

Supplement Analysis
for the
Columbia River Basin Tributary Habitat Restoration Programmatic Environmental Assessment
(DOE/EA 2126/SA-58)

Upper Hangman Creek Restoration Project

Bonneville project number 2010-072-00
Bonneville contract number 84063 rel. 3

Bonneville Power Administration
Department of Energy



Introduction

In December 2020, Bonneville Power Administration (Bonneville) and the Bureau of Reclamation completed the Columbia River Basin Tributary Habitat Restoration Programmatic Environmental Assessment (DOE/EA 2126) (Programmatic EA). The Programmatic EA analyzed the potential environmental impacts of implementing habitat restoration actions in the Columbia River Basin and its tributaries. In March of 2024, Bonneville completed a Supplement Analysis (SA; SA-57) that found that new channel excavation, reactivating abandoned channels, pond construction, and installing multiple large woody debris structures did not represent a substantial change to the proposal evaluated in the Programmatic EA and were not significant new circumstances or information relevant to the environmental concerns that were not addressed by the Programmatic EA.

Consistent with the Programmatic EA, this SA analyzes the effects of the Upper Hangman Creek Restoration Project which BPA is proposing to fund. BPA would provide funds to the Coeur d'Alene Tribe (CDA) to implement specific restoration actions in Upper Hangman Creek in Benewah County, Idaho, consistent with those assessed in the Programmatic EA. The project would construct a new creek alignment; plug and reshape the existing channel alignment to create ponds and wetlands; install large wood structures and beaver dam analogues; and remove a segment of an old railroad grade.

This SA analyzes the site-specific impacts of the Upper Hangman Creek Restoration Project to determine if it is within the scope of the Programmatic. It also evaluates whether the project presents significant new circumstances or information relevant to environmental concerns that were not addressed by the EA. The findings of this SA determine whether additional National Environmental Policy Act (NEPA) analysis is needed pursuant to 40 Code of Federal Regulations (C.F.R.) § 1502.9(d) and 10 C.F.R. § 1021 *et seq.*

Proposed Action

The Upper Hangman Creek Restoration Project is located on Hangman Creek, which is one mile east of U.S. Highway 95 and approximately six miles south of Tensed, Idaho. The project would construct 4,600 feet of new channel to the west of the current Hangman Creek alignment. The existing Hangman Creek channel would be decommissioned and converted to a series of ponds and wetland features. The work would be accomplished in two phases as displayed in Appendix A.

The first phase would include the excavation of the new channel, the construction and installation of twenty-three large wood structures in that new creek alignment, and the installation of vegetated wood and willow banks along all new stream banks. New channel construction would include channel-bed construction of placed rock and alluvium; placement and embedment of individual logs at 20-to-30-foot spacings; and random placement of boulder clusters (up to six boulders each). The stream bed would also include one constructed riffle (a cobble and boulder streambed grade-control structure constructed at a specific elevation and shape to ensure grade and slope stability) at the downstream end of the newly constructed channel. An abandoned elevated railroad grade (1,500 feet) would be removed and graded to match surrounding contours.

The second phase would redirect Hangman Creek flows into the new channel and create twelve ponds (averaging approximately 0.75 to 1.0-acre each) and wetland features along the former channel by plugging sections of it to create the ponds and filling and shaping other sections to specific elevations to create wetland features. Three wetland complexes (an emergent wetland complex – 4.6 acres, a scrub-shrub wetland complex – 12.6 acres, and a forested wetland complex – 3.5 acres) would also be developed in agricultural fields between and along the new and former creek alignments. Temporary coffer dams would be used in the new and existing channels to divert flows or ponded water around discrete work areas to allow for construction in dry conditions to minimize sediment input into flowing or ponded waters.

Four beaver dam analogues (BDAs) would be constructed in two existing small side channels (two BDAs each) west and downstream of the new creek alignment to re-create the historical condition of an active floodplain interlaced with slow water habitats.

Floodplain roughness features (willow baffles and large woody debris) would be placed over nine acres of re-graded floodplain surface to improve the floodplain's capability to slow flows and capture sediment.

Approximately one mile of new temporary access roads and 0.1 mile of existing road would be used for access. Eleven staging areas (about three acres total) would be constructed for short-term storage of excavated material, logs, and equipment.

Seeding and planting of willow cuttings and containerized plants on disturbed areas (about 1.5 acres total) would be applied in riparian areas where vegetation is lacking to accelerate the recovery of riparian habitats.

The top six inches of organic topsoil, sod, and vegetation (trees and shrubs) would be salvaged from areas planned for excavation and stockpiled for use in final contouring and restoration of the project site. All staging areas and temporary access routes, as well as compacted areas within the project area, would be de-compacted by ripping to a depth of eight inches with a tractor-mounted toothed ripper to loosen and aerate the soil while retaining organic matter on the surface.

The entire project would encompass about 101 acres, require about 2.75 acres of excavation, 1.3 acres of vegetation clearing, 2.75 acres of fill, and about 224 logs (each about twenty feet long and ten to twelve-inches in diameter).

This action supports ongoing efforts to mitigate for effects of the Federal Columbia River Power System on fish and wildlife in the mainstem Columbia River and its tributaries pursuant to the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Northwest Power Act) (16 U.S.C. (USC) 839 et seq.).

Environmental Effects

The implementation of the Upper Hangman Creek Restoration Project would require the use of a bulldozer, an off-road dump truck, and a small and medium-sized track-hoe for excavating the new stream channel; plugging portions of the existing channel; contouring wetland features; removing the old railroad grade; constructing the riffle; and for placing logs, alluvium, and boulders. All of these actions would disturb and displace soil in and along the river, damage vegetation, create noise, produce vehicle emissions, and temporarily increase vehicle traffic and human activity in the project area. The typical effects associated with the environmental disturbances created by the Upper Hangman Creek Restoration Project are described in Chapter 3 of the Programmatic EA and summarized in this document.

Below is a description of the potential site-specific effects of the Upper Hangman Creek Restoration Project and an assessment of whether these effects are consistent with those described in the Programmatic EA. Because the project is designed to improve both aquatic and riparian habitats for the long term, the adverse effects from soil, water, and vegetation disturbance and human and mechanical activity, as detailed below, would be short-term only.

1. Fish and Aquatic Species

The effects of using construction equipment in and along Hangman Creek are consistent with the analysis in Section 3.3.1 of the Programmatic EA (“Fish and Aquatic Species”). Section 3.3.1.3 of the Programmatic EA describes overall low impacts to fish and aquatic species after considering moderate short-term adverse effects and highly beneficial long-term effects.

No species listed under the Endangered Species Act or identified for protection by the State of Idaho are present in the project area. Redband trout and Chinook salmon (not currently present, but considered for potential future use) are the species of interest to the Coeur d’Alene Tribe for which this project was designed.

The short-term adverse effects of the project would include exposing, displacing, reconfiguring, or compacting earth with mechanized equipment along Hangman Creek, likely causing moderate, temporary sediment discharges, primarily from the introduction of first-time flows into the newly-constructed channel. These impacts would be minimized because new excavations would be accomplished “in the dry” with no exposure to stream flows wherever possible while applying best management practices to minimize erosion and by slowly introducing new flows into the new channel.

The amount of sediment discharged would be elevated, but the durations of such exposure would be typical of that which fish would encounter in their natural environment, as evaluated in Section 3.3.1.2.1 of the Programmatic EA. As described therein, these durations would have a low potential for triggering the behavioral and physiological effects from elevated water temperatures induced by high suspended sediment concentrations absorbing and transferring solar energy into the water.

Movement, sounds, and vibrations from construction-related human and mechanical activity would likely temporarily disturb and displace fish and aquatic organisms from their preferred habitats for the duration of the disturbance. The new channel would be constructed in the dry in upland areas and that construction action would have no effect on fish or other aquatic species. The dewatering of the current channel or discrete work areas, however, would affect all aquatic species present. To minimize impacts, the creek and work areas would be dewatered slowly, allowing as many fish and other aquatic organisms as possible the opportunity to relocate voluntarily. Nonetheless, some would be trapped in remnant isolated pools or puddles requiring aquatic organism salvage and relocation (primarily for fish) to ponds or free-flowing portions of the creek prior to complete dewatering. Fish salvage could involve electro-shocking, capture, and handling to relocate the fish. This is stressful for individual fish, but less so than stranding the fish without water. Full dewatering would also likely kill aquatic organisms (e.g., invertebrates) not able to be salvaged or themselves unable to survive the dewatering, however, the anticipated amount of this activity and aquatic species disturbance is consistent with

the analysis in Section 3.3.1.2.1 of the Programmatic EA which describes such dewatering and the associated effects.

The Upper Hangman Creek Restoration Project's long-term beneficial effects would include creation of more diverse spawning and rearing habitats for fish by creating a more sinuous channel with more instream habitat features and by constructing numerous ponds in the former channel and the streams with the four BDAs. The effect on fish and other aquatic species from the Upper Hangman Creek Restoration Project would be low considering both the action's short-term adverse effects and long-term beneficial effects. This is consistent with the analysis in Section 3.3.1.2.2 of the Programmatic EA.

2. Water Resources

The effects of using construction equipment in and along Hangman Creek are consistent with the analysis in Section 3.3.2 of the Programmatic EA ("*Water Resources*"). Section 3.3.2.3 of the Programmatic EA describes overall low water quality impacts after considering short-term adverse effects and beneficial long-term effects. There would be no effect on water quantity, as this project would make no water withdrawals, but there could be increased groundwater recharge since the connection between surface flows and the floodplain would be increased over both space and time.

Overall, the Upper Hangman Creek Restoration Project would cause temporary sediment discharges by introducing flows across exposed soils in the newly constructed channel. Restoration actions would disturb lengths of stream or riverbank consistent with the type and scale of activities assessed in the Programmatic EA, and the sediment produced from these restoration actions is not anticipated to be greater than what occurs naturally during annual high-flow events. As in the Programmatic EA, these are short-term effects which would be mitigated with various measures, including high-pressure washing of fine material into the newly constructed riffle, gradual introduction of flows into the new channel, and protection of existing vegetation and revegetation when the Upper Hangman Creek Restoration Project is complete. The long-term effects of the Upper Hangman Creek Restoration Project, however, would include an elevated water table with an increased capacity for water storage as the current channel is incised well below the floodplain level and the new channel would flow closer to the floodplain's elevation. The project would also reduce stream temperatures as a result of improved stream form, instream habitat structure, and increased riparian vegetative cover. These long-term beneficial effects are consistent with those described in the Programmatic EA.

3. Vegetation

The effects of using construction equipment in and along Hangman Creek are consistent with the analysis in Section 3.3.3 of the Programmatic EA ("*Vegetation*"). Section 3.3.3.3 of the Programmatic EA describes overall moderate impacts to vegetation after considering moderate short-term adverse effects and highly beneficial long-term effects. No plant species listed by the State or Federal governments as endangered, threatened, or of concern are present within the Upper Hangman Creek Restoration Project area.

The Upper Hangman Creek Restoration Project would produce impacts consistent with those described in the Programmatic EA for large-scale earthmoving during the construction of the new channel, ponds, and wetland features. Earth-moving actions required to construct these features would impact approximately 1.3 acres of vegetation and would entirely eliminate woody and herbaceous vegetation in those locations. The scale of these actions would be less than the dozens of acres for some projects as assessed in Section 3.3.3.2 of the Programmatic EA in ("*Environmental Consequences for Vegetation*"). All impacted areas would become either waterways or wetlands and would be revegetated by seeding and planting of native species. As described in the Programmatic EA, the short-term adverse effects would be temporary and low, but the long-term impacts would be beneficial. The overall level of effect would be low.

4. Wetlands and Floodplains

The effects of using construction equipment in and along Hangman Creek are consistent with the analysis in Section 3.3.4 of the Programmatic EA ("*Wetlands and Floodplains*"). Section 3.3.4.3 of the Programmatic EA describes overall low impacts to wetlands and floodplains after considering short-term adverse effects and beneficial long-term effects.

By design, most of the proposed construction activities would occur in riparian wetlands and floodplains, (though some of the floodplain had been converted to agricultural uses). All work would thus require, and the CDA has obtained, permits issued by the US Army Corps of Engineers under Section 404 of the Clean Water Act before ground-disturbing actions could begin.

The project would maintain wetland and floodplain habitats and functions, albeit in a different configuration than previously. There would be highly adverse short-term impacts in the immediate area of construction activity where the new channel would be excavated (former agricultural fields and wetland/riparian habitats) and where the former channel would be plugged and reshaped as ponds and wetlands. This moderate level of impact would occur on less than three percent of the 101-acre project area over a two-to-four-week construction period before restoration of the sites to different types of wetland features.

Consistent with the Programmatic EA, there would be long-term beneficial effects on floodplains from implementation of the Upper Hangman Creek Restoration Project. A large benefit would be the increased capacity of the creek to connect with its floodplain at high flows, as the current channel is incised well below its historical floodplain level and the new channel would restore flows closer to the floodplain's elevation thereby allowing flood flows to disperse across the floodplain's surface once again. There would also be increased connectivity between the new channel and its adjacent floodplain from the constructed beaver dam analogues, and the riffle. These would slow water velocities and elevate water levels and thereby facilitate more effective connection between the creek and floodplain. Adding floodplain roughness (willow baffles and large woody debris) would slow the flow of water and improve sediment deposition and groundwater recharge across the nine acres of floodplain that would be regraded to elevations conducive to such sediment capture and water retention.

Considering the moderate adverse short-term impacts and the long-term beneficial effects, the overall effect on wetlands and floodplains would be low, as stated in the Programmatic EA.

5. Wildlife

The effects of using construction equipment in and along Hangman Creek are consistent with the analysis in Section 3.3.5 of the Programmatic EA ("*Wildlife*"). Section 3.3.5.3 of the Programmatic EA describes overall low impacts to wildlife after considering short-term adverse effects and beneficial long-term effects. No wildlife species listed under the Endangered Species Act or by the State of Idaho are present within the Upper Hangman Creek Restoration Project area.

The proposed restoration actions would have short-term impacts on vegetated wildlife habitats as described in Section 3 ("*Vegetation*") above. In the short term, habitat for nesting birds and hiding cover for big game would be eliminated in the areas to be excavated, as evaluated in the Programmatic EA. The number of acres affected, however, is small in proportion to the abundance of identical habitats in the Hangman Creek floodplain above and below this project area. Individual animals may be affected by this short-term loss of vegetation, but the scale of disruption, given the available habitat across the landscape, is too small to adversely affect local populations. And in the long term, the affected area would support even more stream frontage and riparian, wetland, and aquatic habitats. Considering both long- and short-term effects, the overall effect on wildlife would be low, as stated in the Programmatic EA.

6. *Geology and Soils*

The effects of using construction equipment in and along Hangman Creek are consistent with the analysis in Section 3.3.6 of the Programmatic EA ("*Geology and Soils*"). Section 3.3.6.3 of the Programmatic EA describes moderate impacts to geology and soils.

The Upper Hangman Creek Restoration Project would produce impacts consistent with those described in the Programmatic EA for large-scale earthmoving during creation of the new channel and the restructuring of the former channel. The scale of these actions (about 2.75 acres) would be less than the dozens of acres some projects may affect as assessed in the Programmatic EA, and the impacts to soil would be mitigated by minimizing the area of impact during operations, salvaging and re-spreading topsoil, ripping compacted soils, and applying erosion control measures. The level of effect from heavy equipment operation within the project area would be moderate to high in the immediate areas affected by earth moving in the short term, but in the long term, the project would improve connectivity between Hangman Creek and its floodplain. This would provide for sediment capture, vegetation diversity, and improved groundwater infiltration, all of which would restore and improve the soil conditions disrupted during construction. Considering both short-term and long-term effects, the overall effect would be moderate as described in the Programmatic EA.

7. *Transportation*

The effects of the Upper Hangman Creek Restoration Project in and along Hangman Creek are consistent with the analysis in Section 3.3.7 of the Programmatic EA ("*Transportation*"). Section 3.3.7.3 of the Programmatic EA describes low impacts to transportation.

The greatest effect of the proposed restoration actions on transportation would be increased congestion of local roads by vehicles transporting workers and equipment to the project site. The Upper Hangman Creek Restoration Project would be about one mile from U.S. Highway 95 and project activities would have essentially no effect on this roadway. No roads would be closed, temporarily blocked, or relocated. This level of impact would be low, as stated in the Programmatic EA.

8. *Land Use and Recreation*

The Upper Hangman Creek Restoration Project would not affect land use or recreation. Land uses (managed for tribal fish and wildlife values) would not change; and public recreational opportunities on this tribal land (of which there is little since the lands are open only to tribal use, but not public use) would not change. This level of effect is consistent with that described in Section 3.3.8.3 of the Programmatic EA, which states that land use practices underlying most project sites would not change.

9. *Visual Resources*

The Upper Hangman Creek Restoration Project's effects in and along Hangman Creek are consistent with the analysis in Section 3.3.9 of the Programmatic EA ("*Visual Resources*"). Section 3.3.9.3 of the Programmatic EA describes low impacts to visual resources.

The Upper Hangman Creek Restoration Project would implement restoration actions over one mile from U.S. Highway 95, and views of the project area are topography and vegetation. Construction actions would temporarily result in bare soils that would be minimally visible from local roads about 0.4 mile away and would likely detract from the otherwise pastoral scenery along these roads, looking much like a plowed or mowed field until the newly planted grasses, forbs, and shrubs begin to visually restore the setting. Overall, this level of impact would be low and temporary, as stated in the Programmatic EA.

10. Air Quality, Noise, and Public Health and Safety

The effects of the Upper Hangman Creek Restoration Project in and along Hangman Creek are consistent with the analysis in Section 3.3.10 of the Programmatic EA ("*Air Quality, Noise, and Public Health and Safety*"). Section 3.3.10.3 of the Programmatic EA describes low impacts to air quality, noise, and public health and safety.

The Upper Hangman Creek Restoration Project activities would be conducted approximately 0.14 to 0.75 mile from the nearest residence, and about 0.5 to 1.5 miles from residences in the small community of Sanders, Idaho. These residents would likely hear construction activity, but would be too far away to be affected by vehicle exhaust or dust during the few weeks of construction activities. No long-term source of emissions or noise would be created. Safety impacts may result from additional construction traffic on the roads by workers travelling to and from work sites. The Upper Hangman Creek Restoration Project would have no potential to impact public safety infrastructure (e.g., roads and telecommunications) or to burden emergency services (e.g., police, fire, or ambulance).

This level of impact would be low, as stated in the Programmatic EA.

11. Cultural Resources

The effects of these restoration actions in and along Hangman Creek are consistent with the analysis in Section 3.3.11 of the Programmatic EA ("*Cultural Resources*"). Section 3.3.11.3 of the Programmatic EA describes low impacts to cultural resources because Upper Hangman Creek Restoration Project construction would avoid cultural resources, and the National Historic Preservation Act Section 106 consultation process would appropriately resolve any effects.

On July 25, 2024, BPA consulted with CDA Tribal Historic Preservation Office (THPO) and the CDA Tribal chairperson on the effects of the Upper Hangman Creek Restoration Project based on two (2021 and 2023) intensive cultural resource surveys and exploratory subsurface shovel probing of the Area Potential Effect (APE).

The inventory report identified one cultural site containing agricultural and railroad features but concluded that the site was not eligible for the National Register of Historic Places and does not meet the NHPA definition of a historic property. BPA therefore determined that the project would not affect historic properties. Prior to this determination, THPO sent a letter to the Tribe's fish and wildlife department dated July 15, 2024, stating that the project "is approved to proceed" conditioned on work stoppage and following specified protocols should "potential cultural resources and/or human remains" be located within the project. No responses were received from the THPO or the Tribal chairperson to BPA's letters of July 25, 2024, and concurrence with BPA's determinations in those letters was thereby presumed.

Consistent with the Programmatic EA, the result of the 2024 consultation was that the actions in the Upper Hangman Creek Restoration Project would not affect historic properties. In the unlikely event that cultural resources and/or human remains are inadvertently encountered during the implementation of this project, BPA would require that work be halted in the vicinity of the finds and ensure that the THPO's July 15, 2024, conditions be followed. BPA would also inspect and assess the finds if allowed to do so by the THPO and in consultation with that office.

12. Socioeconomics and Environmental Justice

The effects of the Upper Hangman Creek Restoration Project in and along Hangman Creek are consistent with the analysis in Section 3.3.13 of the Programmatic EA ("*Socioeconomics and Environmental Justice*"). Section 3.3.13.3 of the Programmatic EA describes low impacts to socioeconomics and environmental justice.

As described in the Programmatic EA, the Upper Hangman Creek Restoration Project would not result in requirements for additional permanent employees or for individuals to leave the local area or relocate within it. This project would not affect housing availability for local populations, displace people, or eliminate residential suitability of lands being restored or near them. The project would generate short-term employment for those

implementing the restoration actions and would provide small, short-term cash inputs to local businesses for fuel, equipment, and meals. This degree of effect would be low.

The CDA Tribe could be considered an Environmental Justice Population, but this is their project, and the ones who anticipate benefiting directly from it. There are no long-term adverse effects from this action. There are no adverse effects to any Environmental Justice Population.

13. Climate Change

The effects of the Upper Hangman Creek Restoration Project in and along Hangman Creek are consistent with the analysis in Section 3.3.14 of the Programmatic EA ("*Climate Change*"). Section 3.3.14.3 of the Programmatic EA describes low impacts to climate change.

Due to the short duration of construction activities and the relatively small number of vehicles involved, project-related greenhouse gas emissions are anticipated to be low. The Upper Hangman Creek Restoration Project would have a low level of effect on climate change from short-term emissions from motorized equipment operations during implementation of the restoration actions. Further, these emissions would be offset to some degree by the ameliorating effects of restored floodplain function, such as increased water table inputs, increased carbon sequestration in expanded and improved riparian wetlands, and decreased water temperatures from improved instream and riparian habitat conditions. The overall contribution to climate change and greenhouse gas production would be low, which is consistent with the Programmatic EA.

Findings

The types of restoration actions and the potential impacts related to the proposed Upper Hangman Creek Restoration Project are similar to those analyzed in the Columbia River Basin Tributary Habitat Restoration Programmatic Environmental Assessment (DOE/EA 2126) and Finding of No Significant Impact. There are no substantial changes in the EA's Proposed Action and no substantial new circumstances or information about the significance of adverse effects that bear on the analysis in the EA's Proposed Action or associated impacts within the meaning of 10 C.F.R. § 1021.314 and 40 C.F.R. §1502.9(d). Therefore, no further NEPA analysis or documentation is required.

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Appendix A: Proposed conditions: Hangman Creek Restoration Project (note different orientations in these two maps)

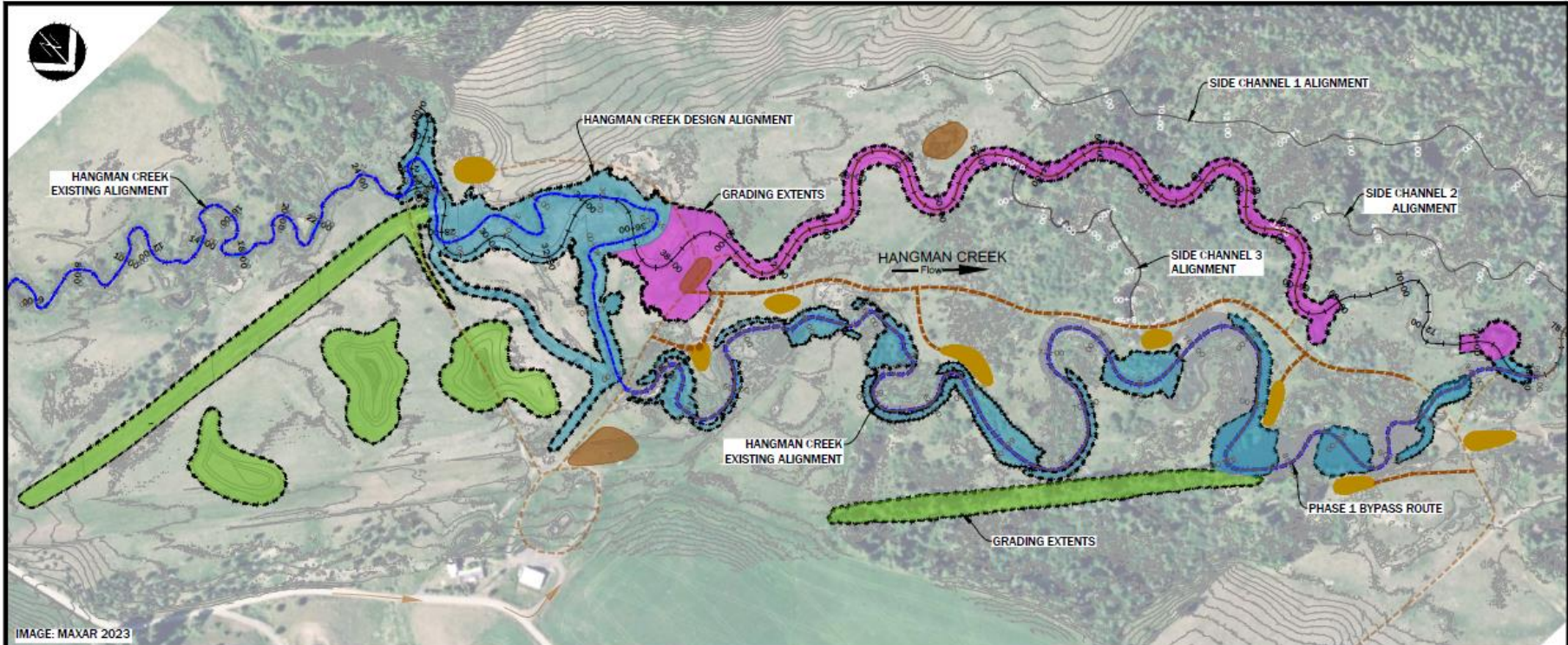


IMAGE: MAXAR 2023

1 PHASING AND WORK AREA ISOLATION PLAN
 PLAN VIEW
 1" = 300'

PHASING PLAN

PHASE 1 - 2024

THE EXISTING CHANNEL AND EXISTING SIDE CHANNEL SHALL BE UTILIZED TO CONVEY FLOW DURING CONSTRUCTION OF PHASE 1 AS SHOWN IN THE PLAN VIEW ABOVE.

CONSTRUCT TEMPORARY CROSSING AT EXISTING CHANNEL WITH 2 - 36" CMP'S AT STATIONS 44+50 AND 92+60 FOR ACCESS TO THE PHASE 1 WORK ZONE.

CONSTRUCT ALL DESIGN ELEMENTS AS HIGHLIGHTED IN THE PLAN VIEW.

HANGMAN CREEK STATION 28+50 TO 68+00 AND STATION 74+00 TO 76+00 WILL BE CONSTRUCTED IN THE DRY. RETAIN AN EARTHEN PLUG FROM STATION 28+25 TO 28+50.

ALL EXCESS CUT MATERIAL SHALL BE STAGED ALONG THE EXISTING CHANNEL FOR PHASE 2 WORK.

PHASE 2 - 2025

ACTIVATE THE NEW CHANNEL THAT WAS CONSTRUCTED DURING PHASE 1.

PERFORM FISH SALVAGE IN EXISTING CHANNEL FOLLOWING NEW CHANNEL ACTIVATION.

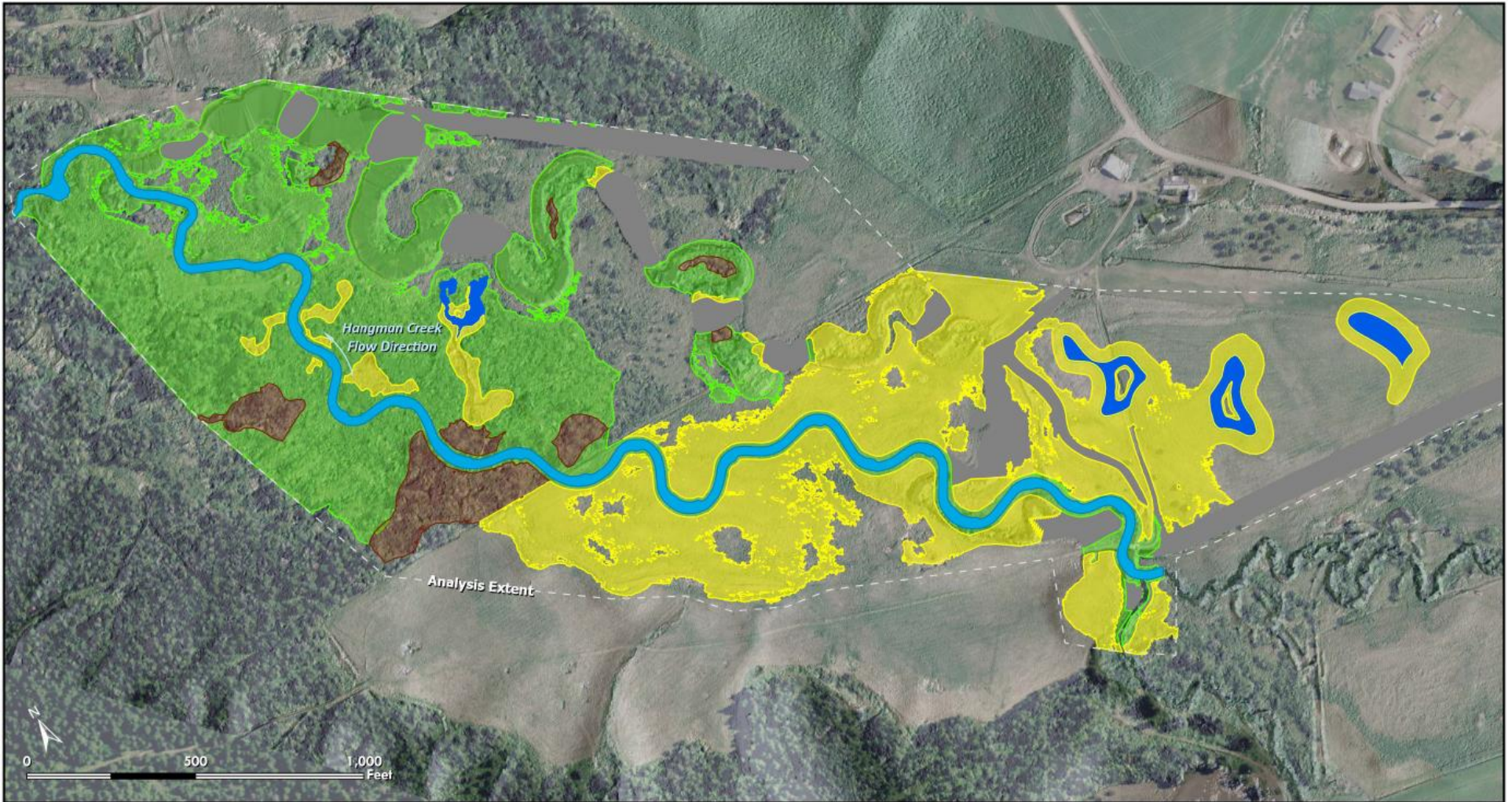
CONSTRUCT ALL DESIGN ELEMENTS AS HIGHLIGHTED IN THE PLAN VIEW.

CONSTRUCT RIFFLE GRADE CONTROL STRUCTURES PER THE DESIGN LOCATIONS.

SMITH CREEK AND HANGMAN CREEK STATION 25+00 TO 28+50 AND STATION 73+50 TO 76+00 SHALL BE CONSTRUCTED IN THE WET. CONTRACTOR SHALL APPLY TECHNIQUES INCLUDING PUMPING TO MINIMIZE TURBIDITY.

PERFORM PLUG CONSTRUCTION AND SHAPING WITHIN ABANDONED EXISTING CHANNEL. UTILIZE ADDITIONAL PUMPS TO DE-WATER INDIVIDUAL WORK AREAS AS NECESSARY.

FEATURE LEGEND	
SYMBOL	ITEM
	GRADING EXTENTS
	PHASE 1 BYPASS ROUTE
	PHASE 1 CONSTRUCTION ELEMENTS
	PHASE 2 CONSTRUCTION ELEMENTS
	CDAT CONSTRUCTION ELEMENTS
	MATERIAL STAGING AREA
	PLUG FILL STAGING AREA
	ACCESS ROAD



Hangman Creek Restoration Project
Wetland Impact Analysis

Proposed Wetlands and Waters



01.25.2024, River Design Group, Inc.

Proposed Features

	Emergent Wetland	22.42 acres		Hangman Creek	3.06 acres
	Scrub-Shrub Wetland	28.64 acres		Open Water	1.32 acres
	Forested Wetland	3.32 acres			

Total Vegetated Wetland Area: 54.38 acres

Total Waters of the U.S., Including Wetlands: 58.76 acres

Proposed Wetlands calculated from design features and proposed conditions 1-D hydraulic model output, utilizing 1.5-yr recurrence interval flow (bankfull) condition.