Gold Hill Whitewater Center Recreation Improvements

Preliminary Design Report

Prepared for:

GOLD HILL Whitewater CENTER
TI'LOMIKH FALLS, GOLD HILL, OREGON

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A DIVISION OF MERRICK & COMPANY

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Contents

BACKGROUND

This preliminary design for a whitewater course on the Rogue River was commissioned by the private, non-profit Gold Hill Whitewater Center with funding and support from:

Funding	Support
• The State of Oregon	USA Canoe/Kayak
• The Oregon Community Foundation	Jackson County Board of Commissioners
• The City of Gold Hill	Medford Mail Tribune
• Olsrud Family Fund	SOREDI
• The Rogue River Greenway Foundation	The Medford Chamber of Commerce
• The Dishman Family Foundation	Travel Medford
• Northwest Rafting Association	

The project was conceived in 2006 during the initial studies for removal of the Gold Hill hydroelectric dam, one mile north of the town of Gold Hill, Oregon. The 2006 whitewater plan envisioned extensive river bed modifications, re-watering the former power canal, a bridge across the river, and other access improvements. The disused dam was removed in 2008, and this preliminary design was begun late 2015. The current plan is more modest in scale than the 2006 study, being limited to the westernmost channel of Ti'lomikh Falls, chiefly due to economics and to lessen environmental impacts.

The project seeks to improve the recreational value of this channel by removing the hazard of a prominent midstream pinning boulder, Muggers Rock, which renders the channel only marginally runnable. It is believed by some local residents that the channel was modified and enlarged during the gold mining era and is not believed to be in a natural condition. Additional goals are to create a whitewater slalom rapid and a whitewater freestyle wave. A monument honoring Native American Tribes will occupy a prominent point on the west bank overlooking the project. The two channels to the east, Grandma's Run and Powerhouse Rapids are not to be modified, as they have significant cultural importance to Tribes and also contain the "line" for a commercial rafting run. Maintaining public and Tribal support is key to the permitting and project funding, therefore, the project limit is Mugger's Alley. The description below is intended to provide a general description of the work.

Figure 1. View of Mugger's Alley and Muggers Rock (center left with arrow) looking upstream

PROJECT NEED AND PURPOSE

The Client desires that there be multiple benefits and objectives for the project.

1. Safety: Remove "mugging rock", a dangerous mid-stream pinning boulder in order to increase the navigability and safety of Mugger's Alley. This would provide an alternate route for raft trips who currently use the middle channel of the river, "Powerhouse Falls."
2. Olympic whitewater slalom competition and training: Requires continuous technical rapids with adequate vertical fall (typically 4+ meters), 200 to 400 meters in length, with reliable water flow. The site possesses all of these characteristics.
3. Economic development and quality of life for the City of Gold Hill: Stimulating tourism and enhancing the City's image as an outdoor destination with an outdoors and fitness lifestyle. Proximity to the central business district is a key metric.
4. Recreational Boating/Surfing: Whitewater park and play boating dominates recreational river use by private (self-equipped) river users. The project will create a reliable hydraulic wave/hole formation that will hold a boat or surfboard that will attract users from a several hour driving radius. This is known as "park and play" and is the chief motivation for building whitewater parks in the US.

Figure 2. Typical surfing wave for boards and boats. Note the separate fish passage in the background.

Figure 3. Slalom competition. In Olympic competition, participants navigate through gates suspended over the river for the fastest time.

Alternatives

The following alternatives were considered at a high level but all but the preferred alternative met all of the project objectives (above).

1.	Gold Ray Dam Site	Insufficient drop, distance from town, increased traffic on neighborhood road
2.	Gold Nugget rapid east channel	Conflict with popular fishing spot, far from center of Gold Hill, inadequate drop
3.	Gold Nugget rapid west channel	Far from center of Gold Hill, inadequate drop
4.	The far east channel of Ti'lomikh Falls	Lacks public access for much of its length, lacks flow.
5.	Ti'lomikh Falls, west channel	Preferred alternative
6.	Ti'lomikh Falls and upstream	Not preferred (Figure 5)

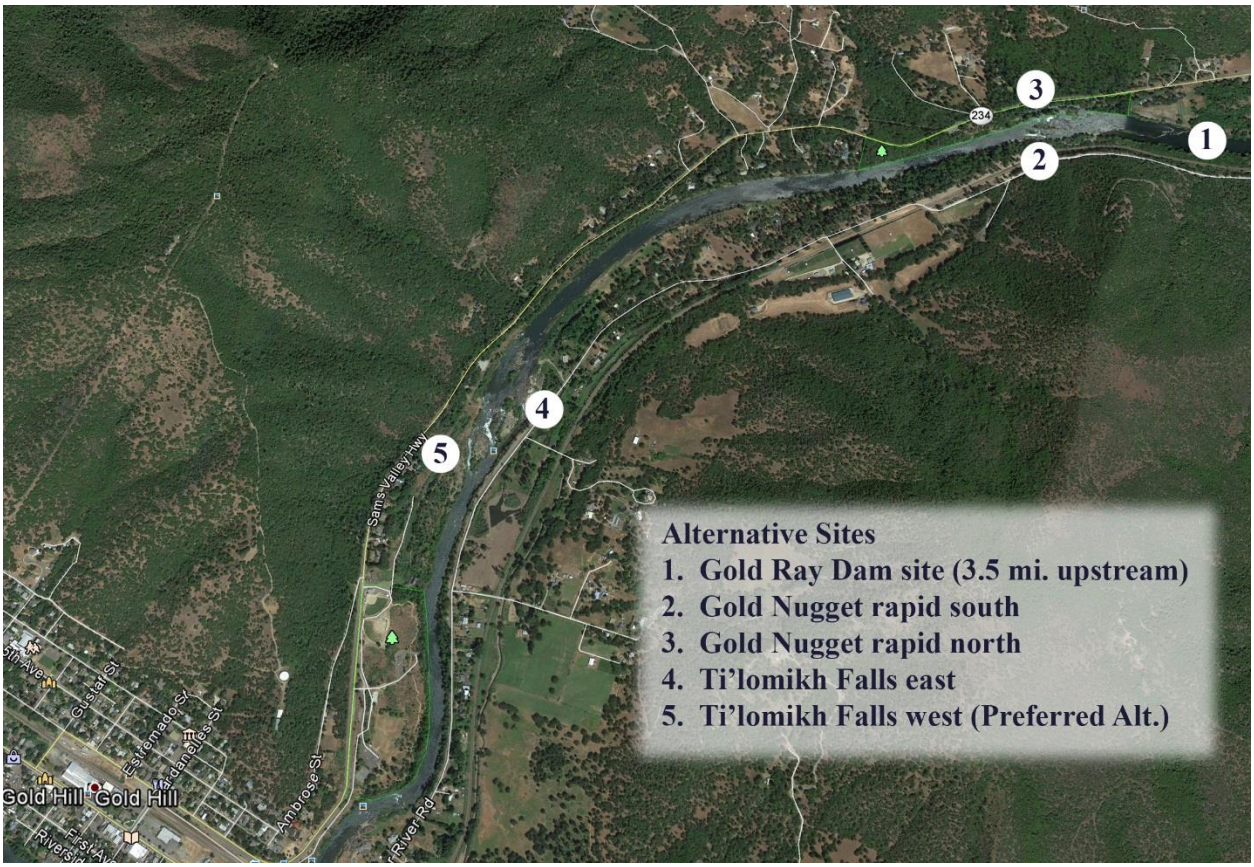


Figure 4. Project vicinity showing alternative sites.

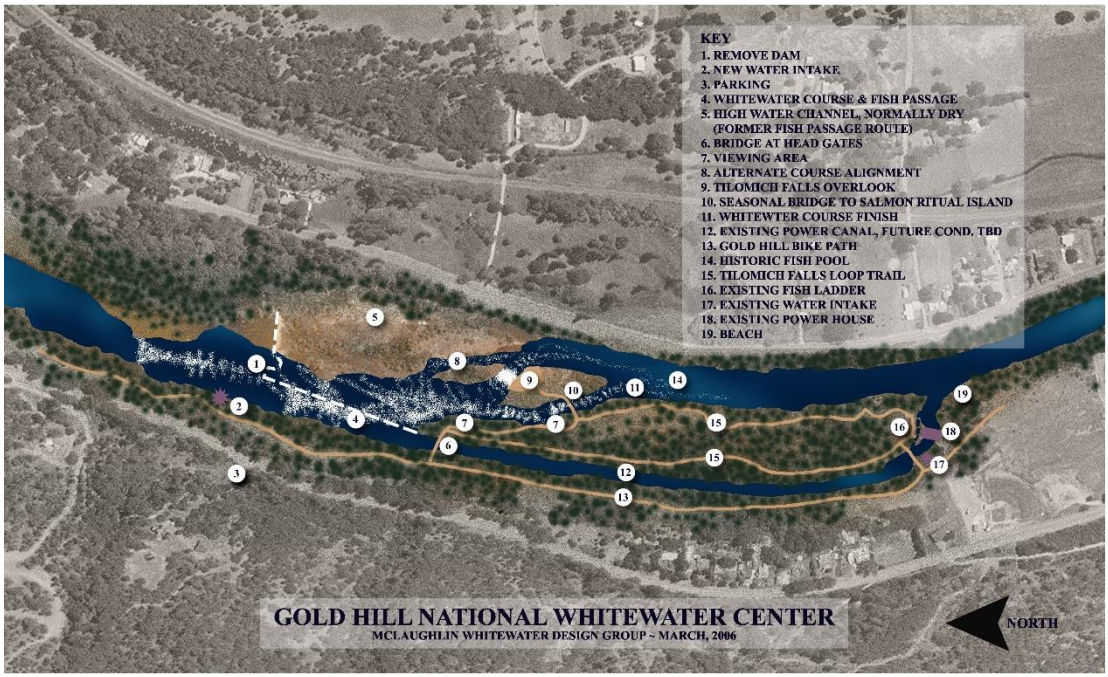


Figure 5. Alternative 6, 2006 study for an expanded project encompassing upstream of the Gold Hill dam and the power canal.

In addition to project criteria and objectives, improvements to the river must not negatively impact the regulatory flood plain – a zero rise certification

Future improvements and those under separate study include:

- First Nations monument
- A signature pedestrian bridge

SCOPE OF STUDY

Our work includes preliminary design, engineering, and hydraulic modeling of proposed modifications to the west channel that meet the above project objectives. Work performed by others under separate contract for the Gold Hill Whitewater Center include:

1. Data collection and topographic survey to aid in the physical layout of the design and the hydraulic modeling,
2. Design of the First Nations Monument,
3. Environmental Permitting.
4. Landscape Architecture

Consideration of fish passage and habitat creation/impacts is not part of the scope of this preliminary design effort. However, based upon comments received from the Oregon Department of Fish and Wildlife (see Attachment A), it is likely that a more detailed analysis and design refinements will be needed in the next steps. To address fish passage at a level of detail that is acceptable to regulating and permitting agencies, a hydraulic analysis comparing existing and proposed conditions is needed. While the field work and modeling conducted as a part of this effort were appreciable and adequate for the purposes of preliminary design of recreational whitewater and safety features, it is not sufficient for detailed evaluation of the impacts on fish passage. Such an evaluation would be

accomplished with two or three-dimensional hydraulic modeling or a physical model. This level of modeling would require significant additional field data collection including more detailed topography, bathymetry, and velocity measurements. This would be used to supplement the data collected as part of this study and as described below.

DATA COLLECTION

Survey Scope

The scope of the survey included bathymetric data collection of the formerly impounded area of Gold Hill dam, all three channels of Ti'lomikh Falls, and cross sections at approximate 500' intervals in the main river channel extending approximately 3600 feet downstream of the project area. In addition, water surface elevations were collected at three flows.

Mapping for the project site was provided by River Design Group (RDG). The composite mapping provided by RDG combines data from LiDAR, sonar bathymetry and ground survey. The LiDAR was flown in April or May 2009 and is available from the Oregon Department of Geology and Mineral Industries (DOGOMI). River bed and water surface survey was collected by RDG between 2013 and 2016. The highest quality aerial imagery available for the project site is from Bing maps. This imagery has suitable resolution for large scale site plans, but is not sufficient for looking at details within the individual rapids. High resolution ortho-rectified aerial photography was not available and new photography was not included in the mapping[1].

Survey Methods

Single beam sonar was used for bathometry acquisition upstream and downstream of the Ti'lomikh Falls network of channels. Survey grade RTK GPS observations were used for bathometry in areas that were not accessible or compatible with RDG's sonar equipment. These areas included shallow areas, Mugger's Alley rapid, and some of Powerhouse rapid. GPS rod data was collected in swift water areas involved using a cata-raft and rope/winch system and a long rod. GPS rod data was also collected in wadable areas and from shore in swift water areas. Adjacent floodplain topography was surveyed and was used to merge the new bathymetric survey and the acquired lidar from DOGOMI.

In addition, staff gages were installed at the upstream and downstream extents of the project area. However, frequent tampering or theft of the gages rendered this effort incomplete.

Review of the mapping has identified multiple issues that should be corrected in the next steps:

- Certain areas of the original LiDAR appear to have incorrect elevations. For example, the island separating Grandma's Run and Powerhouse Rapid is shown at or below low water levels, but photos show this island to be above water level for the normal flow range.
- The bathymetric survey provides excellent detail at certain areas, but not others. Due to the complexity within the existing channel, the current mapping does not provide sufficient information to run a detailed hydraulic model of Mugger's Alley.
- Aerial imagery is not high enough resolution to confirm details of the topographic mapping and specific features within the rapids

We have continued with hydraulic modeling despite the challenges presented with the mapping data. A discussion of these mapping constraints is presented in the Hydraulic Analysis section below.

[1] High resolution aerial photography was collected using a drone, however, it was not done with ground survey control nor compiled into a unified orthorectified image.

In additional to ground survey, RDG collected ground and water surface elevations at three different flows:

- 1100± cfs on 09-30-2015 and 10-01-2015 (partial set)
- 1700± cfs on 07-27-2016
- 4800± cfs on 02-28-2017

PRELIMINARY DESIGN

Nature of the Work

The Project consists of modification to a 950-foot long reach of the Rogue River at Ti'lomikh Falls (the Work). The Work proposes selective rock excavation and additive sills in Mugger's Alley:

1) Addition of a whitewater sill at the downstream-most end of the Project to create surfing waves that are popular "park and play" kayakers,

2) Addition of three more concrete and rock sills (hydraulic grade controls) to create localized standing waves - hydraulic formations that increase the recreational value of the river reach,

3) Selective removal of mid-stream rocks to improve safety and navigability (water depth) as well as to distribute the hydraulic energy, and

4) Selective rock excavation along both banks to create eddies for the Olympic whitewater slalom discipline and resting areas for fish. These also allow recreational boaters to "eddy hop" down the reach, a common way to navigate steep rapids.

Taken together, these modifications seek to balance recreation and fish passage needs: The grade control structures are tunable in order to promote both recreation and fish passage, and there are more pools and side eddies.

Figure 6. Typical multi-purpose whitewater sill on the Gunnison River, Colorado, with boat passage, surfing features and integral fish passage.

The added sills are relatively low volume (less than 200 cubic yards of rock and concrete total) and have a structural height of between one and five feet. In larger rivers (figure above), the sills are typically made of multiple layers of grouted rock. Because of the small size of the sills in this project, we propose making them of concrete with a surface

treatment of faux rock for the portions that are visible or just under the surface of the water. An added benefit of faux rock is the ability to control the geometry and elevations to a much higher degree than rock structures. Properly reinforced and constructed faux rock withstands water and weathering quite well. The image below of the faux rock used at the Ocoee River is over twenty years old and has no surface degradation.

Figure 7. Faux Rock (between arrows) on the Ocoee River where relatively low volume infill of a bedrock outcrop was required.

Figure 7. Photo of the water worn bedrock at the project site. The outcrop in the foreground and background would guide the faux rock contractor in the color, texture and finish of the new work in the channel.

A novel aspect of this project is the use of modular concrete blocks for tuning the whitewater features in order to achieve the desired hydraulic performance. Tuning is generally required at whitewater drops to adjust the hydraulic

formation to meet specific performance criteria—in this case, recreation and fish passage. The modular system of movable blocks reduces the reliance on post-construction poured concrete and the attendant water control/site isolation.

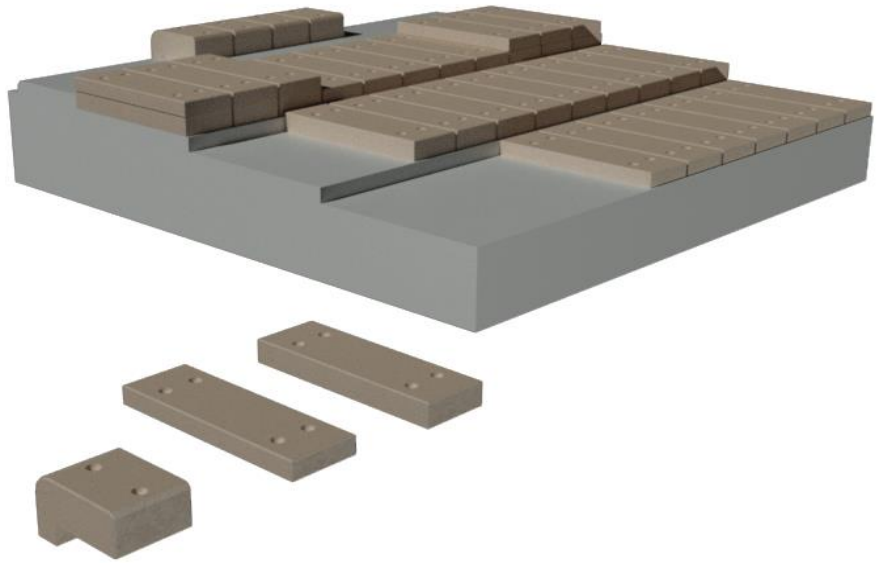


Figure 8. Illustration of modular concrete tuning blocks over a foundation.

The modular block system is used only in the deepest, central portion of the channel and will not be visible when the water is running. They are attached to a poured concrete foundation which is firmly anchored to the bedrock river bottom. The chief advantage of this system is the ability to make post construction modifications relatively quickly and without extensive dewatering, or placing fresh concrete in the river.

CONSTRUCTION OF THE WORK

Isolation of the Work

Overview. The Project envisions the dry isolation of the work site during construction followed by a semi-dry tuning and adjustment phase where water is alternately admitted to the course and then turned off for the purpose of tuning and adjustments with the modular system. During the dry construction phase, the site will be coffered and isolated from flowing water in the river. Soiled water from construction activities and leakage from the coffers will be collected in low points within the work zone and pumped to water quality ponds outside the river. All poured concrete work and excavation will be done in the dry with water control and pump-out measures in place.

The tuning phase is to be done with precast modular blocks, placed by hand or with assistance of light construction equipment. During this activity, it is not necessary to eliminate all leakage since there are no concrete pours or disturbances to the river bottom. In our past projects using this system, a small amount of flowing water did not prevent installation of the blocks. In the event that supplemental concrete pours are to occur in tuning, then full isolation would be restored. However, it is the intent of the design to do all tuning with the modular system to the full extent possible.

Staging of Work: We envision that the Work being staged and sequenced from upstream to downstream will be as described below. This sequence takes advantage of the site's steep gradient and two natural low points along its length to catch runoff, reducing the reliance on a single low point where isolated water may leak back into the river.

Coffers #1 and #2 isolate the work in Mugger's Alley, consisting of four whitewater sills and multiple sites of rock excavation (see Drawings).

Optional Coffer #3. In the interest of limiting inflow of nuisance water, an option is to realign the coffer #1 to station 5+50 where, due to its shorter length, it reduces the volume of pump-out. This would be done at an appropriate stage in the construction activity. It would also facilitate the post construction tuning process by being able to be removed more easily.

Water Control During Tuning Phase. For this activity, it is necessary to test the features with the water on, then restrict the flow water for manual adjustments of the modular blocks. To accomplish this, a means of alternately allowing water flow and shutting it off again is required. The Coffer #1 at Station 5+50 serves this purpose. This coffer would have been built in relative dry and thus have a better seal and reduced leakage. Options for the portion of this structure to alternately open and close to admit water to the course during tuning could be:

1. "Super sacks" of sand placed on a leveling seat of concrete or temporary cementitious material. These would be manually removed to allow flow and replaced to restrict flow.
2. Conventional water-filled rubber tubes used for dewatering.
3. Timber or metal stop-logs set into temporary vertical guides. The gaps between the ends of the logs and the adjoining rocks would be sealed with sandbags supported with mesh netting from behind for the construction phase, thus ensuring minimal nuisance water. (During tuning, there would be no bags and the gate would be alternately lifted and replaced to regulate water.)
4. A temporary Obermeyer gate on a lean concrete foundation with gaps sealed with sandbags as in Option 2.

Note that with the proposed tuning blocks, it is not necessary to completely seal off leaks since minor flow will not inhibit adjustments of the blocks. In addition, the blocks are not a source of pollution.

Timing of the Work

Gold Hill Whitewater Inc. (client) has consulted with resource agencies and has received the directive that in-river work shall be restricted to the period between June 15 to September 1. Work on the shore such as mobilization / demobilization, access roads etc. can occur before and after this time.

Hydrology During Work Period

For the summer construction window outlined above, the historic 30% to 70% exceedance ranges from 3140 cfs to 228 0cfs per the figure below. The highest 30% discharge (3140 cfs) therefore establishes the parameters for the following hydraulic analysis.

In-River Construction

	Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1% Exceedance	11400	19638	14620	9578	8815	8545	6657	3920	3434	2720	2111	8838	22000
10% Exceedance	4730	7644	5534	5910	5808	5390	3810	2980	2580	2359	1600	2920	6948
20% Exceedance	3390	5326	3726	4604	4790	4456	3378	2686	2390	2168	1510	2308	4586
30% Exceedance	2810	3922	2980	3914	4000	3800	3140	2410	2280	1990	1450	1840	3208
40% Exceedance	2420	2992	2546	3270	3396	3422	2996	2230	2210	1890	1380	1610	2492
50% Exceedance	2150	2480	2180	2850	2875	3140	2840	2050	2120	1740	1310	1500	2070
60% Exceedance	1900	2130	1910	2360	2530	2888	2620	1920	2010	1600	1260	1400	1830
70% Exceedance	1660	1900	1700	1970	2303	2600	2420	1780	1920	1483	1180	1340	1686
80% Exceedance	1470	1610	1512	1590	1880	2314	2152	1610	1840	1370	1084	1180	1520
90% Exceedance	1260	1430	1320	1202	1421	2030	1880	1512	1720	1211	1000	1100	1390
99% Exceedance	984	1192	1060	1060	1003	1300	1366	1046	1060	1006	890	919	1040
Min	874	1070	1030	1010	946	1190	1340	1030	1030	927	874	909	1010
Max	53900	53900	22400	16200	18400	11100	11700	4170	3840	3230	4170	19100	31800

Figure 9. Table of Monthly Exceedances

Hydraulic Analysis of Coffers

The high range 30% exceedance governs the design of the upstream and downstream coffer. The geometry of proposed coffers were inputted into our hydraulic model and run with a design flow of 3140 cfs in order to establish their approximate height. A three-foot freeboard was added to arrive at the heights in the table below. Actual heights may be higher and will depend upon the contractor's discretion.

Location	Top Elevation	Invert Elevation	Maximum Height
Coffer #1	1072	1063	9 feet
Coffer #2	1058	1052	6 feet

Figure 11. Approximate Elevations of Proposed Coffer Dams

Construction Access

The Work in the river consists of rock excavation and added rock placed with heavy tracked equipment, and concrete placed from a pumper truck. In addition, the coffers and water control gates may be placed using tracked equipment as well as light cranes. Materials will be delivered in road-rated dump trucks and moved about the site with rubber tire loaders. Of these, the concrete pumper and crane govern the design of access roads. Our proposed design for temporary construction access is a gravel road along the west shore. It is 16 feet in width, with a - percent cross slope and a 10-percent maximum grade. The cut bank is 2:1 slope and the filled embankments are generally three feet or less in height with a 1:1 minimum slope. The grading of the roads would be determined in final design or in the construction phase.

Due to the narrow width of the channel, it is not practical or advisable to build haul roads along the length of the river. Accordingly, we propose to build the in-river features from work pads built out into the channel from the main haul road along the west shore. This allows unencumbered access to five discrete work zones in the river channel while allowing freedom of access along the haul road for other, concurrent construction activities. When the work in one zone is complete the earth-fill work pads are removed and recycled to the next work area downstream. For economy, we propose that the work pads be built of excess cut from the haul roads and borrow from selected areas on site.

At the close of construction, we propose that the haul road be reconfigured as a permanent site access trail with the following modifications:

- Gravel topping be removed and be replaced with wood chips.
- Fill slopes be reduced from a 1:1 slope to a 3:1 slope or greater
- Width reduced to between 10 to 12 feet—wide enough for a light maintenance vehicle
- Cut and fill slopes be re-vegetated with native grasses and trees.

Sediment and Erosion Control

The attached drawings show the entire disturbed perimeter and frontage on free-flowing water to be protected with a silt fence.

- Where not fronting on the free-flowing river, surface drainage from the site will be collected in water catchments in the dry river channel and pumped to two water quality ponds on the west shore.
- A concrete truck wash-off station with catch basin is shown on the attached plans.
- A truck wash-off station at the exit to Highway 234 is shown on the attached plans.
- Locations shown on the drawings of these features are schematic with actual locations determined during the final design or construction phase.

Other Temporary Facilities

The existing gravel parking lot off of Highway 234 will serve as construction worker parking and a temporary field office trailer. Some dry materials may also be stored at this location.

It is our intent that the bike trail remain open for as much of the construction as possible, albeit without the use of the parking lot. The contractor will be required to post warning signs and traffic controls at the access road / trail crossing as well as the construction entrance off of Highway 234.

HYDROLOGY AND HYDRAULIC MODELING

Hydrologic Analysis

The hydrologic analysis for this project used data from USGS Gage 14539000 (Rogue River near Central Point, OR). This gage is located approximately 5 miles upstream of the project site. No significant tributaries join the Rogue River between the gage location and the project site. However, the hydrology of the site is highly influenced by discharges from the USACE's Lost Creek Lake Reservoir. Completed by USACE in 1977, the Lost Creek Project is a multipurpose flood control dam which also improves water quality (temperature) and raises summertime flows, chiefly for the benefit of migratory salmon and steelhead.

We prepared a flow exceedance analysis using daily mean discharge data from 1985-2016 to determine the typical range of flows within the recreation season. Due to the relatively mild climate at Gold Hill, the recreation season is considered to last all year. The 90-percent to 10-percent exceedance range for daily mean flow at the project site is 1260 to 4730 cfs. However, due to the steepness of the channel and its confined character, it is our judgment that the upper range of its attractiveness will about 3,500 cfs, slightly above the 20-percent exceedance. This estimate is subject to revision with refined modeling and observations of the finished project. The low flow 95-percent exceedance of approximately 1,000 cfs is acceptable for boating, based on our on-site observations. This analysis assists in the planning and sizing of whitewater features. The annual exceedances for the site are shown in Figure 12. (The percent exceedance can be thought of as the percentage of time that a particular mean daily flow is met or exceeded.)

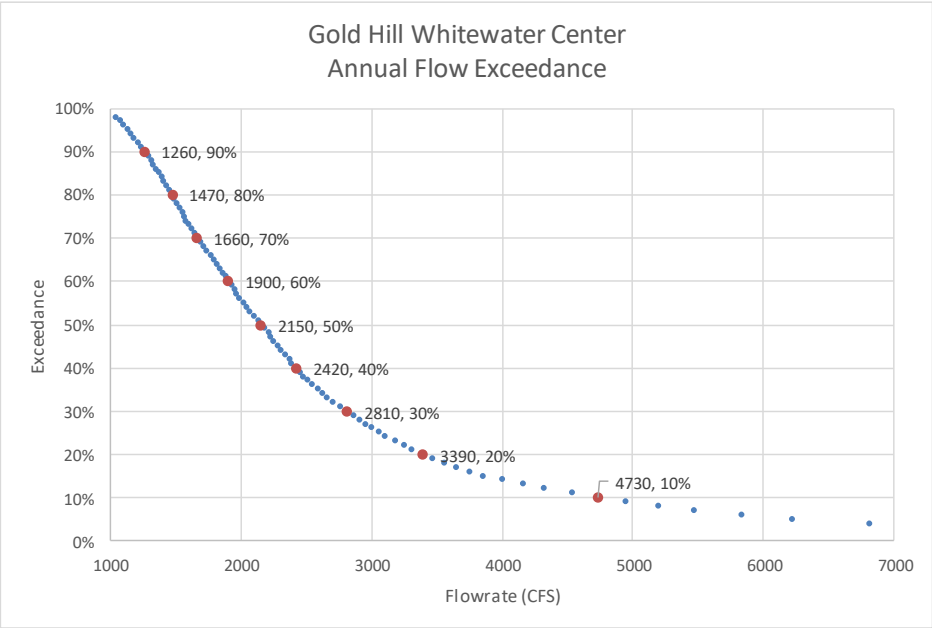


Figure 12. Annual Flow Exceedance

Hydraulic Analysis

A two-dimensional (2D) hydraulic modeling analysis with TuFLOW® modeling software was used to evaluate existing and proposed conditions at the project site. TuFLOW simulates 2D free surface flow over a grid of square elements. 2D models are superior to one-dimensional models in many applications, particularly those with complex flow patterns or multiple flow splits between channels such as within the Project site. A two-foot computational grid was used for the recreational hydraulic analysis, and a ten-foot grid was used for the flood impact analysis.

The 2D model was calibrated using the existing topographic mapping with no modifications. These results were then compared to the surveyed water surface points. As discussed in the Survey sections above, the current ground survey does not provide sufficient detail to model the hydraulics within each of the rapids. Therefore, the comparison of model results and survey was focused on points upstream of the Mugger's Alley channel. Adjustments were made to the model until the results matched the surveyed elevations. These changes included adjusting the ground elevations where we suspect errors in the original mapping, primarily on the island separating Grandma's Run and Powerhouse Rapid. Breaklines were also added along some of the crests that control flow splits between the different channels. After these changes, the existing conditions modeling produced reasonable results at all three surveyed flows.

Recreational Hydraulics

Once the base model was calibrated, the proposed improvements and grading changes were added to the existing conditions model. We modeled five discharges within the anticipated recreational flow range: 1,100 cfs, 1,500 cfs, 1,700 cfs, 2,200 cfs and 3,000. Velocity plots comparing existing and proposed conditions at the surveyed flows are included in Appendix B.

The modeling results indicate that the proposed changes meet the project objectives. Figures 13-15 below compare the existing and proposed velocity at specific areas within the Mugger's Alley channel. Figure 13 shows an example of eddies created by selective rock excavation on the banks. Figure 14 shows the result of removing the "Mugging rock" towards the upstream end of the channel. Removing this rock eliminates the existing hazard. Figure 15 shows an example of a proposed concrete sill. This particular sill will form a high-quality wave feature located at the downstream end of Mugger's Alley. A proposed water surface profile from the 2D modeling results is included in the preliminary design drawings.

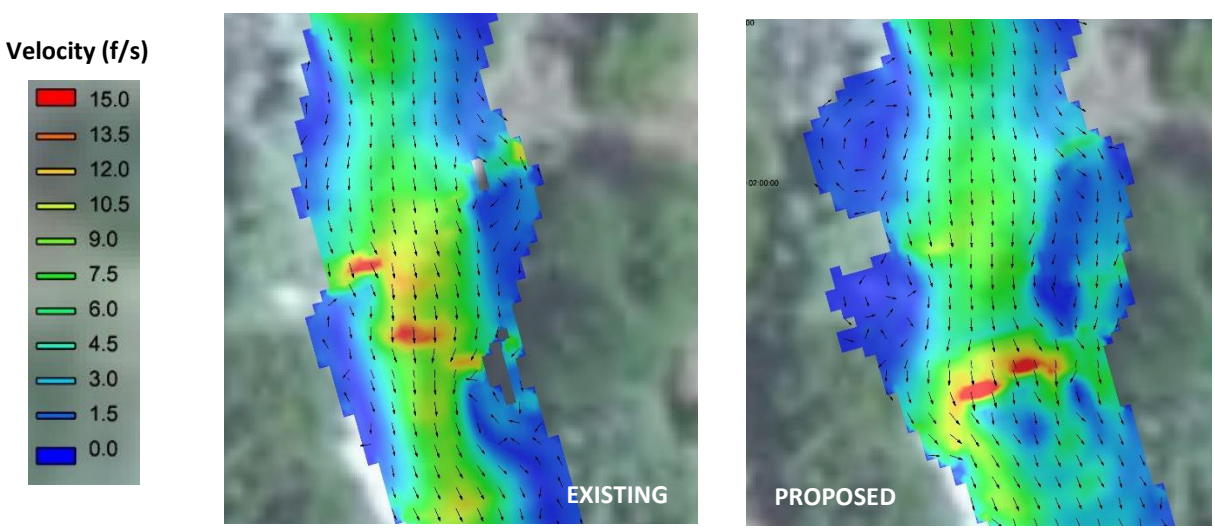


Figure 13. Existing vs. Proposed 2D Velocity Results at Proposed Eddy Location (1700 cfs)

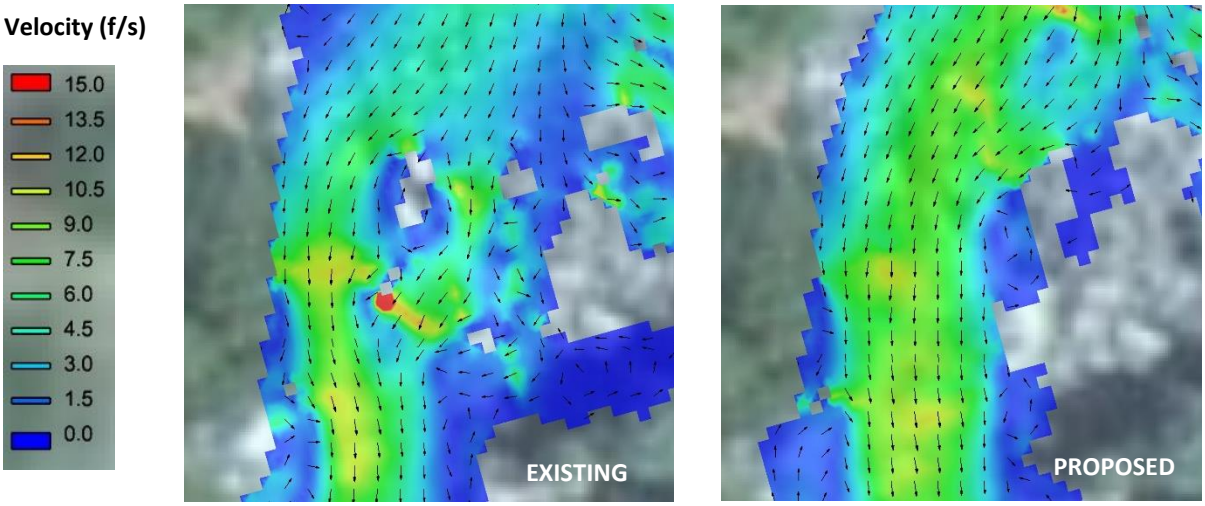


Figure 14.
Existing vs. Proposed 2D Velocity Results at Mugging Rock Location, Station 4+25 (1700 cfs)

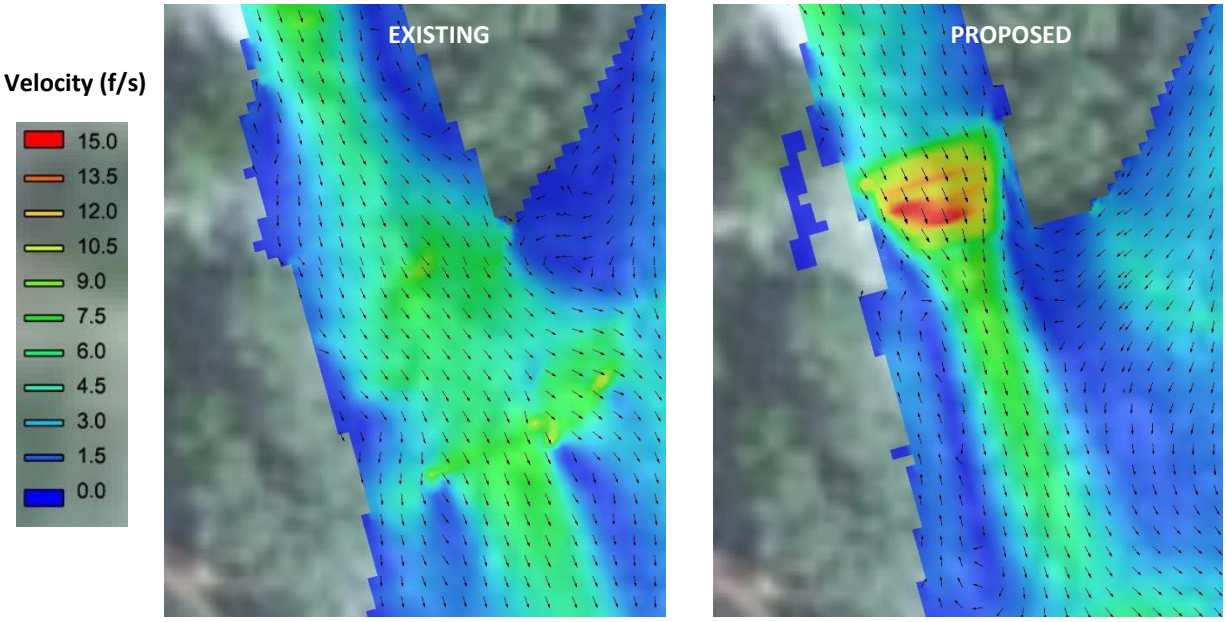


Figure 15. Existing vs. Proposed 2D Velocity Results at Proposed Sill 4 – Station 1+25 (1700 cfs)

Flood Hydraulics

Both the existing and proposed conditions models were run at the 100-year flood peak discharge, and water surface elevations for the existing conditions and proposed project were compared to evaluate impacts of the project to the 100-year floodplain. The intent of the analysis was to identify potential flood conveyance impacts resulting from the proposed improvements. Additional modeling and documentation will likely be required during final design including a "no-rise" certification or a Conditional Letter of Map Revision/Letter of Map Revision (CLOMR/LOMR) per FEMA and local floodplain administration requirements. One hundred year flow and tailwater information was obtained from the Jackson County, Oregon Flood Insurance Study revised April 5, 2017. This information is summarized in the table below.

Flood Event	Peak Discharge at Project Site	Approximate Water Surface Elevation Downstream
1% Annual Chance Flood (100-yr)	107,000 cfs	1080.5’

Figure 16. Table of 100-Yr Flood Parameters

The proposed flood model included all changes proposed within the river, as well as the First Nations Monument proposed on the west bank. A comparison of proposed versus existing conditions is illustrated in Figure 17. Generally, the proposed conditions have no impact on the water surface along the banks, or upstream and downstream of the project site. There are, however, some local impacts from the project, most notably around the First Nations Monument. In Figure 17, the green area indicates water surface changes within 0.1’, which is within the transient fluctuations in water surface at this flow. Red areas indicate that the proposed 100-year water surface is 0.1’ to 0.5’ lower than existing conditions. Blue areas indicate where the proposed 100-year water surface is 0.1’ to 0.7’ higher than existing conditions. The 2D modeling confirmed that the proposed project does not significantly change the existing flood conveyance through the project area. Based on these initial results, there would be no adverse flooding impacts as a result of the project.

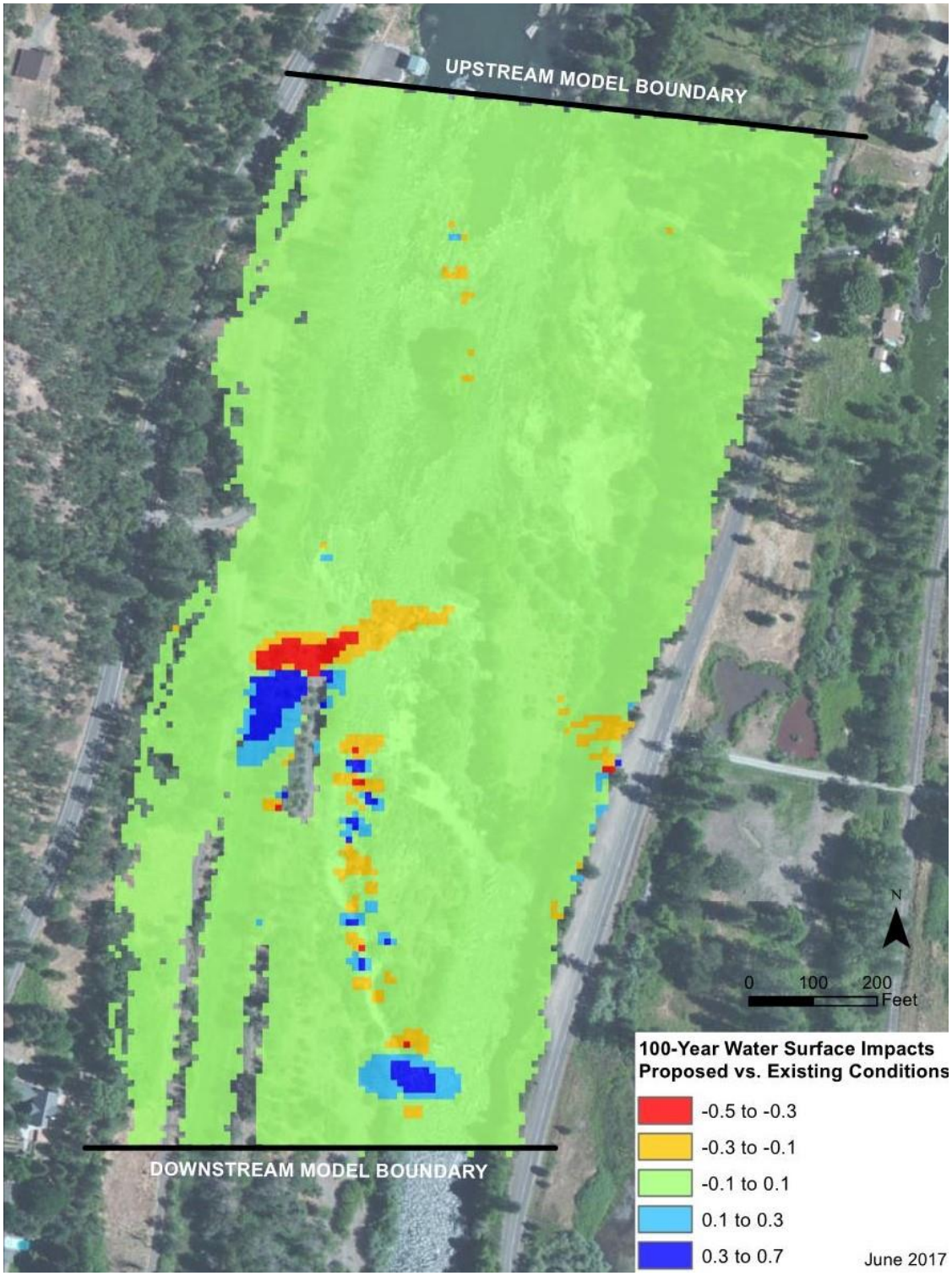


Figure 17. Difference in Proposed and Existing 100-yr Water Surface Elevations.

STATEMENT OF PROBABLE CONSTRUCTION COST

This preliminary-level statement of probable costs is based on analyses conducted by MWDG by applying gross quantity estimates, comparable similar projects, and professional judgment. A table showing the details of this estimate is included in Figure 19. In addition, we gathered unit costs from Slayden Construction, the contractor that removed the nearby Gold Hill dam. Notes:

1. The estimates include allowances for contractor's access, water control and other "means and methods" items which are typically under the contractor's control and are not designed by the engineer. Since these items are a significant part of the cost, and the builder's risk, they could vary considerably according to site conditions and the owner's requirements, e.g. permitting restriction, site access and lay-down area provided, etc.
2. The project depends on construction access and staging at the trailhead parking lot at the west shoreline. No alternative site is apparent, so this cost analysis assumes the use of this property.
3. The estimates include general contractor's overhead and profit, general conditions and bonds. They also include a 20-percent contingency. Allowances for final design, permitting, construction oversight/administration are also included.
4. This estimate does not include easements or land acquisition, or additional costs for fish passage elements which could be identified in further design and permitting efforts.
5. Unit costs generally apply to significant quantities of installed materials or earthwork and excavation quantities. Because of the small quantities involved in this project, unit costs are less reliable. We have used higher numbers provided by Slayden Construction, than we would typically use on projects with a larger work scope.
6. The costs do not include escalation beyond the current year.

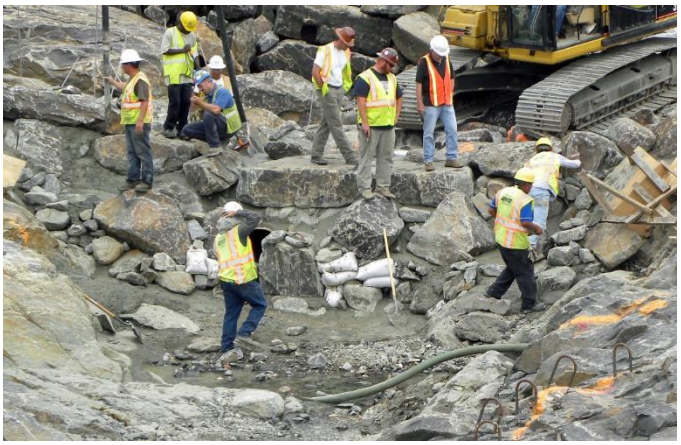


Figure 18. Construction of a Sill in a Bedrock River Bed
Chattahoochee River Restoration Project, Columbus, GA

Gold Hill Whitewater Center
Preliminary-Level Statement of Probable Cost
August, 2017

	Item	Quantity	Unit	Cost($)/Unit	Cost ($)
	General Site & Dewatering Costs				
	Silt fence	4000	LF	$6	$24,000
	Misc. clearing and grubbing	0.5	Acre	$25,000	$12,500
	Two coffer dams	650	CY	$370	$240,500
	Temporary tuning gate or manual stop logs with guides	1	Allowance	$30,000	$30,000
	Foundation for stoplogs gate or supersacks	40	CY	$600	$24,000
	Water quality ponds (1)	110	CY	$300	$33,000
	Work pads x 4	300	CY	$100	$30,000
	Water control and pumping	3	months	$24,000	$72,000
	Site clean up	1	Lump	$50,000	$50,000
	Subtotal				*$516,000*
	Misc. Access, Dewatering & Site Appurtenances	1	Lump		$100,000
	Subtotal				**$616,000**
	Multi-Purpose Whitewater Course in Mugger's Alley				
	Rock excavation - eddies and mid-stream obstacles/mugging rock	400	CY	$335	$134,000
	Rock excavation - keyways for sills	74	CY	$335	$24,716
	Rock excavation sills and pool below sill no 4	600	CY	$335	$201,000
	Concrete sills	170	CY	$1,200	$204,000
	Faux rock topping over grouted rock where exposed to view	160	SY	$300	$48,000
	Conc. tuning blocks	50	EA	$500	$25,000
	Rock anchors	200	EA	$300	$60,000
	Tuning				
	4 man crew with light crane	10	Days	$4,500	$45,000
	Testing & Observation	3	Man-Weeks	$8,000	$24,000
	Misc concrete placement	10	CY	$3,000	$30,000
	Misc materials	1	lump	$10,000	$10,000
	Subtotal				**$805,716**
	Access Path - construction, perm. foot & viewing				
	Turnouts	900	CY	$50	$45,000
	Access road topping (temp in river during const.)	400	CY	$86	$34,400
	Misc grading (road follows nap of earth)	200	CY	$30	$6,000
	Grouted Boulders or Concrete Subgrade	0	CY	$380	
	Monument (not in contract)				
	Subtotal				*$85,400*
	Misc. expenses	1	Lump		$13,000
	Subtotal				**$98,400**
	Total From Items Above				**$1,530,000**
	GC"s and Bonds	5	%		$76,500
	Profit and Overhead	10	%		$153,000
	Contingencies & Unknowns	30	%		$459,000
	GRAND TOTAL CONSTRUCTION COST *(rounded)*				***$2,220,000***
	Aerial Mapping & Ground Survey	1	Lump		$150,000
	CFD Modeling (Assumed required for fish passage)	1	Lump		$70,000
	Engineering - Final Design	8	%		$177,600
	Permitting - Typ.: Wetlands, Habitat ID, 404, FEMA, etc.	10	%		$222,000
	Construction Inspection & Administration	7	%		$155,400
	GRAND TOTAL PROJECT COST *(rounded)***				***$3,000,000***

	Notes and Exclusions	**General Conditions includes**
**	Based upon Current Preliminary Level Design	Site fencing/security
*	Costs are approx. Level 4 based upon AACE International Recommended Practice No. 18R-97	Concrete wash station
*	Assumes non-hazardous disposal	Vehicle wash off station
*	No environmental/site contamination contigencies	Signage and safey
*	Costs do not include any land acquisitions, legal efforts,	Traffic control (for bike path)
		Trailer
		etc.

Figure 19. Table of Budget Costs

NEXT STEPS

Next steps include permitting – particularly related to fish passage - and related field work, studies, and analysis. Fish passage and habitat is not part of the current scope of study, though this task will be a priority in the next step. Conversations with Jason Shappart of Meridian Environmental Inc. indicate that we should document the proposed hydraulic conditions in plan section and profile. Meridian Environmental's work would then focus on documenting existing conditions in plan section and profile. This would be done to the extent possible, given high-energy nature of the Mugger's Alley which prevents or severely limits the ability to collect water velocities. From these two analyses, a comparison may be drawn and submitted to reviewing agencies.

Future A/E Work

- Permitting support and hydraulic analysis. Due to the presence of listed species a detailed hydraulic analysis and modeling will be required. This would likely include physical modeling or computer 3D (Computational Fluid Dynamics or CFD) hydraulic modeling.
- Field data collection. The level of hydraulic modeling required for permitting will likely require additional field survey and mapping in order to support the level of detail needed. This would include:
    - Aerial flight with additional LIDAR or photogrammetry data on the islands and overbanks in the immediate project area. (We note in the data collection section above, a lack of detail in the island that forms the left bank of Powerhouse rapid.)
    - Ortho-rectified aerial photography (taken when foliage is off) that is of a much higher quality than currently available.
    - Additional survey points within Muggers Alley. If permittable, this work should be done with temporary dewatering or during very low flows.
- Final Design: production of bid and construction documents consisting of drawings, specifications, and contract forms with permitting provisions.
- Selection of a Contractor. This can be accomplished in a competitive or negotiated fashion (note that this can also be conducted during the Final Design Phase).
- Construction, course commissioning and tuning.

APPENDIX A. PRE-PERMITTING AGENCY CONSULTATION

Summary

Steve Kiesling (Gold Hill Whitewater Center), Alex Campbell (Oregon Governor's office liaison), and Rick McLaughlin and John Anderson (MWDG) conducted two presentations to permitting and regulatory agencies on May 18, 2016. The first presentation at the Oregon Department of State Lands offices in Salem was headed by the USACE with invitations to review agencies. The second meeting was held at the offices of Oregon Department of Fish and Wildlife (ODFW), also in Salem. Both meetings were informational in nature, and formal comments were not anticipated. ODFW, however, provided a follow up letter and email correspondence (attached) indicating that:

1. ODFW will evaluate the project based on comparing existing versus proposed conditions.
2. Standard fish passage criteria will not likely apply since the existing channel does not meet the criteria.
3. The project may not reduce the ability of fish to migrate upstream without a waiver.
4. A detailed hydraulic analysis would be required and that existing water velocity measurements would be beneficial.

Attachments

1. PowerPoint presentation of May 18, 2016
2. Response from ODFW of June 1, 2016
3. Email correspondence from ODFW of May 26, 2016

Remainder of page intentionally left blank.

"Human beings are not intruders.
We are participants."

Grandma Agnes Baker Pilgrim
Oldest Living Takelma Indian
Keeper of the Salmon Ceremony

GOAL: Make Gold Hill to whitewater what Hood River is to windsurfing

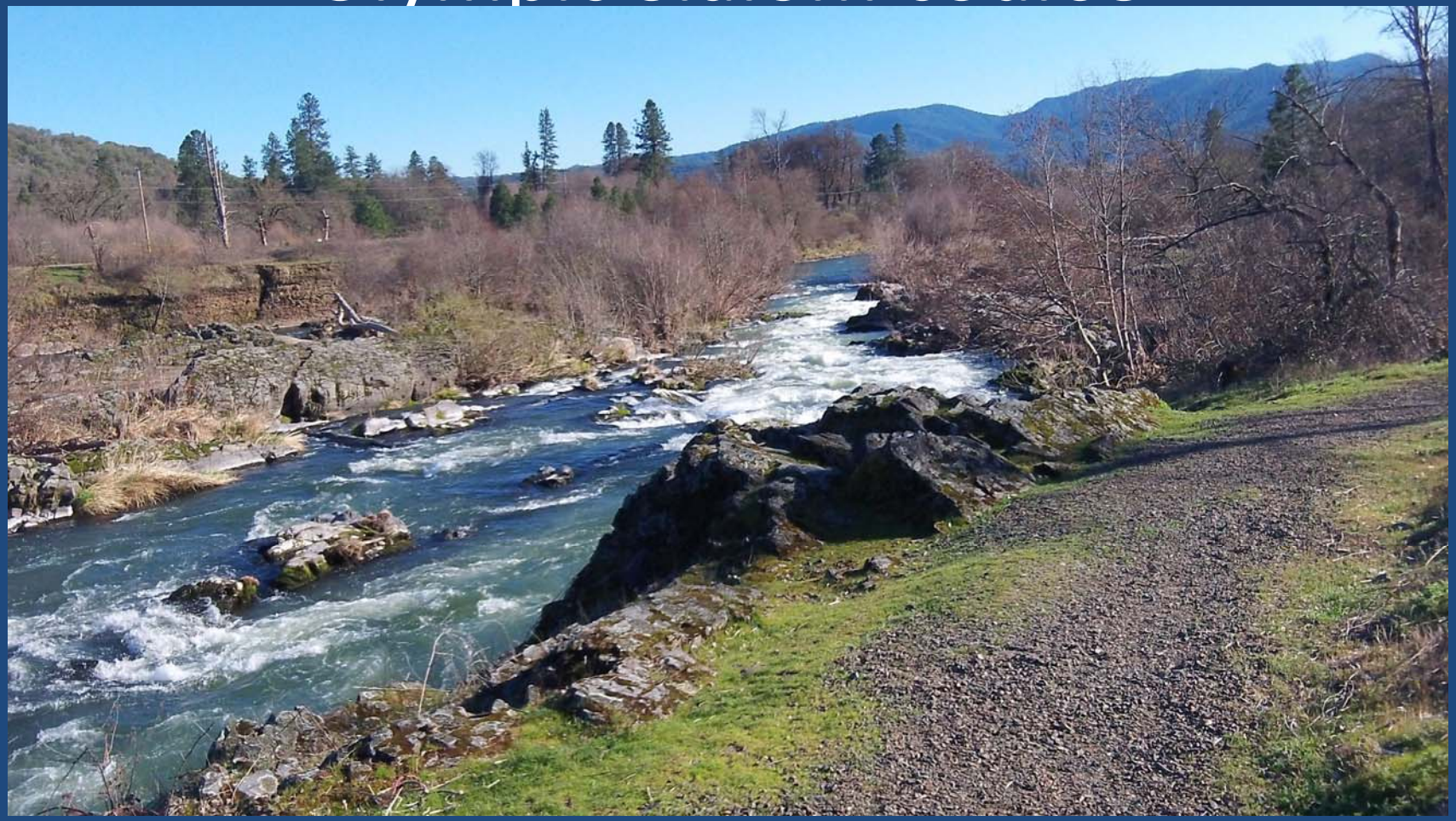
DRIVER: An environmentally friendly Olympic Class Whitewater Park

IMPACT: $7 Million/year (SOREDI)

Ti'lomikh Falls is a Unique Site!

- The water flow and drop of an Olympic Venue
- Inside an existing city park
- Fishing is not permitted (No user conflicts)
- Easy river access from the bank
- Easy access from 5 and 234
- Easy construction with cofferdam
- The site has been mined and dammed

Mugger's Alley already looks like an Olympic Slalom course



Mugger's Rock is potentially lethal entrapment hazard—in a city park

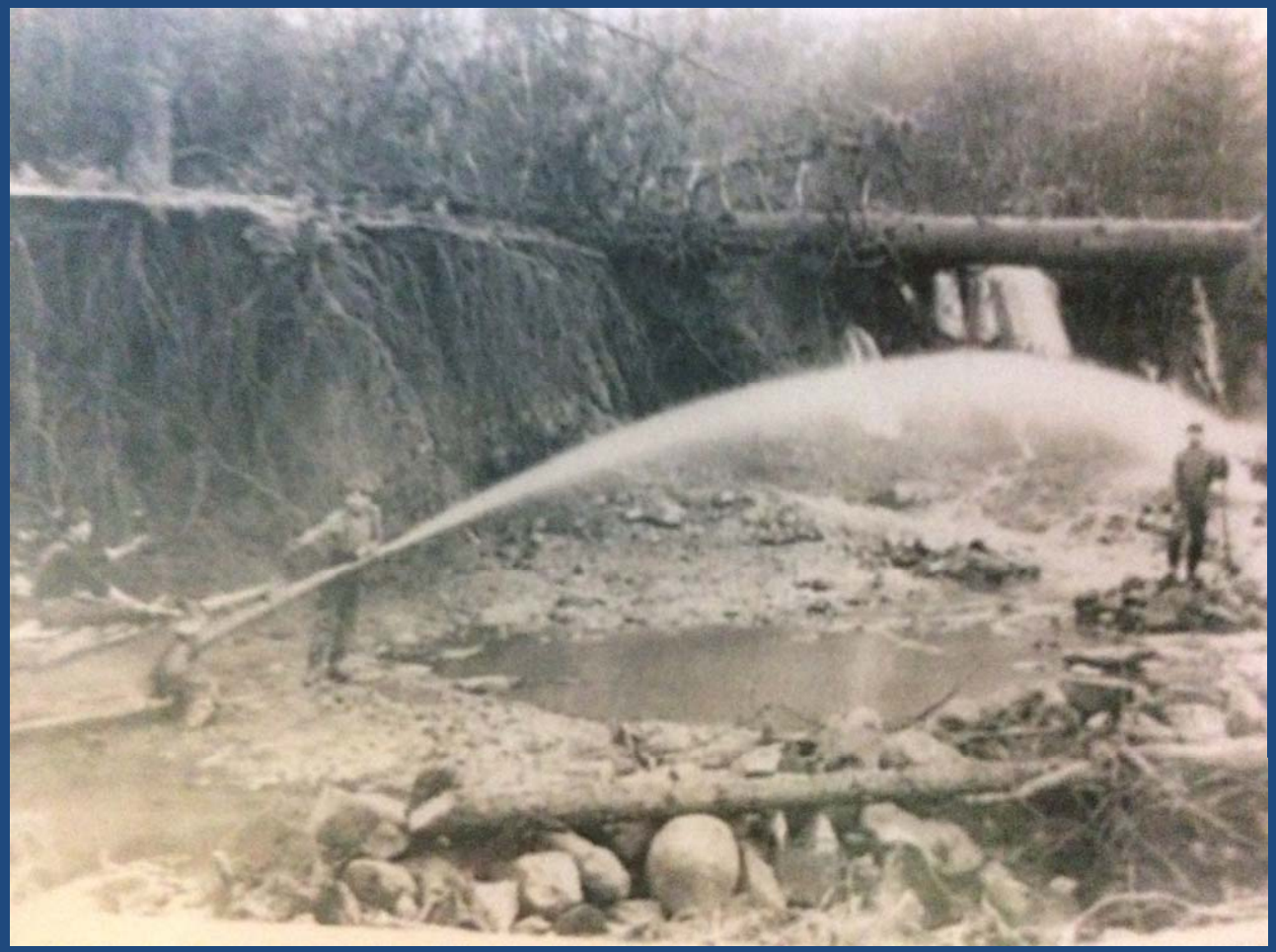
Ti'lomikh Village when 4,500 Takelma came to feast!

Ti'lomikh Village became the Friedenburg Mine

The Navel of the Takelma Universe was obliterated

Placer Mining about 1894, along the Rogue River above Gold Hill, Oregon SOHS # 755

During ethnic cleansing, sacred sites are hit hardest.



Ti’lomikh Village (east bank) today

Ti’lomikh Village (west bank) became the Gold Hill powerhouse canal

Mugger's Alley was a miner's diversion Why? No fish seen in the pool.

Restoration Begins!
Preparing for GH Dam removal (2004)

Salmon Ceremony Returns (2007)

Gold Hill diversion dam removed (2008)

Acknowledging A sacred site on Olympic Day (2012)

Ti’lomikh Falls Park Opens (2014)

The First Monument

The City of Gold Hill apologizes, declares First Nations Day (2016)

FIRST NATIONS DAY PROCLAMATION

WHEREAS: The Takelma Salmon Ceremony at Ti'lomikh Falls was the largest Native American gathering in the Rogue Valley for thousands of years; and

WHEREAS: Generations after the signing of the Declaration of Independence, the Constitution, and the Bill of Rights, the arrival of European Americans caused the death and displacement of the Native Americans; and

WHEREAS: Native Americans living here today grew up deprived of basic human rights, including the right to speak their own languages and practice their own religions; and

WHEREAS: The people of the City of Gold Hill wish to honor the long history of Ti'lomikh Falls as well as to apologize to the Native American of the Rogue Valley for the wrongs done to them.

NOW, THEREFORE: I, Jan Fish, Mayor of the City of Gold Hill, hereby proclaim **The Second Monday in October** to be

First Nations Day

IN WITNESS WHEREOF, I hereunto set my hand and cause the Great Seal of the City of Gold Hill to be affixed. Done at Gold Hill City Hall on this Seventh Day of March 2016.

Jan Fish

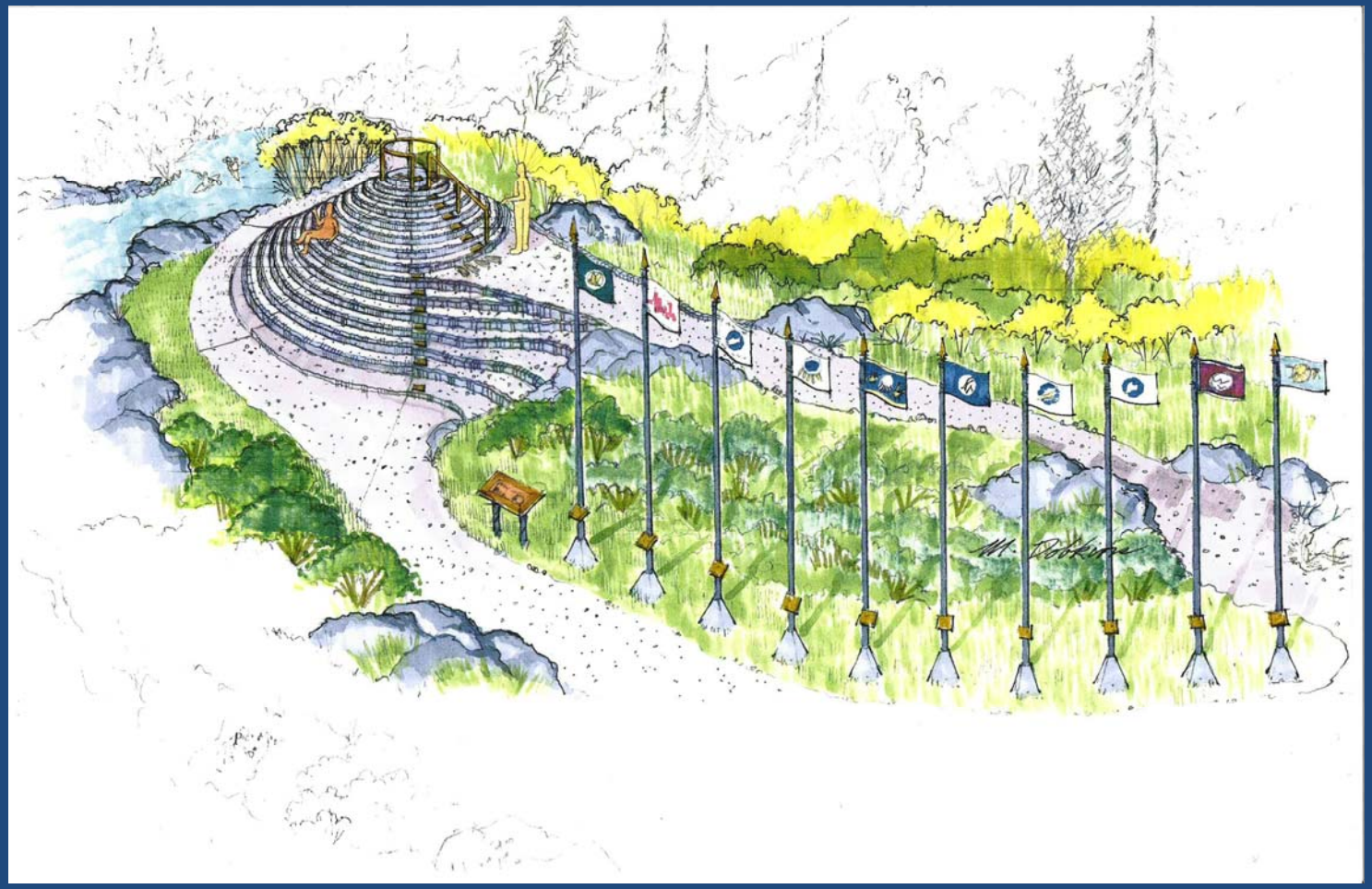
Jan Fish, Mayor of Gold Hill

Gold Hill City Council President Donna Silva
Karen Baker, Margaret Dials, Chris Stanley, Gus Wolf

City Manager Rick Hohnbaum
Deputy City Recorder Mary Goddard

Gold Hill Community Development Organization CAN DO!
President Stephen Kiesling
Vice President Hugh Schoonover
Secretary Lori Hettman

Monument to celebrate 15,000 years of Native American history



Site of First Nations Monument (High enough to view Story Chair)

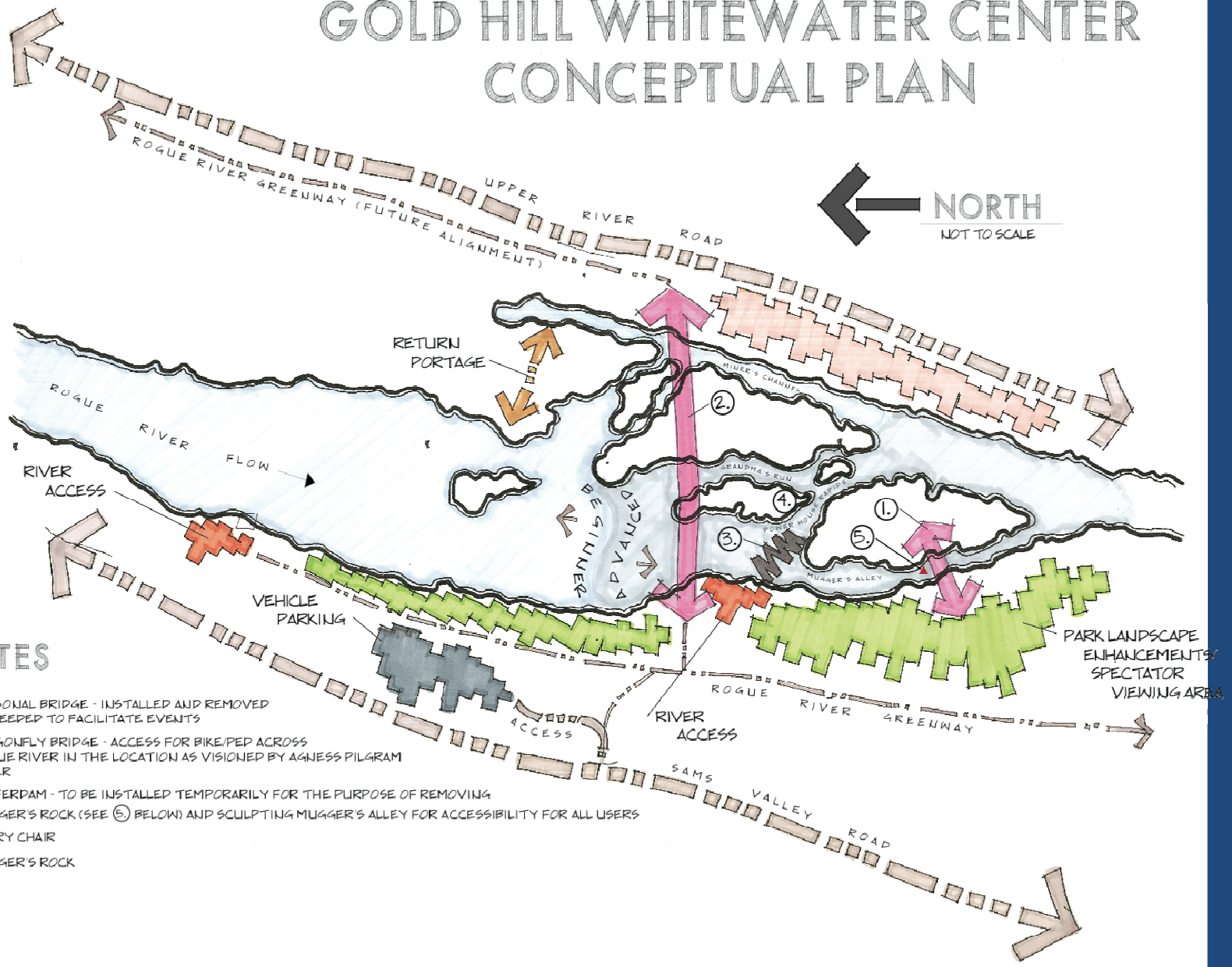
The New Mugger's Alley opens to passage

Our next meeting: The Takelma Dragonfly returns as Greenway Bridge

Partners/Supporters

- City of Gold Hill
- Jackson County
- State of Oregon
- USA Canoe/Kayak and USOC
- Grandma Agnes Baker Pilgrim
- Oregon Community Foundation
- Rogue River Greenway Foundation
- Gold Hill “Can Do” Association
- Southern Oregon University Outdoor Program
- Medford Mail Tribune
- SOREDI
- Travel Medford

GOLD HILL WHITEWATER CENTER CONCEPTUAL PLAN



NOTES

1. SEASONAL BRIDGE - INSTALLED AND REMOVED AS NEEDED TO FACILITATE EVENTS
2. DRAGONFLY BRIDGE - ACCESS FOR BIKE/PED ACROSS ROGUE RIVER IN THE LOCATION AS VISIONED BY AGNESS PILGRAM BAKER
3. COFFERDAM - TO BE INSTALLED TEMPORARILY FOR THE PURPOSE OF REMOVING MUGGER'S ROCK (SEE 5. BELOW) AND SCULPTING MUGGER'S ALLEY FOR ACCESSIBILITY FOR ALL USERS
4. STORY CHAIR
5. MUGGER'S ROCK

MICHAEL A. BLACK, JULY 15, 2014

Project Objectives

- Reduce hazards – prominent pinning rock
- “Detune” channel, distribute gradient
- Increase recreational value
  - Through boat/raft passage
  - Olympic whitewater slalom
  - Park and play whitewater features

Means to Achieve Project Objectives

- Reduce hazards and channel congestion– prominent pinning rock
  - Selective excavation of mid-stream rocks (3)
- "Detune" channel, distribute gradient
  - Selective addition of sills (4)
- Increase recreational value
  - Selective excavation on side of channel to create eddies (7+/-)
  - Whitewater play wave (1)

Selective Excavation to Reduce Congestion

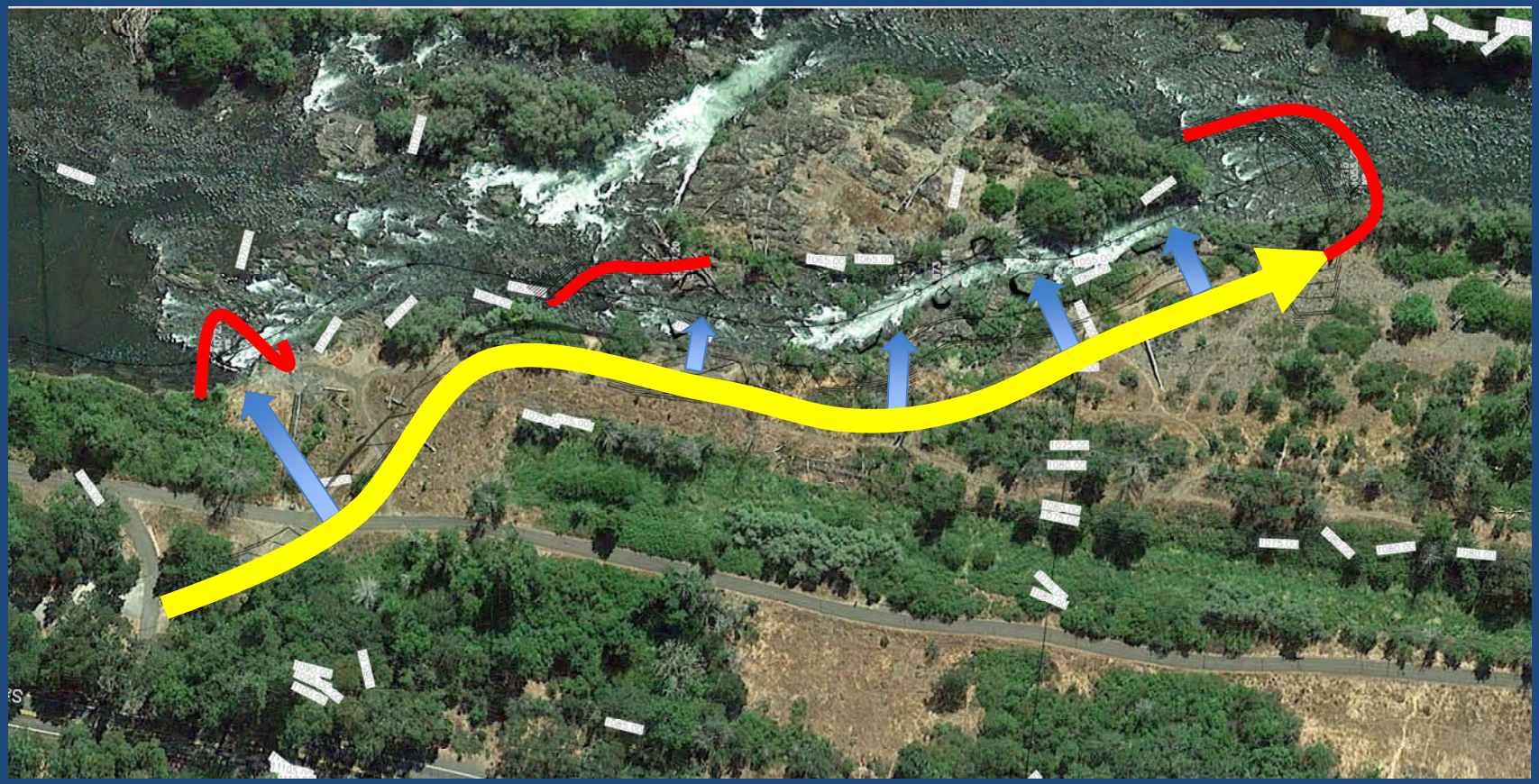
Additive Sills

Excavation for Side Eddies

Whitewater Wave

- Sill at downstream end for whitewater surfing

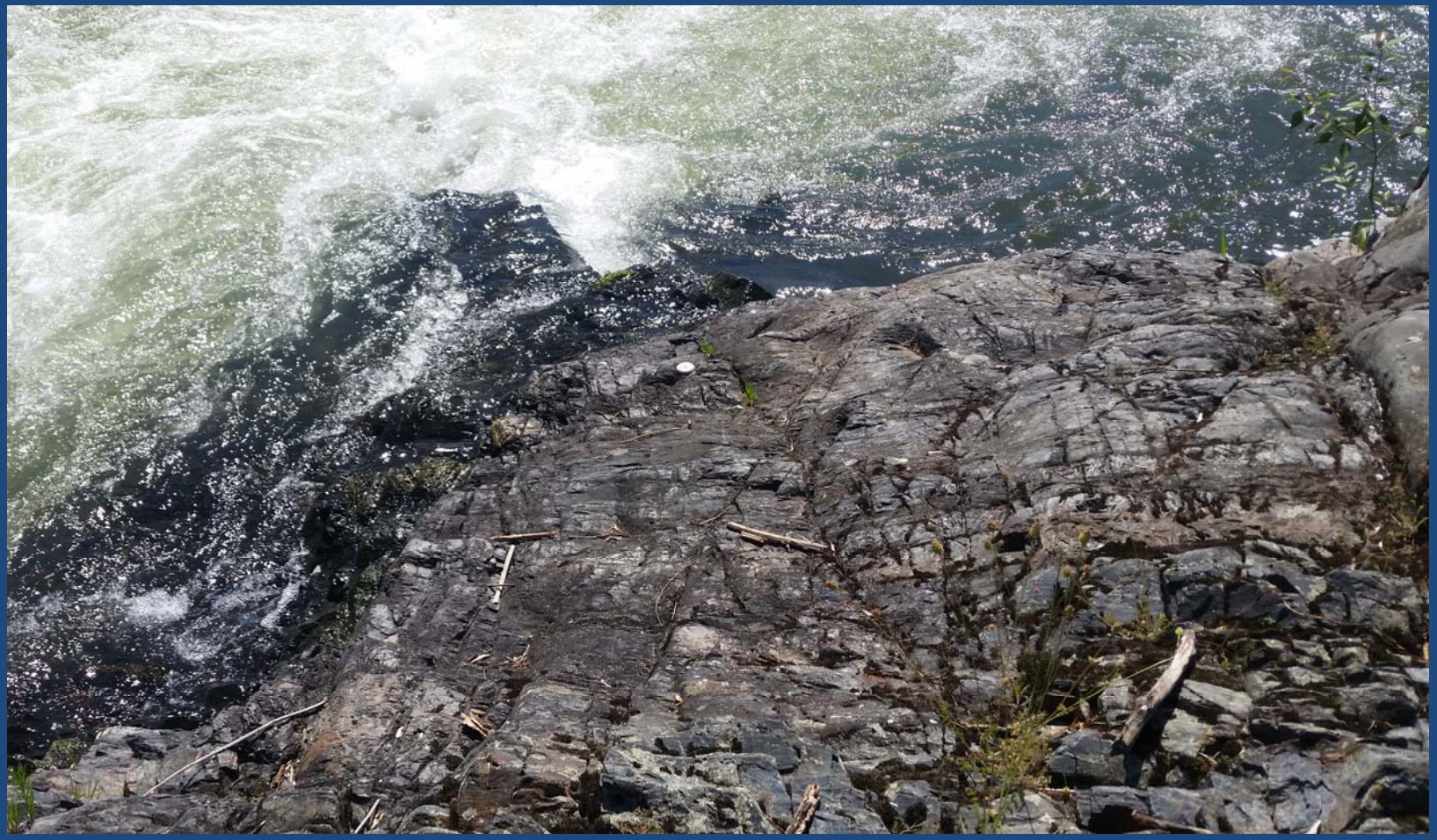
Construction Access + Dewatering




Thank You!

Faux Rock

Faux Rock



Tuning Blocks

Oregon
Kate Brown, Governor

Department of Fish and Wildlife
Fish Division
4034 Fairview Industrial Drive SE
Salem, OR 97302
(503) 947-6201
FAX (503) 947-6202
www.dfw.state.or.us/

June 1, 2016

Steve Kiesling
Gold Hill Whitewater Center
1275 Upper River Rd.
Gold Hill, OR 97525

Mr. Kiesling,

Thank you for providing a conceptual overview of a new whitewater park proposed for the Rogue River near Gold Hill during our May 18, 2016 meeting. Oregon Department of Fish and Wildlife (ODFW) is providing this letter to summarize our concerns related to impacts on fish passage from this proposed Whitewater Park. Other fish and wildlife concerns exist that may be addressed through permit consultations and interaction with ODFW staff.

ODFW's fish passage authority and guidance is described in ORS 509.585 and OAR 635-412-0005 through 0040. In summary, regarding the whitewater park proposal, these laws establish that no person shall construct any artificial obstruction across waters of this state that are inhabited by native migratory fish without providing passage for native migratory fish or obtaining a fish passage waiver through an approved mitigation package.

Plans have not been provided at a level adequate to conduct a fish passage evaluation. Conceptual drawings (March, 2016) were available for discussion purposes. Some enhancements identified in these conceptual drawings have already been removed or relocated. ODFW understands the applicants plan to conduct a more thorough site survey this year as the water flow drops. This survey information may then be used as the basis for advancing the design and conducting a fish passage analysis.

If an artificial obstruction is proposed in this side channel at Ti'Lomikh Falls, ODFW will need documentation from the applicant from which a thorough fish passage analysis can be completed. This documentation should include a detailed engineering plan set showing the proposed alterations to the channel and how this is expected to impact water velocities, water depths, and potential jump heights encountered during upstream migration. ODFW is particularly concerned about full spanning sills and the intent to create a "play wave". It is unclear how upstream fish passage will not be impaired with the addition of a play wave structure. A number of two and three dimensional hydraulic modeling programs can be used by the applicant to analyze the impacts of the proposed structures. This includes Flow-3D, HEC-RAS, or other engineering models that predict pre and post treatment hydraulic conditions. All modeling software outputs are reliant on the quality and quantity of survey data available for model input. It will be beneficial to collect actual water velocity

measurements at various flows within the channel around the proposed enhancement sites.

ODFW understands this proposal is unique in that multiple fish passage channels exist at this site. The applicant has stated in multiple documents that fish passage will be improved by these enhancements. If ODFW determines this project does not reduce the ability for native migratory fish to migrate upstream through the proposed channel, additional design modifications or fish passage mitigation may not be required. If fish passage is impaired by this proposal, ODFW will identify what is preventing a fish passage approval authorization. You may then consider a design modification that addresses the needs of native migratory fish or develop a mitigation strategy and apply for a fish passage waiver.

ODFW is available to provide additional advice on future modeling efforts to ensure this is completed with enough detail and accuracy to provide a useful analysis. Feel free to contact Greg Apke, ODFW Fish Passage Coordinator (503-947-6228, greg.d.apke@state.or.us) if you have any questions on ODFW's Fish Passage Program and how it relates to the Whitewater Park proposal.

Sincerely

Alan Ritchey
Fish Screening and Passage Program Manager

Cc: Alex Campbell, Regional Solutions
Greg Apke, ODFW
Russ Stauff, ODFW
Joy Vaughan, ODFW

John Anderson

From: CAMPBELL Alex * GOV <Alex.CAMPBELL@oregon.gov>
Sent: Thursday, May 26, 2016 6:36 PM
To: RITCHEY Alan D; RITCHEY Alan D
Cc: APKE Greg D; 'John Anderson'; DOINO Jay V; Rick McLaughlin; steve@goldhillwhitewater.org
Subject: RE: meeting last week - Gold Hill Whitewater proposal

Thanks much Alan. Appreciate you taking the time. I think you were probably just re-stating what you said in the meeting already … but it was a lot to take in. We have started discussions about getting a fish biologist on the team soon.

Alex Campbell
Regional Solutions Coordinator
Southern Oregon Region
Office of Governor Kate Brown

(541) 601-0408 ◆ alex.campbell@oregon.gov
www.regionalsolutions.oregon.gov

From: Alan Ritchey [mailto:alan.d.ritchey@state.or.us]
Sent: Thursday, May 26, 2016 10:14 AM
To: CAMPBELL Alex * GOV <Alex.CAMPBELL@oregon.gov>; RITCHEY Alan D <Alan.D.Ritchey@state.or.us>
Cc: APKE Greg D <Greg.D.Apke@state.or.us>; 'John Anderson' <j.anderson126@verizon.net>; DOINO Jay V <Jay.V.Doino@state.or.us>; Rick McLaughlin <rick.mclaughlin@merrick.com>; steve@goldhillwhitewater.org
Subject: RE: meeting last week - Gold Hill Whitewater proposal

Alex

I hope to have a letter ready for distribution next week. ODFW's fish passage approval will be based on the impact of the proposed whitewater enhancements compared to current conditions. I do not expect this side channel to meet the same criteria established for typical fish ladders. Documents provided by the proponents had a number of statements regarding how these enhancements would benefit fish passage. Supporting these statements through baseline flow data, modeled impacts, and post project monitoring may be the clearest path forward for fish passage approval. Once you have a chance to review our letter we can work with you to address remaining questions and expectations.

Alan Ritchey

Oregon Department of Fish and Wildlife
Fish Screens and Passage Program Manager
4034 Fairview Industrial Dr SE
Salem, OR 97302-1142
503-947-6229

From: CAMPBELL Alex * GOV [mailto:Alex.CAMPBELL@oregon.gov]
Sent: Wednesday, May 25, 2016 10:51 AM
To: RITCHEY Alan D <Alan.D.Ritchey@state.or.us>
Cc: steve@goldhillwhitewater.org; Rick McLaughlin <rick.mclaughlin@merrick.com>; 'John Anderson' <j.anderson126@verizon.net>; DOINO Jay V <Jay.V.Doino@state.or.us>
Subject: meeting last week - Gold Hill Whitewater proposal

Alan-

Thanks very much for taking the time to dig in a bit on the proposed whitewater park. We'll look forward to receiving your/Jay's letter regarding fish species present in the project area.

Could I ask you to address, either in that letter, or in another format a couple related questions? I'm sure the answers may have more nuance than you can manage in a short letter. We will, of course, understand if you can't really answer these questions at this stage. However, if possible, a few more hints at what we are up against could be really useful.

When I went back to review the state fish passage law, in particular OAR 412-0035 … Section (1) makes a lot of sense in terms of the letter that you will provide. I think a (potentially) insurmountable hurdle would be meeting Section (2) if, for example, the project would have to demonstrate that any gaps between the sill for the standing wave meet the absolute standards for "fishways"?

A related/similar question: will the list of species to consider be stratified by flow conditions? (My thought is that even though X species may be present at times during the year, that may not necessarily mean that the current conditions allow them passage through this channel at all times of year.) Would the project only need to demonstrate passage under the types/levels of flow under which they currently could be reasonably assumed to be capable of passing?

Another related question: for *some species under some flow conditions* could passage be demonstrated by describing and/or modeling how/if they would be likely to use the other channels? Or demonstrating that they would be more likely under current conditions to use the other channels?

Thanks for any light you feel comfortable shedding on the above.

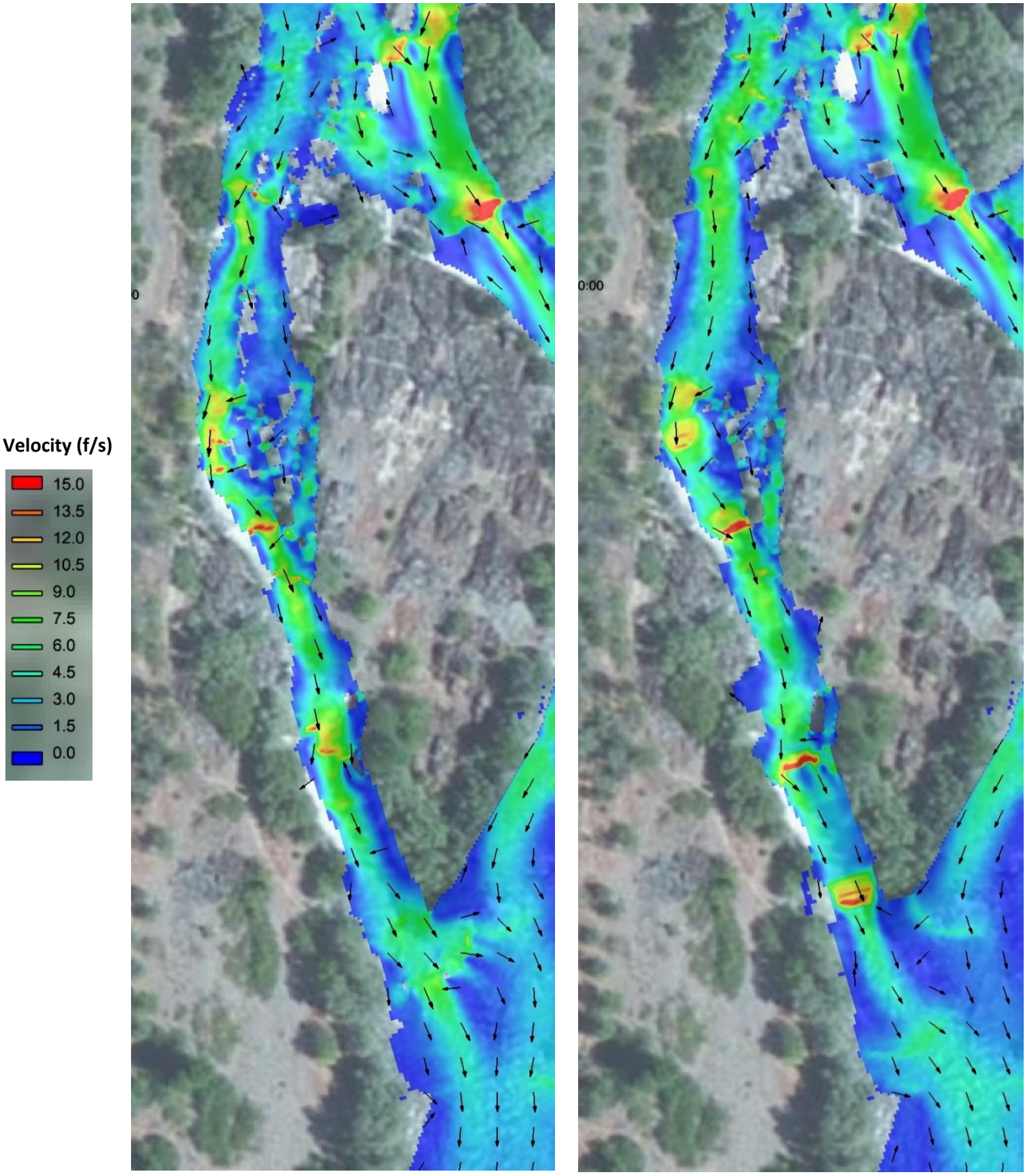
Best, Alex

Alex Campbell
Regional Solutions Coordinator
Southern Oregon Region
Office of Governor Kate Brown

(541) 601-0408 ◆ alex.campbell@oregon.gov
www.regionalsolutions.oregon.gov

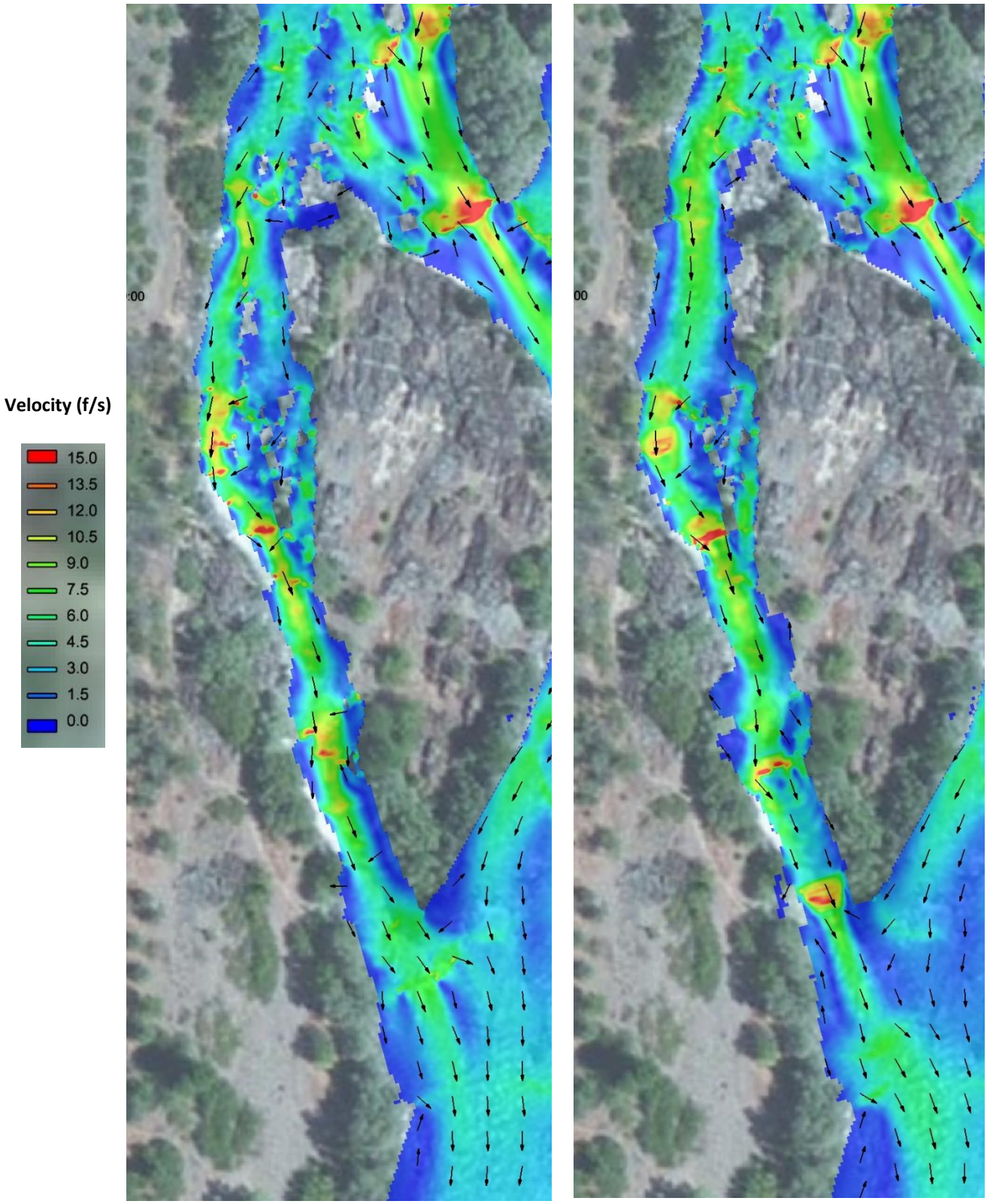
APPENDIX B. HYDRAULIC MODELING RESULTS

Figure B1. Existing vs. Proposed 2D Velocity Results in Mugger's Alley, 1100 cfs



EXISTING **PROPOSED**

Figure B2. Existing vs. Proposed 2D Velocity Results in Mugger's Alley, 1700 cfs



EXISTING **PROPOSED**

Figure B3. Existing vs. Proposed 2D Velocity Results in Mugger's Alley, 4800 cfs