Lewiston Temperature Control Study Alternative Descriptions

Purpose

The purpose of this document is to detail descriptions of the alternatives for the Lewiston Temperature Control Study. The original objective of the study was to provide recommendations for improving the transmission of cold water (less than 50 degrees Fahrenheit) through Lewiston Reservoir. The Trinity River Restoration Program Temperature Work Group (TWG) expanded that objective to address four goals.

Goals

The TWG drafted the following generalized study goals at their April 13 and May 23, 2012 meetings. The TWG has yet to finalize, clarify, or rank these goals.

1. Habitat improvement on the Trinity River; increased mileage
2. Improve cold water transmission upstream of Lewiston Dam
3. Increase Salmon production
4. Increase recreational benefits and minimized impacts to same

Alternatives

The TWG identified many alternatives at their April 13 and May 23, 2012 meetings. The TWG directed MP-700 to focus on the four alternatives described in this document:

1. Removal of Lewiston Dam
2. Dredging of Lewiston Reservoir

3a. Tunnel from Trinity Dam to Lewiston Dam

3b. Pipeline from Trinity Dam to Lewiston Dam

4. Raise Lewiston Dam

In addition to these alternatives, the following two options are included:

A. Lewiston Powerplant Intake Extension Modification

B. Trinity Dam Selective Withdrawal Structure

General Considerations

Construction activities require mobilization, site preparation, and demobilization. Mobilization is the cost of moving equipment and materials to the jobsite. This could include the cost of a mobile trailer for use as an office for construction personnel. Site preparation could include fencing, grading, establishing parking areas and staging areas, and possibly the construction of some access roads. Demobilization involves removing equipment, unused materials, and debris from the jobsite. The jobsite and surrounding areas must be left clean after the work is completed, temporary facilities must be removed, and disturbed areas must be restored to their previous state. All of the following alternatives implicitly include mobilization, site preparation, and demobilization.

Alternative #1 - Removal of Lewiston Dam

This alternative focuses on Goal 1, improvement of habitat by increasing the river mileage available for salmonid habitat. This alternative aims to create salmonid habitat following removal of Lewiston Dam by restoration of the former lakebed (see Figure 1 – Lewiston Dam and Reservoir Facility and Structures). Removal of Lewiston Dam would eliminate the retention time in the reservoir upstream of the dam and the associated heating. It would also add roughly 6.5 miles of river over which heating would occur. The net change in heating is uncertain prior to analysis with advanced riverine temperature prediction models. This alternative does not retain current recreational benefits on Lewiston Lake. It adds riverine-based recreational benefits similar to those below Lewiston Dam. Requirements include significant work related to the removal of existing structures, restoration of roughly 6.5 miles of riverine habitat, and retention of several operating functions, including gravity (no pumping) water supplies to the Trinity River Fish Hatchery, and the Clear Creek Power Conduit. See Figure 2 – Demolition Plan for a plan view of the existing features proximate to Lewiston Dam, and Figure 5 – Lewiston Dam Annual Operational Data, 2011 for last year's releases from Lewiston Reservoir.

Figure 1. Lewiston Dam and Reservoir Facility and Structures.

Figure 2. Demolition Plan.

Clear Creek Tunnel Water Supply

The removal of the dam will eliminate the Lewiston Reservoir, which provides water to several features. The Clear Creek Tunnel conveys water from the Trinity River to Whiskeytown Reservoir, and this conveyance would continue after the dam removal activities are complete. Costs associated with maintaining a water supply for the Clear Creek Tunnel will be a significant expense related to the removal of Lewiston Dam. One possibility is to construct a canal along the eastern shoreline of Lewiston Reservoir (see Figure 3 – Canal Alignment). Due to the large peak flow requirements of the Clear Creek Tunnel (approximately 3,200 cubic feet per second), the rough terrain, limited access to the canal construction area, and the geological conditions (large areas of hard rock), a canal of sufficient size and length to deliver water from Trinity Dam to the Clear Creek Tunnel could be the costliest item associated with the dam removal alternative (see Figure 4 – Typical Canal Sections). Another possibility would be to convey water to the Clear Creek Tunnel through a pressure pipe connected to the Trinity Dam outlet works. This option would also be very expensive due to the length of the large diameter pipe that would be required to maintain a sufficient water supply for the Clear Creek Tunnel. Additional requirements of the pressure pipe option would include excavation, pipe bedding, backfill, compaction, support structures and appurtenant features such as thrust blocks, and a new outlet structure at the Clear Creek Tunnel.

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72 **Figure 3. Canal Alignment.**

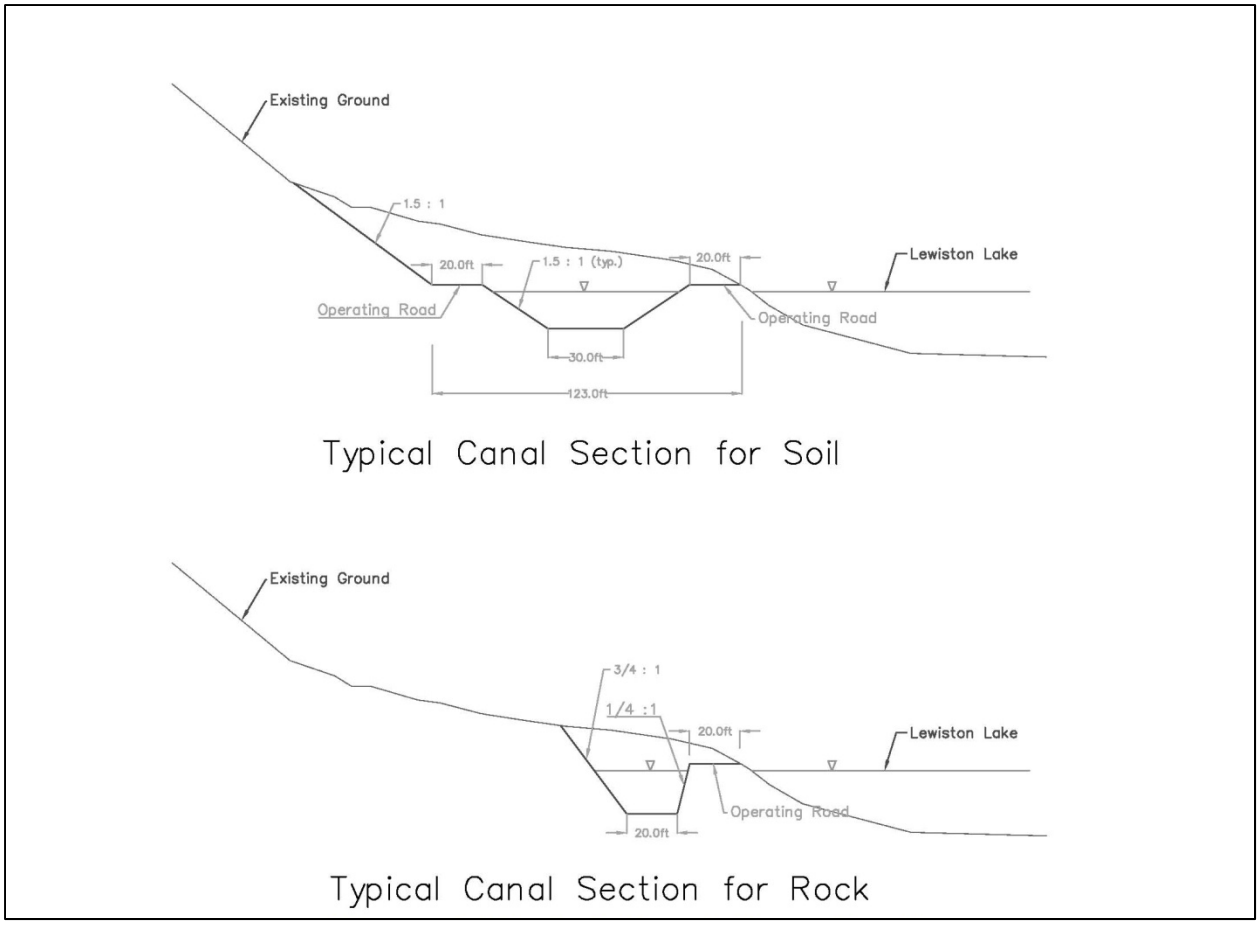


Figure 4. Typical Canal Sections.

Decommission Powerplant

Water from Lewiston Reservoir currently generates power via a small powerplant downstream of Lewiston Dam. If the dam is removed, this powerplant will need to be decommissioned. The primary building and associated structures would be demolished and removed. Electrical equipment and power lines would also require careful removal. The Lewiston Dam site will no longer be capable of generating power after the dam is removed, and future revenue associated with that power would be forfeited.

Maintain Fish Hatchery Water Supply and Functions

A fish hatchery is currently located just downstream of Lewiston Dam. This hatchery will remain operational under the dam removal alternative. With the dam gone, new structures would need to be constructed for the hatchery such as fish screens and a fish ladder. A new water supply for the hatchery would need to be established, as the current supply comes from the dam. Possibilities include a small pumping facility or tapping into the water supply for the Clear Creek Tunnel.

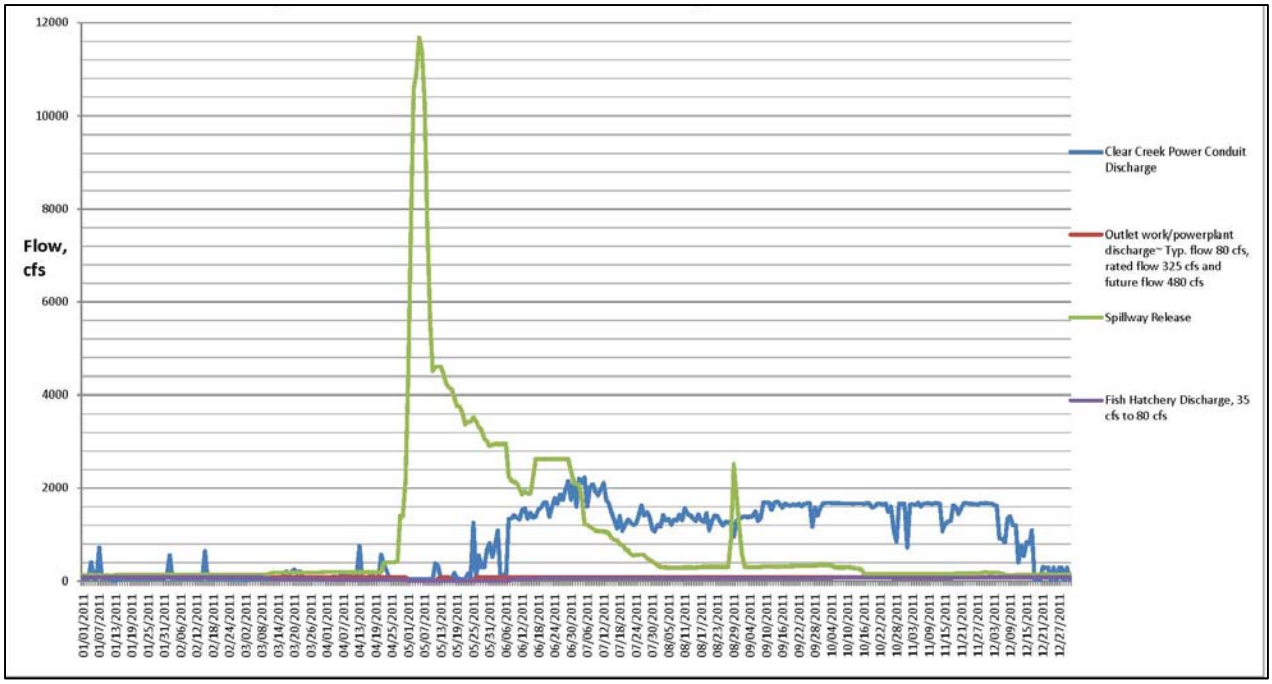


Figure 5. Lewiston Dam Annual Operational Data, 2011.

Remove Temperature Control Curtains

There are currently two temperature control curtains within Lewiston Reservoir. If the dam is removed, these curtains would need to be removed as well. Expenses related to removing the curtains would include demolition, preparation for transport, and disposal at an appropriate location.

Excavate and Remove Dam

Another large expense of the dam removal alternative is the removal of the dam itself. The dam consists of approximately 265,000 cubic yards of material. This material would need to be excavated, processed, transported, and placed at another location. It is possible that a significant percentage of the material could be used to restore portions of the Trinity River. Some material may need to be hauled further away to an appropriate disposal site.

Manage and Remove Sediment

Throughout the life of Lewiston Dam, sediment has collected in Lewiston Reservoir. Due to the mining history of the area, the sediment in Lewiston Reservoir may contain heavy metals, including mercury. It may be possible to leave much of the sediment in place. The remaining sediment would need to be moved to more appropriate locations along the newly exposed riverbanks, or hauled to an appropriate dumping site. Expenses would include excavation, processing of the material, transport, and placement.

Overhaul

One expense related to the removal of the dam material and sediment is overhaul. Overhaul is the volume of material that is transported offsite multiplied by the distance that it is transported. If the dumping location is far from the removal site, or if the volume of material to be removed is very large, the cost of overhaul can become a significant percentage of the cost of the job. If Lewiston Dam is removed, it is expected that some of the material will need to be relocated to a disposal site. A disposal site has not yet been identified, so estimating the overhaul cost is difficult.

Trinity Powerplant Tailwater Regulation

Lewiston Dam currently regulates the pulse flows out of Trinity Dam in order to ensure a stable flow in the Trinity River downstream of Lewiston Dam. The cause of these pulse flows is the tendency for more water to be released through the Trinity Powerplant during the daytime, when the demand for power is high. Lower power demand at night corresponds with lower flows through the powerplant. If Lewiston Dam is removed, the tailwater at Trinity Powerplant will need to be regulated through alternate means. There will be costs associated with the tailwater regulation, and if an acceptable solution is not achievable, there will be an impact to the revenue generated by Trinity Powerplant because the ability to release higher flows to match higher power demand could be lost.

Recreation Facilities and River Access Points

Recreation facilities are located along Lewiston Reservoir, including boat docks, fishing areas, picnic areas, and parking lots. If Lewiston Dam is removed and the reservoir is gone, these recreation facilities will need to be altered or relocated adjacent to the restored Trinity River. Additional expenses will be related to the inclusion of river access points so people can fish or recreate in other ways on the river.

General Infrastructure

The removal of Lewiston Dam will require changes to the existing infrastructure. General infrastructure expenses will include removing, constructing, and relocating various features as appropriate to accommodate the area's new physical conditions. Sewer lines, roads, power lines, drainage structures, and other infrastructure will be affected by the change. Once completed, these general infrastructure items will function properly with the restored portion of the Trinity River.

Slope Stability

As Lewiston Reservoir draws down and disappears, the soil conditions in the area will change as water seeps out into the river and flows downstream. Soil that was once saturated due to proximity to the river may have stability issues as the conditions change. Slope stability and the management of potential landslide areas will be a necessary expense related to removing the dam.

Riverine Restoration and Riparian Revegetation

The bottom of Lewiston Reservoir currently contains significant sediment deposits and is largely void of vegetation. When the dam is removed, the reservoir will convert back to a river, but the riverbanks will require some effort to restore. Riverine restoration and riparian revegetation will be necessary to provide shade for fish in the Trinity River and allow the river to return to a natural state.

Diversion Tunnel for Dam Removal Work

In order to remove the dam, the reservoir will need to be dewatered. When Lewiston Dam was built, a diversion tunnel was used so the river flows would not impede the construction of the dam. This tunnel was capped and abandoned in place, and should be usable again to dewater the reservoir. The tunnel would need to be located, uncapped, then closed back up after the dam is removed and the natural flow of the Trinity River is restored.

Alternative #2 –Dredging of Lewiston Reservoir

Another possibility to address the Trinity River temperature issue is to dredge material to create an underwater channel within Lewiston Reservoir, which would improve cold water transmission between Trinity Dam and Lewiston Dam. Creation of submerged berms in key areas of the lake may decrease the retention time, decrease lateral mixing, and provide a deeper route to convey cooler water from Trinity Dam to Lewiston Dam. This alternative would not result in a significant change in the area. Most of the work required for this approach involves the dredging operations and management of the associated construction activities. Existing operations at the Clear Creek Tunnel, both dams, and both power plants would not be changed as a result of this alternative. Current recreational benefits on Lewiston Lake would not be adversely affected.

Excavate Sediment

In order to create the underwater channel that is the centerpiece of this alternative, dredging will be required within Lewiston Reservoir. The dredging would be planned to carve an optimum path along a determined route based on existing bathymetry. A temperature analysis will be used to identify locations which will be widened or closed off as required to achieve the desired objective. Hard rock will be avoided wherever possible, focusing the dredging operations on sedimentary material within the reservoir.

Overhaul

The removal of some sedimentary material will result in overhaul costs. Overhaul is the volume of material that is transported offsite multiplied by the distance that it is transported. Most or all of the material that is dredged to form the channel will be relocated within the reservoir, so only a small percentage of the material will need to be relocated to a disposal site, if any. A disposal site outside of the reservoir has not yet been identified.

Construct Berm

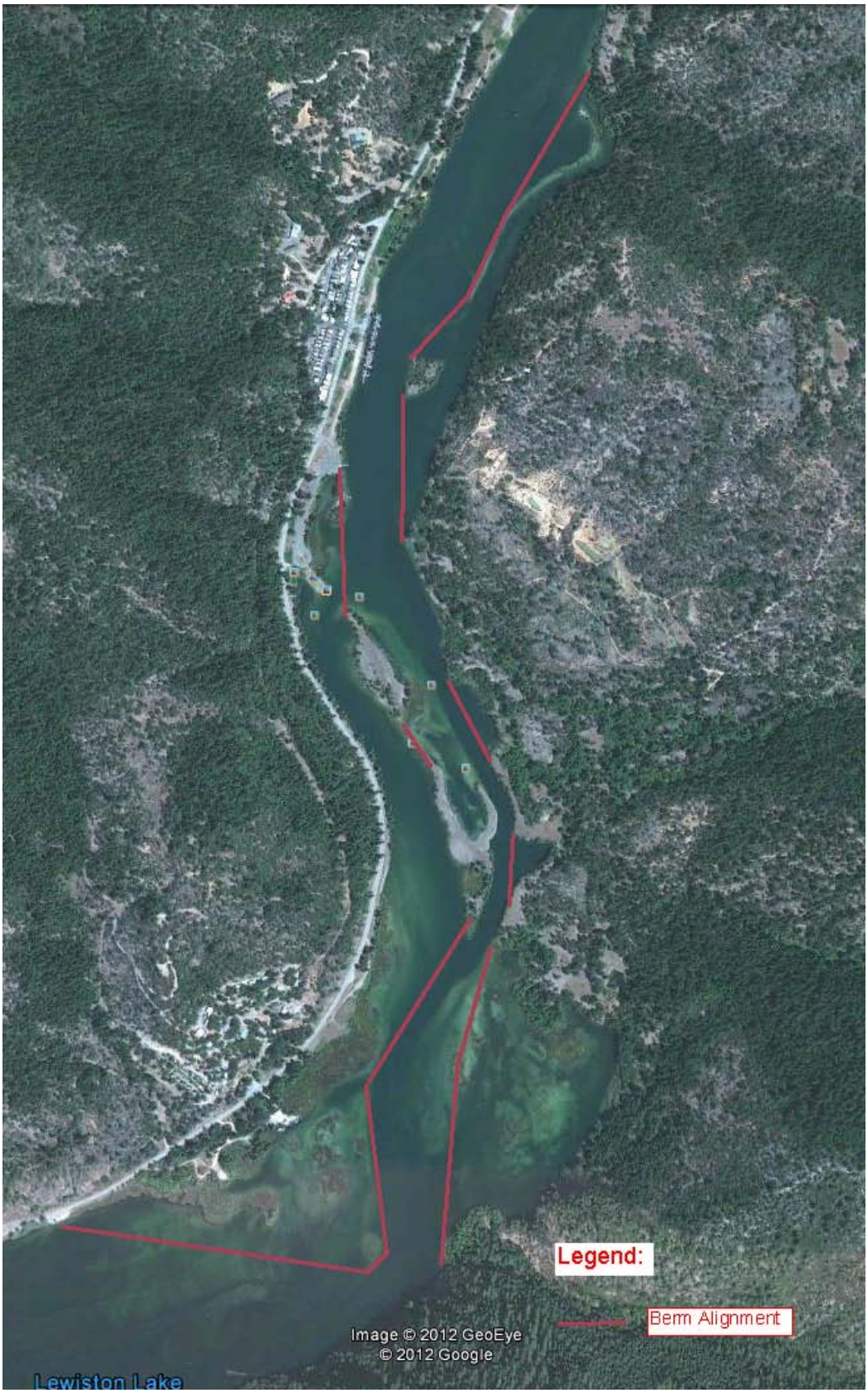
To increase the effectiveness of the channel and further decrease the propensity of lateral mixing, berms will be constructed adjacent to the channel (see Figure 6 – Dredging and Berm Alignment). The material from the dredging operations will be used to construct the berms. The top of the berms will be under the water surface a sufficient depth to avoid any issues with boats and other watercraft that may use Lewiston Reservoir (see Figure 7 – Typical Berm Cross Section).

Turbidity Management

It is expected that the dredging operations will result in significant turbidity issues. Material that is currently settled at the bottom of the reservoir could become suspended in the water after being disturbed. Measures will need to be put in place to contain the turbidity and prevent an excessive amount of suspended solids from entering the Trinity River downstream of Lewiston Dam.

Site Restoration

Although this alternative will be carried out in a way to minimize the disturbance of the areas around the reservoir, it is expected that some locations may be affected. Areas that are changed through the elimination of side channels, disturbed shoreline, or accumulation of material will need to be restored after construction is complete. Revegetation is expected to be the primary means of restoring the site, although additional work may be required.



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189 **Figure 6. Dredging & Berm Alignment.**

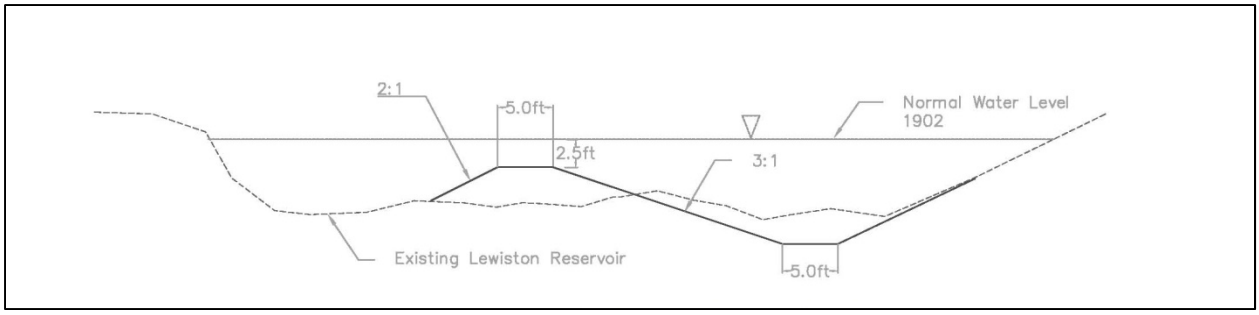

Figure 7. Typical Berm Cross Section.

Recreation & Navigation

Any areas that are significantly disturbed in a way that could adversely affect boating operations or existing recreational activities will need to be addressed. This could include the installation of buoys where material is built up too close to the water surface, the construction of replacement recreational facilities such as docks and picnic tables, and other measures.

Additional Costs

An allowance for unidentified items should be included in a preliminary estimate of the cost of conducting the dredging operations and constructing the underwater channel. A percentage should also be added for contingencies, which include the costs of modifications during construction resulting from unexpected work, differing site conditions, and other issues not covered in the construction contract.

Alternative #3a – Tunnel from Trinity Dam to Lewiston Dam

This alternative focuses on Goal 2, improving cold-water transmission between Trinity Dam and Lewiston Dam by transmitting water from Trinity Dam to Lewiston Dam via a tunnel. This would decrease retention time, eliminate lateral mixing, and prevent the water from being heated by the sun during the conveyance between the dams. This alternative would result in minimal impact to the general area and to recreational benefits, as most of the construction related to the tunnel would be underground. Operations at the Clear Creek Tunnel, both dams, and both powerplants would continue without major changes.

Tunnel Boring

The primary work required by this alternative is the boring of the tunnel. The tunnel would take an approximately direct path from Trinity Dam to Lewiston Dam, which would shortcut major curves in Lewiston Reservoir (see Figure 8– Tunnel Alignment). It is expected that most of the material to be bored will be hard rock, causing this item to be the major driver of the cost of this alternative. Large boring machines would need to be mobilized to the site, and the construction process to complete the tunnel will be time intensive.

Material Disposal

Boring the tunnel will result in significant amounts of material to be removed. A portion of the material could be disposed somewhere in the vicinity of Lewiston Reservoir, with the remainder being hauled offsite. Moving the material to the disposal sites will result in overhaul costs, the volume of hauled material multiplied by the haul distance. Disposal sites have not yet been identified, and the percentage of material that may be disposed near the reservoir is unknown.

Access Roads

The alignment of the tunnel will be on the east side of Lewiston Reservoir. This area currently has very limited access. Although much of the tunnel may be constructed underground with boring machines, access will still be needed at various locations along the route, such as near access shafts. Access roads would need to be constructed to provide a path to these areas. Due to the topography and vegetation, the construction of access roads will require the removal of numerous trees, significant excavation and embankment, and careful planning of the routes. The steep slopes will increase the cost to construct the access roads.

Trinity Outlet Works Tap

At the Trinity Dam side of the tunnel, water will enter via a direct tap of the dam's outlet works. By connecting to the outlet works directly, the water in the tunnel will have enough pressure for the required flow to be achieved in spite of the small elevation drop between the bottom of Trinity Dam and the elevation of Lewiston Reservoir. This portion of the effort will require altering the existing outlet works and constructing a structure to convey the water to the tunnel entrance.

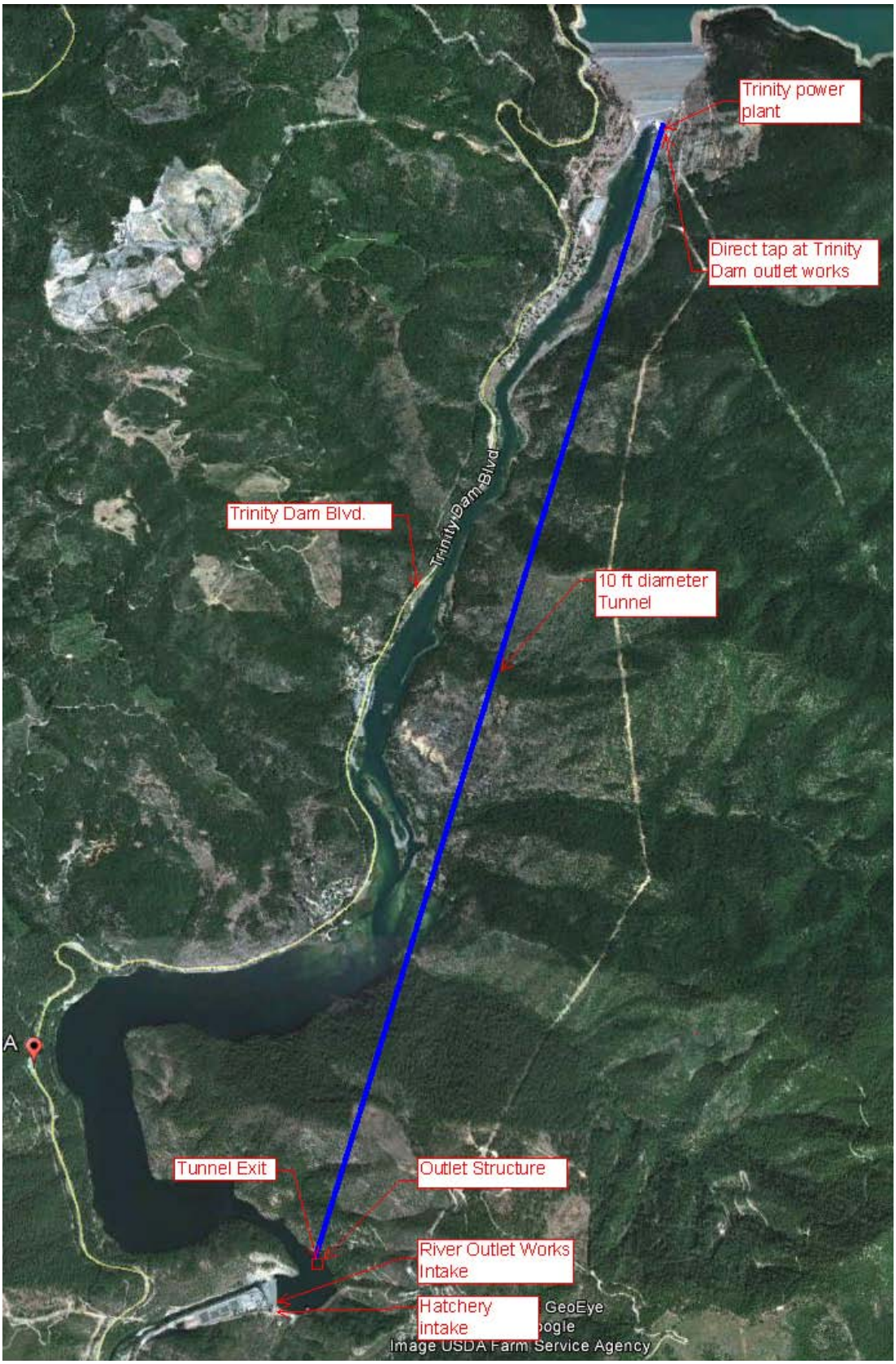

Figure 8. Tunnel Alignment.

Outlet Structure

The exit of the tunnel will require an outlet structure. The purpose of the outlet structure would be to prevent erosion from the water exiting the tunnel and to direct the cooler water to the desired location behind Lewiston Dam. Construction of the outlet structure may require some degree of dewatering in order to complete the work in the dry. Care would also be needed to ensure the outlet works are located properly and include a smooth transition from the tunnel to avoid violent turbulence that could cause damage to the structures.

Tunnel Ventilation and Access Shafts

Long tunnels require ventilation for proper functionality and access shafts to allow entrance to the tunnel for maintenance purposes. In this case, with a tunnel conveying water under pressure, the ventilation shafts would act as surge tanks to provide pressure relief, mitigating sudden pressure increases. Without such features in place, pressure increases could result in the formation of cracks, seepage, and further damage to the tunnel and its components. The access shafts, which could be designed to provide the required ventilation, would need to be located where access is available above ground so maintenance personnel could reach the entrances. They would need to be sized to accommodate any equipment which may be needed to maintain the tunnel. The cost of constructing these shafts could be approximate to the cost of a similar distance of tunnel.

Coordination with Existing Intakes

The cooler water exiting the tunnel will need to be delivered to the existing intakes proportionately in order to provide the lower temperatures required downstream of Lewiston Dam. This may be achieved by the water being directed toward the dam by the outlet works, but may also require direct taps of the tunnel exit. To effectively change the temperature of the Trinity River, the intakes for the fish hatchery and the Lewiston Powerplant may require direct taps to the tunnel, while additional cooler water from the tunnel is directed to the existing Lewiston Dam spillway.

Alternative #3b - Pipeline from Trinity Dam to Lewiston Dam

An approach similar to the tunnel would be the installation of a pipeline from Trinity Dam to Lewiston Dam. Like the tunnel, this would decrease retention time, eliminate lateral mixing, and prevent solar heating during the conveyance between the dams. The impact to the area by this alternative would depend on the pipeline's route (see Figure 9 – Typical Trench Section and Figure 10 Pipeline Alignment). A portion of the pipeline will be located within the reservoir at the terminus, with other sections may be near the shore and under existing roads. Operations at the Clear Creek Tunnel, both dams, and both powerplants would continue without major changes.

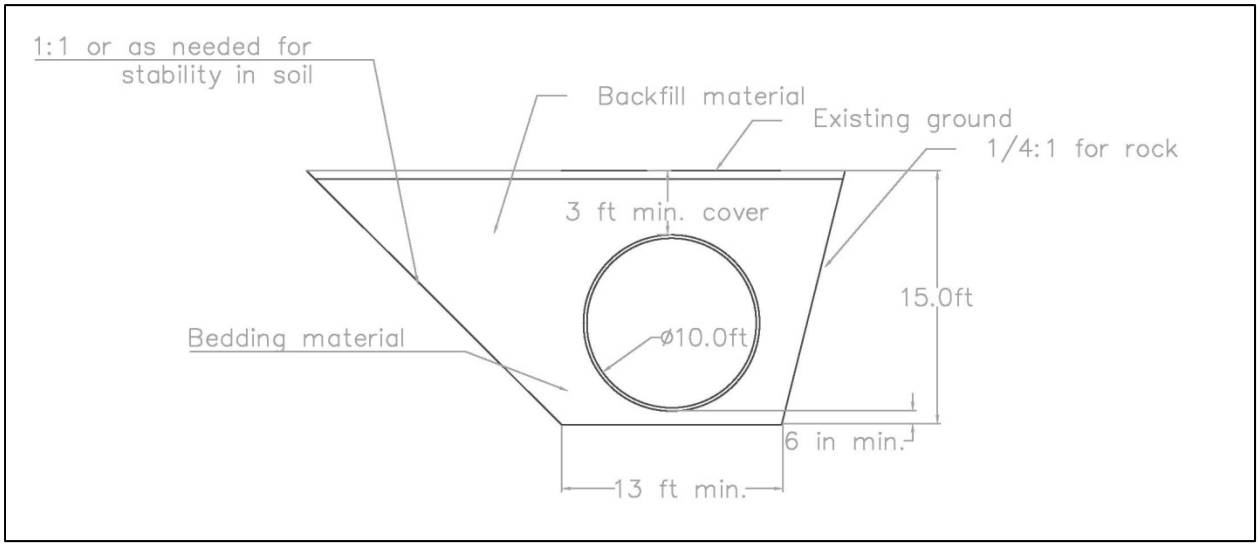

Figure 9. Typical Trench Section.

Trench Excavation

A trench would need to be excavated along the pipe's alignment. This work will require some dredging in Lewiston Reservoir, excavation along the shoreline, and temporary removal of other infrastructure to accommodate the pipe. The pipeline would be significantly longer than a tunnel, as it would conform to the existing topography. Lewiston Reservoir has multiple curves which would affect the pipe's alignment. The material to be excavated will include sediment within the reservoir, sedimentary material outside of the reservoir, and hard rock. The cost of this alternative would largely depend on the volumes of the different material types to be excavated. The proportions of the different materials are unknown at this time.

Material Disposal

Excavating the trench will result in a significant volume of material to be removed. A portion of the material could be disposed near Lewiston Reservoir, while the remainder will need to be hauled offsite. As with several other alternatives, transporting the material to the disposal sites will

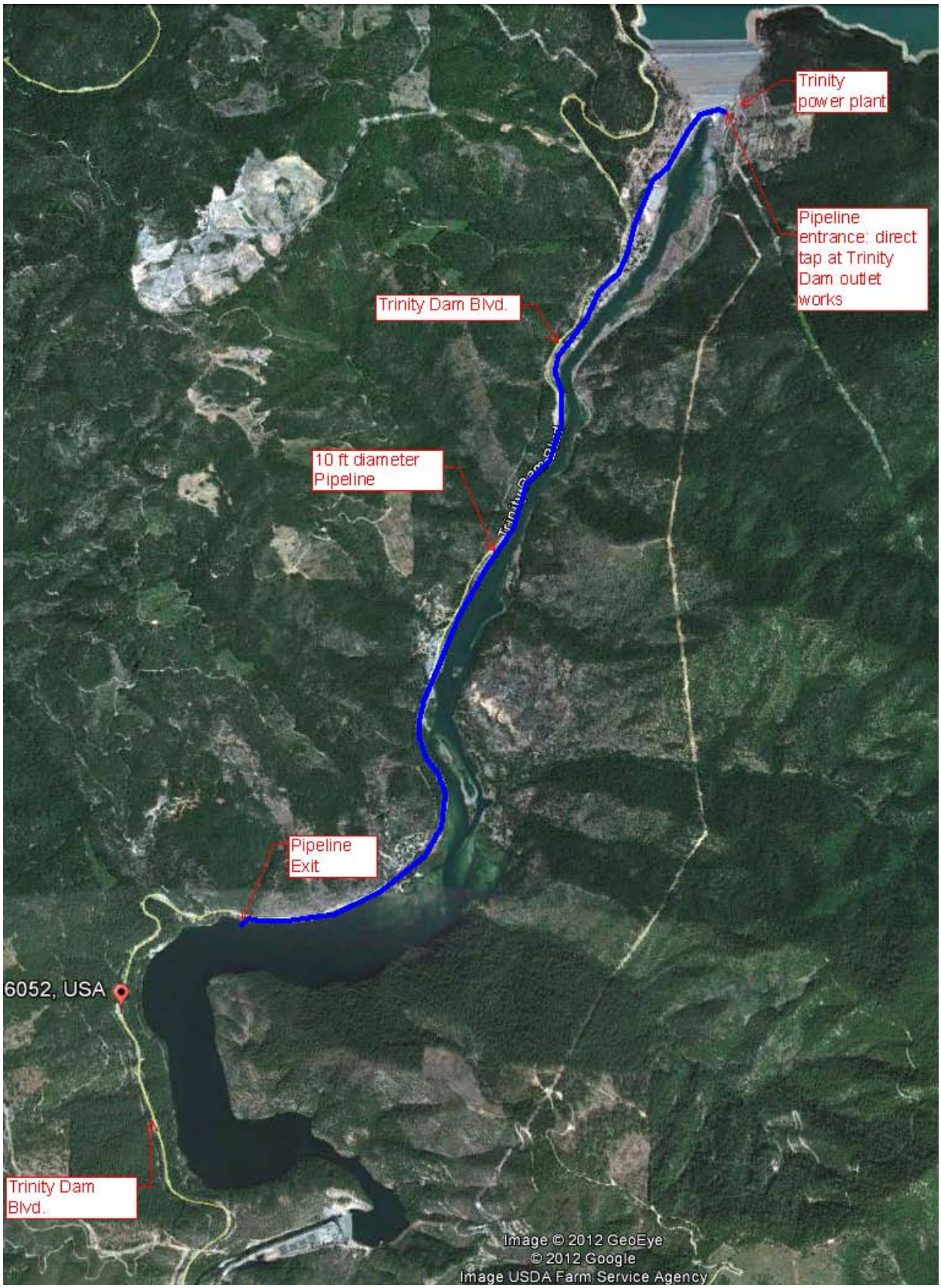

Figure 10. Pipeline Alignment.

result in overhaul costs, the volume of hauled material multiplied by the haul distance. Disposal sites have not yet been identified, and the percentage of material that may be disposed near the reservoir is unknown.

Dewatering

Although some portions of the pipeline will be installed within Lewiston Reservoir, other sections will be placed along the shoreline or further from the water. Trench excavation near the reservoir will require dewatering operations, as the pipe bedding and backfill cannot be placed underwater, and saturated soil cannot be compacted. The dewatering may include the use of portable pumps and the construction of temporary cofferdams.

Pipe Installation

The largest expense related to the pipeline alternative is the pipe itself. It is expected that the pipeline will be over eight miles long. In addition to the cost of the pipe, the cost of transporting the pipe to the site will also be significant.

Pipe Bedding

Portions of the pipeline which are installed in dry locations will require a bedding to be placed on. Rock and hard soil may damage the pipe due to the pressure between the pipe and the surface beneath it. A bedding of sand or other conforming material decreases the probability of this type of damage.

Backfill

After the pipe is placed, it must be covered to prevent damage from ultraviolet light and vandalism. It is expected that the material from the trench excavation may be used as backfill material in most locations. Areas with hard rock may need to have backfill material supplied from other areas. The costs associated with backfill include placement, compaction, and transport where necessary.

Trinity Outlet Works Tap

At Trinity Dam, water will enter the pipe from the dam's outlet works. By connecting to the outlet works directly, the water in the pipe will have sufficient pressure for the required flow to be achieved between Trinity Dam and Lewiston Reservoir. The high pressure will also allow the pipe to be placed at higher elevations where needed. This portion of the effort will require altering the existing outlet works and connecting the new pipeline to it.

Outlet Structure

The end of the pipeline will require an outlet structure. The purpose of the outlet structure would be to prevent erosion from the water exiting the pipe and to direct the cooler water to the desired location behind Lewiston Dam. Construction of the outlet structure may require dewatering so the work may be conducted in dry conditions. A smooth transition from the pipe to the reservoir would be needed to prevent turbulence which could cause damage.

Coordination with Existing Intakes

The cooler water from the pipeline will need to be delivered to the existing intakes at Lewiston Dam to provide the lower temperatures required downstream. This may be achieved by directing the water from the outlet works toward the dam at a sufficient depth. To effectively change the temperature of the Trinity River, the intakes for the fish hatchery and the Lewiston Powerplant will require access to the cooler water in the reservoir, with additional cool directed toward the spillway.

Infrastructure Improvements

Installing the pipeline will require changes to the existing infrastructure. General infrastructure expenses will include removing, constructing, and relocating various features as appropriate to accommodate the pipeline. A portion of the pipe alignment will be under existing roads. The roads will need to be restored and repaved after the pipeline is installed. Other affected infrastructure such as parking lots and recreational areas will also require restoration.

Turbidity Control

Pipeline placed within Lewiston Reservoir may cause turbidity issues. Material that is settled within the reservoir could become suspended in the water after being disturbed. Measures will need to be put in place to contain the turbidity and prevent an excessive quantity of suspended solids from entering the Trinity River downstream of Lewiston Dam.

Alternative #4 – Raise Lewiston Dam

Another alternative under consideration is raising Lewiston Dam. Increasing the depth of Lewiston Reservoir would provide more space for cooler water. Currently, much of the heating takes place in shallow areas where the water velocity is low. Raising the dam would help to mitigate the heating in these shallow areas. This alternative will have a significant impact on the surrounding area as additional land is inundated by the reservoir. Depending on the magnitude of the dam raise, modifications would need to be made in order to maintain the functionality of the Clear Creek Tunnel, Lewiston Dam, Trinity Fish Hatchery, and Trinity and Lewiston powerplants.

Dam Embankment

Raising Lewiston Dam would require increasing the dimensions of the dam structure. Since Lewiston is an earthfill dam, additional embankment material would be needed to build it up. The higher the dam is raised, the more material would be required. Borrow material would need to be identified and processed to be incorporated into the dam. The material would then need to be properly placed and compacted. See Figure 11 – Lewiston Dam Embankment Fill Section.

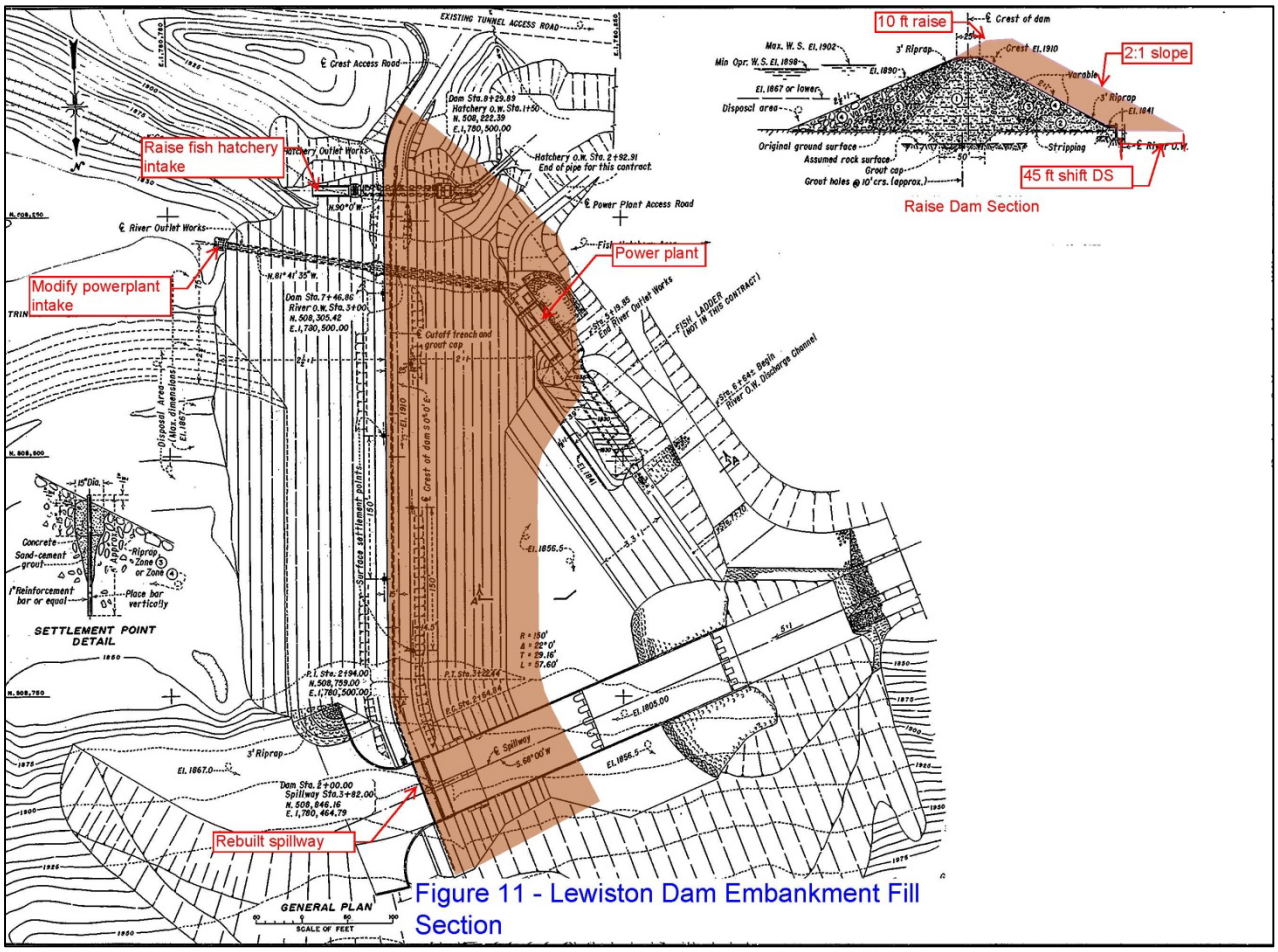

Figure 11. Lewiston Dam Embankment Fill Section.

Overhaul

The cost of supplying Lewiston Dam with the additional material to raise it will include overhaul, the volume of the borrow material multiplied by the distance from the borrow site to the dam. If the borrow site is far from the dam, the overhaul cost could be significant. A borrow site has not been identified, so estimating the overhaul cost is difficult.

Raise Clear Creek Tunnel Intake

Since the elevation of the Clear Creek Tunnel cannot be changed, the tunnel intake will need to be raised along with Lewiston Dam. Raising the Clear Creek Tunnel intake would involve increasing the height of the reinforced concrete structure. As this additional concrete would result in the structure having more mass, the support structures will need to be evaluated and strengthened as well.

Modify Clear Creek Tunnel

The Clear Creek Tunnel was designed to handle a certain pressure level. Raising Lewiston Dam would result in additional pressure within the tunnel, as the water level above the tunnel would be higher. This additional pressure may damage the tunnel, or exacerbate existing damage. Any current seepage will increase, as the water would exert more pressure to any flawed areas. To mitigate these issues, the tunnel would need to be modified. Strengthening measures would need to take place along the length of the tunnel, which is over ten miles. Sufficient improvements must be completed to ensure that the tunnel would not be damaged by the dam raise.

Modify JF Carr Powerplant

The Clear Creek Tunnel delivers water to the JF Carr Powerplant. Like the tunnel, the powerplant intakes and penstocks were designed to handle certain loading conditions. These structures would need to be evaluated and most likely improved before Lewiston Dam was raised in order to ensure their continued operability and prevent damage.

Rebuild Spillway

The current spillway and spillway gates at Lewiston Dam sit at a certain elevation. If the water level behind the gates is higher, the gates would be subjected to additional forces that they were not designed to endure. The gates and spillway structure would need to be altered or completely rebuilt to accommodate a dam raise.

Modify Fish Hatchery and Lewiston Powerplant Intakes

Both the Trinity Fish Hatchery and the Lewiston Powerplant have existing intakes within Lewiston Reservoir. Like the other structures, these intakes would need to be evaluated and upgraded to handle the additional hydrostatic pressure that they would be subjected to.

Recreation Facilities

Recreation facilities are located along Lewiston Reservoir, including boat docks, fishing areas, picnic areas, and parking lots. If Lewiston Dam is raised, many of these facilities will be inundated. New facilities would need to be constructed at a higher elevation along the shoreline of the higher Lewiston Reservoir. New access points for fishing and other recreation would also need to be constructed.

Trinity Powerplant Tailwater Regulation

As Lewiston Dam is raised and the water level of the reservoir is increased, the higher water will encroach on the Trinity Powerplant. The powerplant may need to be modified to accommodate the raise and to ensure continued functionality.

General Infrastructure

Raising the dam will require changes to the existing infrastructure. General infrastructure expenses will include removing utilities, roads, and structures. This infrastructure will then need to be moved or rebuilt at higher elevations. Numerous residences near the reservoir will also need to be relocated because of the higher water level.

Slope Stability

As the elevation of Lewiston Reservoir is increased, the soil conditions in the area will change as higher areas around the reservoir become saturated. Changing soil conditions may cause slope stability issues. Raising the dam will require the inclusion of slope stability measures and management of potential landslide areas.

Option A – Lewiston Powerplant Intake Extension Modification

The Trinity Public Utilities District (TPUD) plans to replace the existing 350-kilowatt Lewiston Powerplant with a 2.2-megawatt powerplant. An Environmental Assessment (EA) was prepared for the powerplant replacement and a Finding of No Significant Impact (FONSI) was signed in September 2011. Although it was not addressed in the EA, a potential option to provide additional flexibility for managing downstream temperatures in the Trinity River would be to extend the proposed new intake. If the new intake is extended further than currently planned, cooler water at the bottom of the reservoir may be used to generate power. This cooler water could then be tapped when necessary to assist with temperature control. This option would not affect the current operations of Clear Creek Tunnel, Trinity Fish Hatchery, or Trinity Powerplant. The Lewiston Powerplant intake extension option could be combined with all of the alternatives except Alternative #1 (removal of Lewiston Dam).

Extend Intake for New Lewiston Powerplant

The majority of the work required for this option is the extension of the intake itself. As currently planned, the new intake will be located behind Lewiston Dam on one of the banks. Extending the intake would not result in direct contact with the dam. Most of the work to install the extended intake would be conducted below the water surface, increasing the difficulty and cost of the work. The additional material for the intake extension would also result in a higher shipping expense. See Figure 12 – Modification of Lewiston Powerplant Intake.

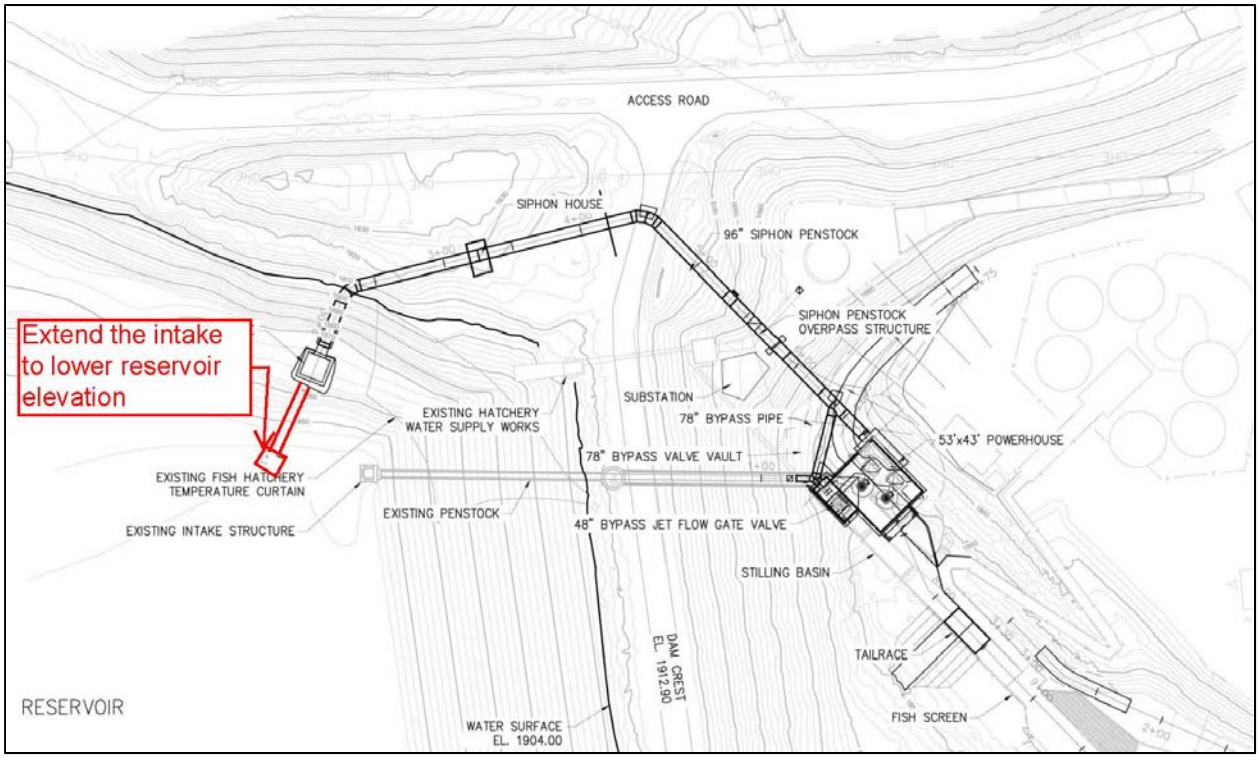

Figure 12. Modification of Lewiston Powerplant Intake.

Turbidity Control

It is anticipated that work related to extending the Lewiston Powerplant intake would disturb sediment within the reservoir. These disturbances may cause turbidity issues. Sediment near the intake extension

could become suspended in the water after being disturbed. Measures would need to be implemented to contain the turbidity and prevent an excessive amount of suspended solids from entering the Trinity River downstream of Lewiston Dam.

Option B – Trinity Dam Selective Withdrawal Structure

Another potential option for managing downstream temperatures in the Trinity River involves increasing the operational flexibility of Trinity Dam. A selective withdrawal structure at Trinity Dam would enable water to be released from a wide range of depths in order to influence the temperature of Lewiston Reservoir. This option could be combined with all alternatives, and would not affect the operation of Trinity Powerplant. The functionality of the Clear Creek Tunnel, Lewiston Dam, Trinity Fish Hatchery, and Lewiston Powerplant would not be impacted.

Selective Withdrawal Intake Structure

The selective withdrawal intake structure would require significant work below the water surface, as well as additional material costs and shipping expenses. The new intake structure would need to be constructed on the bank behind the dam near the existing intake structure. The structural section of Trinity Dam would not be impacted. Since Trinity Reservoir is over 400 feet deep, the selective withdrawal intake structure would need to be hundreds of feet high to provide full access to water at a wide range of temperatures. A sufficient foundation with appropriate supports and structural connections would be required to handle the loads of the new structure. Construction of the foundation may require a significant amount of costly underwater work with hard rock, including drilling, and removal.

Modify Existing Intake

To function properly with the new selective withdrawal intake structure, Trinity Dam's existing intake would need to be significantly modified. The existing intake is a reinforced concrete structure that is several hundred feet high. Strengthening the structure's foundation may be required if additional loading results from the alterations. The work associated with these alterations would also require a significant amount of costly underwater work.

Turbidity Control

Installing a selective withdrawal structure behind Trinity Dam would disturb sediment within the reservoir, potentially causing turbidity issues. Material that is currently settled proximate to the construction area could become suspended in the water after being disturbed. Measures would need to be implemented to contain the turbidity and prevent an excessive amount of suspended solids from entering Lewiston Reservoir.