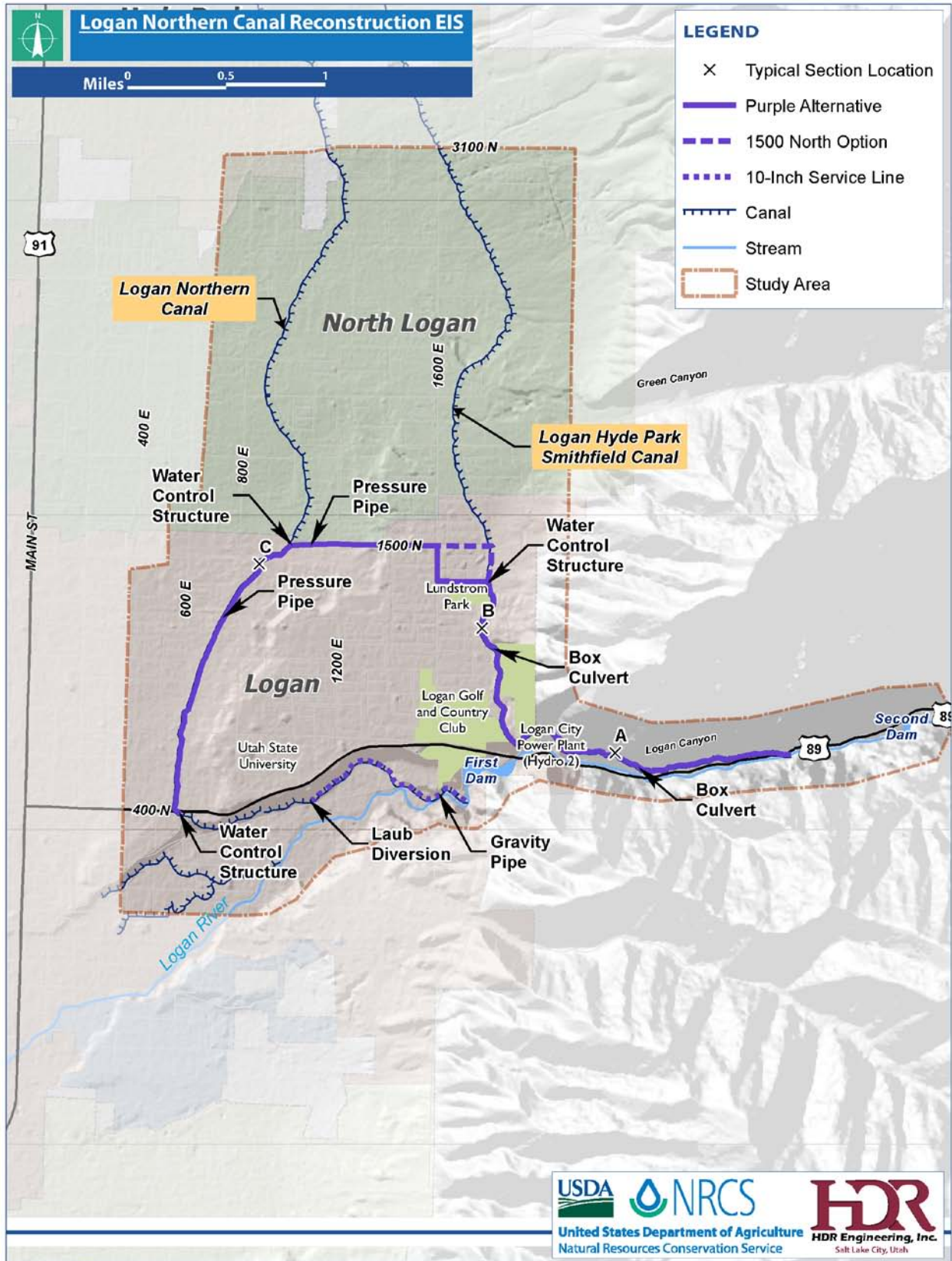
Location

Figure 3-1 shows the route of the Purple Alternative, and Figure 3-2, Figure 3-3, and Figure 3-4 show the typical cross-sections. This alternative would divert LN Canal water using the LHPS Canal POD just below Second Dam. Once the water is diverted, it would be conveyed for about 2.4 to 2.6 miles using a reconstructed LHPS Canal to Lundstrom Park or 1500 North in Logan.

From the Lundstrom Park option, the LN Canal water would be taken from the LHPS Canal and conveyed in a piped system under the park and city streets for about 1.2 miles to the LN Canal at about 1500 North.

From the 1500 North option, the LN Canal water would be conveyed using a pipeline installed under the road surface of 1500 North to the LN Canal, a distance of about 1 mile. At 1500 North, most of the water would be discharged directly into the existing LN Canal for delivery to downstream shareholders. The rest of the water would be directed into a 1-mile-long pressure pipe constructed in a canal maintenance road parallel to the existing LN Canal between about 400 North and 1500 North.

Figure 3-1. Purple Alternative



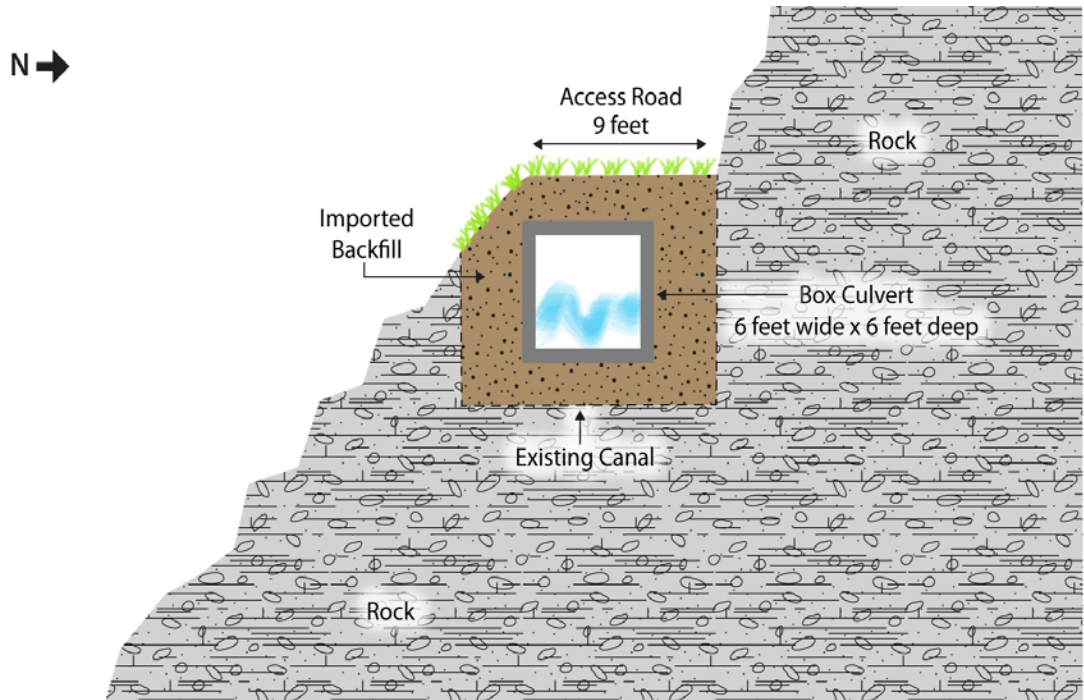


Figure 3-2. Typical Cross-Section A: 6-foot-wide by 6-foot-deep box culvert in Logan Canyon (looking downstream)

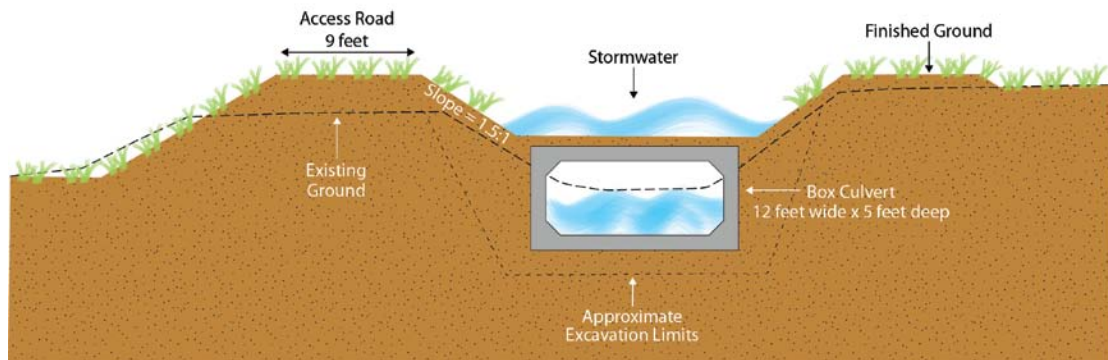


Figure 3-3. Typical Cross-Section B: 12-foot-wide by 5-foot-deep box culvert at about 1200 North in Logan (looking downstream)

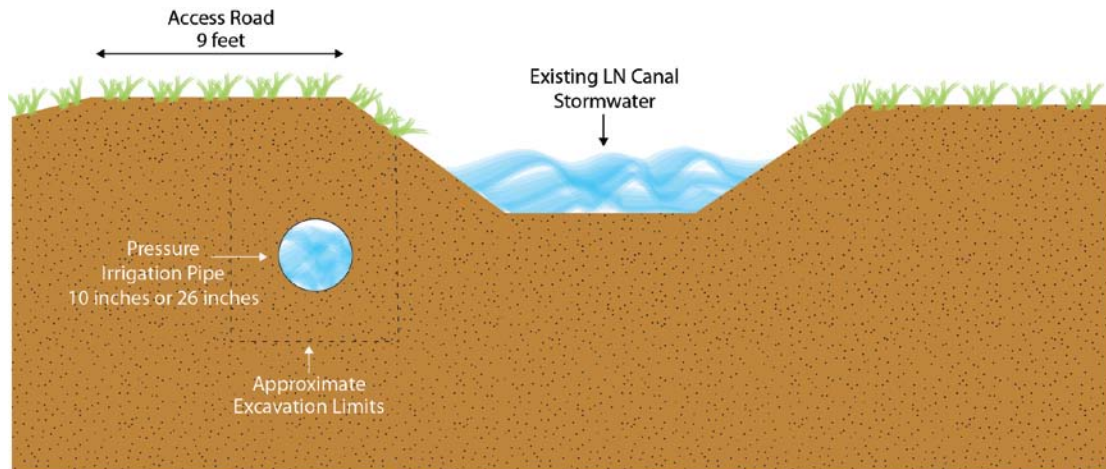


Figure 3-4. Typical Cross-Section C: Pressure pipe in LN Canal (looking downstream)

Shareholders between the existing LN Canal POD and the Laub Diversion (a distance of about 1 mile) would receive water through a new 10-inch-diameter pipeline constructed in the existing LN Canal alignment for water delivery to shareholders in this area.

This alternative includes purchasing and demolishing structures on 14 properties along the north side of Canyon Road in Logan in the area of the 2009 landslide and in the historic landslide zone between about 750 East and 1100 East (Figure 3-5 and Table 3-1). The land in this area is unstable and is at risk of future landslides. The affected structures are along the toe of a steep slope known locally as the Logan Bluff (described in Section 4.4.5.1, Topography). NRCS can purchase structures from willing sellers only. Although the remainder of this alternative could be constructed if property owners are not willing to sell, any structures that remain in the unstable area would be subject to damage during future landslides.

NRCS has not completed detailed geologic studies to identify the exact limits of the zone but has identified an area that it focuses on for the purpose of this EIS based on topography, landslide history, geology or soil characteristics, and available documentation. NRCS recognizes that further study would be needed to clearly define the limits of the area that would be most susceptible to future landslides.

This alternative would not repair the 2009 landslide site or otherwise address the stability of the historic landslide zone, so removing the future risk to life and property can best be achieved by purchasing the structures and relocating the residents. The City of Logan owns six properties in the area; the 14 affected properties are in addition to the six already owned by the City.

What is the route of the Purple Alternative?

The Purple Alternative would divert LN Canal water at the LHPS Canal POD and use the LHPS Canal between the POD and Lundstrom Park/1500 North. At Lundstrom Park/1500 North, the LN Canal water would be diverted under the park and/or city streets to the LN Canal at about 1500 North in Logan. The Purple Alternative includes a new pipeline in the LN Canal alignment between 400 North and 1500 North to deliver water to upstream shareholders. It also includes a short pipeline in the LN Canal between the LN Canal POD and the Laub Diversion to provide water to shareholders in that area.

Figure 3-5. Parcels From Which Structures Would Be Acquired

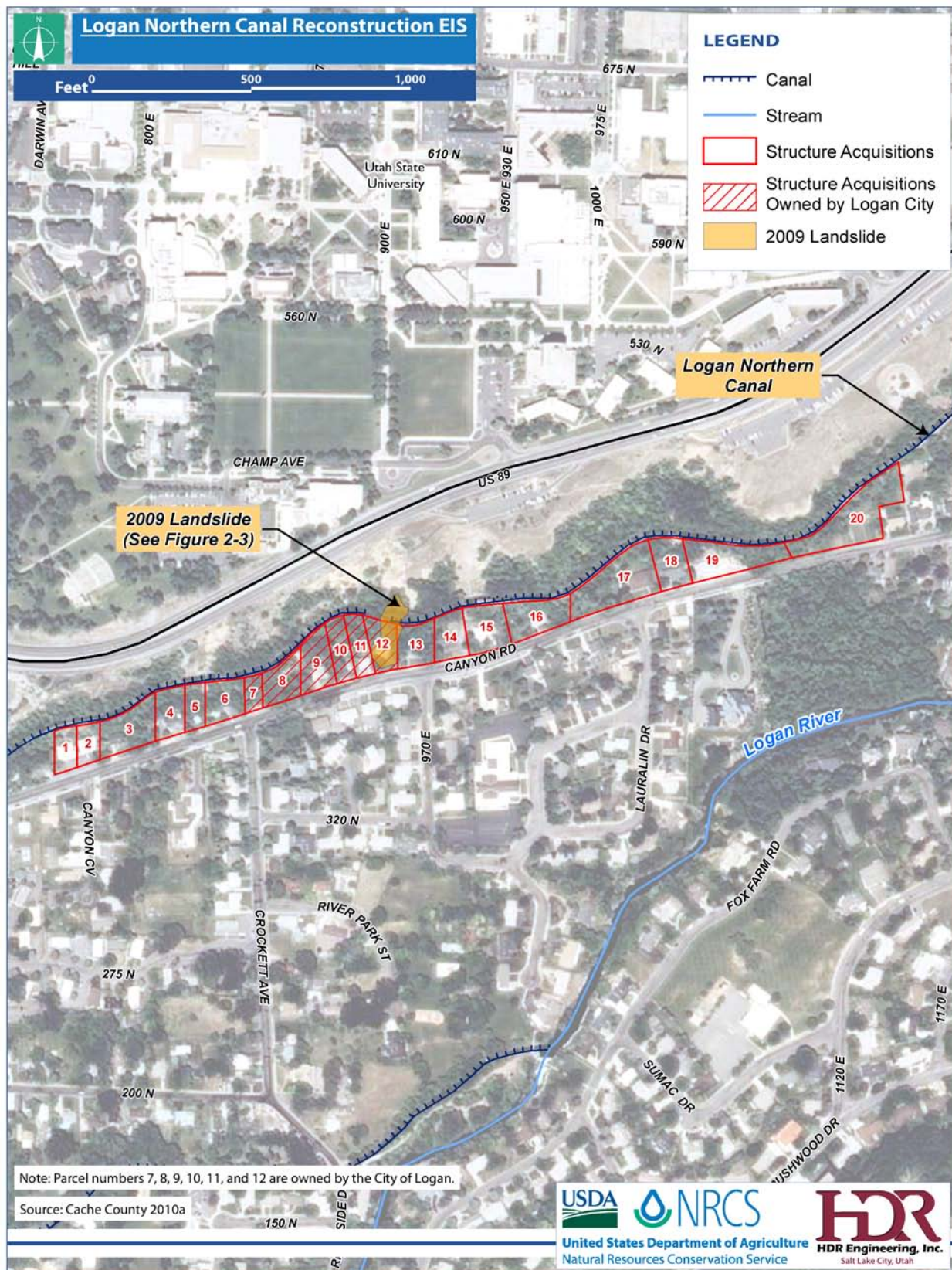


Table 3-1. Proposed Structure Acquisitions along the North Side of Canyon Road in Logan

Identifier ^a	Tax Identifier/ Parcel Number	Address
1	06-048-0013	783 Canyon Road
2	06-048-0014	805 Canyon Road
3	06-048-0015	815 Canyon Road
4	06-091-0001	821 Canyon Road
5	06-091-0002	855 Canyon Road
6	06-091-0003	895 Canyon Road
13	06-091-0009	925 Canyon Road
14	06-091-0031	Not applicable (vacant)
15	06-091-0010	975 Canyon Road
16	06-091-0011	989 Canyon Road
17	06-092-0001	1035 Canyon Road
18	06-092-0002	1055 Canyon Road
19	06-092-0003	1067 Canyon Road
20	06-092-0006	Not applicable (vacant)

Source: Cache County 2010a

^a These identifiers match the numbers shown in Figure 3-5. Parcels 7, 8, 9, 10, 11, and 12 are already owned by the City of Logan; structures might be present, but no one is living in them. Parcels 14 and 20 appear to be undeveloped and without residential structures but could have other structures such as outbuildings for which compensation would be required.

The NRCS EWPP manual allows NRCS to purchase and remove structures when removing that structure is the least costly alternative, the purchase is from a willing seller, and the purchase would not affect a lessee or tenant (EWPP Manual, Title 390, Part 5116[B]). Under the NRCS guidance, the purchase must be based on current value, and the purchase can include relocating residents and demolishing structures. Buying and demolishing the structures in this historic landslide area is the least-costly way to protect life and property from hazards associated with future landslides. Purchasing the structures would not completely remove the risks associated with future landslides in this area or along other areas of the Logan Bluff, but it would minimize the potential loss of life and property damage in the area immediately surrounding the 2009 landslide.

Because the purchase of structures would address an area damaged during the event that triggered the need for the proposed action, the purchase does not conflict with the EWPP prohibition against solving watershed or natural problems that existed prior to the natural disaster (Title 390, Part 511.4[v]). This purchase is consistent with the objective of the EWPP, which requires NRCS to implement recovery measures that “relieve imminent

hazards to life and property created by a natural disaster that causes a sudden impairment of a watershed” (7 CFR 624.2).

Once NRCS purchases the structures, the properties on which they are located would be restricted from any future development that would place people or property at risk of landslides. The most likely scenario for future management of the affected properties would be zoning-based or deed-based restrictions on the future use of the properties.

Construction equipment and materials would be staged in existing parking lots and other previously disturbed areas along the LHPS and LN Canals. Because of limited space, construction contractors would probably not stage any equipment or materials in Logan Canyon. Equipment and materials would not be staged in areas that support sensitive resources such as wetlands or other natural water bodies or near sensitive land uses such as churches and medical facilities.

Operation

The Purple Alternative would require moving the POD for some of the Logan & Northern Irrigation Company’s water rights from the LN Canal POD just below First Dam to the LHPS Canal POD upstream to a point just below Second Dam. The combined flows to be diverted at the LHPS Canal POD would be a maximum of 130 cfs. The diversions to the canal system would vary based on actual irrigation demands and would be based on seasonal variations in Logan River flow rates. Logan River flow rates during the irrigation season vary but tend to drop as the summer and fall seasons progress. Because of this, the actual diversion at the LHPS Canal POD could be less than 130 cfs throughout much of the irrigation season.

This alternative includes enclosing reaches of the LHPS Canal. Enclosing the canal would prevent debris from accumulating along the canal alignments, which would help improve water quality and eliminate operational problems such as clogged headgates and local flooding associated with buildup of debris. Enclosing the canal would also enable separation of irrigation water and stormwater, which would also protect the quality of water in the canals.

NRCS’s standards for irrigation canals specify construction standards and maximum flow rates that are appropriate for irrigation water delivery systems. If the LHPS Canal were to remain open, the canal alignment would need to be substantially enlarged to safely convey as much as 130 cfs of irrigation water and the stormwater that the LHPS Canal has historically captured between the mouth of Logan Canyon and Lundstrom Park/1500 North. Enclosing the LHPS Canal should enable construction to be completed within the existing canal easement and minimize encroachment on adjacent properties.

Finally, open canals pose a safety hazard in areas where they can be accessed by the public. People have historically waded and floated in the canals, even though the canals are generally posted for no trespassing and are not safe or legal recreational features. The amount of increased water proposed for the LHPS Canal could exacerbate the safety hazard if the canal were not enclosed.

The Purple Alternative would provide service to the limited number of shareholders between the existing LN Canal POD and 400 North in two ways. Because the 2009 landslide is located in the middle of this reach of the LN Canal, the Logan & Northern Irrigation Company is proposing to provide service using two systems on either side of the landslide. Most of the shareholders are between the POD and Laub Diversion. Shareholders along this first part of the LN Canal would receive their shares through a small-diameter pipe placed in the existing canal alignment. The Logan & Northern Irrigation Company would provide service to the second group of shareholders between the 2009 landslide site and 400 North using water discharged at the terminus of the 10-inch-diameter pressure pipe at 400 North; this water would be conveyed upstream to upstream shareholders.

The Purple Alternative would travel through the Logan Golf & Country Club. This shareholder could incorporate the new conveyance structure into the layout of the golf course and/or could use some of its water to support water features through the golf course. Using some of the water at the golf course would not change the operation of the canal system downstream.

The Water Conveyance Facilities Safety Act (2010 Utah Legislature, House Bill 60, signed by Governor Gary Herbert on March 23, 2010) requires canal facility owners or operators to develop management plans for water-conveyance facilities such as the LHPS Canal and LN Canal. This plan would identify the cities and counties that the canal passes through, would identify the canal components (such as PODs, bridges, and stormwater entry points), and would include a maintenance and improvement plan, information about insurance coverage, a slope stability assessment, a stormwater assessment, and an emergency response plan.

Canal owners or operators must adopt management plans prepared in support of the Water Conveyance Facilities Safety Act no later than May 1, 2013. The Utah Division of Water Resources and NRCS funding for the Purple Alternative would also require developing long-term operation and maintenance plans and service agreements that identify the roles and responsibilities of each party to the agreement(s). The long-term operation and maintenance plan could identify options to modify canal system operations and/or provide controls to manage flows in the event of an emergency.

3.2.2.2 Structural Features

The Purple Alternative would require constructing, operating, and maintaining new features in the existing LHPS Canal and LN Canal alignments. The structural features would include the following:

- Modified LHPS Canal POD structure on the Logan River just below Second Dam. This would be needed to accommodate diversion and design flow rates as high as 130 cfs. Modifications would include reconstructing the canal flow gage along US 89.
- About 2.4 to 2.6 miles of new box culvert to convey irrigation water from the LHPS Canal POD to Lundstrom Park/1500 North in the existing LHPS Canal alignment. Preliminary calculations show that about 1.6 miles of 6-foot-wide by 6-foot-deep box

culvert would be needed between the LHPS Canal POD and the mouth of Logan Canyon (called the Logan Canyon section), and about 0.8 to 1.0 mile of 12-foot-wide by 5-foot-deep box culvert would be needed from the Logan Golf & Country Club (golf course) to Lundstrom Park/1500 North.

- A new stormwater channel for about 0.8 to 1.0 mile in the LHPS Canal alignment to convey stormwater.
- Modify Cedar Heights Drive and 1500 North where they cross the LHPS Canal to accommodate the new box culvert. Also modify several private driveways and pedestrian crossings that cross the LHPS Canal and LN Canal.
- Restore vegetation and landscaping that is removed during project construction from private property outside the canal easement along the LHPS Canal.
- A water-control structure at Lundstrom Park/1500 North to transition water from the box culvert to the existing open channel. The new structure combines irrigation water and stormwater for conveyance downstream.
- A new headgate structure at Lundstrom Park/1500 North to allow LN Canal water to be diverted into a new pressurized pipeline system running west to the LN Canal.
- About 1.0 to 1.2 miles of new 42-inch-diameter pressure pipe to convey 40 cfs of LN Canal water from the LHPS Canal to the LN Canal. The pipeline, which would require air vents and a flow meter, would be routed under city streets and through and under a field to connect to the LN Canal at 1500 North.
- A new water-control structure at the LN Canal to discharge water from the pipe system to the LN Canal system. The structure would include pressure-reducing valves, flow control, and energy-dissipation measures. Water would be divided at the structure into the existing LN Canal open channel to serve shareholders to the north (downstream of 1500 North) and into a pressurized pipeline system traveling to the south (upstream of about 1500 North).
- About 1 mile of 10-inch-diameter pressure pipe from 1500 North to 400 North installed in the existing canal maintenance road. The pressure pipe, which would not affect the existing LN Canal, would convey about 2 cfs for use by shareholders in this reach. These shareholders could access water from the pressure pipe or from the LN Canal. Access from the canal would be available for water not taken from the pressure pipe that is discharged from the pipe into the LN Canal at about 400 North.
- A new water-control structure to discharge water not taken directly from the pressure pipe into the existing LN Canal at 400 North. This water would supply the Temple Ditch (a LN Canal shareholder) and would provide water in the canal to the north (downstream) to prevent stagnant pools between 400 North and 1500 North.
- About 1 mile of 10-inch-diameter pipe in the current LN Canal alignment between the LN Canal POD and the Laub Diversion at about 1100 East. This pipeline would

carry up to 2 cfs for delivery to shareholders in this area. The POD would not need to be modified to accommodate the 10-inch-diameter pipeline.

3.2.2.3 Purple Alternative Costs

Table 3-2 summarizes the cost of the Purple Alternative. Detailed cost information is presented in Appendix C1, Action Alternative Cost Estimates.

Table 3-2. Cost Summary for the Purple Alternative

in millions

Item	Cost	Subtotal
Construction materials and installation costs		
Logan Canyon conveyance segment	\$7.1	
Valley conveyance segment	\$4.2	
Pressurized pipeline systems	\$1.6	
Property acquisition and easements ^a	\$2.7	\$15.6
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Additional construction items ^b	\$3.5	
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Engineering and construction management ^c	\$1.2	
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Total cost estimate		\$20.3
Total cost range (0% to +10%, rounded)		\$20.4 – \$22.4

^a Assumes an average cost of \$157,000 per property and \$10,000 in relocation assistance for each property owner, \$10,000 to demolish structures, and purchase of 10 temporary construction easements.

^b Additional construction items are based on a percentage of material and installation and property costs subtotal and include contractor mobilization (5%), environmental permits and controls (0.5%), minor utility crossings (2%), and a 15% construction contingency.

^c Engineering and construction management are also based on a percentage of construction costs and include survey and geotechnical evaluations (1.5%), final engineering analysis and design plan production (5%), bid document production and contractor procurement assistance (0.5%), and construction management (1%).

The reported value of the Logan Canyon conveyance segment in Table 3-2 (\$7.1 million) is different than the value reported in the description of the gravity option referenced in Section 3.4.1.3, Step 3: Alternative Similarities and Differences (\$9.4 million to \$10.3 million). These values differ because additional construction and engineering percentages are applied to the construction materials and installation subtotal, and this subtotal includes costs for other conveyance segments in Table 3-2.

Compared to the Lundstrom Park option, the 1500 North option would require a longer reach of the box culvert construction in the LHPS Canal (0.2 mile more). Because the additional construction items and engineering construction-management categories listed in Table 3-2

apply percentages to the construction materials and installation subtotals, the total cost for the 1500 North option would be more, or a total of between \$21.5 million and \$23.7 million. For conceptual cost estimates of the Purple Alternative options, see Appendix C1, Action Alternative Cost Estimates.

3.2.2.4 Permit and Compliance Requirements

In addition to EWPP requirements and mitigation measures that might be identified as part of this EIS, construction of the Purple Alternative would also require the following permits or authorizations:

- Special-use permit from USFS for work on land administered by USFS.
- CWA Section 404 authorization for modifying the LHPS Canal POD, the LHPS Canal, and LN Canal. If USACE determines that the activity requires an individual permit, then a separate Section 401 water quality certification would also be required.
- Compliance with the CWA Section 402 National Pollutant Discharge Elimination System (NPDES) general permit for construction-related stormwater discharges (file a Notice of Intent and compile a Storm Water Pollution Prevention Plan [SWPPP]).
- National Historic Preservation Act (NHPA) Section 106 concurrence and memorandum of agreement with the State Historic Preservation Officer (SHPO) for modifying the LHPS Canal POD, LHPS and LN Canals, and possibly the LN Canal POD.
- Stream alteration permit from the Utah Division of Water Rights for modifying the POD.
- Antidegradation review by the Utah Division of Water Quality for potential impacts to a Category 1 water (Logan River in Logan Canyon).
- Construction easements from UDOT (US 89), the City of Logan (city streets and other city property), USU (at the golf course), and property owners along the LHPS and LN Canals.

In all cases, the SLO or its contractors would be responsible for obtaining the authorizations ensuring compliance with any conditions of permit approval.