



**Proposal for**

# Los Padres Dam Fish Passage Feasibility Study

Monterey Peninsula Water Management District



March 25,  
**2016**



# 06 Technical Aspects of Proposal

Through our previous experience developing and implementing this similar study plan with United Water, our team members are familiar with the challenges, advantages, and disadvantages of specific technical approaches contained therein. Nearly all of this prior work was completed by the key staff and/or organizations included on our team. Given our team's recent successful completion of the Santa Felicia study and our experience at Los Padres Dam (LPD), our team has a high level of insight to the applicability and associated level of effort required to complete the study plan tasks outlined in the RFP.

In addition to our experience with the Santa Felicia study, our team's specific approach to conducting this proposed study also recognizes the prior efforts examining fish passage at LPD. We recognize some of the limitations imposed on the previous LPD study and anticipate that this newest endeavor will foster a far more effective environment for success. The proposed effort will be benefited by the following factors offered by the HDR team:

- Key staff members on HDR's proposed team reflect decades of experience with numerous fish passage programs and facilities throughout the western U.S., Pacific Northwest, and Canada. As shown in Section 3 of this proposal, our resume of completed projects has given this team first-hand experience with the most relevant and applicable fish passage technologies throughout the nation, including those studies directly referenced in the RFP (Alameda Creek Diversion Dam, Santa Felicia, and the Susitna-Watana Hydroelectric Project). This experience is augmented significantly by our Carmel River experience gained over the past 16 years beginning with a year 2000 study developed by R2 reviewing "Carmel River Dam Fish Passage Facilities," continuing through HDR's successful design and construction support of the Los Padres Dam Downstream Fish Passage Project, and through AECOM's involvement in the recent removal of San Clemente Dam.

- Regular and direct communication with fisheries resource agencies and DSOD facilitated through the TRC process will improve collaboration and understanding of project expectations beyond what was achieved during previous feasibility studies at LPD. Our team has incorporated meeting facilitators that will focus on achieving meeting or workshop goals, clearly coordinate the transfer of information with all parties, and accurately document discussions, decisions, and action items. Through integration of our coordination and meeting facilitation team, we anticipate clearer focus on combined objectives and more effective communication and feedback from the District, Cal-Am, and additional partners that make up TRC and Advisory Group.
- HDR team members have had the opportunity to work with DSOD through design approval and construction of a fish passage project at LPD in addition to numerous other projects. We have navigated through their concerns for the existing facility and have developed defensible and implementable solutions when others could not. We recognize the importance and potential limitations that limit the type, size, and configuration of fish passage facilities at LPD and feel that our site-specific experience will improve communication and efficiency, while performing the proposed work tasks. To proactively augment this project need, our team includes a liaison to communicate with DSOD, define structural and geotechnical constraints, refine criteria, and inform the fish passage alternative development process.

The HDR team has a high regard for the scope of work and available budget. As the primary authors of both the Santa Felicia and Susitna-Watana scopes of work, these study plans were developed to do more than just develop the most promising alternatives. These study plans were very formal and structured to not only develop alternatives, but to thoroughly inform stakeholders of the available options, chances

of success, complexity, reliability, and costs. The Santa Felicia study was also part of a FERC relicensing effort. Our experience with similar studies, and level of effort can vary widely based on the specific owner needs. To fully inform the selection committee, the two studies used to formulate the Los Padres study plan in the RFP were based on cost well over \$1 million each to fully implement. When preparing this proposal, the HDR team estimated a potential project cost to fully implement the study plan – as stated in the RFP – in excess of \$400,000.

The HDR team proposes to be responsive to this opportunity and to carry out the work and provide the deliverables following the general outline and detailed scope of work presented in the RFP. However, we also desire to provide value, effectiveness, and cost awareness to the project partners using our knowledge of this process and the budget constraints potentially limiting this effort. Therefore, the following technical approach is modified from the original technical study plan presented in the RFP to accommodate the budgetary limitations known for this project, while still maintaining defensibility, transparency, and integrity of the intended study plan.

Given the experience and high capability of the HDR team we are confident we can complete the specific scope of work within the anticipated 18-month timeline of the study. As noted in a recent answer to a RFP question, it is desired to conclude the study sooner. Using the approach outlined here in this proposal, and if agreed to at the time of contracting, we can anticipate being able to complete the study within 15 months.

### Consultant Team Specific Scope of Work

The feasibility evaluation includes six main tasks, as outlined below, with specific detail and deliverables. This specific scope of work will become the study work plan upon initiation of the project.

#### Task 1 Feasibility Study Preparation (Consultant)

The intent of this task is to compile, synthesize, and document pertinent key background information that characterizes the operational, physical, and biological basis of study for this

project. The resulting information will be used to shape key decisions in the feasibility process, as well as inform the type, size, and configuration of technically, ecologically, and financially feasible alternatives to fish passage at LPD. This task will result in three key deliverables that will be used to communicate key baseline information, physical and operational constraints, target biological performance goals, and the initial framework upon which fish passage alternatives will be evaluated. Those basic deliverables include: 1) a compilation of background information summarizing the key operational, physical, and biological basis of study for this project; 2) project work maps illustrating the physical configuration of the exiting project area; 3) a list of criteria and their definitions that will be proposed to be used as the basis comparison and evaluation throughout the development and selection of potential fish passage alternatives; and 4) generation of an initial data gaps log with potential pathways for addressing them. The development of these basic building blocks is described in more detail in the following sections.

#### TASK 1-1 COMPILE BACKGROUND INFORMATION

The HDR team will begin the feasibility process by obtaining available background information and data that characterizes the operational, physical, and biological considerations influencing the development of potential fish passage options and subsequent alternatives. Given this team's experience on the Carmel River and at LPD, we anticipate the compilation of background information to be efficient and will build upon previous work performed by this team. The resulting information will be synthesized, documented, and distributed to the TRC members prior to TRC Meeting No. 1 to become more easily familiar with the key and essential conditions unique to this project location.

The background information for this project is intended to represent the primary foundation upon which each option or alternative is developed. Information obtained for this project will be lumped into three basic categories as follows:

- **Physical data** that describes physical layout of the facility stilling pool, dam, spillway, abutments, reservoir, and adjacent hill slopes, in addition to the flow frequency and

quantity that passes through the reservoir and down the Carmel River. This also includes any available stage vs. discharge data, temperature, or water quality data that has been recorded and can be made available. The HDR team is thoroughly familiar with the site and feels that much of the information already existing in the 2009 Administrative Draft Fish Passage Assessment can be amended, updated, and augmented with any new information available through the District or already collected as part of projects recently completed by HDR. Reservoir data from water years subsequent to 1999 can be added to the period of record and characterized into wet, normal, and dry operational conditions. Additional USGS and District records can be combined with the previous period of record to update the available hydrology data set. The updated hydrology and dam stage records can be used to select appropriate ranges of flows and reservoir elevations anticipated during the periods of fish migration established as part of this task.

- **Operational data** pertinent to the current purpose, function, and objectives of LPD are to include any rule curves, instream flow enhancement objectives, operational scenarios or characterizations, historic reservoir stage data, maintenance requirements, outlet works operations, safety requirements, or similar type information related to the reservoirs function and specific measures required to achieve facility objectives. It will be necessary as part of this process by which the Carmel River instream flow committee uses information to make reservoir releases during summer low-flow periods.
- **Biological data** and fisheries resources will be summarized, including a clear description of the species and life stages targeted for upstream and downstream passage (inclusive of other steelhead and resident life histories exhibited in the Carmel River), migration periodicity for each target species and life stage, known fish abundance and estimates of current and future peak rates of migration, and biological performance objectives for the Carmel River. The team recognizes that only limited data regarding upstream and

downstream migration will be available for this study. The Consultant Team will collect additional data obtained at San Clemente dam prior to its decommissioning, trap and transport data available for the LPD adult fish collection facility operations, in addition to trapping and monitoring data of juveniles and adults available through efforts by the District. This newest information can be used to augment the baseline already established in the 2009 report. As required in other tasks, the information gaps present in the biological framework will be identified and discussed with the TRC.

*Deliverables: a compilation of background information that characterizes the physical, operational, and biological basis for this project*

#### **TASK 1-2 OBTAIN BATHYMETRIC AND TOPOGRAPHIC DATA FOR LOS PADRES RESERVOIR**

As part of previous projects, the HDR team has been involved in the use, evaluation, and collection of various forms of survey and bathymetric information for the project area. We recognize that the California State University of Monterey Bay conducted bathymetric data collection and calculation of a stage-volume relationship in 2008. We also recognize that substantial sedimentation was anticipated in the years following the 2008 survey, which has likely modified lake bed contours and the stage-volume relationship. As part of the 2010 fish passage facility design work performed by HDR, Cal-Am hired Bestor Engineering to perform detailed aerial mapping and surveys of the dam, spillway, dam face, stilling basin and outlet areas. Bestor was asked to augment bathymetric information present in the stilling basin and additional information was later added to the available survey files and stitched together with available reservoir bathymetry in February of 2011.

In addition to the quantitative information generated as part of previous work performed at LPD, both Jon Mann and Mike Garello were present at the site throughout various periods of design and construction during implementation of the downstream fish passage project. During those efforts, Mike and Jon had the opportunity to observe and photograph conditions representing extremely low reservoir elevations and an empty stilling basin. These

first-hand accounts bring additional insight and applicable experiences which are useful when characterizing reservoir, and stilling basin conditions with respect to their influence on fish collection, fish passage, and fish passage facility development.

While a combination of laser scanning and multi-beam bathymetry will result in a highly detailed and accurate surface model of the reservoir and surrounding upland areas, using these technologies can be costly and may provide a level of detail that exceeds the requirements for the deliverables outlined in the RFP. These technologies are traditionally used to characterize specific features on the landscape (submerged objects, dredging trenches, buildings, and other facilities), which are not included in the list of deliverables for this task.

HDR has provided the same types of required deliverables for other clients while utilizing less costly methods that still meet the RFP requirements. HDR recommends that an approach that utilizes single-beam bathymetric survey methods combined with aerial LiDAR for upland areas be considered. This approach would still provide accurate volumetric information at 5-foot vertical intervals or better within the reservoir area and the cross sections at 100 feet horizontally per the RFP.

Single-beam sonar data survey data will be collected in parallel and perpendicular transects at a variable spacing in order to best delineate the bathymetric elevations in an efficient manner given the special extents of reservoir features. A transect will also be run along the perimeter of the ponds so that the border of the ponds is captured for surface and contour generation (i.e., so interpolation is not required to fill in the perimeter).

Sonar will be mounted off the bow or side of a vessel on a pole. A standard bar-check (defined in USACE Hydrographic Surveying Manual EM 1110-2-1003) will be used to calibrate the echosounder. Calibration facilitates proper determination of measured water depths based on speed of sound in the water. GPS receiver will be mounted on top of the sonar pole mount if possible; or, the horizontal offsets will be measured and applied during post-

processing to ensure proper positioning of measured soundings.

The sonar will comprise a 200 kHz frequency (Standard frequency for bathymetric surveying). A 3.5 degree transducer (i.e., small beam width) will be used to obtain the most accurate soundings. A differential kinematic GPS (RTK GPS) will be used to position the soundings centimeter accuracy.

HDR has also determined that aerial LiDAR was collected in 2010 for the region surrounding and including the Los Padres Dam and Reservoir. These data have 2-meter point spacing and are vertically accurate to approximately 10 centimeters (0.3 feet). A processed bare earth DEM is publically available to characterize upland areas in the vicinity of the reservoir and convert it to the project coordinate system and Datum. LiDAR scientists from the HDR team would then evaluate the data for any inconsistencies or errors. Assuming no errors are discovered or discovered errors can be easily reconciled, members of the HDR team would collect RTK field topographic positions to supplement and validate the aerial LiDAR data, focusing efforts on the upstream extent of the data to ensure any above Normal Maximum Water Surface Elevation (NMSWE) area calculations accurately represent the extent of upstream contours. If previous upland surveys are available from previous efforts.

While a multi-beam survey provides a census level representation of the inundated reservoir area, a single-beam survey is a sampling methodology intended to characterize trends. The area in between transects will be interpolated using industry standard methodologies, resulting in a volumetrically unbiased and accurate representation of the reservoir bottom.

The information collected will be synthesized into compiled GIS and AutoCAD compatible formats to develop representative 3D surface visualizations, create representative cross-sections, and to verify the reservoir inundation areas and hydraulic pathways suitable for fish passage at discrete intervals (5 feet or smaller) of elevation.

*Deliverables: a report describing methods used; a digital elevation model of Los Padres Reservoir; reservoir cross-sections at 100-foot intervals; and inspection reports, including photos and descriptions of passage through reservoir sediments*

### **TASK 1-3 PREPARE EVALUATION CRITERIA**

In addition to compilation of background material, the Consultant team will begin tailoring project-specific definitions of the comparison and evaluation criteria. These specific criteria will be categorized as technical, biological, and economic feasibility criteria. Refinements to these definitions will be made initially based upon known challenges and experiences as part of the Santa Felicia project, as well as the team's knowledge of various LPD project constraints. A draft list of criteria and definitions will be prepared for distribution and consideration prior to the TRC Meeting No. 1.

*Deliverables: draft feasibility criteria*

### **TASK 1-4 IDENTIFY CRITICAL DATA GAPS**

The Consultant Team will identify missing or additional key information and will provide recommended steps to acquire the necessary material. In some cases, data gaps and the need to collect additional information will require direct communication with the TRC. The process to address any information gaps will be identified based on the specifics of the necessary information, and a plan to address this information need will be formulated for TRC and Advisory Group review. In some cases, reasonable and defensible assumptions may be adopted by the TRC for the purposes of carrying out this study. In other cases, a clear path forward to obtain additional data may need to be formulated. It is assumed that any additional data collection not specifically stated in this technical scope of work will require additional contract modification with the Consultant Team. All data gaps, decisions, working assumptions, and corresponding methods for resolving data gaps will be recorded in a data gaps log that will be tracked as a living document throughout the course of this study. Critical data gap identification and resolution is intended to occur throughout various study plan work activities rather than at discrete points in the study plan.

*Deliverables: data gaps tracking log which identifies missing data or information and a proposal for acquiring data or information*

### **Task 2: Prepare Biological Performance Tool (Consultant and TRC)**

*"South-Central California Coast Steelhead are adapted to deal with highly variable rainfall and temperature conditions, but are otherwise similar to other steelhead." California Trout*

Successfully restoring South-Central California Coast steelhead (SCCCS) access to and from spawning and rearing habitats upstream of Los Padres Dam (LPD) involves a range of biological, engineering, and environmental considerations. SCCC exhibit variations in life history strategies, including age at migration, migration timing, and habitat use. These different life history strategies (for example, fluvial anadromous, freshwater resident, and lagoon anadromous) allow SCCC to take advantage of changes in environmental conditions caused by drought, fire, or floods. Little is known about the proportion of juvenile steelhead exhibiting these variations in life history strategies, and life history expressions may change from year to year, and from upstream to downstream habitats. These variations in life history are particularly challenging when evaluating the influence of alternate fish passage facility designs. One tool to assist in fish passage feasibility evaluations is a BPT.

When faced with the need to integrate site-specific hydrology, dam, reservoir, and river features, localized steelhead life histories, and site-specific migration cues, R2 and HDR team members, in coordination with water district, state, and federal biologists, developed a quantitative tool to evaluate site-specific conditions for steelhead passage at Santa Felicia Dam, California. The BPT was successfully used to evaluate optimum hydraulic capacities of alternate downstream fish passage facilities and estimate steelhead migrant survival for alternate reservoir and dam passage scenarios.

The BPT can be adapted to calculate survival indices based on size, timing, and environmental conditions of migrating steelhead and evaluate fish passage facility performance under a range of life history expressions. This ability to evaluate

the influence of alternate facilities under a range of life history assumptions will be particularly useful for LPD where the proportion of SCCCS migrating as fry, yearling, multiple-year smolts, or adults may be poorly understood.

The Consultant Team will develop a BPT that will be used to estimate potential steelhead passage survival using the downstream fish passage concepts identified and refined in the feasibility study. In addition, compiling information on upstream steelhead migratory behavior based on collected data will help identify the type, location, size, and timing of potential upstream fish passage facility components and the necessary coordination with existing downstream passage facilities. Additional information needs may be defined during the compilation and studies may be outlined and planned for implementation to provide such information. The proportion of the migrant population using each alternative and the estimated survival associated with new upstream pathways will determine the biological performance and contribute to the feasibility evaluation of fish passage concepts identified and developed in the study. Where information on Carmel River SCCCS is lacking, the BPT will be used to evaluate facility performance under a range of life history strategies.

#### **TASK 2-1 COMPILE BACKGROUND INFORMATION ON MIGRATORY PATHWAYS (CONSULTANT)**

Information needed to develop and populate the fish passage model (that is, the BPT) includes physical, hydraulic, and biological information on conditions in the watershed and in particular at Los Padres Reservoir, flow releases, and operational characteristics of downstream fish passage facilities. Results of studies conducted at other water control projects, conceptual-level drawings of potential fish passage facilities, and, where appropriate, the professional opinions of the TRC may also be compiled.

Passage conditions will be evaluated using average daily flow data for representative average, wet, and dry years. Project operations data will include daily reservoir water surface elevations, average daily flow releases through the outlet pipes and spillway, and periodic water quality data. Recent data on releases from storage and reservoir pool levels will be reviewed. This is presumed to be representative of current

and proposed future conditions. Representative years will be selected in coordination with members of the TRC to evaluate fish passage facilities. Information compiled as part of Task 2-1 will be used to populate the fish passage model and will be presented with a progress report at the end of this task.

*Deliverables: technical memo characterizing available Los Padres Reservoir data and recommendation of target flows/reservoir elevations for passage, and a review of studies and concepts appropriate to LPD fish passage*

#### **TASK 2-2 REVIEW AND IDENTIFY CRITICAL BIOLOGICAL DATA GAPS (CONSULTANT AND TRC)**

The TRC will discuss the information compiled during planned meetings and determine its completeness for the fish passage biological evaluation needs. Evaluation of upstream and downstream migratory pathways requires structural and hydrologic information and assumptions regarding steelhead behavior. No site-specific data are available to make survival estimates, so these will depend on data collected at similar facilities, literature values, or professional opinions of the researchers.

As noted in the RFP, the focus of this study is on the engineering constraints, biological needs of steelhead (i.e., ability of different life stages to use a particular alternative), and the economic costs of volitional passage. Should definitive data on steelhead use and population in the upper watershed become available, it could be factored into the recommendations for this study.

If additional information is needed, the TRC will work with HDR to take appropriate steps to acquire the necessary material or develop reasonable assumptions. The process to address information gaps will be identified based on the specifics of the information. If data gaps are identified that prove critical to the feasibility evaluations and TRC recommendations, the TRC will identify the most appropriate means to fill those gaps, including influence on ability to complete a meaningful analysis, timing to acquire and evaluate the information, and potential outcomes, as they could affect the recommendations by the TRC. This task could be combined with the efforts under Task 1-4 for identifying the critical data gaps. The following

steps will be utilized in Task 2-2 as led by the HDR team:

- Perform a background review of biological information, and identify information needs
- Identify any biologically-related critical data gaps
- The TRC will review information from Task 1 (background) and Task 2 (BPT) with the Consultant to determine suitability for work to evaluate passage facilities. It is expected that review will be completed using web access

*Deliverables: incorporation of data needs into the data log developed as part of Task 1-4*

### **TASK 2-3 DEVELOP AND POPULATE FISH PASSAGE MODEL WITH AVAILABLE INFORMATION**

The Consultant Team will evaluate potential fish passage facilities at the Project using the BPT that tracks survival at LPD and reservoir. BPT will be used to conduct a relative comparison of the biological performance of downstream fish passage facilities. An evaluation of the uncertainty and sensitivity of the assumptions used to develop the mathematical functions will provide an indication of the robustness of modeling results. Evaluation of critical parameters, and background information available to define them, will be evaluated to determine the influence of the values in evaluating the potential feasibility of fish passage facilities.

The following steps will be utilized in Task 2-3:

- Finalize BPT, which will be a spreadsheet-based passage evaluation model.
- Populate the model with data and perform sensitivity runs to assess the model's output prior to use on the fish passage concepts and alternatives.

*Deliverables: a compilation of background information related to the project biology; a draft of the spreadsheet based model and data set; and a sample of a model run with output and a preliminary sensitivity analysis*

### **Task 3: Identify Fish Passage Concepts (Consultant, TRC)**

This task is a crucial first step to enlist the TRC in agreement on the fish passage concepts to be evaluated and builds upon the knowledge gained from compiling existing baseline data and establishing the site-specific operational, physical, and biological basis of design completed in previous tasks. Our approach includes the development and early distribution of a functional fish passage technology assessment and determination of applicability to the TRC for review and consideration prior to the TRC Meeting No. 1. The functional assessment is performed by starting with the basic building blocks of fish passage (e.g., attract fish, guide fish, collect fish, convey fish, transport fish, hold fish, etc.). All known technologies that accommodate each function will be identified and cross-referenced with applicable NOAA and CDFW design criteria, site-specific physical conditions, and biological objectives. Technologies with higher levels of applicability will be identified and recommended for use in development of alternative concepts. Technologies with limited applicability will be flagged for consideration. Technologies appearing to have fatal flaws or only limited levels of applicability to site specific conditions will be recommended for removal from consideration. Technologies and their applicability will be based upon their use at other existing facilities, known successes or failures, and their range of documented performance at other locations. Experimental technologies will be accommodated in the process as available information allows. For example, technologies such as WHOOSH and passive multi-level fixed collectors with a helical bypass (the Helix) will be discussed. Consultant team will formulate and list conceptual-level alternatives based upon the results of the functional assessment that will be introduced to the TRC for discussion purposes. The results of the functional assessment and compilation of conceptual alternatives will be distributed to the TRC for review and consideration three to six weeks prior to the meeting, in addition to the operational, physical, and biological baseline data already prepared as part of Tasks 1 and 2.

This brainstorming tactic is a normal and very necessary part of concept development and has been successfully used in our other projects such as the fish passage feasibility studies performed by HDR and AECOM on Alameda Creek and by HDR on the Chehalis Basin Strategy Project. On these occasions, the preliminary functional assessment was prepared and submitted to the corresponding technical committee for review, consideration, and to initiate discussion. The resulting document provides a cross-section of potential building blocks (fish passage technologies or components), an initial discussion on their applicability relative to specific project goals and site-specific conditions, a list of potential alternative concepts compiled from the most applicable fish passage technologies, and discussion relative to the inclusion or removal from further evaluation and alternative formulation. TRC participants will have time to consider the listed technologies and come to TRC Meeting No. 1 prepared with additional information and feedback.

### **TASK 3-1 TRC MEETING #1 – CONCEPT WORKSHOP**

Under the coordination and guidance of the meeting facilitators provided by the HDR team, the TRC and HDR team will meet to discuss the results of the fish passage functional assessment and will consider the selection of fish passage concepts for further evaluation in light of dam operations, physical, and biological information collected as part of Tasks 1. The meeting will include a presentation summarizing the primary operational, physical, and biological parameters that inform the type, size, configuration and effectiveness of fish passage technologies or concepts. Additional review of proposed comparison and evaluation criteria will be conducted to make sure that all attendees are approaching discussions and consideration of options off of the same basis of comparison. Potential for fatally flawed options and technologies that don't appear to meet performance expectations or specific constraints identified by DSOD or others will be discussed. Ultimately, the TRC will collaborate closely with the HDR team to create a list of technically feasible concepts that meet the basic criteria for further consideration and to define what constitutes fatal flaws for feasibility. Concepts selected for further consideration

will be assembled into like categories and considerations for upstream, downstream, and combined passage facilities will be addressed. Documentation for concepts not selected for further evaluation will be developed for the project record.

An initial alternative evaluation matrix will be formulated based upon any refinements made to the evaluation criteria that occur during the TRC Meeting No. 1. It is assumed that the matrix will be based upon a grid analysis technique (Pugh Matrix) with weighted evaluation criteria and scoring of how well each alternative meets the evaluation criteria definition. Decisions regarding the weighting of each evaluation criteria, as well as the ranking or scoring of alternatives will be made at this meeting. For example, incorporation of criteria weighting techniques, such as the unranked paired comparison technique, can be employed here to manage the subjectivity introduced into the process and to maintain the integrity of the grid analysis approach. The HDR team will facilitate the discussion by providing numerous previous examples, from other successful projects completed by the HDR team, their advantages and disadvantages, and discussion of tradeoffs as part of this meeting. A refined draft of the grid analysis technique will be defined and agreed upon prior to the end of the meeting.

Prior to adjourning, a summary of decisions recorded, next steps, milestone dates, and priority information needs will be discussed and included for the meeting documentation.

It is assumed that a facilitator and project manager from the HDR team will attend the meeting in person while the remaining participants from the HDR team will attend via conference call, webinar, and/or video conference to control meeting costs in a manner that maintains meeting effectiveness and efficiency. The HDR team will provide the means for conference calling, webinars, and or video conferencing as long as phone lines and high speed internet connections are available.

*Deliverables: electronic copies of a technical memo describing design parameters, functional fish assessment of fish passage technologies, initial summary of concepts, evaluation criteria and definitions, and initial analysis; base drawings; and a workshop agenda*

### TASK 3-2 MEETING #1 SUMMARY

The Consultant Team will prepare a document summarizing the primary discussion topics and results of TRC Meeting No. 1. The document will clearly note meeting discussion topics, accomplishments, major decisions, next steps, milestone dates, and priority information needs. This summary document will be distributed within two weeks of the meeting date to the TRC and to the Advisory Group. As part of the summary, updates and refinements to work products prepared in previous tasks will be incorporated as a result of the feedback obtained during the TRC Meeting No. 1.

*Deliverables: meeting summary, including updated criteria document and a draft evaluation spreadsheet; list of fish passage concepts identified in the session; list of additional information necessary to reduce uncertainty or risks associated with each concept; a discussion of the fatal flaw analysis and documentation of concepts eliminated from further consideration at this time; status update on the biological performance tool and any further development recommended by the Panel; and a short list of fish passage concepts for further development*

### Task 4: Alternative Development and Refinement (Consultant and TRC)

The intent of the Task 4 activities is to use the concepts selected for further evaluation in Task 3, formulate a series of fish passage alternatives, and develop initial narrative and illustrative products to depict the type, size, configuration, functionality, and operation of each alternative. Site-specific constraints, as well as risk and uncertainties for each alternative, will be defined as part of this task. The alternative development process includes the following steps: 1) development of alternatives; 2) scoring of initial alternatives using the grid matrix with input from the TRC; 3) refinement of alternatives based upon the results and feedback obtained in TRC Meeting No. 2; 4) submission of refined alternatives and scoring matrix to TRC for independent review and feedback, and 5) facilitation of teleconference webinar to discuss comments and feedback prior to preparation of the Draft Fish Passage Feasibility Report. These activities associated with Task 4 are described further in the following sections.

### TASK 4-1 DEVELOP INITIAL CONCEPTS INTO ALTERNATIVES (CONSULTANT)

The Consultant Team will use the concepts selected for further evaluation as part of Task 3 and begin the process of formulating comprehensive fish passage alternatives that address the objectives and constraints for this project. In general, each alternative will be developed to clearly define the type, size, and configuration of the primary alternative components and also to describe its theory of operation, anticipated functionality and performance with respect to site constraints, and anticipated environmental operating conditions. The physical illustration and description of components will be developed to a level of detail sufficient to inform Class V Opinion of Probable Construction Cost (OPCC) development.

As the alternatives are developed, the HDR team will identify any concepts or alternatives that appear to be fatally flawed or infeasible. Those alternatives will be modified if possible or a recommendation for removal from evaluation will be made to the TRC. The HDR team will retain at least one upstream volitional alternative for further evaluation during this alternative development process.

For each alternative, the HDR team will generate both narrative and illustrative information as follows:

- A clear narrative description summarizing the primary alternative components and theory of operation
- Hydraulic operational parameters and characteristics created as figures in the text or HGLs on the drawings
- Plan and sectional drawings to scale on 11x17 drawing sheets
- Benefits, risks, and a comparison of advantages and disadvantages comparable to other alternatives being formulated based upon the evaluation criteria developed in Task 3
- Results from application of the BPT
- Initial OPCC values and summary of relative anticipated operating costs (high, medium, or low)

As part of this task, the Consultant will compile the grid form evaluation matrix based upon the evaluation criteria established in Meeting #1 and the alternatives developed as part of this task. Scores for this matrix will be left blank and the matrix will be prepared for use in TRC Meeting No. 2 described below.

All OPCC and operational costs will be developed to a Class V level of detail based upon the information available at the time. As requested in the RFP, cost data will be developed for comparative purposes. The Consultant Team recognizes the risk and uncertainty in developing costs for complex facilities such as the type of projects implemented for the purposes of fish passage. An article titled "Planning Pacific Salmon and Steelhead Reintroductions: Aimed at Long-Term Viability and Recovery," in the North American Journal of Fisheries Management (Anderson, Joseph et. al., 2014) discusses the disparity between costs incurred and populations recovered. To proactively inform our ability to accurately address project costs and to reduce the disparity between planning level costs and actual costs that are realized by so many project owners throughout the Pacific States, the HDR Team has compiled lists feasibility level, design level, and construction level cost data for numerous similar facilities throughout the Pacific implemented in the past decade. These activities were performed as part of the feasibility evaluations recently performed for many of the projects presented in our team qualifications. Given the availability of this information, The HDR Team will employ the use of parametric cost estimates, scaled and calibrated to this site for the purposes of cost development.

*Deliverables: compilation of narratives and illustrations of alternatives; a compiled evaluation matrix; and supporting documentation*

**TASK 4-2 MEETING #2 – REVIEW AND REFINE ALTERNATIVES (CONSULTANT, TRC)**

The facilitation experts provided by the Consultant Team will coordinate and facilitate a second meeting with the TRC. The overall intent of the second meeting will be to discuss and refine passage alternatives while focusing on the initial completion of the evaluation matrix. In a collaborative forum, rates will be selected to represent how well an alternative achieves a given evaluation criteria based upon

the system generated in Task 3 and results will be computed representing the overall score given to an alternative. Higher scores will represent alternatives that reflect a great level of compatibility with the selected evaluation criteria. The results of the grid analysis will be used as a decision tool to further refine facility components, identify data gaps, and assess the potential influence of sensitivity and uncertainties. A progress summary on the use of the BPT as well as identification of additional fatal flaws or modifications required for alternatives will be discussed.

HDR team will incorporate the results and feedback obtained during Meeting No. 2 to update descriptions and drawings for the fish passage alternatives to more effectively meet project objectives. The results will be presented to the TRC at the meeting, with the goals of receiving input and the TRC reaching consensus on a list of alternatives for final refinement in Task 5.

It is assumed that a facilitator and project manager from the Consultant Team will attend the meeting in person while the remaining participants from the Consultant Team will attend via conference call, webinar, and/or video conference to control meeting costs in a manner than maintains meeting effectiveness and efficiency. The Consultant Team will provide the means for conference calling, webinars, and or video conferencing as long as phone lines and high speed internet connections are available.

*Deliverable: meeting coordination, workshop agenda, and attendance*

**TASK 4-3 MEETING #2 SUMMARY**

The Consultant Team will prepare a document summarizing the primary discussion topics and results of TRC Meeting No. 2. The document will clearly note meeting discussion topics, accomplishments, major decisions, next steps, milestone dates, and priority information needs. As part of the summary, updates and refinements to work products prepared in previous tasks will be incorporated as a result of the feedback obtained during the TRC Meeting No. 2. The HDR team will incorporate updated narratives, illustrations, and supporting documentation of draft fish passage alternatives. This summary document will be distributed

within three weeks of the meeting date to the TRC and to the Advisory Group.

*Deliverables: status update on the biological performance tool and any further development recommended by the TRC and/or Group; final evaluation spreadsheet; list of fish passage alternatives identified in the session; list of additional information necessary to reduce uncertainty or risks associated with each alternative; discussion of the fatal flaw analysis and documentation of alternatives eliminated from further consideration at this time; and a recommendation of alternatives for further development.*

#### **TASK 4-4 TELECONFERENCE MEETING #3**

The facilitation experts provided by the HDR team will coordinate and facilitate a third meeting with the TRC for the purposes of reviewing the most up-to-date alternative descriptions, performance data, and to review feedback on the revised work products distributed in Task 4-3. The agenda will also include a discussion topic focused on the elimination of any alternatives that appear to be less favorable from a performance or feasibility level. During the meeting, the TRC and the HDR team will work collaboratively to perform a final determination of volitional passage, adjust prioritized or ranked alternatives based upon their scoring and relative level of performance with respect to project evaluation criteria, and to agree on recommendations for the final documentation.

If, at the conclusion of this meeting, the consensus is that upstream volitional passage is not feasible, the reasoning and justification for this conclusion will be documented for the project record.

The Consultant Team will record results and feedback obtained during Meeting No. 3 and will incorporate updated narratives, illustration, and supporting documentation of the final fish passage alternatives into the Draft Fish Passage Feasibility Report prepared as part of Task 6.

It is assumed that attendance will be via conference call, webinar, and/or video conference to control meeting costs in a manner that maintains meeting effectiveness and efficiency. The Consultant Team will provide the means for conference calling, webinars, and or

video conferencing for participants that have access to high speed internet.

*Deliverables: meeting coordination, agenda, and attendance, documentation of the meeting and revisions to alternatives will be incorporated into the Draft Fish Passage Feasibility Report.*

#### **Task 5: Present Final Set of Passage Alternatives (Consultant, TRC with Advisory Group input)**

The objective of Task 5 will be to communicate with the Advisory Group the results of Tasks 1 through 4 and obtain feedback from the community prior to finalizing the fish passage alternatives.

#### **TASK 5-1 PRESENT FINAL SET OF PASSAGE ALTERNATIVES (CONSULTANT, TRC, ADVISORY GROUP)**

The Consultant Team will coordinate and facilitate a meeting with the TRC and Advisory Group to discuss the refined set of passage alternatives developed and updated as part of Task 5 activities.

*Deliverable: meeting summary that includes comments from the Advisory Group; a copy of any written materials submitted by the Advisory Group; and any follow-up response from the Consultant or TRC*

#### **Task 6: Reporting and Fish Passage Recommendations (Consultant and TRC)**

Task 6 is structured to organize and report on the full development of the final fish passage alternatives. A draft and final feasibility report will be developed that will document the process followed, development of fish passage alternatives, evaluation criteria, summary of alternatives eliminated with justification for the eliminations, a final feasibility evaluation and the final recommended alternative(s). Each alternative selected will be described with text and conceptual level design drawings, an OPCC, estimate of operating and maintenance costs, an implementation schedule and description of construction issues, listing of pros and cons, and a summary and details of the final evaluation.

At least one volitional alternative for upstream passage will be described, regardless of its feasibility; however, if all volitional alternatives are determined to have one or more fatal flaws,

the additional work described in this task may not be carried out.

The final feasibility report will include the TRC recommendation regarding the technical and biological feasibility of providing volitional steelhead passage at LPD and other recommended alternatives. If a volitional passage facility cannot be recommended due to site constraints, uncertainties, or other factors the final report will document the rationale. Recommendations for next steps will be developed, which might include: fish passage alternatives to be pursued; further studies, if needed to address uncertainties or risk; or additional analysis to determine economic feasibility. The draft report will be presented to the TRC and Advisory Group for input.

Depending on the nature of comments, the draft report may be finalized or, if additional issues are raised, the report may be amended and recirculated for final review.

#### **TASK 6-1 PREPARE DRAFT FISH PASSAGE FEASIBILITY REPORT (CONSULTANT, TRC)**

The Consultant and TRC will review the final set of alternatives and recommendations made by the Advisory Group and the TRC will make a final recommendation. A Draft Fish Passage Feasibility Report will be developed in this task to document the scope of the study, background information used, design criteria, the process utilized to conduct the feasibility analyses, the results of the analyses and the TRC recommendation. It is anticipated that the report will include the following contents but that the final outline will be based upon comments received from the TRC and Advisory Group as part of Task 5:

- Introduction
  - Problem statement
  - Purpose, objective
  - Fish passage goal statement
  - Relevance to Steelhead Recovery Plan
  - Overview of the study process
  - Summary of meetings, coordination, and progress reports
- Overview of the BPT
  - Overview of the spreadsheet based fish passage model

- Descriptions of alternatives
  - Short descriptions of all initial brainstorm concepts (functional assessment of fish passage technologies)
  - Documentation of concepts that were dropped for fatal flaws or low ranking
  - Preferred concepts
  - Detailed physical, functional, and operational descriptions
  - Summary of disadvantages and advantages
  - Implementation challenges and uncertainties
  - Constructability considerations
  - Expected performance for upstream and downstream fish passage (based on the biological performance tool)
  - Opinions of probable construction and operating costs
  - Two to five scale drawings will be provided for each alternative, with applicable site overviews, site plans, sections, elevations, and hydraulic design parameters clearly defined.
- Evaluation of Alternatives
  - Description of evaluation process
  - Description of evaluation matrix and criteria
  - Weighting and scoring
  - Criteria that could lead to fatal flaws
  - Graphics and summaries of evaluation
  - Ranking of alternatives based on evaluation matrix
  - Ranking of alternatives based just on fish passage criteria
  - Relative fish passage ranking compared to cost and operations criteria
- Conclusions and Recommendations
- References cited

The Consultant will provide a draft report to the TRC for review. After a 30-calendar day review period, the Consultant will proceed to incorporate comments provided by the TRC to date and finalize the document. If no substantive issues are raised during the review, the Consultant will move on to production of the Final Report; however, if substantive issues are raised, the Consultant, Cal-Am, and the District may elect to work directly with the commenter(s) to address any issues, or hold a meeting to address issues.



## Task 7 Project Management

The Project Manager for the Consultant team will implement effective project management procedures and communication with the District throughout the duration of the project. Activities anticipated for this task include the following:

- Management and oversight of all “consultant in-house” project personnel and sub consultants. This shall include monitoring budgets, schedule, financial reporting timelines, personnel assignments, and ensuring that work not expressly contained within the scope of work is not performed without prior written authorization from the District.
- Preparation and update of a project schedule: A project schedule shall be prepared and regularly updated to reflect work progress, spending progress, changes in scope, or other activities that may impact the project schedule and costs.
- Monthly project progress status and expenditure reports shall be prepared and delivered to the District’s project manager. The expenditure report shall include a summary of expenditures for the preceding month, monthly and project lifecycle spending projection tracking, project-to-date for each task and the total project, along with estimates on percentage completion of the scope of services and earned value analysis.
- Project progress meetings will be held to update all members of the team on the status of the project, to identify uncertainties or impacts to schedule, and to discuss course corrections when necessary to keep the project moving forward.
- Coordination and facilitation of other project related meetings such as: 1) kick-off meeting with MPWMD and Cal-Am; 2) review of existing and proposed operations in the field w/MPWMD and Cal-Am; 3) meetings with regulatory agencies as required to determine constraints.

*Deliverables: Invoices; progress reports; copies of communications among agencies and consultants (if appropriate); and meeting minutes*

## Optional Tasks

The following optional tasks are offered for the consideration of the District and TRC.

### **OPTIONAL TASK 1 OBTAIN MULTI-BEAM SONAR BATHYMETRIC AND TOPOGRAPHIC DATA FOR LOS PADRES RESERVOIR**

As a replacement for proposed Task 1-2, the Consultant Team will collect a full-bottom coverage, multi-beam sonar bathymetric survey of the reservoir to yield high-resolution, high-accuracy elevations of the present reservoir bottom and side slope surfaces. A Teledyne Odom MB2 multi-beam echo-sounder is recommended for this project. The MB2 is developed for rapid mobilization and is optimized for deployment on smaller vessels. It features a selectable swath width of up to 140 degrees, acoustic beam widths of 1.8°, user-selectable frequency range of 200 to 460 kHz, and an integrated real-time sound velocity profiler (SVP) sensor. Its ultimate range resolution is 2 cm. The MB2 will be combined with a Coda Octopus F-180 GPS-aided inertial motion unit to accurately and rapidly determine the three-dimensional position and orientation of the sonar.

Position and heading of the vessel-mounted system will be determined through transmission of real-time kinematic (RTK) GPS receiving corrections from a base station located at the previously described land-side established control point. The complete sonar system will yield precise positioning and sounding measurements. Hydrographic survey data will be collected and processed using XLEM HYPACK HYSWEEP software. The processed data result in a dense and highly detailed point cloud representation of the reservoir area of bathymetric coverage.

The information collected will be synthesized into compiled GIS and AutoCAD compatible formats to develop representative 3D surface visualizations, create representative cross-sections, and to verify the reservoir inundation areas and hydraulic pathways suitable for fish passage at discrete intervals (5 feet or smaller) of elevation.

*Deliverables: a report describing methods used; a digital elevation model of Los Padres Reservoir; reservoir cross-sections at 100-foot*

*intervals; and inspection reports including photos and descriptions of passage through reservoir sediments*

### **OPTIONAL TASK 2 - PRESENT INITIAL SET OF PASSAGE ALTERNATIVES (CONSULTANT, TRC, ADVISORY GROUP)**

The Consultant Team will coordinate and facilitate a meeting with the TRC and Advisory Group to discuss the initial set of passage alternatives developed as part of early Task 4 activities. This meeting would occur earlier in the development of alternatives in addition to Advisory Group meeting already proposed. The purpose of this meeting would be to reach out and collaborate more closely with the Advisory Group prior to completion of the final alternatives.

*Deliverable: meeting summary that includes comments from the Advisory Group; a copy of any written materials submitted by the Advisory Group; and any follow-up response from the Consultant or TRC*

### **OPTIONAL TASK 3 - TRC MEETING NO. 3 AND MEETING SUMMARY REPORT— DETERMINATION OF FEASIBILITY AND SELECTION OF ALTERNATIVE(S) (CONSULTANT AND TRC)**

As a replacement of the teleconference activity presented in Task 4-4, an additional face-to-face workshop could be added for the purposes of Alternative Refinement. For this task, the facilitation experts provided by the Consultant Team will coordinate and facilitate a third face-to-face workshop with the TRC for the purposes of reviewing the most up-to-date alternative descriptions and performance data and to eliminate any alternatives that appear to be less favorable from a performance or feasibility level. During the meeting, the TRC and the Consultant Team will work collaboratively to perform a final determination of volitional passage, prioritize or rank alternatives based upon their scoring and relative level of performance with respect to project evaluation criteria, and make selections for alternatives to recommend for the final documentation. If, at the conclusion of this meeting, the consensus is that upstream volitional passage is not feasible, the reasoning

and justification for this conclusion will be documented for the project record.

In addition to meeting coordination and attendance, the Consultant Team will prepare a document summarizing the primary discussion topics and results of TRC Meeting No. 3. The document will clearly note meeting discussion topics, accomplishments, major decisions, next steps, milestone dates, and priority information needs. This summary document will be distributed within two weeks of the meeting date to the TRC and to the Advisory Group. As part of the summary, updates and refinements to work products prepared in previous tasks will be incorporated as a result of the feedback obtained during the TRC Meeting No. 3. Recommendations discussed pertinent to the selection of alternatives and feasibility of the selected alternatives for the final report will be documented as well as any alternatives selected to not be carried forward.

*Deliverables: final status of the biological performance tool and any further development recommended by the TRC; final evaluation spreadsheet; list of fish passage alternatives evaluated at the session; list of additional information necessary to reduce uncertainty or risks associated with each alternative; discussion of the fatal flaw analysis and documentation of alternatives eliminated from further consideration at this time; and a recommendation of alternatives for further development*



# 7

## Pricing

# 07 Pricing

Our project costs are summarized by task with a not-to-exceed amount for the proposed total costs. Tasks are presented with an estimated approximate level of effort in hours and the equivalent costs for that estimated level of effort for each task. Hours are provided for the prime and subconsultants combined. It is anticipated that the project budget will be managed to the total costs and not to the individual tasks budgets to provide flexibility and adaptability for subtle changes to the estimated level of efforts as tasks are completed.

Costs for optional tasks are available upon request.

## Schedule

We are confident we can complete the scope of work within the anticipated 18-month timeline of the study. Using the approach outlined above, and if agreed to at the time of contracting, we

anticipate being able to complete the study within 15 months.

## Cost and Schedule Control

For all projects, HDR uses a proven schedule and cost control tracking system that includes a production schedule vs. actual progress tracking component and an earned value component comparing budget versus actual costs. This tracking capability is contained within an intranet-based company wide system. Projects are broken down into clearly trackable tasks, subtasks/work units that reflect a detailed view of the total array of activities required to accomplish the work consistent with the project scope of work and requirements. The project manager and discipline task leaders receive weekly updates on schedule and cost performance. The system also tracks and reports all subcontractor information within the same period.

Task	Description	Hours	Cost
<b>1</b>	<b>Feasibility Study Preparation (Consultant)</b>		
1-1	Compile Background Information	60	\$9,751
1-2	Obtain Bathymetric and Topographic Data for Los Padres Reservoir	160	\$27,562
1-3	Prepare Evaluation Criteria	18	\$3,431
1-4	Identify Critical Data Gaps	38	\$7,423
<b>2</b>	<b>Prepare Biological Performance Tool (Consultant and TRC)</b>		
2-1	Compile Background Information on Migratory Pathways (Consultant)	24	\$4,893
2-2	Review and Identify Critical Biological Data Gaps (Consultant and TRC)		
2-3	Develop and Populate Fish Passage Model with Available Information	132	\$21,682
<b>3</b>	<b>Identify Fish Passage Concepts (Consultant, TRC)</b>		
3-1	TRC Meeting #1 – Concept Workshop	78	\$15,359
3-2	Meeting #1 Summary	86	\$18,967
<b>4</b>	<b>Alternative Development and Refinement (Consultant, TRC with Advisory Group input)</b>		
4-1	Develop Initial Concepts into Alternatives (Consultant)	394	\$48,656
4-2	Meeting #2 – Review and Refine Alternatives (Consultant, TRC)	60	\$12,368
4-3	Meeting #2 Summary	58	\$11,651
4-4	Teleconference Meeting #3 - Determination of Feasibility and Selection of Alternative(s) (Consultant and TRC)	32	\$6,265
<b>5</b>	<b>Present Final Set of Passage Alternatives (Consultant, TRC with Advisory Group input)</b>		
5-1	Present Final Set of Passage Alternatives (Consultant, TRC, Advisory Group)	24	\$4,828
<b>6</b>	<b>Reporting and Fish Passage Recommendations (Consultant and TRC)</b>		
6-1	Prepare Draft Fish Passage Feasibility Report (Consultant, TRC)	254	\$41,526

**EXHIBIT 2-A**

<b>7</b>	<b>Project Management</b>		
7-1	General Project Management, Team and Client Coordination, Scheduling and Reporting	160	\$24,602
7-2	Kickoff Meeting with MPWMD and Cal-Am including Site Visits	48	\$6,705
7-3	QA/QC including Independent Technical Reviews Senior Technical Advisors Oversight	92	\$14,837
		<b>Total</b>	<b>1,718</b>
			<b>\$280,597</b>