Memorandum

DATE: August 14, 2018
FROM: Russ Becker and Dan Dunn
TO: Sonoma Water
VIA: Richard Roos-Collins, Water and Power Law Group PC
RE: Potter Valley Project – Evaluation of Sediment Stabilization Measures - Alternative 4

EnviroAnalytics Group, LLC (EAG) was engaged on behalf of Sonoma Water to provide further concept development for a specific alternative of the Potter Valley Project (PVP) as outlined in the “Potter Valley Project Capital Modifications Feasibility Study Report” FERC No. 77-110 (July 2018) prepared by McMillen Jacobs Associates (McMillen Jacobs). Specifically, EAG evaluated and prepared design assumptions and estimated costs associated with the feasibility of sediment stabilization measures for Scott Dam and Lake Pillsbury (Alternative 4), contemplating full PVP decommissioning without removal or discharge of the sediment load captured by historical operations of the project.

Alternative 4 – Full Dam Decommissioning with Sediment Management
(synopsis excerpted from McMillen, 2017)

Alternative 4 would consist of removal of Cape Horn and Scott Dams and restoration of the natural river flows. The natural river channel would be re-established upstream and downstream from the Cape Horn Dam site providing natural fish passage through the project reach. The remaining sediment would be stabilized within the channel using natural systems and replanting the riparian river zones. The river channel upstream and downstream from the dam site would be restored to generally approximate its natural alignment and grade. Sediment deposits outside the natural channel alignment would be stabilized and replanted. The Cape Horn Dam is illustrated on Drawing CH-D-1. The Scott Dam is illustrated on Drawing SD-D-1.

A new river channel would also be established through the former Scott Dam/Lake Pillsbury reservoir area and would be excavated through the reservoir with the material disposed of in the river overbank areas (former Lake Pillsbury lakebed areas). The much larger volume of sediment within Lake Pillsbury would require more extensive channel work to recreate the natural river channel. The remaining sediment would be maintained within the former reservoir area. This would require selected excavation to bench and stabilize the deposited materials. Both structural and vegetative erosion control measures would be required to provide effective stabilization of the sediment. However, as stated in the feasibility study, it could still be expected that some of this material would be eroded and
transported downstream during large flood events.

The Eel River within the project reach would be returned to a free-flowing river system with unimpeded fish passage conditions for both upstream and downstream fish migrants. Sediment management is frequently a major concern in dam removal projects with little long-term knowledge and application of documented techniques available to resource managers. While system hydrology, sediment storage volume and sediment particle size generally dictate the approach to sediment management, stabilization of impounded sediments upstream of dam removal sites is usually addressed with a combination of management techniques (i.e. placement of stone, vegetation, grade control structures, etc.). Construction activities during the dam removal process would require extensive demolition, material excavation, and disposal. Identifying debris disposal sites for the concrete, soil, and sediment removed from the project to restore the natural channel would be one of the biggest challenges.

Alternative 4 would require an extensive capital investment, identification and permitting of a location for debris disposal, and extensive river channel restoration and sediment stabilization. Table 4-2 provides a summary of Order-of Magnitude Cost Estimates for the project identified in the feasibility study.

Table 4-2. Summary of Preliminary Dam Options Order-of-Magnitude Cost Estimates

<table>
<thead>
<tr>
<th>Option No.</th>
<th>Description</th>
<th>Construction Cost(^1)</th>
<th>Total Project Cost(^2,3,5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scott Dam Baseline</td>
<td>$1,000,000(^4)</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>D</td>
<td>Full Decommissioning wit Sediment Management</td>
<td>$50,000,000</td>
<td>$65,000,000</td>
</tr>
</tbody>
</table>

McMillen 2017

1. Order of magnitude cost estimates based on similar projects at hydroelectric and dam projects.
2. Estimated construction costs plus engineering, planning, environmental, permitting, and construction management equal Total Project Costs. The construction cost was increased by a factor of 30% to estimate the Total Project Costs.
3. Level of accuracy is -25/+50 percent for cost estimates.
4. Assumed construction value to maintain existing facilities in operation.
5. The $65M total project cost for Scott Dam Option D is an estimated total Capital costs for the alternative - - encompassing planning, environmental, permitting, construction (de-construction), and construction management costs for both the removal of the structure and all baseline construction/stabilization work for a new river channel.
Alternative 4 - Lake Pillsbury Design Considerations

The reservoir created by Scott Dam has accumulated large amounts of sediment over time. Ongoing contribution of sediment is on the order of 230 to 280 acre-feet/year. Designs of river bed excavation will have to account for this future load and possible ongoing maintenance activities.

The proposed work assumes that the level of Lake Pillsbury can be drawn down to allow “dry” excavation of the sediments and placement of sediments in nearby lake bed disposal areas. The approach will lower the reservoir by creating a bypass channel and then stored sediments would be excavated and relocated to upland storage areas. The floodplain must provide sufficient acreage for a bypass channel that allows diversions up to the 100-year flood event around the stored sediments. Bathymetric data will be critical to assess and refine the plans for excavating and stabilizing a new river channel. The sediment removal process to establish river channels requires adequate area and structural confinement to contain the large amount of sediment. The attached figure provides a conceptual illustration of the scope and extent of re-channelization, sediment deposition, and stabilization work that would be required for the former Lake Pillsbury area once exposed to surface runoff.

Access routes to and from the sediment containment or deposition areas and ancillary structures will be necessary for construction equipment staging areas. In addition, borrow sites will have to be created outside the containment and storm water runoff control structures to generate adequate quantities of material to construct containment berms. It is estimated that nearly one and a half million cubic yards (cys) of sediment will require excavation, including:

- 150,000 cys from the Reservoir area (assumes average 16 ft depth downstream of log boom),
- 350,000 cys from grading tributary deltas, shorelines, and over-bank areas, and
- approximately 850,000 cys for re-channelization (overall average of 6 ft thickness, less upstream and larger in proximity to dam and tributaries).

The sediments are assumed to be primarily coarse sand and gravel up to cobble sized that allow this process to be efficiently implemented. Grain sizes of the sediment will need to be identified to confirm the appropriateness of this construction technique. Additional alternative measures must be implemented to prevent fine-grained sediments from being released downstream during the sediment stabilization/dam removal project. Construction of graded granular filter berms from local sources are presumed sufficient to protect streams from the short-circuit return of fine-grained sediments placed into depositional areas.

The concentrations of leachable metals and other contaminate from historical upstream sources that could be mobilized during dam removal activities is not currently well understood. This data will be important to assess the potential implications of downstream sediment transport during dam removal and future anomalous storm events. The risks associated with mechanical removal of potentially erodible reservoir sediments requires further evaluation, as discussed later.
Stream channel instability is commonly encountered as a result of increased flows due to runoff from storms, roads, upland disturbances, and human interferences. The reconstruction or restoration of a stream reach and/or channel re-alignment can be stabilized using fill materials (riprap), concrete, fabricated structures, or a variety of bioengineering practices. This practice significantly reduces sediment input to a system and jump starts the riparian recovery process. All sources contributing to channel instability should be identified before considering channel treatment on a site-specific basis.

The natural channel design approach involves the use of reference channel morphology as templates for design (Rosgen 2007). Reference channels are selected for their natural stability, habitat, and functions. Normally, these reference channels are least altered reaches found on the same river where the restoration is proposed. The logic of this approach is that reference reaches within the same watershed and with similar drainage area are handling the flows and sediment that the restored channel will need to carry. In addition, mimicking habitat characteristics in a natural reference channel is more likely to address habitat needs of the biota found there. In adapting reference channel morphology to restoration sites, slope differences, sediment differences, sediment transport capacity and competence, and flow capacity must be accounted for. Various stream stabilization measures are incorporated into engineered stream channels. The measures believed to be appropriate for this application include:

a. Cross-Vane Weir Diversion: The V-shaped diversion of this natural weir effectively transports stream flow while maintaining the transport of sediment. The cross-vane is a grade control structure that decreases near-bank shear stress, velocity and stream power, but increases the energy in the center of the channel. The structure will establish grade control, reduce bank erosion, create a stable width/depth ratio, maintain channel capacity, while maintaining sediment transport capacity, and sediment competence. The cross-vane also provides for the proper natural conditions of secondary circulation patterns commensurate with channel pattern, but with high velocity gradients and boundary stress shifted from the near-bank region.

b. Filter Strips: Filter Strips are areas of grass or other permanent vegetation that intercept runoff before it enters a water body. Filter strips collect sediment, nutrients and organic materials, and provide wildlife habitat. The purpose of a filter strip is to provide a buffer between possible contamination sources and water bodies. Herbaceous vegetation will filter runoff water by intercepting or trapping field sediment, organics, nutrients, pesticides and/or other potential pollutants before they are able to reach streams, lakes, or rivers.

c. Grade Stabilization structures: Grade stabilization structures are designed to prevent banks from slumping, reduce the velocity with which water runs off the land, and prevent erosion of a channel that results from excessive grade in the channel bed. Proper grade stabilization, combined with adequately protected outlet structures, can reduce the likelihood that soil will be detached and transported to surface water. A structure designed to reduce channel grade in natural or constructed watercourses to prevent erosion of the channel from excessive grade or increased channel flows. This practice can prevent head-cutting or stabilize gully erosion. Grade stabilization structures may consist of rock, drop structures, concrete or riprap chutes, gabions, pipe drop structures, diversion ponds, water and sediment control basins, or the use of biologs. Biologs are made from natural
material rolled into structures resembling tree trunks or logs. Biologs can contribute to the protection of the streambank toe or grade by trapping sediment and erosive currents and providing riparian vegetation that may be planted into biolog.

d. Rip Rap: Riprap consists of a layer of angular stone designed to protect and stabilize areas subject to erosion, slopes subject to seepage, or areas with poor soil structure. Riprap is used on streambanks where stream velocities are too great to successfully establish vegetative cover, on channel bottoms and slopes, stormwater structure inlets and outlets, slope drains, and shorelines. Stones should be of sufficient size to resist washing downstream. Larger rock should be placed at the bank bottom below the baseflow elevation. Rock should be underlain by a filter blanket of gravel, sand and gravel, or synthetic material to prevent soil movement into or through the riprap. It is most effective when used as part of a system which includes a means of reducing the erosive potential of incoming flows at their source, despite the fact that riprap is detrimental to wildlife and their habitat.

e. Toe Rock: Rock (riprap) can be layered at the toe of the stream as an armoring technique to provide additional strength to stream banks. This will reduce the scouring of the toe and banks in high velocity flows. Layers of rock should be placed from the toe extending up to bankfull elevation. Toe rock can be even more effective when combined with bioengineering practices such as brush trench, live staking, planting, and seeding. By using a trench extending below the stream scour level, variety of rocks sizes layered upward will withstand stream forces, reduce erosion, and stabilize the streambank. Fabric can be installed behind the rock to keep stream flows from washing out soils behind the structure.

f. Rock Vane / Barb: Rock vanes and barbs are constructed rock structures (or logs) created to slow flood waters near the banks and increase flood velocities in the channel center. Vanes and barbs convey flow away streambank reducing the channel slope and stream velocity. This protects stream banks from erosion and helps the stream scour the center channel for better sediment transport.

g. Vegetation / Seeding: Vegetation is probably the most commonly used tool for streambank protection. Vegetation has the advantage of being self-propagating and self-repairing. Emergent vegetation provides two levels of protection. First, the root system helps to hold the bank soil together and increase overall bank stability by forming an interweaving network. Second, the stalks, stems, branches and foliage provide resistance to streamflow, absorbing flow energy rather than deflecting it as hardened structures do or allowing it to erode soil particles. Vegetative cover above the waterline protects the banks from rainfall, runoff, and trampling forces. Vegetation also provides water quality benefits by causing settling of particulates and absorbed pollutants, removing nutrients directly from the water column, and assimilating nutrients from the soil. Native species should be used and their water requirements should be matched to the zones in which they are placed. Vegetation seeded above the waterline should typically be spread in a matrix such as a hydro-mulch, or sprigged. The range of successful applications can be expanded by using vegetation in conjunction with other streambank protection measures, such as geo-grid pavers, riprap, geotextile or biodegradable mats and rolls, or the use of other bioengineering methods. Seeding can be used where appropriate. Seeding and mulching are not appropriate in areas of flooding, high
water flow or rapid changes in water depth, as the mulch and seed will be washed away. Proper seedbed preparation, fertilization and irrigation may be needed to assure seedling survival. Establishment of perennial vegetative cover with seed to minimize runoff, erosion, and sediment yield on disturbed areas. Disturbed soils typically require roughening and amendment with a nutrient source. Seeding should be done together with mulching. Seed mixtures are typically most effective, and species vary with preferences, site conditions, climate, and season.

Sources of rip rap for slope and containment area stabilization were assumed to be in close proximity to Lake Pillsbury. These source areas will need to be identified. Temporary processing plants to screen and sort materials suitable for use as rip rap may be needed (with corresponding air and storm water permits). The total length of reconstructed channel shoreline is estimated at approximately 15 miles. Up to 15% of that length may necessitate armoring with rip rap ranging from 4 to 24-inch diameter.

The containment and/or sediment depositional sites and disturbed areas will require restoration to conditions suitable for long term safety and sustainability, that includes reducing the thickness of the sediment and height of any containment berms by recontouring to fit the natural topography. Revegetation of the disturbed sites would be necessary to minimize invasive vegetation. The restoration activities also pose potential air quality impacts, wildlife impacts, cultural resource impacts, and similar unforeseen consequences.

Allocation of liabilities associated with potential natural resource damages and environmental restoration costs have not been formally established (assume mostly on PG&E with whatever support of available grants, contributions, if any?).

**Risks Impacting Mechanical Sediment Removal**

a. Weather Conditions – floods, ice, variability in snowfall, etc. (i.e., loss of reservoir storage) could all impact the time required for completion, total cost of the project, and long-term recovery of the natural environment post-restoration work.

b. Cultural Resources - cultural resource sites that are submerged in the reservoirs could be unearthed by dredging areas that have been buried for decades.

c. Sediment Drainage and Dewatering Process - Sediment transported to containment and/or depositional areas must be placed with adequate controls to prevent discharges back into the River that cause water quality impacts (i.e., be free of suspended solids). Risks associated with this process include primarily weather conditions such as wave action during flood conditions, and freezing during winter weather conditions.

d. Redundancy of Construction Techniques – The alternative methods and techniques for sediment removal and stabilization can produce detrimental environmental impacts that could potentially offset the benefits of sediment removal. There is ecological risk and uncertainty during and after sediment removal in the reservoirs.

e. The sediment stabilization measures and channel reconstruction process would also be happening simultaneously at each reservoir site making it difficult to apply any lessons learned to improve efficiencies other than daily adaptive management.
f. Sediment management in the reservoirs pose risk and uncertainties associated with the critical mitigation measure to reduce aquatic and water quality impacts. The sudden release of sediment and organic matter following a dam removal can compromise downstream ecological habitat, sometimes permanently. There is also uncertainty regarding the construction, operation and management of potential sediment disposal sites to prevent environmental impacts to terrestrial wildlife and cultural resources caused by the footprint of the sediment disposal sites and supporting infrastructure.

Cost Estimates and Escalation

An opinion of probable construction cost (OPCC) has been developed for sediment removal, as described above. The preliminary cost estimate presented for the Scott Dam Alternative 4 in the feasibility study was $50 to $65 million including removal of Scott Dam, low level outlet and associated structures. The estimated costs were presented with accuracy in the range of -25% to +50%. The feasibility study estimate does not account for escalation of costs in the future.

An OPCC of the sediment management related costs within Lake Pillsbury is presented below.

<table>
<thead>
<tr>
<th>Task Descriptions</th>
<th>Assumptions - sediment management (excludes dam removal)</th>
<th>Duration (Weeks)</th>
<th>Budgetary Cost Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRE-DESIGN SERVICES</strong></td>
<td></td>
<td></td>
<td>$250,000</td>
</tr>
<tr>
<td>Sediment bathymetry and chemical/physical characterization data evaluation</td>
<td>P G &amp; E file information sufficient to validate</td>
<td>4 – 8</td>
<td></td>
</tr>
<tr>
<td>Surveys and geotechnical characterization of sediment depositional areas</td>
<td>P G &amp; E file information sufficient for Grading Plan</td>
<td>4 – 8</td>
<td></td>
</tr>
<tr>
<td>Identification of locally-sourced materials (rip rap, vegetation, logs, etc.), as needed</td>
<td>Local supplies &lt; 20 miles available</td>
<td>4 – 8</td>
<td></td>
</tr>
<tr>
<td><strong>DESIGN AND PERMITTING</strong></td>
<td></td>
<td></td>
<td>$500,000</td>
</tr>
<tr>
<td>Design specifications</td>
<td>Professional Services</td>
<td>6 – 12</td>
<td></td>
</tr>
<tr>
<td>Permitting and Project approvals</td>
<td>FERC +</td>
<td>12 – 48</td>
<td></td>
</tr>
<tr>
<td>Contractor procurement</td>
<td>P G&amp; E</td>
<td>6 – 8</td>
<td></td>
</tr>
<tr>
<td><strong>MOBILIZATION</strong></td>
<td></td>
<td></td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Access road construction</td>
<td>4 miles, 6 segments</td>
<td>4 – 8</td>
<td></td>
</tr>
<tr>
<td>Borrow pits with crusher/screen processing unit set up (includes Operations &amp; Maintenance), decommissioning</td>
<td>Single unit moved between 3 “temporary” locations, each with adequate area for stockpiles</td>
<td>8 – 24</td>
<td>$2,500,000</td>
</tr>
<tr>
<td>Tailwater erosion control measures, pre-drainage and dam removal</td>
<td>1 mile, in-stream &amp; hard-bank stabilization measures</td>
<td>4 – 8</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Dam by-pass structures, if applicable</td>
<td>Sheet-piling, 600 LF, 24,000 SF</td>
<td>8 – 16</td>
<td>$1,000,000</td>
</tr>
</tbody>
</table>

**RESERVOIR DRAINAGE** (in stages)
- Stage I – gradual flow increases | Seasonal | 12 – 36 | $250,000 |
- Stage II – sediment dewatering | Filtering requirements ?? | 16 – 32 | $1,000,000 |

Water quality monitoring | Schedule varies | 52 – 310 | $200,000 |

**STREAM CHANNEL RECONSTRUCTION**
<table>
<thead>
<tr>
<th>Description</th>
<th>Material/Method</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Area Construction – overbank</td>
<td>Native stone, gravel, sand for filter berms</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Thick sediment removal (near dam)</td>
<td>12 - 20 ft thick at dam, 2 - 8 ft in-stream 1.25 – 1.75 M cubic yards, (two seasons)</td>
<td>$10,000,000</td>
</tr>
<tr>
<td>Tributary deltas – sediment removal</td>
<td>Grade for transitional “shaping”</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>Natural upstream w/meanders – variable sediment thickness requiring removal and near-by deposition</td>
<td>Locally grade to replicate “model” upstream/downstream reaches</td>
<td>$600,000</td>
</tr>
<tr>
<td>Sediment transport to storage areas</td>
<td>Off-road cross-country, road, etc.</td>
<td>$12,000,000</td>
</tr>
<tr>
<td>STREAM BANK STABILIZATION (armoring and erosion protection by various engineered and natural methods)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“Soft” bank methods (36,000 LF)</td>
<td>Brush, logs, vegetation, etc.</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>“Hard” bank methods (24,000 LF)</td>
<td>Geotextile, rip rap, piles, etc.</td>
<td>$5,000,000</td>
</tr>
<tr>
<td>In-stream methods (36,000 LF), up to 24 locations</td>
<td>Barbs, vanes, weirs, etc.</td>
<td>$600,000</td>
</tr>
<tr>
<td>OTHER SITE RESTORATION (assumes no in-situ solidification or pressure grouting applicable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetation</td>
<td>Native species – per guidance</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Misc. site restoration activities</td>
<td>(grading and revegetation of sediment depositional areas?)</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>To prevent invasive species</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESTIMATED CONSTRUCTION COST BUDGETARY RANGE</td>
<td>(based on available data and assumptions = +/- 25%)</td>
<td>$47,400,000</td>
</tr>
</tbody>
</table>

| LONG-TERM MAINTENANCE                                                        |                                                                                  |               |
| Stream Channel Areas                                                        | 50-year O&M period                                                              | $2,500,000    |
| Sediment Storage Areas                                                       | 50-year O&M period                                                              | $7,500,000    |


Risk Mitigation through Insurance Products

Force majeure events can be insured (with certain exceptions, such as armed conflict, terrorism and epidemics). Changes in law are generally uninsurable. Differing site and dam structural conditions, as well as the discovery of archaeological, cultural and historical resources, also are generally uninsurable.

Carrying out the Project may expose the Owner to third-party claims for losses attributable to the performance of the work for the dam removal and restoration. Such potential claims generally involve property damage and bodily injury, and may include damage claims related to diminution in property values; loss of property use; economic losses to businesses; and damage to natural resources. Damage claims may also be brought relating to sediment deposits; the possible expansion of the 100-year flood plain; any impact on water rights and their value; and any impact of electric power availability and its cost. Third party loss claims may be based on any legal theory, including tort, environmental impairment, breach of contract or common law duties or inverse condemnation, and actions could be brought by injured or damaged parties not only against the Owner but also against the Project Contractor and the federal and state governments. Collateral issues such as disputes concerning the ownership of the land underlying the reservoirs may also arise. If the dams are partially removed, liabilities may be associated with the continuing existence of the unremoved portions of the dams.

In general, the costs associated with any such valid claims will be borne by the Owner, as the owner of the demolished property which caused the liability. If the Project Contractor was negligent in performing the work, the Project Contractor is likely to be obligated to indemnify the Owner for some of
such losses and expenses. Project Contractor indemnities usually do not extend to “consequential damages”, and the extent to which any third-party loss or liability may constitute consequential damages can be expected to constitute a consequential damage is usually an important element in the contract negotiations. Insurance should be available to respond to most such third-party claims of loss and liabilities, protecting both the Owner and the Project Contractor, as well as other named insureds.

The Project Contractor will furnish a conventional performance bond from a financially sound surety company, assuring the Owner that the dam removal and restoration will be performed as required. The performance bond operates to further mitigate the risk of Project Contractor non-performance of the responsibilities and risks undertaken in the Agreement. A performance bond is not “insurance” in a strict legal sense, but in broad general terms operates in a similar fashion. The surety’s liability does not extend to Uncontrollable Circumstances or other risks that constitute Project Contractor relief events, and the Owner will continue to bear such risks. As an alternative or in addition to a performance bond, the Project Contractor may also be asked to furnish a standby letter of credit securing performance of the dam removal and restoration. The Owner will have the right to draw on any such letter of credit in the event of a Project Contractor failure to perform, and use the proceeds of the draw as immediate payment for any non-performance damages it is owed under the Agreement.

The Owner also may be exposed to third-party claims of the type discussed above under “Risk of Third Party Losses – Not Caused by Hazardous Substances Or Other Pollution Conditions” based on hazardous substances, pollution or contamination claims. Hazardous substances, pollution, or contamination-based claims are handled separately from other claims because the insurance market fundamentally differentiates these two types of claims by writing separate policies. In general, the risks associated with these occurrences, and the indemnities available from the Project Contractor, will be similar for either type of occurrence.

A variety of insurance policies to deal with potential losses and liabilities that may result from the Project, including any damage to third parties, are commercially available. Standard insurance arrangements generally are reasonably priced and are ordinarily considered to be sufficient to protect the owner and Project Contractor from all but extraordinary classes of risk, subject to the appropriate policy limits. The exact cost of the aggregate Project insurance premiums would depend on the composition, terms and conditions of the insurance policy package.

Based on its industry experience, Willis Insurance provided an estimate for a comprehensive insurance package for removal of the Klamath Hydroelectric Project’s four dams. Assuming a most probable cost of $292 million for that project as a whole, Willis estimated that the aggregate insurance premiums (including the surety’s performance and payment bond premiums) would total approximately $16.5 million, with $10 million allocated to the consolidated insurance program (“CIP”) (worker’s compensation/employer’s liability, commercial general liability, automobile liability, umbrella liability and pollution liability), $5 million allocated to non-CIP coverages (professional liability and commercial property), and $1.5 million allocated to the surety bond (performance bond and payment bond). The insurance estimate there was approximately 6% of the most probable all-in cost. Ultimately, the insurance package put in place for this Project will be based on extensive Project-specific due diligence investigations and can be tailored to address the greatest risks associated with the Project.

The types of insurance policies available to respond to Project risks include (1) worker’s compensation/employer’s liability; (2) commercial general liability; (3) builders’ risk/inland marine; (4) automobile liability; (5) umbrella liability (excess coverage for general liability and automobile liability); (6) pollution liability (contractors’ pollution liability and pollution legal liability); and
(7) professional liability. The Owner and the principal stakeholders generally can be additional insureds on the required insurance policies. The insurance policies that would likely be available are listed below;

1. Workers Compensation / Employer’s Liability / USL&H – coverage for injuries that occur on the dam deconstruction site to individual workers
2. Commercial General Liability – third-party property damage and third-party bodily injury that occurs from activity performed at the dam deconstruction site
3. Builder’s Risk / Inland Marine – property coverage for damage to any equipment or components of the dam that will be restored or salvaged
4. Automobile Liability – coverage for third-party property damage and third-party bodily injury that auto fleet used related to the construction activities
5. Umbrella Liability – excess coverage for General Liability and Automobile Liability
6. Pollution Liability – coverage for remediation costs and third-party property damage and third-party bodily injury arising out of pollution conditions
7. Professional Liability – coverage to protects an insured in the event their client is financially harmed from the rendering of their professional services or advice (including lack thereof) and for which the insured is held legally liable

The insurance industry generally divides coverage between the risks of “known” and “unknown” hazardous substance and other pollution conditions. “Unknown” pollution risks (that is, unknown conditions after a full site investigation) that may be discovered or created later are generally insurable; known pollution risks are not. For example, unexpected additional costs of remediating pollution conditions identified in the full site investigation report generally are not insurable. Although only small and localized pollution conditions are likely to be present, if any unexpected additional remediation costs are incurred, the Owner would need to pay for such costs from available reserves.

Similar to the project specific program noted above for the CGL, Auto and Workers Compensation liabilities, claims for pollution conditions arising out of the contractor’s performance can be insured on a CIP platform as well. Known as a Contractors Pollution Liability policy (CPL), this form of insurance is offered on a claims-made or occurrence basis and provides third-party coverage for clean-up/remediation costs, bodily injury, property damage (including natural resource damages, loss of use and diminution in value) and legal defense expenses, as a result of pollution conditions arising from contracting operations performed by or on behalf of the contractor. Coverage applies to new pollution conditions first commencing during the policy period and the aggravation or disruption of historical contamination directly arising from the contractor’s operations. Coverage can be purchased by the Owner (OCIP) or the Contractor (CCIP).

Another environmental liability policy is known as a Fixed Site Pollution Liability (PLL) and is purchased by the owner to insure claims arising from Pollution Conditions on, at, under, migrating to and migrating from property owned or leased by the Insured. On a project such as Potter Valley this policy would seek to insure the losses not otherwise addressed by the CPL (i.e. Pollution Conditions not caused or exacerbated by the contractors). Core coverage includes on-site & off-site clean-up/remediation costs, third-party claims for bodily injury & property damage (including natural resource damages, loss of use and diminution in value) and defense expenses/legal costs. Subject to the availability of underwriting information, coverage can apply to both new and pre-existing (unknown) pollution conditions whether
sudden & accidental in nature or gradual contamination. Limited coverage for “known” contamination may be available from certain markets.

REFERENCES


OPTION DESCRIPTION:

OPTION D CONSISTS OF COMPLETE DAM REMOVAL AND RESTABLISHING THE NATURAL RIVER CHANNEL THROUGH THE RESERVOIR. THE EXISTING SEDIMENT WILL BE MAINTAINED IN PLACE TO THE MAXIMUM EXTENT POSSIBLE.

KEY OPTION COMPONENTS:

A. REMOVE THE EXISTING DAM ENTIRELY FROM THE DAM FOUNDATION TO THE DAM CREST.
B. REMOVE THE VALVE HOUSE AND LOW LEVEL OUTLETS.
C. RESTORE THE NATURAL RIVER CHANNEL THROUGH THE RESERVOIR. MAINTAIN SEDIMENT IN PLACE WITHIN THE RESERVOIR AREA. REGRADE, STABILIZE, AND REPLANT THE NEW RIVER CHANNEL TO PROVIDE STABLE OVERBANK AREAS AND MAIN RIVER CHANNEL.
D. MODIFY THE EXISTING RIVER CHANNEL TO RESTORE THE NATURAL RIVER CHANNEL.

SCALE: 1" = 30'
Green - Main Channel
Blue - Outer Banks
Pink - Sediment Storage Areas
Yellow - Dam Area

Approximate length of all proposed streams - 78,200ft

Approximate area of Main Channels - 89.6ac
Approximate area of Outer Banks - 71.8ac
Approximate area of Dam Area - 5.9ac
Approximate area of Sediment Storage Area - 217.6ac
Approximate area of Lake - 1490ac

Approximate volume per 1ft of average depth:
Main Channels: 145,000cy
Outer Banks: 116,000cy
Dam Area: 9,600cy
Sediment Storage Area: 351,000cy