OREGON DEPARTMENT OF FISH AND WILDLIFE

Fish Passage WAIVER Application

- *Use this form if providing fish passage at the artificial obstruction for which a Waiver is being requested would benefit native migratory fish.*
- *Use the "Fish Passage EXEMPTION Application" if a waiver has already been granted for the artificial obstruction, fish passage mitigation has already been provided for the artificial obstruction , or if there would be no appreciable benefit for native migratory fish if passage were provided at the artificial obstruction.*
- *If you unlock and re-lock this Form, information already entered may be lost in certain versions of MS Word.*

APPLICANT INFORMATION

The Applicant must be the owner or operator of the artificial obstruction for which a Waiver is sought.

ORGANIZATION/APPLICANT: Washington County Clean Water Services

CONTACT:	Tom VanderPlaat	**TITLE:**	Water Supply Project Manager
ADDRESS:	2550 SW Hillsboro Hwy		
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E-MAIL ADDRESS:	vanderplaatt@cleanwaterservices.org		

SIGNATURE: Tom VanderPlaat **DATE:** 1/14/19

OWNER *(if different than Applicant)*: Bureau of Reclamation

CONTACT:	Dawn Wiedmeier	**TITLE:**	Columbia-Cascades Area Manager
ADDRESS:	1917 Marsh Road		
CITY:	Yakima	**STATE:** WA	**ZIP:** 98901-2058
PHONE:	509-575-5848 x200		
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SIGNATURE: Dawn Wiedmeier **DATE:** 1/16/19

Signature indicates that you understand and do not dispute this request.

APPLICATION COMPLETED BY *(if different than Applicant)*: Stuart Myers

TITLE:	Environmental Scientist
ORGANIZATION:	Mason, Bruce & Girard, Inc. (MB&G)
ADDRESS:	707 SW Washington St. Suite 1300
CITY:	Portland **STATE:** OR **ZIP:** 97205
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SIGNATURE: **DATE:** 1/14/19

To Be Completed by ODFW Fish Passage Coordinator

APPLICATION #: **DATE RECEIVED:**

FILE NAME:

APPROVED ☐ **SIGNATURE:** **DATE:**

DENIED ☐ **TITLE:**

ARTIFICIAL OBSTRUCTION (*for which a Waiver is being requested*)

1. TYPE OF ARTIFICIAL OBSTRUCTION:

- ☒ Dam
- ☐ Culvert/Bridge
- ☐ Tidegate
- ☐ Other (describe):

New ☒ Existing ☐

2. PLEASE PROVIDE A BACKGROUND AND DESCRIPTION OF THE PROPOSED ACTION TRIGGERING THE NEED TO ADDRESS FISH PASSAGE:

Scoggins Dam and Henry Hagg Lake were authorized by Congress in 1966 to provide water supply for irrigation, municipal, and industrial uses, flood control, recreation, and conservation and development of fish and wildlife resources. The dam is owned by the Bureau of Reclamation (Reclamation) and managed by the Tualatin Valley Irrigation District (TVID) under contract with Reclamation. Clean Water Services (District) is the fish passage waiver project lead agency, providing project management and public involvement oversight; as the owner of Scoggins Dam, Reclamation supports the District's application for a fish passage waiver from ODFW as a matter of comity. Water impounded by the dam is used for agricultural, industrial, residential, and conservation purposes. Scoggins Dam is the central component of Washington County's water supply and a major regional asset. It uses water from Henry Hagg Lake to support more than 250,000 jobs, provide drinking water for nearly 400,000 residents, irrigate 17,000 acres of cropland, and sustain water quality in the Tualatin River to protect fish and wildlife habitat.

The 2005 Tualatin Basin Water Supply Feasibility Study determined the water supply provided by Scoggins Dam and Henry Hagg Lake is not sufficient to address the projected municipal, industrial, agricultural, and environmental demands through 2050.

The original concept for increasing water capacity involved raising the height of the existing Scoggins Dam by up to 40 feet to meet 50-year supply needs for the region. Since the development of the dam raise concept and issuance of a fish passage waiver (Waiver Agreement No. W-04-0005) in 2005 by ODFW, seismic studies have revealed potential dam instability in the event of a large earthquake. Seismic concerns associated with the existing dam and resources required to meet updated Reclamation seismic standards have resulted in analyses of additional dam safety and water storage alternatives associated with the Tualatin Basin Dam Safety and Water Supply Joint Project (Joint Project). These alternatives include:

- Option 1 – Increase the seismic stability of the existing Scoggins Dam with no increase in water supply,
- Option 2 – Increase the seismic stability of the existing Scoggins Dam and raise the dam 17 feet to provide additional water supply, and
- Option 3 – Construct a new dam on Scoggins Creek downstream of the existing Scoggins Dam, and the existing Scoggins Dam would be notched and remain in place or otherwise modified to allow hydraulic connectivity between the existing and newly constructed downstream reservoir. The new dam (herein described as the Option 3 Dam) would result in new areas of inundation that would be hydrologically connected to Henry Hagg Lake, but the existing area of inundation for Henry Hagg Lake would essentially remain the same (see Figure 1, Attachment A).

The District wishes to move forward with the fish passage waiver/mitigation process in advance of the decision on the Joint Project so that proposed mitigation actions may be implemented, and their associated ecological benefits realized, as soon as possible, regardless of the alternative chosen. This fish passage waiver application, however, addresses only implementation of Option 3, as the implementation of Option 1 is not expected to result in fish passage concerns, and ODFW has determined that the potential fish passage impacts associated with Option 2 are adequately addressed by the existing Waiver Agreement.

3. PASSAGE WILL NOT BE PROVIDED FOR THE FOLLOWING REASON(S):

Several factors were considered to evaluate the feasibility of providing fish passage at the Option 3 Dam. These factors include current and historic Native Migratory Fish (NMF) populations, NMF habitat conditions, impacts to the existing reservoir fishery, technological constraints, and costs. Based on this analysis, providing passage at the Option 3 Dam is expected to result in a lower net benefit to NMF compared to the passage alternatives proposed in this application.

Passage will not be provided at the Option 3 dam because of the following factors:

1. **Available data does not support the assumption that providing fish passage will create a net benefit for NMF species.**

   Scoggins Creek and its tributaries in the Option 3 impact/inundation area (Figures 1 and 2, Attachment A) consist of marginal NMF habitat that has experienced long-term disturbances from various land uses. Approximately 2.89 miles of marginal habitat exists in this area for Pacific lamprey (*Lampetra tridentata*), steelhead (*Oncorhynchus mykiss*), coho salmon (*O. kisutch*), mountain whitefish (*Prosopium williamsoni*), largescale sucker (*Catostomus macrocheilus*), and mountain sucker (*C. platyrhynchus*); and a conservative maximum of 9.26 miles of coastal cutthroat trout (*O. clarki clarki*) habitat exists in the impact area. Implementation of Option 3 would result in an expanded reservoir that encompasses approximately 2.8 square miles with an approximate capacity of 112,000 acre-feet at the full pool elevation of 303.5 feet above mean sea level. A larger benefit for NMF from a biological perspective is expected to be achieved by restoring habitat and habitat connectivity elsewhere in the Tualatin River Basin.

2. **Passage may conflict with management of the warm-water fishery in Henry Hagg Lake (Scoggins Reservoir).**

   Henry Hagg Lake supports a renowned warm-water fishery that is considered an important recreational activity for the region. The fishery includes introduced species such as bass (*Micropterus* sp.), yellow perch (*Perca flavescens*), pumpkinseed (*Lepomis gibbosus*), bluegill (*L. macrochirus*), and brown and yellow bullhead (*Ameiurus* spp.) (BLM 2000). The reservoir produced current state angling records for the largest smallmouth bass and bullhead catfish caught (ODFW 2018). ODFW annually stocks thousands of hatchery-raised rainbow trout (*O. mykiss*) into the lake for anglers. It is expected that the recreational fishery would continue after implementation of Option 3, and that warm-water species would continue to flourish in the expanded reservoir. The presence of a successful warm-water fishery would counteract the success of a NMF-passage effort into the expanded reservoir through juvenile predation and resource competition. Providing passage would also increase the risk of downstream release of non-native, warm-water species into Scoggins Creek and the Tualatin River.

3. **Engineered passage solutions are not cost effective, given the limited potential benefit to NMF.**

   A significant capital investment would be required to provide passage at the Option 3 Dam, which would include long-term operation and maintenance of the passage system. Water surface elevations within the expanded Option 3 Dam reservoir would fluctuate significantly throughout the year during normal dam operations, which significantly increases the design and operation complexity and cost of an Option 3 Dam passage system. Additional operating and maintenance costs would be incurred to protect, maintain, and isolate the warm-water fishery in the Option 3 reservoir. The benefit of passage at the Option 3 Dam would be access to marginal headwater habitat upstream of the reservoir pool in tributaries that have been characterized as having a lack of structure, low number of pools, limited spawning substrate, and naturally low summer flows. These tributaries are scattered throughout the Option 3 inundation area and range from 193 feet to 1.9 miles in length, including many reaches with intermittent flow and passage barriers. Further, it is expected that there was limited-to-no use of these tributary areas by NMF, except coastal cutthroat trout, prior to the construction of Scoggins Dam. Therefore, the ecological benefit of providing passage at the Option 3 Dam would not be proportional to the cost that would be incurred. Reclamation and the District believe a greater net benefit for NMF can be achieved by implementing the fish passage mitigation discussed in this waiver application.

4. **The Gales Creek subbasin, where fish passage mitigation is proposed, contains higher-quality and more NMF habitat than the Scoggins Creek subbasin.**

   The primary fish passage mitigation proposed in this application involves fish passage improvements in Gales Creek, a headwater tributary of the Tualatin River near the Scoggins Creek subbasin (refer to Figure 3, Attachment A). The aquatic and riparian habitat quality in Gales Creek has been documented as being of higher quality than habitat conditions in Scoggins Creek (Breuner 1998, BLM 2000, TRWC 2003, CH2MHill 2003, CWS 2005, NMFS 2005, DEA 2009, and Bio-Surveys, LLC 2015). The Gales Creek subbasin is larger than the Scoggins Creek subbasin and maintains higher flows than Scoggins Creek throughout the low-flow summer period (in areas not regulated by Scoggins Dam) (BLM 2000). Although Scoggins Dam regulates flow to the approximately 5-mile reach of Scoggins Creek downstream of the dam, the creek's tributaries downstream of the existing dam are relatively small and appear to have a higher rate of intermittency and degradation than Gales Creek tributaries based on the size of the tributary drainages, available reference information for both subbasins, and the results of field reconnaissance for the development of this application (BLM 2000, TRWC 2003, and ODFW 2016). Refer to Figure 4 in Attachment A for habitat distribution in the Gales Creek basin.

4. DATE THE TRIGGER ACTION IS SCHEDULED TO BEGIN *(a minimum of two months should be planned for the waiver process after ODFW receives your application; requests that must go before the Commission will take longer)***:**

The District and Reclamation propose implementing Joint Project Option 1, 2, or 3 after land use and real estate agreements are made and Reclamation's National Environmental Policy Act (NEPA) process is complete. Waiver approval is requested in advance of these activities to authorize the proposed mitigation actions so that they may be carried out prior to any potential triggering event.

5. LOCATION

COUNTY: Washington

ROAD CROSSING (if applicable)**:** SW Scoggins Valley Road at mile point 1.53

RIVER/STREAM: Scoggins Creek

TRIBUTARY OF: Tualatin River

BASIN: Willamette

COORDINATES[a]**:** Longitude: -123.172306° Latitude: 45.458778°

[a] *Geographic projection using NAD_83 and formatted as decimal degrees to at least 4 places.*

6. STREAM DESCRIPTION

6A. BARRIER TABLE (*please provide the following information for barriers, which will help determine the benefit of providing passage at the Artificial Obstruction; indicate measurement units if applicable*)**:**

	DOWNSTREAM					UPSTREAM			
Locations	3	C/N	2	1	AO	1	2	E	*example*
Type	D		N/A	N/A	D	D	N		C
Length	~4,100 sf.		N/A	N/A	~ 5.6 ac.	~48.5 ac.	N/A		80 ft
Distance	62.4 mi.	2.75 mi.	N/A	N/A		2.89 mi.	8 mi.	55.73 mi.	1,200 ft
Level	4		N/A	N/A	5	5	5		5

Type = C (culvert/bridge), D (dam), T (tide gate), N (natural; *describe below*), O (other; *describe below*)
Length = length of the barrier in the stream (e.g., culvert's length, dam's width/footprint)
Distance = distance from the Artificial Obstruction (to closest point of other barriers)
Level = amount of passage at the barrier using the following codes:
5 - barrier to all native migratory fish
4 - barrier to some native migratory fish adults and/or species
3 - barrier to some native migratory fish adults and/or species for only part of migration period
2 - barrier to all native migratory fish juveniles
1 - barrier to some native migratory fish juveniles and/or for only part of migration period

LOCATIONS:
AO = the existing or proposed Artificial Obstruction
1,2 = other barriers in the same stream as the Artificial Obstruction
3 = downstream barrier outside the immediate stream in which the Artificial Obstruction is located (*only needed if C/N is a confluence rather than a complete natural barrier*)
E = end of historic native migratory fish use, including all tributaries (i.e., potential range without any artificial barriers in place)
C/N = first downstream confluence or complete natural barrier, whichever comes first

NOTE: The *example* indicates that there is culvert which is 80 feet long, is located 1,200 feet from the Artificial Obstruction in question, and is a complete fish passage barrier.

PLEASE PROVIDE ADDITIONAL DESCRIPTIONS FOR THOSE BARRIERS INCLUDED IN THE BARRIER TABLE OR FOR OTHER BARRIERS AFFECTING NATIVE MIGRATORY FISH MOVEMENT TO OR FROM THE ARTIFICIAL OBSTRUCTION:

If Option 3 is chosen, the proposed AO (Option 3 Dam) would encompass approximately 5.6 acres and would be sited at river mile 2.75 of Scoggins Creek, approximately 2.89 miles downstream of Scoggins Dam (Figure 1, Attachment A). Scoggins Dam encompasses approximately 48.5 acres, is the first barrier upstream of the Option 3 Dam site, does not contain fish passage facilities, and is a complete barrier to all NMF. Conservatively, there are approximately 43 miles of marginal coastal cutthroat trout habitat in Scoggins Creek upstream of Henry Hagg Lake. Coastal cutthroat trout distribution upstream of Henry Hagg Lake in Scoggins Creek ends where a tributary joins the Scoggins Creek mainstem. Upstream of this point, the gradient increases significantly in both stream segments, and flows are intermittent, thus creating a natural passage barrier that prevents upstream fish passage and usage. Coastal cutthroat trout habitat also exists in some tributaries of Henry

Hagg Lake/Scoggins Creek upstream of the reservoir. These self-sustained populations have existed in the reservoir/stream habitat upstream of the dam for many decades.

There are no known passage barriers on Scoggins Creek downstream of the proposed AO to its confluence with the Tualatin River. The only passage barrier in the Tualatin River downstream of the proposed AO is the Lake Oswego Corporation Diversion Dam (LOCDD) located at river mile 3.4, approximately 62.4 river miles downstream of the proposed AO. The structure contains a fish ladder, but it is a partial barrier to adult and juvenile passage due to the existing configuration of the ladder and poor passage attraction flow. Retrofit of the LOCDD ladder to improve passage conditions is a component of the mitigation package proposed in this waiver application to provide a net benefit to NMF.

6B. SUMMARY TABLE (*please provide the following information relative to the Artificial Obstruction, which will help determine the benefit of providing passage at it*)**:**

	DOWNSTREAM	**UPSTREAM**
NMF Species Present Currently	Steelhead, coho salmon, Pacific lamprey, mountain sucker, largescale sucker, mountain whitefish, coastal cutthroat trout	Steelhead, coho salmon, Pacific lamprey, mountain sucker, largescale sucker, mountain whitefish, coastal cutthroat trout
NMF Species Present Historically	Steelhead, coho salmon, Pacific lamprey, mountain sucker, largescale sucker, mountain whitefish, coastal cutthroat trout	Steelhead, Pacific lamprey, mountain sucker, largescale sucker, mountain whitefish, coastal cutthroat trout
Habitat Quality	Habitat conditions for NMF are considered poor-to-fair downstream of the proposed AO based on past and ongoing land uses. The in-stream habitat downstream of the proposed AO to the Tualatin River (2.75 miles) lacks general habitat complexity needed for self-sustaining salmonid populations. Habitat conditions are more favorable for NMF species such as largescale sucker that are more tolerant of degraded habitats. The riparian and floodplain habitat in this reach is of low quality given the dominance of invasive vegetation species and minimal native woody riparian species, incised streambanks, lack of off-channel habitat, and lack of channel/floodplain connectivity. The National Marine Fisheries Service (NMFS) rates Scoggins Creek as having low conservation value (NMFS 2005).	Approximately 2.89 miles of NMF habitat (12.31 miles of coastal cutthroat trout habitat, with 9.26 miles lost from Option 3 inundation) occurs upstream of the proposed AO location in Scoggins Creek. The habitat quality is considered poor to marginal due to ongoing and historic land uses that have directly and indirectly affected channel conditions, riparian corridors, and water quality. As noted below, these land uses are predominately forest practices and agricultural related, as well as operations and maintenance of Scoggins Dam.
Flows	Flows in Scoggins Creek downstream of the proposed AO are controlled by releases from Scoggins Dam. The dam is regulated to provide flow for multiple uses including flows to support NMF and their habitat.	Scoggins Creek flows upstream of the proposed AO are controlled by releases from Scoggins Dam. Flows in Scoggins Creek tributaries upstream of the proposed AO to Scoggins Dam are largely intermittent based on GIS mapping and site observations conducted in 2017 and 2018 for

		preparation of this application. Flows in the tributaries are presumed to be a primary limiting factor for NMF use of the tributaries.
Water Quality	Lower Scoggins Creek and the upper Tualatin River are listed on the Oregon Department of Environmental Quality's (DEQ) 303d list of impaired water bodies for 23 separate water quality violations. These violations include, but are not limited to, exceedances for multiple heavy metals, pH, biological criteria, E. coli, temperature, and dissolved oxygen (DEQ 2012).	Scoggins Creek upstream of the proposed AO location is listed on the Oregon Department of Environmental Quality's (DEQ) 303d list of impaired water bodies for 23 separate water quality violations. These violations include, but are not limited to, exceedances for multiple heavy metals, pH, biological criteria, E. coli, temperature, and dissolved oxygen (DEQ 2012).
Water Right Availability	The Tualatin River basin hosts a relatively large human population and extensive agricultural practices compared to other similarly sized basins in Oregon. As such, water is fully allocated in summer. A 1993 instream water right for fish in Scoggins Creek provides 20 cubic feet per second (cfs) in October and November and 10 cfs for all other months. However, there are senior water rights in the Scoggins Creek subbasin, which if exercised could exceed the instream water rights. The Oregon Water Resource Department website lists 3,855 water rights records for the Tualatin Basin.	Water right availability in Scoggins Creek is dominated by water storage and distribution provided by Scoggins Dam and Henry Hagg Lake. Rights to water stored in Henry Hagg Lake are maintained by several local water resource agencies. A 1993 instream water right for fish in Scoggins Creek provides 20 cfs in October and November and 10 cfs for all other months. However, there are senior water rights in the Scoggins Creek subbasin, which if exercised could exceed the instream water rights.
Land Use/Zoning	Land uses immediately downstream of the proposed AO location are based primarily on agriculture, forest practices, and rural, single-family residences to the Scoggins Creek confluence with the Tualatin River. Downstream of the confluence, land uses are dominated by agriculture; rural, single-family residences; and secondarily by commercial, industrial, and urban land uses further downstream in the basin in the Washington County population centers.	As noted, land use upstream of the proposed AO location is dominated by forest practices and the Stimson forest products mill. There are small areas zoned for rural single-family residential uses situated along SW Scoggins Valley Road. Upstream of these areas land use is primarily associated with Scoggins Dam and the various uses of Henry Hagg Lake. The lake is used for irrigation supply water, recreation, flood retention, and fish and wildlife habitat. Upstream of Henry Hagg Lake, land uses are predominated by public and private forest practices.

PLEASE PROVIDE ADDITIONAL DETAILS REGARDING THE INFORMATION PROVIDED IN THE SUMMARY TABLE (*such as species listed under the state or federal ESA and descriptions of the stream channel and riparian habitat*)**:**

NMF Species Affected

NMF that currently and/or historically used Scoggins Creek to carry out all or part of their life histories include steelhead, coho salmon, coastal cutthroat trout, mountain whitefish, mountain sucker, largescale sucker, and Pacific lamprey (CH2MHill 2003, DEA et al. 2009, BLM 2000, StreamNet 2018, Tom Murtagh pers. comm. October 2, 2017, and Tom Murtagh pers. comm. November 8, 2017).

Coho salmon are not native to the Tualatin River Basin, but a small population was established by fish passage improvements at Willamette Falls in the late 1800's and from historic hatchery stocking efforts (TRWC 2003). ODFW indicates that current steelhead use in lower Scoggins Creek is minimal, with juveniles periodically using the creek for rearing (Tom Murtagh pers. comm. May 11, 2018). Steelhead spawning in Scoggins Creek is very infrequent, and adult use of the system is expected to be based on straying from other Tualatin River tributaries to seek out seasonally-preferred water quality conditions (Tom Murtagh pers. comm. May 11, 2018). Individual Chinook salmon (*O. tshawytscha*), a NMF per OAR 635-412-0005(32), were documented in the lower reaches of Scoggins Creek in the 1970s, but this species is not known to consistently occur in the Scoggins Creek basin, and the basin is not considered suitable Chinook salmon habitat (Ward 1995, CH2MHill 2003, DEA et al. 2009, and Tom Murtagh pers. comm. November 8, 2017). As such, Chinook salmon are not addressed in this waiver application.

NMF Passage Impact Assessment Methods

The GIS data listed in Section 6c (Table 3) was used to assess the extent of impacts on fish distribution and habitat within the areas affected by construction of the Option 3 Dam. National Hydrography Database (NHD) GIS data for the Option 3 inundation area were supplemented by correlating the available coarse digital stream-lines with high-resolution aerial imagery and stream-lines modeled from LiDAR-derived digital elevation models to ensure the creeks' sinuosity and complete stream lengths were accounted for and digitized. NMF distribution data listed in Section 6c were compiled and calculated to determine the extent of habitat for each species (*i.e.*, stream miles) that would be lost from Option 3 implementation.

Distribution data for mountain whitefish, mountain sucker, largescale sucker, and coastal cutthroat trout for the Option 3 impact/inundation area are not available. As such, distribution for these species in the Option 3 impact area was assumed based on their life history traits and preferred stream habitats.

Coastal cutthroat trout distribution was modeled by assuming the species currently or were historically present in the Scoggins Creek mainstem and associated tributaries upstream to a point where gradient averages 20% or greater over a span of at least 300 feet, regardless of whether the stream segments have intermittent or perennial flow. This conservative approach assumes that stream segments with a 20% gradient or higher are not capable of supporting coastal cutthroat trout life history. This method of coastal cutthroat trout distribution modeling has been completed on other fish passage waiver assessments where existing distribution data are not available and is supported by ODFW (Tom Murtagh pers. comm. October 2, 2017 and January 7, 2019). Stream gradients were assessed using LiDAR-derived digital elevation models and hill- shade files referenced in Section 6c.

Distribution of mountain whitefish, mountain sucker, and largescale sucker in Scoggins Creek was based on these species' life histories and preferred habitats. These species prefer large, low-gradient river systems with large pools (Platts 1979, McEvoy 1998, Belica and Nibbelink 2006, and Meyer et al. 2009). Typical riverine habitats for these species include channel widths that are greater than 30 meters with low flow velocities, and channel gradients less than 1%-1.5% (Dauble 1986 and Meyer el al. 2009). Given the general similarities of these species' life history traits and habitat conditions in the Option 3 impact area, current and historic distribution for these species is assumed to occur only within the mainstem of Scoggins Creek

within the Option 3 impact/inundation area. This is based on the low and intermittent flow characteristics, narrow channels, and gradients that are generally over 1.5% in the Scoggins Creek tributaries within the Option 3 impact area.

Stream and NMF Passage Impacts

Approximately 18.50 stream miles occur in the Option 3 impact/inundation area (Figure 2, Attachment A). This estimate includes Scoggins Creek and all of its tributaries within the Scoggins Creek subbasin between the Option 3 Dam downstream spillway location and the existing Scoggins Dam spillway pool. Construction of the Option 3 Dam and the resulting reservoir would inundate and result in a loss of approximately 9.90 miles of stream miles. Of this total, 2.89 stream miles are associated with the mainstem of Scoggins Creek, and 7.01 stream miles are associated with several small, unnamed Scoggins Creek tributaries in the impact/inundation area. Approximately 8.60 tributary stream miles (intermittent and perennial) would remain upstream of the inundated area. As such, approximately 54% of the existing stream network in the Option 3 impact area would be lost due to inundation from the new dam. Stream impacts that would result from Option 3 implementation are shown below (Table 1).

Table 1. Option 3 Stream Impacts.

Stream	Stream Miles Lost to Inundation	Stream Miles Not Impacted
Scoggins Creek Mainstem	2.89	0
Scoggins Creek Tributaries	7.01	8.61
Total	**9.90**	**8.61**

Implementation of Option 3 would eliminate approximately 2.89 miles of winter steelhead, coho salmon, and Pacific lamprey habitat. These species are known to only use the mainstem of Scoggins Creek in the Option 3 impact area per ODFW GIS and other sources (StreamNet 2018 and Tom Murtagh pers. comm. November 8, 2017). Similarly, Option 3 implementation would eliminate approximately 2.89 miles of habitat for mountain whitefish, mountain sucker, and largescale sucker associated with inundation of the Scoggins Creek mainstem.

Option 3 would result in the loss of 9.26 miles of coastal cutthroat trout habitat within the inundation area based on GIS analysis previously described. Approximately 3.05 miles of current and/or historic coastal cutthroat trout habitat occurs upstream of the inundation area and would remain accessible to these species. However, access to the tributaries outside of the inundation area would be limited to the coastal cutthroat trout population between the Option 3 Dam and Scoggins Dam. Coastal cutthroat trout are potamodromous species with most individuals not exhibiting anadromy (*i.e.,* they are migratory in freshwater, but do not out migrate to estuarine or marine habitats to carry out their life histories). Fish habitat impacts resulting from Option 3 implementation are shown below (Table 2). Figure 2 in Attachment A illustrates stream and fish habitat impacts that would result from Option 3 implementation.

Table 2. Option 3 Fish Habitat Impacts Based on GIS Analysis.

Species	Habitat Lost (Stream Miles)	Habitat Retained (Stream Miles)
Winter steelhead	2.89	0
Coho salmon	2.89	0
Pacific lamprey	2.89	0
Mountain whitefish	2.89	0
Mountain sucker	2.89	0
Largescale sucker	2.89	0
Coastal cutthroat trout	9.26*	3.05

* Value includes 2.89 stream miles of the Scoggins Creek mainstem.

NMF Habitat

Land uses within the vicinity of the proposed AO are dominated by the Stimson Lumber Company mill and associated forest product manufacturing infrastructure and Scoggins Dam operations. Secondary land uses include rural residential and agriculture. Scoggins Creek in the Option 3 inundation area is highly channelized, largely disconnected from its floodplain, and contains limited side channels, alcoves, or other off-channel habitat components that are conducive for supporting NMF. In addition, the riparian corridor for most of the reach downstream of the dam is fragmented with limited mature woody vegetation and has infestations of invasive vegetation including large populations of Himalayan blackberry (*Rubus armeniacus*) and reed canary grass (*Phalaris arundinacea*).

Scoggins Creek in the Option 3 inundation area was given a subjective rating of "Poor" to "Poor to Fair" based on the limiting factors for salmonids present in the creek during studies completed in 2002 and 2003 for the water supply project (White 2003). These factors included spawning area, pool and riffle abundance, presence of undercut banks, aquatic invertebrate production, bank cover, and instream structure. These habitat conditions continue to exist today. Existing operations at Scoggins Dam provide cold, oxygenated water to Scoggins Creek downstream of the dam in the Option 3 impact area; however, it has been noted that winter dissolved oxygen levels in Scoggins Creek near its confluence with the Tualatin River are below optimal levels for spawning salmonids (BLM 2000 and DEQ 2001). It is expected that degraded habitat conditions between the existing Scoggins Dam and the Tualatin River confluence increase biological oxygen demand and diminish high oxygen levels from dam discharge. As noted in Table 6b, Scoggins Creek and the upper Tualatin River are listed for multiple water quality violations by DEQ. NMFS rates Scoggins Creek as having low conservation value (NMFS 2005).

There are several small tributaries of Scoggins Creek that occur mostly within the potential Option 3 inundation area. Access to these tributaries by NMF is unavailable due to several undersized, perched culverts under roads that lie parallel to the creek on both sides, by several large tributary segments piped under the Stimson lumber mill, and by seasonally low flows and high tributary gradients. District and MB&G staff observed the undersized and perched road crossings and long piped stream segments in October 2017 and in May 2018 (with ODFW, NMFS, and Reclamation staff) which consistently appear to limit upstream fish passage (for both juveniles and adults) into the majority of the tributaries' habitat. Several of the lower reaches on tributaries of Scoggins Creek in the Option 3 impact area appear to have been channelized and moved from their natal courses to promote past agricultural uses on the Scoggins Creek floodplain based on site visit observations and review of LiDAR imagery. Only three of the tributaries contained streamflow in their lowest reaches during the October 2017 site visit. Eight of the tributaries contained minimal flow during the May 2018 site visit. Flow conditions during the May 2018 site visit did not appear adequate to support coastal cutthroat trout. Further, many of the lower tributary reaches did not appear to have a physical connection to Scoggins Creek. These intermittent tributaries appear to discharge flow onto the Scoggins Creek floodplain before reaching the Scoggins Creek channel. This lack of habitat connectivity, continuity, access, and quality acts to further diminish the habitat value of the Option 3 inundation area for NMF. Photographs of the area that would be affected by the proposed

Option 3 Dam are provided in Attachment B; Attachment B also includes photos of the Balm Grove Dam on Gales Creek and of the diversion in Lake Oswego.

6C. PROVIDE THE SOURCE FOR INFORMATION CONTAINED IN THE BARRIER AND SUMMARY TABLES:

Table 3. Fish Passage GIS Assessment Data Source and Publication Date.

Data	Publication Date
ODFW Oregon Fish Passage Barriers	2016-11-01
ODFW Fish Habitat Distribution (FHD) for Coho Salmon	2016-05-17
ODFW FHD for Pacific Lamprey	2017-05-01
ODFW FHD for Winter Steelhead	2015-07-24
StreamNet GIS Service Layer	2013
LiDAR derived DEM & Hill-shade (DOGAMI)[1]	2017 (downloaded); 2007-2010 (surveyed)
ODF Statewide Streams FP	2010-01-01
U. S. Geological Survey (USGS) National Hydrography Database (NHD) flowlines[2]	2017-09-15

[1]DOGAMI (Oregon Department of Geology and Mineral Industries) LiDAR program. URL: https://doi.org/10.5069/G9QC01D1.
[2]Oregon NHD metadata URL: https://prd-tnm.s3.amazonaws.com/StagedProducts/Hydrography/NHD/State/HighResolution/Shape/NHD_H_Oregon_Shape.xml

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MITIGATION (*attach additional copies of this section if multiple mitigation sites are proposed*)

1. DESCRIBE THE MITIGATION TO BE PROVIDED:

The mitigation includes three actions at separate locations in the Tualatin River basin: 1) removal of the Balm Grove Dam on Gales Creek, 2) fish passage ladder improvements at the existing LOCDD on the lower Tualatin River, and 3) acquisition of a water right on Gales Creek for in-stream/ecological uses. Figure 3 in Attachment A provides an overview of the locations of the main elements addressed in this application.

Balm Grove Dam Removal

Balm Grove Dam is a low-head structure located on Gales Creek at river mile 13 that is a high-priority fish passage barrier listed in ODFW's 2013 Statewide Fish Passage Priority List (ODFW 2013). Given the habitat quality upstream of the dam, the structure is one of the highest priority fish passage barriers in the Tualatin River basin (Tom Murtagh pers. comm., November 8, 2017). The dam is a concrete sill with provisions for flashboards that historically were installed during summer to create a small impoundment for swimming. The structure is approximately 30-feet long and has a hydraulic height of approximately 3 feet. The flashboards provided an additional 4 feet of height when they were installed.

No fish passage facilities are present at the dam, and the structure is considered a complete upstream barrier to all juvenile NMF, as well as adult Pacific lamprey, mountain whitefish, mountain sucker, and largescale sucker (TRWC 2003, Jolley *et al.* 2016, and Bio-Surveys, LLC 2015a and 2015b). It is a seasonal barrier for adult steelhead and coho salmon during periods of low flow (Bio-Surveys, LLC 2015), and it is located in a general transition zone in Gales Creek separating the lower quality habitat found in the lower 13 miles of the creek from the higher quality habitat found upstream of the dam. As such, the dam presents an additional adverse effect on NMF fish during periods of low water quality (*i.e.,* summer) when rearing juvenile anadromous and non-anadromous NMF are unable to move upstream past the dam to seek out better habitat conditions in the middle and upper reaches of Gales Creek.

Given that the dam is a partial upstream barrier to adult steelhead and coho salmon and a complete barrier to juvenile coho salmon, steelhead and all other NMF in Gales Creek, analyses were completed to determine the dam's likely overall passability to weight upstream habitat available for steelhead and coho salmon. Application of the Washington Department of Fish and Wildlife's (WDFW) *Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual* (Manual) was conducted to determine the likely extent of adult coho salmon and steelhead passage provided by the dam in terms of the exiting dam geometry relative to local stream conditions. The Manual provides a process for rating a dam's passability to determine its effect on fish passage and lists dams that are 1 meter or taller as completely impassible. The Manual's percent-passability estimates are intended to represent general categories of passability, not actual estimates of the number of fish that may pass a potential barrier. Therefore, according to WDFW's Manual, Balm Grove Dam has a conservative passage capability of 0.33. This means that adult coho salmon and steelhead could pass the dam 33% of the time that they are on migration runs, and that the upstream available habitat should be weighted by 33% to determine the weighted total stream miles available to the species upstream of the dam.

The 33% passage probability is related to high-flow periods in winter when flow over the dam and the water elevation downstream of the dam raises enough for adult coho salmon and steelhead to pass over the obstruction. It is not fully understood how long the flow and water surface elevations at the dam are sufficient to provide upstream passage. However, given the flashy nature of the creek's runoff regime, it is assumed that the water rises to passable levels for discrete, brief periods (*i.e.,* 1-2 days) numerous times annually during the winter high-flow periods and then drops back to unpassable levels relatively quickly after storm events. Coho salmon enter freshwater systems in late summer and fall to spawn at the onset of fall rain events that raise creek levels from low summer baseline levels. Adult coho salmon arrive at the dam in fall at the onset of their spawning run. As such, it is likely that adult coho salmon arrive at the dam during periods when flows are not high enough for fish to immediately pass upstream past the structure. This can result in impacts or delays to spawning timing and ultimate spawning success, and can cause fish crowding downstream of the dam, increasing the likelihood of disease transmission among fish.

The dam's passability metric (33%), derived from the Manual's passability model, was used to weight the existing upstream habitat available to adult coho salmon and steelhead. This was done to account for the dam's partial passage capability and to develop an estimate of how much adult coho salmon and steelhead habitat is inaccessible upstream of the barrier. Table 4 provides estimated stream miles for NMF species to be made accessible after Balm Grove Dam is removed and incorporates the WDFW passability metric for available adult coho salmon steelhead habitat upstream of the dam (*i.e.,* 67% of upstream habitat is accessible). More details regarding NMF distribution in Gales Creek are included in Section 6B. Distribution of NMF habitat upstream of Balm Grove Dam is illustrated in Attachment A, Figure 4.

In 2016, the District purchased the property that contains the Balm Grove Dam and the riparian/floodplain area adjacent to the dam on the southwest side of the Gales Creek. In addition to removal of Balm Grove Dam and its ancillary features, the District intends to restore the reach of Gales Creek that has been affected by the dam, and restore the District-owned riparian and floodplain areas at the dam site as part of the Joint Project mitigation. Specifically, the District will restore approximately 1,200 linear feet (2.5 acres) of the

Gales Creek channel in the vicinity of the dam. The restoration will involve the placement of large wood and channel grading to promote aquatic habitat complexity, functional fluvial conditions, and the maintenance of NMF passage and habitat through the site. Approximately 12 acres of the creek's floodplain will be planted with riparian and upland vegetation native to the region during fall 2019/winter 2020. Preliminary dam removal and channel restoration design plans are included in Attachment C.

Table 4. Estimated NMF Habitat Upstream of Balm Grove Dam.

NMF Species	Life Stage	Available Upstream Habitat	Weighted Available Upstream Habitat*
Coho salmon	Adult	25.51 miles	17.09 miles
Coho salmon	Juvenile	25.51 miles	N/A
Steelhead	Adult	28.90 miles	19.36 miles
Steelhead	Juvenile	28.90 miles	N/A
Coastal cutthroat trout	All	106.11 miles	N/A
Pacific lamprey	All	25.51 miles	N/A
Mountain whitefish	All	5.89 miles	N/A
Mountain sucker	All	5.9 miles	N/A
Largescale sucker	All	5.9 miles	N/A

*As determined by application of WDFW's (2009) passability metrics.

Lake Oswego Corporation Diversion Dam Fish Ladder Improvements

The District also proposes improvements to the existing fish ladder at the LOCDD as additional fish passage mitigation if Option 3 is chosen. The improvements are in design and may involve constructing a debris boom, retrofitting the ladder from a pool and weir configuration to a vertical slot configuration, increasing attraction flow at the ladder entrance, and possibly changing the dam's operation to increase flow attraction. Because the LOCDD is located at river mile 3.4 of the Tualatin River, passage modifications to the ladder are expected to benefit upstream NMF access to the entire Tualatin River basin and improve connectivity of aquatic habitats between the Tualatin and Willamette basins. Design of the fish ladder improvements is currently underway. Preliminary ladder retrofit design plans will be provided to ODFW as soon as they are complete.

While these improvements will improve fish passage at the LOCDD and assist NMF passage in the lower reaches of the mainstem Tualatin River, quantification of the exact net benefit to NMF from this action is challenging given that the dam's existing passage limitations and effects on NMF are not fully understood. However, it can be assumed that the proposed LOCDD ladder improvements would enhance the net benefit provided by removal of Balm Grove Dam given the location of the LOCDD in the lower Tualatin Basin and that all anadromous fish in the Tualatin Basin have to pass the dam during upstream spawning migrations and rearing out-migrations (potamodromous species would not be required to pass the dam to complete their life histories). If the ladder and attraction-flow improvements increase the capability of NMF to more effectively pass through the dam site during migrations, net benefits would be provided, which would enhance the overall benefit of Balm Grove Dam removal (Tom Murtagh pers. comm. June 14, 2018). Passage improvements at the dam will decrease swimming and jumping stress on

fish, decrease potential predation and disease transmission by minimizing time NMF congregate at the dam for proper upstream passage conditions, and decrease NMF exposure to poor water quality conditions (*e.g.*, low flows and high water temperatures) while fish wait for favorable passage conditions. The aquatic habitat upstream of the LOCDD functions as a 20-mile-long, relatively stagnant reservoir that is a noted area of poor water quality (DEQ 2012 and Tom Murtagh pers. comm. June 14, 2018). Therefore, if NMF expend less energy passing the LOCDD due to ladder improvements, they would be less susceptible to the adverse effects of the poor water quality upstream of the dam.

Gales Creek Water Right

The District intends to dedicate a 0.09 cfs irrigation water right in Gales Creek to in-stream, ecological uses upon ODFW's approval of the waiver request. The irrigation water right and an 8 acre-foot water storage right are associated with the parcel the District purchased in 2016 and Balm Grove Dam, respectively. While transition of the water right to in-stream use is expected to result in a small benefit to NMF and enhance the proposed Joint Project fish passage mitigation, quantification of the exact net benefit to NMF from this action is impossible. Nonetheless, this action clearly further enhances the mitigation proposal and potential net benefit to NMF.

2. DISTANCE BETWEEN MITIGATION SITE(S) AND ARTIFICIAL OBSTRUCTION:

Balm Grove Dam is approximately 8.5 aerial miles from the AO. The LOCDD is located approximately 25 aerial miles from the AO.

3. OWNER (*if different than Applicant*)**:** Clean Water Services (Balm Grove Dam and Gales Creek Water Right)

CONTACT:	Laura Porter	**TITLE:** Water Resources Analyst	
ADDRESS:	2550 SW Hillsboro Hwy.		
CITY:	Hillsboro	**STATE:** OR	**ZIP:** 97123
PHONE:	503-681-4475		
FAX:			
E-MAIL ADDRESS:	porterl@cleanwaterservices.org		

OWNER (*if different than Applicant*)**:** Lake Oswego Corporation (LOCDD)

CONTACT:	Mark Rosencrantz	**TITLE:** Water Resources Specialist	
ADDRESS:	700 McVey Ave.		
CITY:	Lake Oswego	**STATE:** OR	**ZIP:** 97034
PHONE:	503-515-7864		
FAX:	503-636-3226		
E-MAIL ADDRESS:	mark.rosenkranz@lakecorp.com		

4. DATE THE MITIGATION IS SCHEDULED TO BE COMPLETED:

Regardless of the alternative chosen for the Joint Project, the District proposes to remove Balm Grove Dam and restore the Gales Creek channel within the vicinity of the dam in 2019. All in-water work will be completed during the Gales Creek preferred in-water work window (IWWW) (July 15 – September 30). Final site restoration and planting is expected to extend through the end of 2019 and possibly into early 2020. The District anticipates completing the proposed fish ladder improvements at LOCDD in 2021 during the Tualatin River IWWW (June 1 – September 30) after a decision is made on the Joint Project. The LOCDD fish ladder improvements will only occur if Option 2 or Option 3 is selected for the Joint Project given that fish passage concerns will not result from implementation of Option 1. Dedication of the 0.09 cfs water right on Gales Creek to in-stream uses will occur after receipt of a Waiver Agreement from ODFW for the Joint Project.

5. LOCATION

BALM GROVE DAM

COUNTY: Washington
ROAD CROSSING (if applicable)**:** 10660 NW Balm Grove Loop, Gales Creek, OR. 97117
RIVER/STREAM: Gales Creek
TRIBUTARY OF: Tualatin River
BASIN: Willamette
COORDINATES[a]**:** Longitude: -123.2166° Latitude: 45.5980°

LAKE OSWEGO CORPORATION DIVERSION DAM

COUNTY: Clackamas
ROAD CROSSING (if applicable)**:** The dam is located at river mile 3.4 on the Tualatin River and is accessed from SW Tualatin Loop
RIVER/STREAM: Tualatin
TRIBUTARY OF: Willamette River
BASIN: Willamette
COORDINATES[a]**:** Longitude: -122.6857° Latitude: 45.3571°

[a] *Geographic projection using NAD_83 and formatted as decimal degrees to at least 4 places.*

6. STREAM DESCRIPTION

6A. BARRIER TABLE (*please provide the following information for barriers, which will help determine the benefit of the Mitigation site; indicate measurement units if applicable*)**:**

Information in Section 6 pertains only to Balm Grove Dam given that it is the primary element of the passage mitigation proposal, and its removal alone provides a net benefit to NMF if Option 2 or Option 3 is selected for the Joint Project.

Balm Grove Dam

	DOWNSTREAM					UPSTREAM			
Locations	3	C/N	2	1	M	1	2	E	*example*
Type	D		N/A	N/A	D	N	N/A		D
Length	~4,100 sf.		N/A	N/A	30 ft.	N/A	N/A		8 ft
Distance	68 mi.	13 mi.	N/A	N/A		16 mi.	N/A	106.1 mi.	1,700 ft
Level	4		N/A	N/A	4	5	N/A		1

LOCATIONS: M = the Mitigation site

NOTE: The *example* indicates that there is a dam which is 8 feet wide in the stream, is located 1,700 feet from the Mitigation in question, and is a seasonal or partial fish passage barrier for juveniles only.

See **ARTIFICIAL OBSTRUCTION: 6A. BARRIER TABLE** for further details regarding this table.

PLEASE PROVIDE ADDITIONAL DESCRIPTIONS FOR THOSE BARRIERS INCLUDED IN THE BARRIER TABLE OR FOR OTHER BARRIERS AFFECTING NATIVE MIGRATORY FISH MOVEMENT TO OR FROM THE MITIGATION:

Balm Grove Dam is located at river mile 13 on Gales Creek. There are no other known manmade barriers upstream or downstream of the dam on the mainstem of Gales Creek. NMF (coastal cutthroat trout) distribution ends on the mainstem of the creek approximately 16 miles upstream of Balm Gove Dam where the stream gradient prevents the maintenance of NMF habitat. The total maximum, historic range of NMF (coastal cutthroat trout) including tributaries upstream of the dam is 106.11 miles per the modeling effort discussed previously.

The first downstream passage barrier from the dam is the LOCDD located approximately 68 river miles downstream at river mile 3.4 on the Tualatin River. The structure contains a fish ladder, but is a partial barrier to adult and juvenile passage due to the existing configuration of the ladder and dam. As previously noted, retrofit of the LOCDD ladder to improve passage conditions is a component of the mitigation package proposed in this waiver application to provide a net benefit to NMF.

6B. SUMMARY TABLE (*please provide the following information relative to the Mitigation, which will help determine its benefit*)**:**

	DOWNSTREAM	**UPSTREAM**
NMF Species Present Currently	Steelhead, coho salmon, Pacific lamprey, mountain sucker, largescale sucker, mountain whitefish, coastal cutthroat trout	Steelhead, coho salmon, coastal cutthroat trout
NMF Species Present Historically	Steelhead, coho salmon, Pacific lamprey, mountain sucker, largescale sucker, mountain whitefish, coastal cutthroat trout	Steelhead, coho salmon, Pacific lamprey, mountain sucker, largescale sucker, mountain whitefish, coastal cutthroat trout
Habitat Quality	Habitat quality downstream of the dam is generally lower quality than habitat upstream. Downstream reaches exhibit poor riparian conditions, entrenched streambanks, high water temperatures, and high sedimentation levels compared to upstream conditions (Breuner 1998, TRWC 2003, Bio-Surveys, LLC 2015a). The first three miles of Gales Creek upstream of its confluence with the Tualatin River contained only fish species adapted to warm and degraded water conditions during fish surveys conducted in 2013 and 2014, and the available habitat appeared to be significantly degraded (Bio-Surveys, LLC 2015a). Habitat quality is more suitable for NMF between river mile 8 and river mile 13 where the dam is located, but is generally not of the same quality as reaches upstream of the dam (Bio-Surveys, LLC 2015a).	Habitat quality upstream of the dam is generally higher quality than downstream. Land use encroachment into floodplain and riparian zones is generally less extreme than downstream of the dam. Water temperatures are consistently lower, and substrates consistently exhibit lower levels of embeddedness upstream of the dam compared to downstream reaches (TRWC 2003 and Bio-Surveys, LCC 2015a). Habitat conditions are more suitable for NMF upstream of the dam.
Flows	Relatively extensive irrigation withdrawals and diversions exist in the watershed with most in-stream irrigation withdrawals occurring	Although multiple water withdrawals occur upstream of the dam on the mainstem of Gales Creek and tributaries, flows upstream of the dam

	downstream of the dam (Bio-Surveys, LCC 2015a). The City of Forest Grove has a water right in Clear Creek, a tributary of Gales Creek that joins the creek at creek mile 10.7, for its domestic water supply (Breuner 1998). In 2013 and 2014, fish surveyors noted that flows in reaches downstream of the dam diminished in terms of velocity and depths as they moved downstream to the creek's confluence with the Tualatin River (Bio-Surveys, LLC 2015a). Flows downstream of the dam are potentially inadequate to support crucial NMF summer rearing and migration behavior (TWRC 2003 and Bio-Surveys, LLC 2015a).	are generally less affected by seasonal irrigation pressure and anthropogenic summertime flow reductions (Breuner 1998 and Bio-Surveys, LLC 2015a).
Water Quality	As noted, water quality downstream of the dam is impaired during summer due to degraded channel and riparian conditions and irrigation pressure. The 13-mile reach downstream of the dam is listed for multiple year-round water quality violations per DEQ's 303d list of impaired water bodies (DEQ 2012). The downstream reach is listed for multiple heavy metals, E. coli, phosphorus, sedimentation, dissolved oxygen, pH, and temperature. The inability for all juvenile and most adult NMF to pass upstream of the dam compounds the dam's adverse effect on migratory fish given the poor water quality conditions in the downstream reach. The dam limits rearing juvenile and most adult NMF from seeking higher quality upstream habitat, which is exacerbated in summer when downstream water quality is at its lowest.	Water quality upstream of the dam is generally of higher quality than downstream of the dam. Riparian corridors are more intact upstream of the dam than downstream, which helps to moderate water temperature during summer (TRWC 2003). Land uses are less varied upstream of the dam, primarily focused on forest practices. Agricultural and residential uses are concentrated downstream of the dam, which appear to affect downstream water quality. Stream surveys conducted in 2013 and 2014 throughout Gales Creek found water quality and habitat conditions to be better upstream of the dam compared to downstream conditions (Bio-Surveys, LLC 2015a and 2015b). The reach upstream of the dam is listed for several seasonal water quality exceedances by DEQ including several heavy metals, pH, and E. Coli (DEQ 2012).
Water Right Availability	Water right availability downstream of the dam is unknown. Given the history of agriculture in the basin and existing irrigation infrastructure, it is presumable that current water right availability is low in the basin.	Water right availability upstream of the dam is unknown. Given the history of agriculture in the basin and existing irrigation infrastructure, it is presumable that current water right availability is low in the basin.
Land Use/Zoning	The vast majority of floodplain and near-channel area downstream of the dam is zoned Exclusive Farm Use (EFU) – minimum 80-acre lot size by the Washington County Land Use and Transportation Department. There are small areas of the downstream basin that are zoned Agricultural and	The vast majority of land upstream of the dam is zoned EFC. Some areas immediately upstream of the dam in the Little Beaver Creek subbasin are zoned EFU.

	Forestry Use (AF) – minimum 80-acre and 10-acre lot size. For the most part, these areas do not abut the creek channel. The western part of the lower basin headwaters that separates the Gales Creek basin from the Scoggins Creek basin is zoned Exclusive Forest and Conservation Use (EFC) – minimum 80-acre lot size.	

PLEASE PROVIDE ADDITIONAL DETAILS REGARDING THE INFORMATION PROVIDED IN THE SUMMARY TABLE (*such as species listed under the state or federal ESA and descriptions of the stream channel and riparian habitat*)**:**

Balm Grove Dam

Balm Grove Dam is listed as a priority fish passage barrier on ODFW's 2013 Statewide Fish Passage Barrier Priority List (ODFW 2013). The Gales Creek watershed (HUC 1709001002) lies immediately to the north of the Scoggins Creek subbasin (Attachment A, Figure 3), and drains approximately 78 square miles. Gales Creek is designated as Critical Habitat for steelhead of the Upper Willamette River (UWR) Distinct Population Segment and provides some of the highest quality steelhead habitat in the entire Tualatin River basin (NMFS 2005). Gales Creek is also considered a Conservation Opportunity Area by ODFW for forest and aquatic habitats and is a priority conservation and restoration headwater subbasin of the Tualatin River basin (ODFW 2016).

The net benefit to NMF from providing passage at Balm Grove Dam rather than passage in Scoggins Creek at the Option 3 Dam is based on three primary factors, discussed below.

Habitat Quality

The aquatic and riparian habitat quality in Gales Creek has been documented as being of higher quality than habitat conditions in Scoggins Creek (BLM 2000, TRWC 2003, CH2MHill 2003, CWS 2005, NMFS 2005, DEA 2009, Bio-Surveys, LLC, 2015a and 2015b). The Gales Creek subbasin is larger than the Scoggins Creek subbasin and maintains higher flows than Scoggins Creek throughout the low flow summer period (in areas not regulated by Scoggins Dam) (BLM 2000). Although Scoggins Dam regulates flow to the approximately 5-mile reach of Scoggins Creek downstream of the dam, the creek's tributaries in this part of the subbasin are relatively small and appear to have a higher rate of intermittency than Gales Creek tributaries based on the size of the tributary drainages, available reference information for both subbasins, and the results of field reconnaissance in October 13, 2017, and May 11, 2018 (BLM 2000, TRWC 2003, and ODFW 2016). Scoggins Creek downstream of Scoggins Dam provides poor in- stream habitat for NMF that is moderated by the dam's regulation of flows (*i.e.,* the dam moderates high flows and provides cooler, supplemental flow during low flow periods). However, the in-stream habitat in this reach lacks general habitat complexity for most species of NMF. The riparian and floodplain habitat along Scoggins Creek downstream of the dam is of low quality given the dominance of invasive vegetation species and minimal native woody riparian species, incised streambanks, lack of off-channel habitat, and lack of channel/floodplain connectivity.

Habitat Quantity

The previously-prepared fish passage waiver application for the Scoggins Dam raise indicates that 23 miles of essential habitat for anadromous salmonids exists upstream of Balm Grove Dam (CWS 2005). The National Marine Fisheries Services' 2005 Critical Habitat Analytical Review Team (CHART) Assessment for the UWR Steelhead Evolutionarily Signification Unit identified 39.3 miles of steelhead spawning and rearing habitat and 15.2 miles of steelhead rearing and migration habitat in Gales Creek (NMFS 2005). Approximately 26.2 miles of steelhead habitat occurs upstream of Balm Grove Dam per the NMFS CHART assessment (NMFS 2005 and StreamNet 2018). Rearing and migration habitat occurs downstream of the

Balm Grove Dam, with overlapping migration, rearing, and spawning habitat occurring upstream of the dam (StreamNet 2018). GIS habitat modeling based on available GIS data from ODFW indicates that 28.90 miles of winter steelhead habitat and 25.51 miles of coho salmon habitat occur upstream of the Balm Grove Dam.

Detailed data for Pacific lamprey habitat upstream of the dam are not available. Jolley *et al.* (2016) performed Pacific lamprey presence/absence studies in Gales Creek upstream and downstream of Balm Grove Dam in 2015 and did not observe any Pacific lamprey adults, juveniles, or spawning sites (redds) upstream of the structure. Both life forms of the species were observed downstream of the dam during the study, indicating that the dam likely serves as a complete passage barrier to Pacific lamprey. StreamNet (2018) lists upstream Pacific lamprey distribution in Gales Creek ending at the dam. It can be assumed that the extent of available habitat for Pacific lamprey upstream of the dam is similar to coho salmon habitat based on the species' general life histories and use of similar habitats (Beamish 1980 and USFWS 2008). Both species perform upstream migrations into small headwater freshwater streams to spawn and utilize similar freshwater habitats as juveniles and adults. As such, the potential extent of Pacific lamprey habitat upstream of the Balm Grove Dam is assumed to be 25.51 miles.

Data for coastal cutthroat trout distribution in Gales Creek are not available. Available habitat upstream of Balm Grove Dam for this species was determined by the same modeling exercise that was completed for cutthroat trout distribution that was discussed in Section 6B for the Option 3 Dam on Scoggins Creek. The model assumes cutthroat trout could occur in all perennial and intermittent streams upstream of Balm Grove Dam to where stream gradients, as measured in 100-foot long stream reaches, exceed 20% (*i.e.*, the difference in elevations between upstream and downstream end of given 100-foot stream reach exceeds 20 vertical feet). This results in approximately 106.11 miles of potential coastal cutthroat habitat occurring upstream of the Balm Grove Dam.

Data for mountain whitefish and mountain and largescale sucker distribution in Gales Creek are not available. Given these species' life histories and preference for low gradient, large river and lake systems with low flow velocities, their potential distributions were estimated based on a GIS analysis of stream reaches upstream of the dam. Based on review of scientific literature for these species, upstream potential habitat for the species was modeled assuming individuals would have access to all accessible stream reaches upstream of the dam location to a point where stream gradients, as measured in 100-foot long stream reaches, exceed 1.5% (*i.e.*, the difference in elevations between upstream and downstream extents of a given 100-foot reach exceeds 4.5 vertical feet).

It is assumed that stream reaches upstream of these gradient thresholds are too steep, shallow, and likely have flow regimes that are not conducive for supporting mountain whitefish and mountain and largescale suckers based on their life histories and preferred habitats. This modeling effort is supported by ODFW and results in approximately 5.9 miles of mountain whitefish, mountain sucker, and largescale sucker habitat occurring in Gales Creek upstream of Balm Grove Dam.

Proximity

The proximity of Gales Creek to Scoggins Creek in the upper Tualatin River basin likely results in genetic exchange between the fish subpopulations through straying and mixing of individuals. This increases the net benefit of providing passage improvements in the Gales Creek subbasin given the likelihood that the same overall upper Tualatin River NMF fish populations in Scoggins Creek would benefit from improved passage in Gales Creek.

6C. PROVIDE THE SOURCE FOR INFORMATION CONTAINED IN THE BARRIER AND SUMMARY TABLES:

The GIS data sources listed in section 6b were also used for the mitigation net benefit analysis. Additional

references that were used to complete the fish passage net benefit analysis include:

Beamish, R.J. 1980. Adult biology of the river lamprey (*Lampetra ayresi*) and the Pacific lamprey (*Lampetra tridentata*) from the Pacific coast of Canada. Canadian Journal of Fish and Aquatic Sciences. 37: 1906-1923.

Bio-Surveys, LLC. 2015a. Tualatin River: Rapid Bio-Assessment 2013 & 2014 Final Report. Alsea, Oregon.

Bio-Surveys, LLC. 2015b. Tualatin River: Rapid Bio-Assessment 2013 & 2014 online dataset. Available: http://www.arcgis.com/home/webmap/viewer.html?webmap=261a95cefbe841bd9d5cd3bf6656bee3.

Breuner, N. 1998. Gales Creek Watershed Assessment. Prepared for the Tualatin River Watershed Council. Hillsboro, Oregon.

Bureau of Land Management (BLM). 2000. Upper Tualatin-Scoggins Watershed Analysis. BLM Salem District Office, Tillamook Resource Area. Tillamook, Oregon.

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7. DESCRIBE HOW THE MITIGATION RELATES TO ANY EXISTING FISH MANAGEMENT PLANS, INCLUDING THE OREGON PLAN:

As previously mentioned, Gales Creek is designated UWR Steelhead Critical Habitat, and Balm Grove Dam is listed as a priority barrier on ODFW's 2013 Statewide Fish Passage Barrier Priority List for the Tualatin Basin. Gales Creek is also considered a Conservation Opportunity Area by ODFW for forest and aquatic habitats and is a priority conservation and restoration headwater subbasin of the Tualatin River basin (ODFW 2016).

NMFS views Gales Creek as containing some of the highest quality steelhead habitat for upper Willamette River tributaries draining the eastern slope of the Coast Range (NMFS 2005).

Improving passage at the LOCDD fosters steelhead recovery in the Tualatin Basin and improves passage and habitat connectivity for non-ESA-listed NMF such as coho salmon and Pacific lamprey.

8. DESCRIBE ANY KNOWN RESTORATION OR LAND USE PLANS WHICH MIGHT HAVE AN IMPACT ON THE MITIGATION *(e.g., is the watershed included within an expanded Urban Growth Boundary or does a Local Comprehensive Plan limit future development in the watershed)***:**

There are no known land use plans that are expected to have a negative impact on the proposed removal of Balm Grove Dam and local restoration of Gales Creek. The property that this dam is situated on is owned by the District, and the property's restoration areas will be protected in perpetuity by a conservation easement. The project site and upstream reaches are not within an urban growth boundary, and existing rurally-focused zoning designations (*e.g.*, EFC) are not expected to change in a manner that would degrade the mitigation benefit for NMF. Because Gales Creek contains some of the best riverine habitat in the upper Tualatin River Basin, multiple jurisdictions and non-governmental organizations are focused on restoring and conserving the subbasin's aquatic and riparian habitat.

Similarly, existing Clackamas County zoning and long-range land-use planning goals are not expected to have an adverse impact on proposed passage improvements at the LOCDD. No dam improvements are expected in the near future beyond the proposed passage improvements.

9. IF THE MITIGATION ENTAILS PROVIDING PASSAGE AT AN EXISTING ARTIFICIAL BARRIER, WHAT IS THE EXPECTED DATE OF REPLACEMENT OR MAJOR REPAIR FOR THE STRUCTURE IF IT WERE NOT USED AS MITIGATION:

The District and other stakeholders purchased the property containing Balm Grove Dam with the expectation to remove the dam as mitigation for impacts associated with the Joint Project. The prior dam property owners expressed no desire to fund and implement dam removal. Had the District not purchased the property, the future replacement or major repair of the dam would likely occur well into the future when site conditions warranted replacement or repair (*e.g.*, storm flow/debris damage).

Because the existing LOCDD provides the needed backwater to provide the Lake Oswego Corporation's water right through a gravity/ditch system without its flashboards raised, future replacement or major repair of the structure would likely only occur as needed in response to storm flow/debris damage. Given the configuration, construction, and height of the dam, it is likely that future repairs from storm flow/debris damage would occur on less than 30% of the dam's structural volume and would; therefore, not trigger Oregon's fish passage law as defined in OAR 635-412-0005(9)(b)(A)."

10. DOES THE MITIGATION INCLUDE ANY ACTIVITY THAT IS A REQUIREMENT OR CONDITION OF ANY OTHER AGREEMENT, LAW, PERMIT, OR AUTHORIZATION *(if "Yes", describe)***:**

The mitigation does not currently include any activity that is a requirement or condition of any other agreement, law, permit, or authorization. The District intends to apply the aquatic resource benefits of the Balm Grove Dam removal as potential mitigation for the loss of stream functions and values, and for impacts on federally-listed UWR steelhead resulting from Option 3, if Option 3 is selected.

11. DESCRIBE HOW THE MITIGATION WILL BE FUNDED *(include a cost estimate, funding sources, and whether funds are currently secured)***:**

The District will fund the proposed mitigation actions with internal funds. The 30% design-level cost estimate for Balm Grove Dam removal is approximately $980,000 for dam removal, channel restoration,

and riparian corridor restoration and planting, and post-construction performance monitoring. The 30% design-level cost estimate for LOCDD ladder improvements will be provided to ODFW as soon as possible. The Gales Creek water right is associated with the property containing Balm Grove Dam and has already been purchased. Funding is secure for all proposed mitigation elements.

12. DESCRIBE HOW THE MITIGATION WILL BE EVALUATED, MONITORED, AND MAINTAINED:

The District will monitor and maintain the Balm Grove Dam site after mitigation implementation. Monitoring and maintenance will occur per requirements of applicable permits. The District will monitor and maintain the site after the permit-required, post- construction monitoring and reporting period (typically five years after construction), with a focus on fostering self-sustained stream channel evolution, sediment transport, and fish passage in Gales Creek, as well as self-sustained native vegetation communities in the restored riparian corridor and floodplain at the dam site.

Proposed improvements to the LOCDD fish ladder will be monitored and maintained after implementation through the existing agreement between local ODFW staff, the Lake Oswego Corporation, and local private residences that provide access to the dam. The proposed fish ladder improvement design is expected to minimize the frequency and magnitude of maintenance currently required to operate the ladder.

MAP(S)

- *Please attach one or more maps indicating the Artificial Obstruction, Mitigation, the streams on which they are located, and other barriers in those streams. A 7.5 minute USGS quad map is sufficient.*

☒ -- Map(s) included

PHOTOS

- *Please include photographs of the following* (*.JPG files are preferred):*

☒ -- Artificial Obstruction
☒ -- Mitigation Site(s)
☒ -- up- and downstream habitat at the Artificial Obstruction and Mitigation Site(s)
☒ -- other barriers up- and downstream of the Artificial Obstruction and Mitigation Site(s)

Please submit this application electronically to the ODFW Fish Passage Coordinator at greg.d.apke@state.or.us and send one signed original paper copy of the application to the ODFW Fish Passage Coordinator at 4034 Fairview Industrial Dr. SE, Salem, OR 97302.

Attachment A

Figures

Tualatin Basin Dam Safety and Water Supply Joint Project

Option 3 Fish Passage Waiver Application

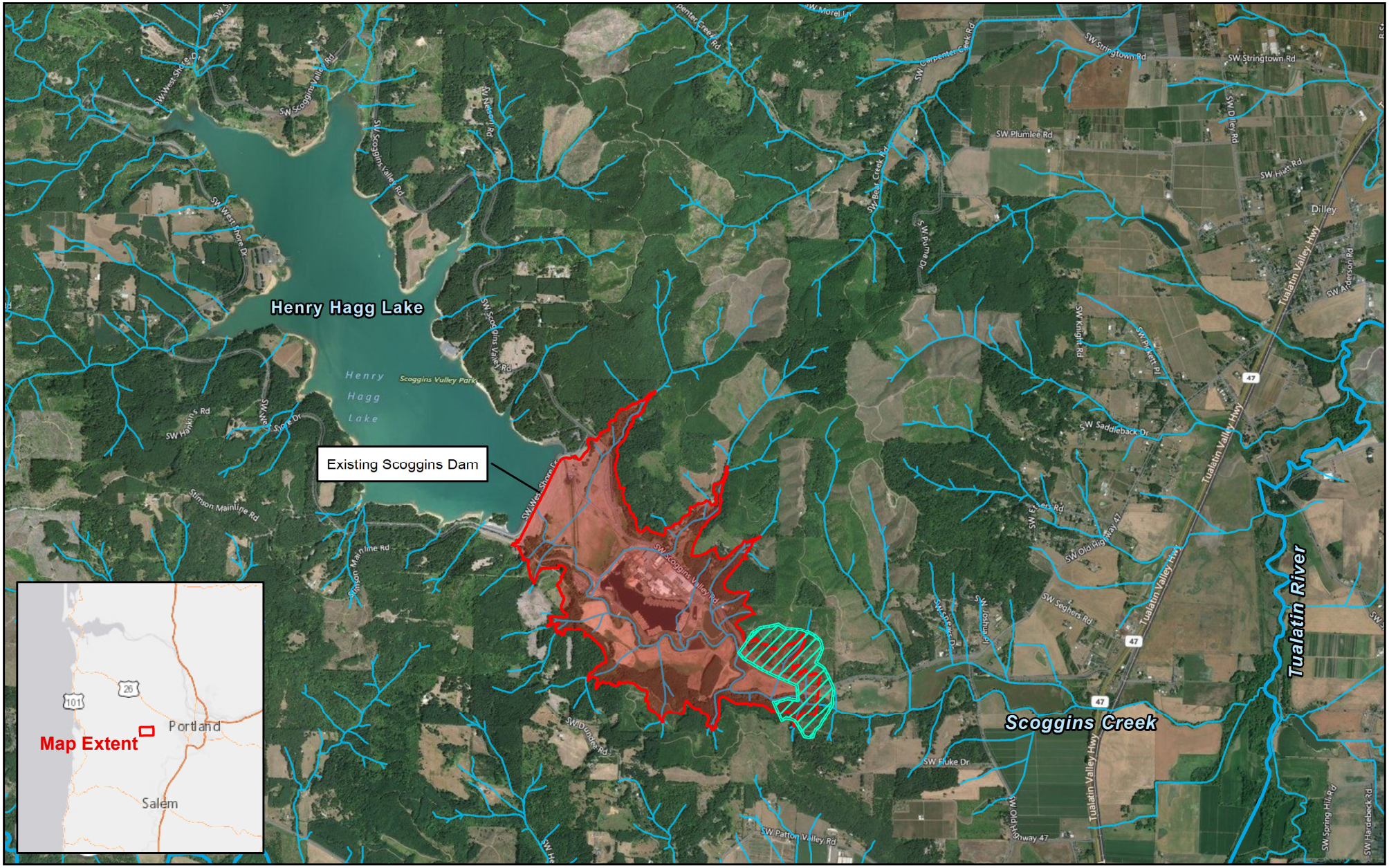


Figure 1.
Joint Project Option 3 Vicinity Map
Option 3 Fish Passage Waiver Application

Tualatin Basin Dam Safety and
Water Supply Joint Project
Washington County, Oregon

- Option 3 Inundation Area
- Proposed Option 3 Dam Footprint and Construction Limits
- Perennial and Intermittent Streams

Tualatin Basin Joint Project
DAM SAFETY • WATER SUPPLY

Source: Basemap from Microsoft Bing Hybrid service; fish habitat distribution from ODFW; cutthroat habitat distribution from MB&G (modeled using periodicity and slope of stream segments); NHD streams from USGS and ODF. Reproduced for informational purposes and may not be suitable for legal, engineering or surveying purposes. Conclusions drawn from such information are the responsibility of the user.

0 0.25 0.5 1 Miles

Figure1_2018_FishPassageAnalysis, 8/13/2018

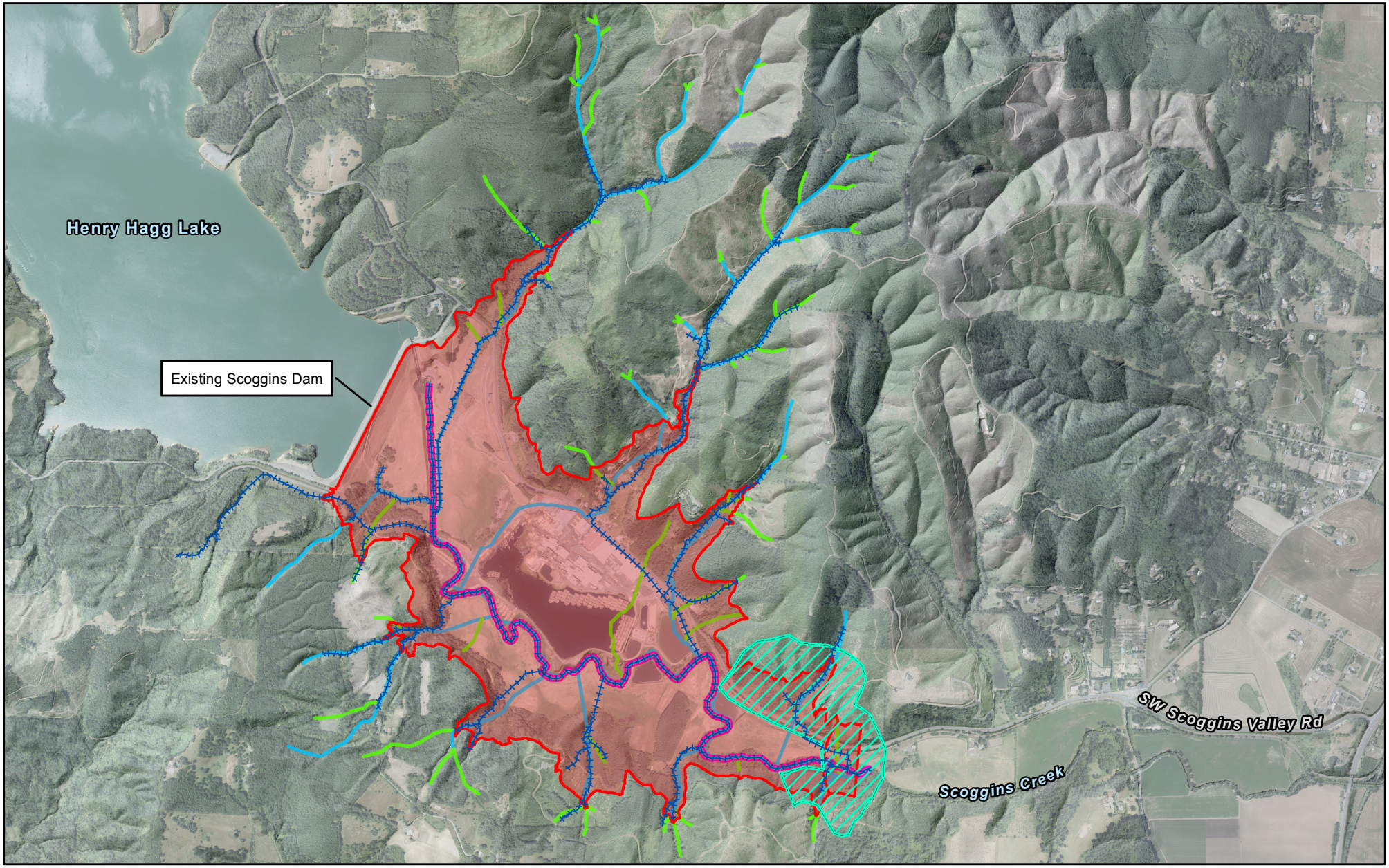


Figure 2.
Stream Habitat and Fish Passage Impact Map
Option 3 Fish Passage Waiver Application

Tualatin Basin Dam Safety and
Water Supply Joint Project
Washington County, Oregon

- Option 3 Inundation Area
- Proposed Option 3 Dam Footprint and Construction Limits
- Perennial Streams
- Intermittent Streams
- Modeled Coastal Cutthroat Trout Habitat*
- Winter Steelhead, Coho Salmon, Mountain Whitefish, Mountain Sucker, Largescale Sucker, and Pacific Lamprey Habitat (Scoggins Creek only)*

*Fish distribution includes assumed historical extent and presence

Tualatin Basin Joint Project
DAM SAFETY + WATER SUPPLY

Source: Basemap from Clean Water Services (flown 2016); fish habitat distribution from ODFW; cutthroat habitat distribution from MB&G (modeled using LiDAR and slope of stream segments); NHD streams from USGS and ODF. Reproduced for informational purposes and may not be suitable for legal, engineering or surveying purposes. Conclusions drawn from such information are the responsibility of the user.

0 500 1,000 2,000 3,000 Feet

Figure2_2018_FPWA_Scoggins_Impacts, 8/13/2018

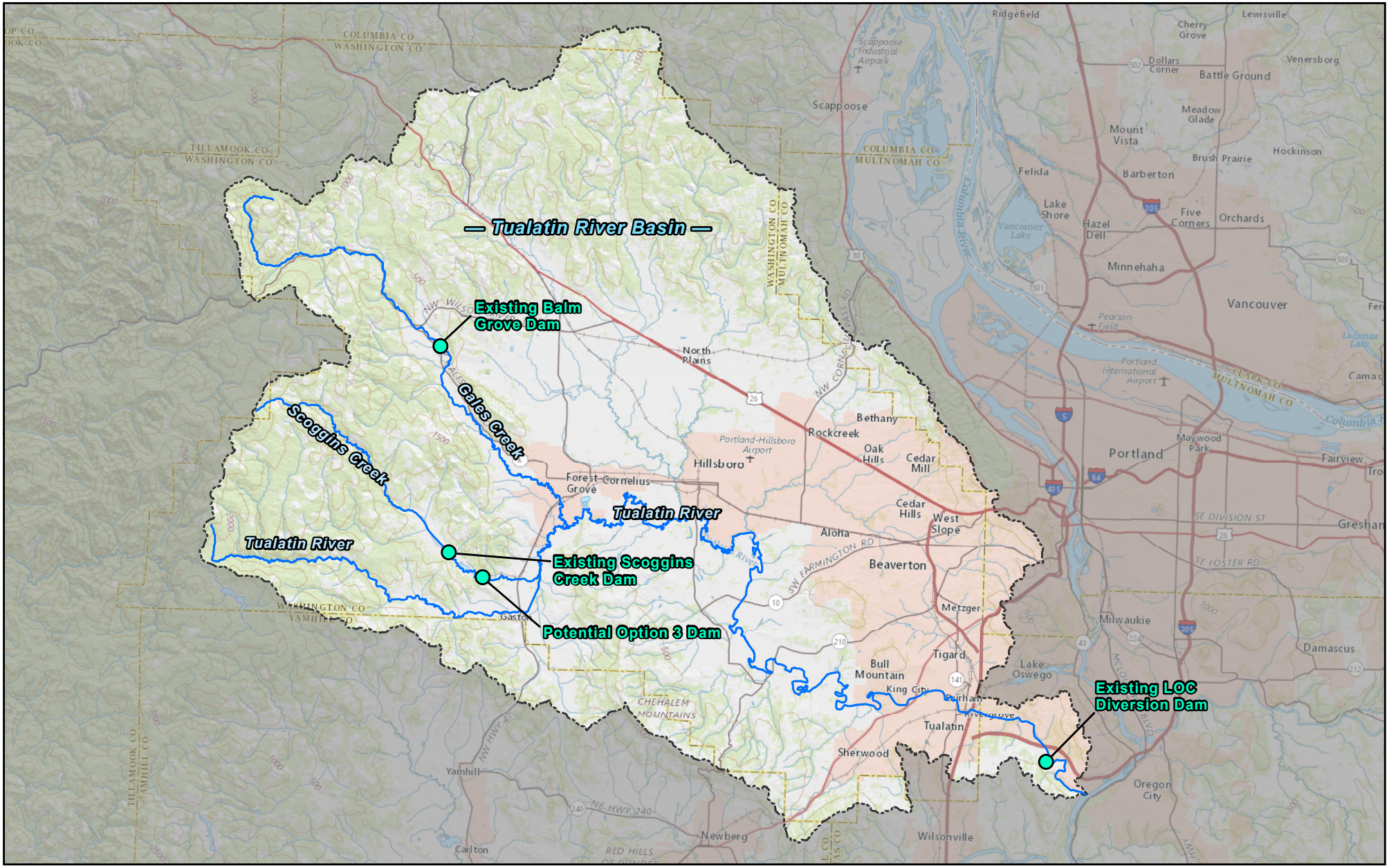


Figure 3.
Upper Tualatin River Basin Vicinity Map
Option 3 Fish Passage Waiver Application

Tualatin Basin Dam Safety and
Water Supply Joint Project
Washington County, Oregon

Existing and Potential Dam Locations
National Hydrography Dataset (NHD) Waterways

Tualatin Basin Joint Project
DAM SAFETY + WATER SUPPLY

Source: Basemap from National Geographic Society, all other data from MB&G. Reproduced for informational purposes and may not be suitable for legal, engineering or surveying purposes. Conclusions drawn from such information are the responsibility of the user.

0 2 4 6 Miles

Figure3_2018_FPWA_Tualatin_Vicinity_8/13/2018

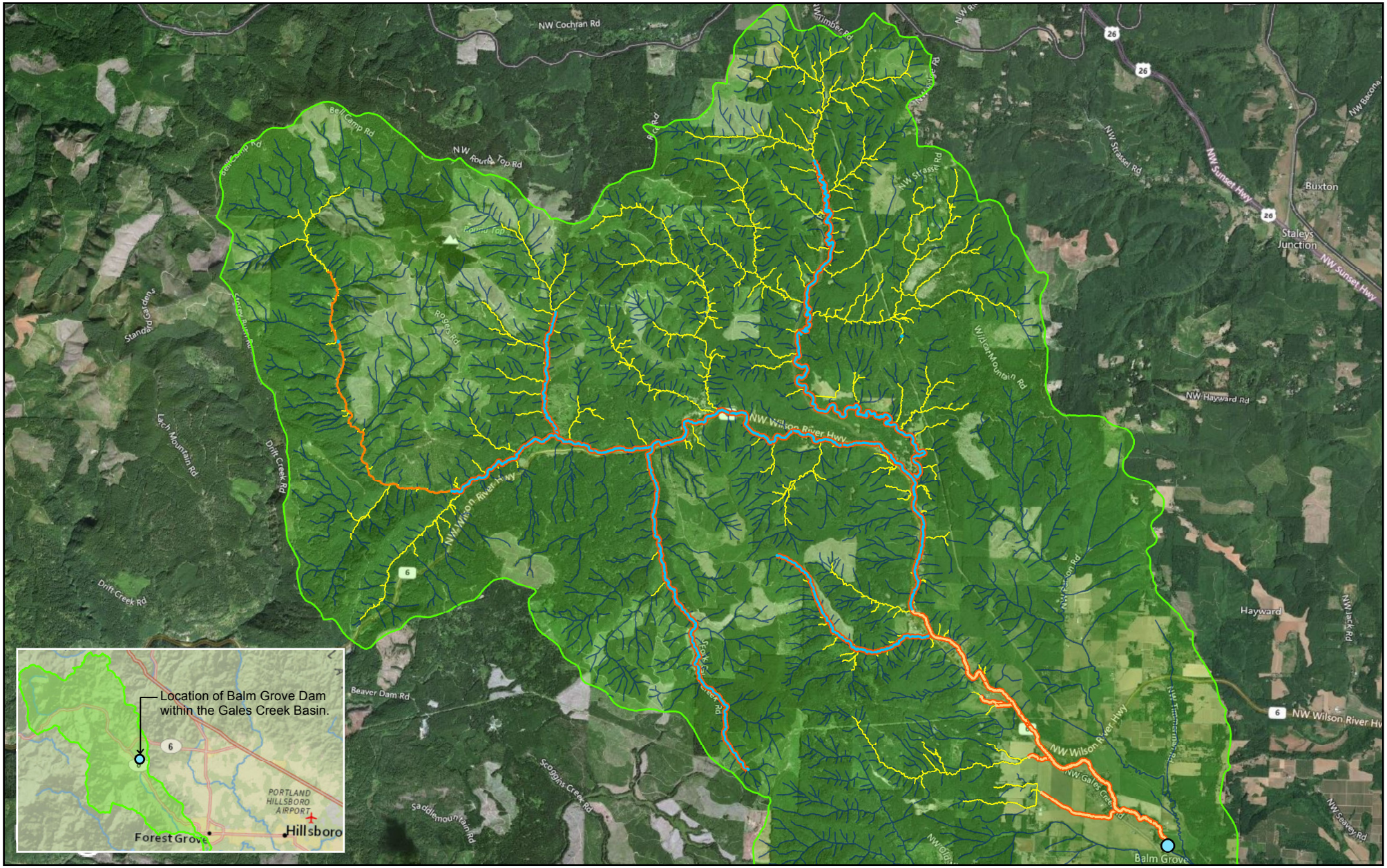


Figure 4.

Native Migratory Fish Distribution
Gales Creek Subbasin

Option 3 Fish Passage Waiver Application

Tualatin Basin Dam Safety and
Water Supply Joint Project
Washington County, Oregon

Gales Creek Basin
NHD/ODF Streams
Balm Grove Dam
Habitat for Mountain Sucker, Largescale Sucker, Mountain Whitefish, Pacific Lamprey, Winter Steelhead, Coho Salmon, and Coastal Cutthroat Trout
Habitat for Coho Salmon, Pacific lamprey, Winter Steelhead, and Coastal Cutthroat Trout
Habitat for Winter Steelhead and Coastal Cutthroat Trout
Habitat for Coastal Cutthroat Trout

Fish habitat distribution includes historical extent and presence. Cutthroat habitat was modeled by MB&G using LiDAR derived slopes of stream segments.

Tualatin Basin Joint Project
DAM SAFETY · WATER SUPPLY

Source: Basemap from Microsoft Bing; suitable habitat distributions for cutthroat, whitefish, and sucker were modeled by MB&G using slope of stream segments and ODFW-mapped fish passage barriers; Habitat distributions for all other species from ODFW; NHD streams from USGS and ODF. Reproduced for informational purposes and may not be suitable for legal, engineering or surveying purposes. Conclusions drawn from such information are the responsibility of the user.

0 0.5 1 2 Miles

Figure4_2018_FPWA_GalesCrk_Habitat, 1/11/2019

Attachment B

Photographs

Tualatin Basin Dam Safety and Water Supply Joint Project

Option 3 Fish Passage Waiver Application

PHOTO 1
May 11, 2018

View to the northwest (looking upstream) of Scoggins Creek immediately downstream of Scoggins Dam.

PHOTO 2
October 13, 2017

View to the southeast of Scoggins Creek (looking upstream) immediately downstream of Scoggins Dam.

PHOTO 3
May 11, 2018

View to the east of Scoggins Creek, degraded riparian and upland habitat, and a Stimson Lumber Company log yard on the Scoggins Creek floodplain.

PHOTO 4
October 13, 2017

View to the northeast of Scoggins Creek, degraded riparian and upland habitat, and the Stimson Lumber Company mill on the Scoggins Creek floodplain.

PHOTO 5
October 13, 2017

View to the southwest of a Scoggins Creek tributary near its confluence with Scoggins Creek. Note the excessive channel incision, bank erosion, and lack of stream flow.

PHOTO 6
October 13, 2017

View of a small, perched culvert outlet on a Scoggins Creek tributary under a private logging road in the Option 3 impact area. Note the lack of flow.

PHOTO 7
October 13, 2017

View of a small culvert inlet on a Scoggins Creek tributary under a private logging road in the Option 3 impact area. Note the lack of flow and lack of clear indication of a streambed and bank.

PHOTO 8
October 13, 2017

View of the outlet for the culvert shown in Photo 7. This culvert outlet is perched and flows into a steep, incised channel.

PHOTO 9
October 13, 2017

View of a Scoggins Creek tributary channel immediately upstream of a logging road on the south side of the Scoggins Creek subbasin in the Option 3 impact area.

PHOTO 10
October 13, 2017

View to the northwest of Scoggins Creek in the proposed Option 3 Dam footprint.

PHOTO 11
October 13, 2017

View to the east of Scoggins Creek (looking downstream) in the proposed Option 3 Dam footprint.

PHOTO 12
October 13, 2017

View of a culvert under SW Scoggins Valley Road that conveys a Scoggins Creek tributary in the Option 3 impact area. There was no flow at this location during the site reconnaissance, and the culvert appeared to be at least a partial passage barrier

PHOTO 13
October 13, 2017

View to the west of a channelized tributary on private property immediately south of SW Scoggins Valley Road in the Option 3 impact area. Note the dry and degraded channel conditions.

PHOTO 14
October 13, 2017

View to the north of a northern tributary of Scoggins Creek in the Option 3 impact area that flows adjacent to a private road. There was no flow in this tributary during the October 2017 site reconnaissance.

PHOTO 15
July 27, 2017

View to the northwest of Gales Creek and Balm Grove Dam immediately downstream of the dam.

PHOTO 16
July 27, 2017

View to the northeast of Balm Grove Dam.

PHOTO 17
May 11, 2018

View to the northwest of Gales Creek immediately upstream of Balm Grove Dam. A dam wingwall is visible in the left side of the photo.

PHOTO 18
May 11, 2018

View to the southeast of Gales Creek immediately downstream of Balm Grove Dam.

PHOTO 19
July 27, 2017

View to the southwest of floodplain habitat on the parcel containing Balm Grove Dam purchased by CWS in 2016.

PHOTO 20
June 14, 2018

View to the south of the Lake Oswego Corporation Diversion Dam. The existing fish ladder is partially shown at the bottom of the photo.

PHOTO 21
June 14, 2018

View of the existing Lake Oswego Corporation Diversion Dam fish ladder without baffles installed.

PHOTO 22
June 14, 2018

View to the southwest of the Lake Oswego Corporation Diversion Dam. The existing fish ladder entrance is shown on the right side of the dam.

PHOTO 23
June 14, 2018

View to the southeast of the Tualatin River and a large pool immediately downstream of the Lake Oswego Corporation Diversion Dam.

Attachment C

Preliminary Design Plan Sheets

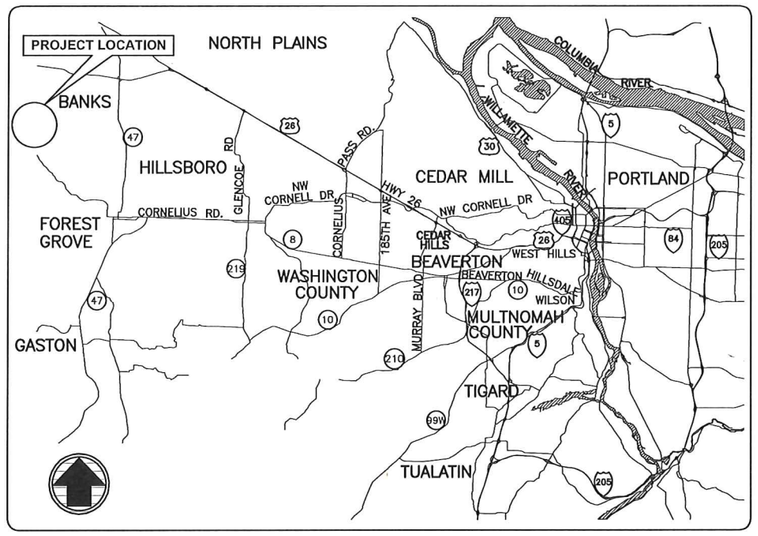
Tualatin Basin Dam Safety and Water Supply Joint Project

Option 3 Fish Passage Waiver Application

BALM GROVE

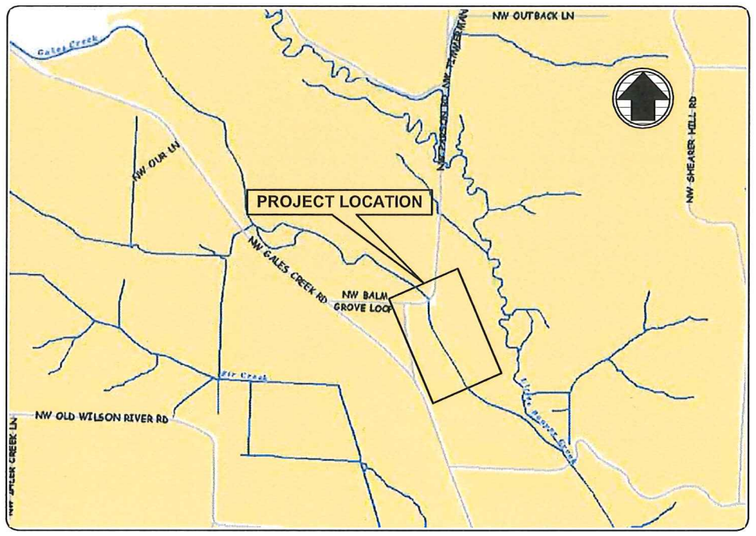
DAM REMOVAL & STREAM RESTORATION

CLEAN WATER SERVICES PROJECT NO.6483



VICINITY MAP
1N405, 06

SHEET INDEX



SITE MAP
NTS

UTILITY LOCATES (503) 232-1987

48 BUSINESS HOUR NOTICE PRIOR TO EXCAVATION

OREGON LAW REQUIRES CONTRACTOR TO COMPLY WITH RULES ADOPTED BY OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH 952-001-0090. COPIES OF RULES MAY BE OBTAINED BY CONTACTING THE UTILITY LOCATE CENTER AT (503) 232-1987.

ELECTRIC:	FOREST GROVE LIGHT & POWER	(503) 992-3250
GAS:	NORTHWEST NATURAL GAS	(503) 226-4211
TELEPHONE:	QWEST	(800) 833-0825
	FRONTIER	(800) 483-4000
STREETS:	WASHINGTON COUNTY	(503) 846-7037

CLEAN WATER SERVICES

CONTACT INFORMATION

SENIOR ENG.	MATT BRENNAN	(503) 681-3682
PROJECT MGR.:	ABBEY RHODE	(503) 681-4472
INSPECTOR:	MIKE CHAPMAN	(503) 681-5105
ENG. TECH.:	MIKE CHAPMAN	(503) 681-5105

GENERAL NOTES

1. CONTRACTOR SHALL NOTIFY CLEAN WATER SERVICES PROJECT MANAGER (503-681-3636) AND INSPECTION DEPARTMENT (503-681-4444) 48 BUSINESS HOURS PRIOR TO START OF CONSTRUCTION AND COMPLY WITH ALL OTHER REQUIREMENTS OF ORS 757.541 TO 757.571.
2. CONTRACTOR SHALL PROVIDE 24 HOUR NOTICE OF WORK RESUMPTION AFTER ANY SHUTDOWN EXCEEDING ONE DAY DURATION EXCEPT FOLLOWING WEEKENDS OR HOLIDAYS.
3. ALL EROSION CONTROL INSTALLATION AND MAINTENANCE SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF CLEAN WATER SERVICES EROSION PREVENTION & SEDIMENT CONTROL TECHNICAL GUIDANCE HANDBOOK.
4. ALL TRAFFIC CONTROL SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AS MODIFIED BY THE OREGON SUPPLEMENTS. COST ASSOCIATED WITH IMPLEMENTATION OF TRAFFIC CONTROL, SIGNAGE, OR DEVICES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
5. CONTRACTOR SHALL CONFINE CONSTRUCTION OPERATIONS WITHIN PERMANENT EASEMENTS, TEMPORARY CONSTRUCTION EASEMENTS, OR PUBLIC RIGHT-OF-WAY ONLY. IF AREAS OR FEATURES OUTSIDE DESIGNATED CONSTRUCTION ZONES SUSTAIN IMPACT FROM CONTRACTORS ACTIVITIES, CONTRACTOR SHALL RESTORE TO PRE-CONSTRUCTION CONDITION AT NO COST TO CLEAN WATER SERVICES.
6. ALL EXISTING UTILITY LOCATIONS AND DESCRIPTIONS SHOWN ON PLANS HAVE BEEN COMPILED FROM AVAILABLE RECORDS AND/OR FIELD SURVEY. CLEAN WATER SERVICES CANNOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THIS INFORMATION. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF LOCATION AND DEPTH (POTHOLE) OF ALL EXISTING UTILITIES WITHIN CONSTRUCTION ZONE PRIOR TO BEGINNING CONSTRUCTION. CONTRACTOR SHALL PROMPTLY NOTIFY CLEAN WATER SERVICES OF POTENTIAL CONFLICTS. UNDER THESE TERMS CLEAN WATER SERVICES SHALL BE RESPONSIBLE FOR COST OF REQUIRED RELOCATION. IF CONTRACTOR FAILS TO LOCATE ANY KNOWN UTILITY WITHIN CONSTRUCTION ZONE THAT CONFLICTS WITH WORK, CONTRACTOR SHALL CORRECT CONFLICT AT OWN COST. ANY COSTS TO THE CONTRACTOR ARISING FROM COORDINATION WITH UTILITY COMPANY TO RELOCATE UTILITIES SHALL BE CONSIDERED INCIDENTAL TO COST OF PROJECT AND NO ADDITIONAL COMPENSATION SHALL BE DUE CONTRACTOR.
7. CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTS AND CONSTRUCTION STAKING. CONTRACTOR SHALL NOTIFY CLEAN WATER SERVICES PRIOR TO DISTURBANCE OR REMOVAL OF ANY PERMANENT MONUMENTS TO ALLOW REFERENCING FOR FUTURE REPLACEMENT.
8. CONTRACTOR SHALL RESTORE ALL STREET FEATURES IMPACTED BY CONSTRUCTION. FEATURES SHALL INCLUDE , BUT NOT BE LIMITED TO, PAVEMENT, CURBS, GUTTERS, SIDEWALKS, DRIVEWAYS, STREET STRIPING, SIGNAGE, MAILBOXES, AND UTILITIES.
9. CONTRACTOR SHALL RESTORE ALL PROJECT- RELATED EASEMENT AREAS AS STIPULATED IN EASEMENT AND CONTRACT DOCUMENTS. CLEAN WATER SERVICES SHALL PROVIDE CONTRACTOR WITH REFERENCE COPY OF ALL EASEMENT AGREEMENT CONDITIONS.

ELEVATION DATUM:

BASIS OF BEARING: OREGON STATE PLANE COORDS.

Clean Water Services
2550 SW Hillsboro Hwy
Hillsboro, OR 97123
(503) 681-3600
www.cleanwaterservices.org

CHECKED BY: AR | APPROVED: AR

BALM GROVE
DAM REMOVAL & STREAM RESTORATION

NO.	REVISION	BY	DATE
1	?????	XXX	XX/XX/XX

COVER SHEET

DESIGNER: AR
DRAFTER: MC
PROJECT: 6483

SHEET 1 OF 9

NOTES

1. WOOD STRUCTURE COMPOSITION & PLACEMENT PER DISTRICT STAFF (TYPICAL, SEE CONSTRUCTION DETAIL SHEET 8 OF 9)
2. CROSS SECTION PROFILE (SEE SHEET 7 OF 9)
3. EXISTING DAM STRUCTURE AND HEADWALLS TO BE REMOVED IN ENTIRETY. ALL DEBRIS TO BE REMOVED FROM SITE (SEE SHEET 6 OF 9).
4. POTENTIAL GRAVEL DEPOSITION ZONES
5. POTENTIAL STREAM CHANNEL MIGRATION AFTER DAM REMOVAL.
6.
7.
8.
9.
10.

ABBREVIATIONS

LOD	LIMITS OF DISTURBANCE
TOB	TOP OF BANK/ SLOPE
TOE	TOE OF SLOPE

LEGEND

EXISTING

TAX LOT
EDGE OF GRAVEL
MAJOR CONTOURS — 200
MINOR CONTOURS
TOP OF SLOPE
TOE OF SLOPE
STREAM
BRIDGE
EXSTING WETLANDS — WET WET

PROPOSED

MAJOR CONTOURS — 200
MINOR CONTOURS
LIMITS OF DISTURBANCE — LOD
TO BE REMOVED
CROSS SECTION LOCATIONS — XS
CONSTRUCTED WOOD PLACEMENT
GRAVEL BAR (ESTIMATED)
STREAM CHANNEL (ESTIMATED)
DETAIL NOTE- DETAIL#/ PAGE# — 1/8

Clean Water Services
2550 SW Hillsboro Hwy
Hillsboro, OR 97123
(503) 681-3600
www.cleanwaterservices.org

APROVED: AR
CHECKED BY: AR
DESIGNER: AR
DRAFTER: MC
PROJECT: XXXX

BALM GROVE
DAM REMOVAL & STREAM RESTORATION

NO.	REVISION	BY	DATE
1	?????	XXX	XX/XX/XX

ABBREVIATIONS, LEGEND, & PLAN NOTES

SEE SHEETS 4 & 5 FOR GALES CREEK PROFILE

NORTH

200 0 100 200 400

1 INCH = 400 FEET

1N4060000100
WOODROW SMITH FAMILY TRUST &
EDITA M SMITH REVOC LIV TRUST
11142 NW GALES CREEK RD
FOREST GROVE, OR 97116

1N4060000100
FOREST GLEN FARM LLC
FOREST GROVE, OR 97116

1N4050000403
MERIBELLE THOMPSON FAMILY TRUST
BY RICHARD STAWICKI
11000 NW PARSON RD
FOREST GROVE, OR 97116

1N4060003400
MICHAEL A & KAREN A HOWARD
10863 NW BALM GROVE LOOP
GALES CREEK, OR 97117

1N4060003300
LINDA C PETSHOW TRUST
BY LINDA C PETSHOW & JOHN D PETSHOW TRS
10955 NW GALES CREEK RD
GALES CREEK, OR 97117

1N4050000500
JOHN D PETSHOW SR TRUST
BY JOHN D SR PETSHOW & LINDA C PETSHOW TRS
FOREST GROVE, OR 97116

1N4060003500
CLEAN WATER SERVICES
10660 NW BALM GROVE LOOP
GALES CREEK, OR 97117

1N4050000800
WALTER WAYNE WRIGHT & JANNETT BRAUN
51761 NW CLAPSHAW HILL RD
FOREST GROVE, OR 97116

1N4050000603
STEPHEN J & PATRICIA L CARMICHAEL
51545 NW CLAPSHAW HILL RD
FOREST GROVE, OR 97116

1N4060003200
ANGEL MARTINEZ & LUIS MARTINEZ
FOREST GROVE, OR 97116

1N4050000601
ANGEL MARTINEZ & LUIS MARTINEZ
10400 NW GALES CREEK RD
FOREST GROVE, OR 97116

1N4050000900
DOROTHE WILMS LIVING TRUST
51896 NW CLAPSHAW HILL RD
FOREST GROVE, OR 97116

NW PARSON ROAD

NW BALM GROVE LOOP

NW GALES CREEK ROAD

NW CLAPSHAW HILL ROAD

SEE SHEET 6 OF 10

SEE SHEET 7 OF 10

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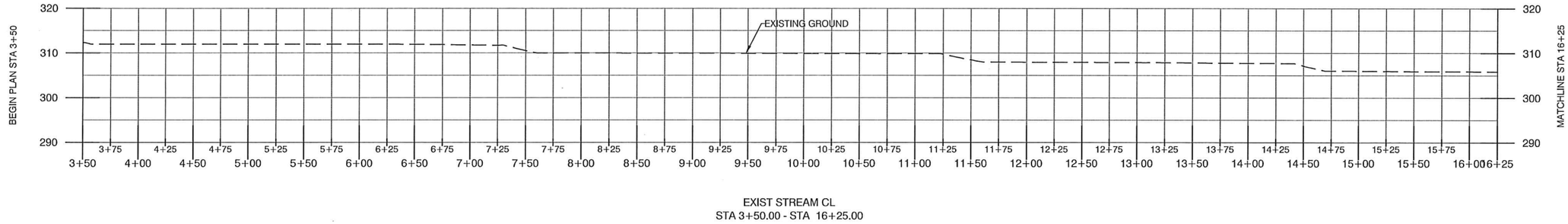
BALM GROVE
DAM REMOVAL & STREAM RESTORATION

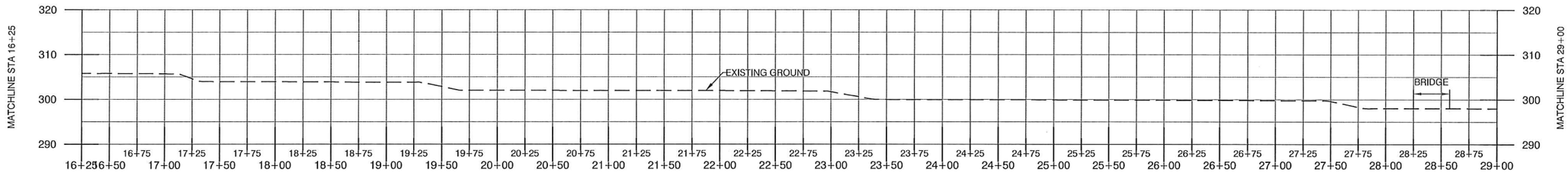
CORPEHENSIVE SITE MAP

NO.	REVISION	BY	DATE
1	?????	XXX	XX/XX/XX

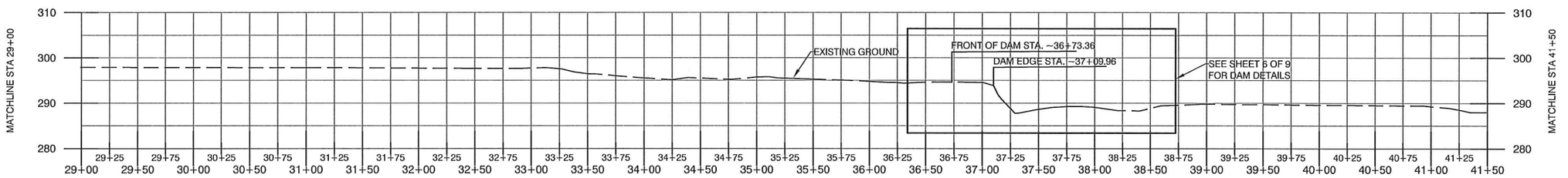
PROJECT: XXXX | DRAFTER: MC | DESIGNER: AR | CHECKED BY: AR | APPROVED: AR

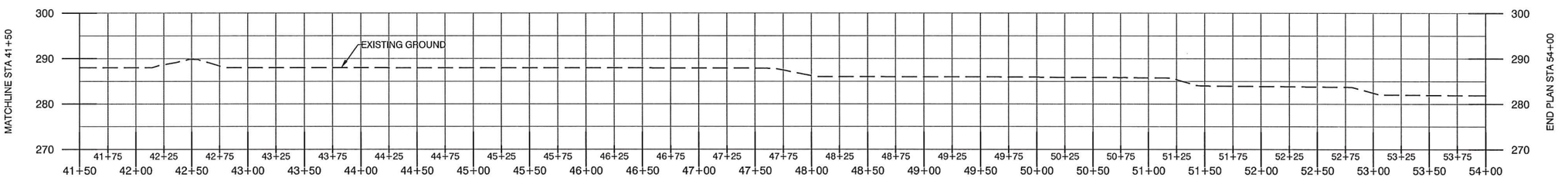


EXIST STREAM CL
STA 3+50.00 - STA 16+25.00



EXIST STREAM CL
STA 16+25.00 - STA 29+00.00





EXIST STREAM CL
STA 41+50.00 - STA 54+00.00

100 0 50 100 200
1 INCH = 100 FEET

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CHECKED BY: AR | APROVED: AR

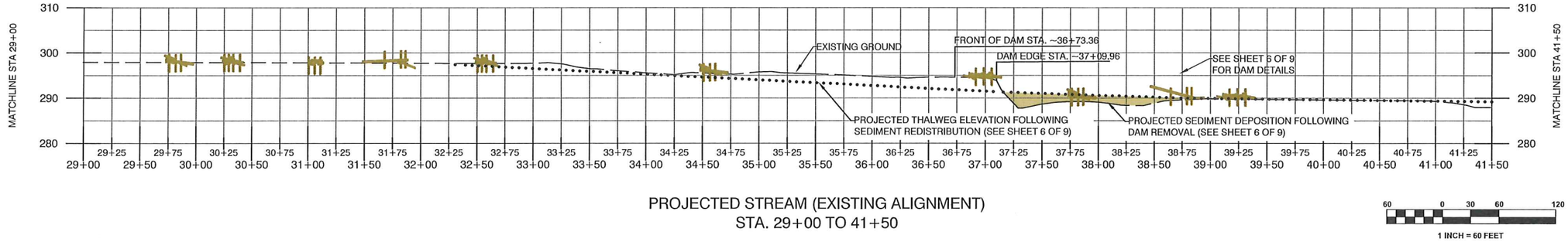
DESIGNER: AR | DRAFTER: MC | PROJECT: XXXX

BALM GROVE
DAM REMOVAL & STREAM RESTORATION

NO.	REVISION	BY	DATE
1	?????	XXX	XX/XX/XX

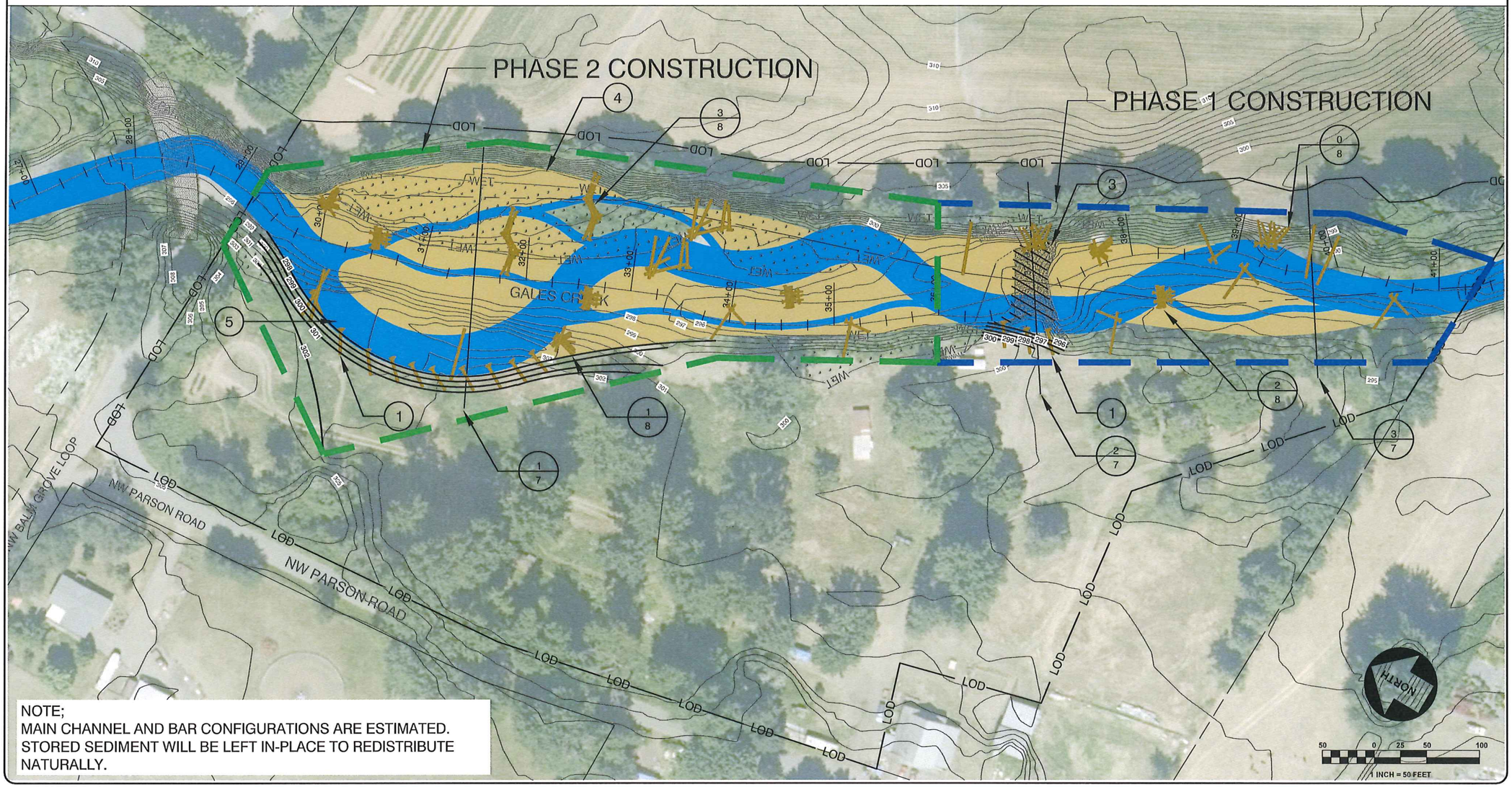
EXISTING- PROFILES
STA. 3+50 TO 54+00

SHEET
4 OF 9



PROJECTED STREAM (EXISTING ALIGNMENT)
STA. 29+00 TO 41+50

60 0 30 60 120
1 INCH = 60 FEET



NOTE;
MAIN CHANNEL AND BAR CONFIGURATIONS ARE ESTIMATED.
STORED SEDIMENT WILL BE LEFT IN-PLACE TO REDISTRIBUTE NATURALLY.

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BALM GROVE
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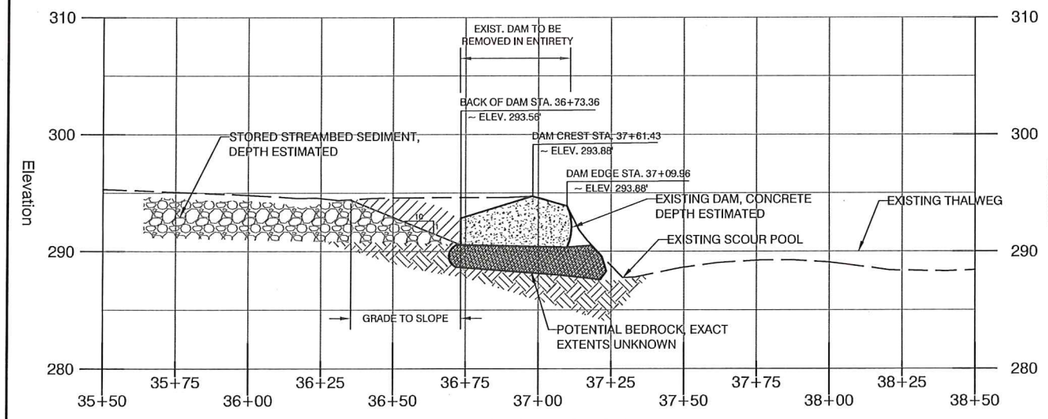
PROJECTED -
PLAN & PROFILE
STA. 29+00 TO 41+50

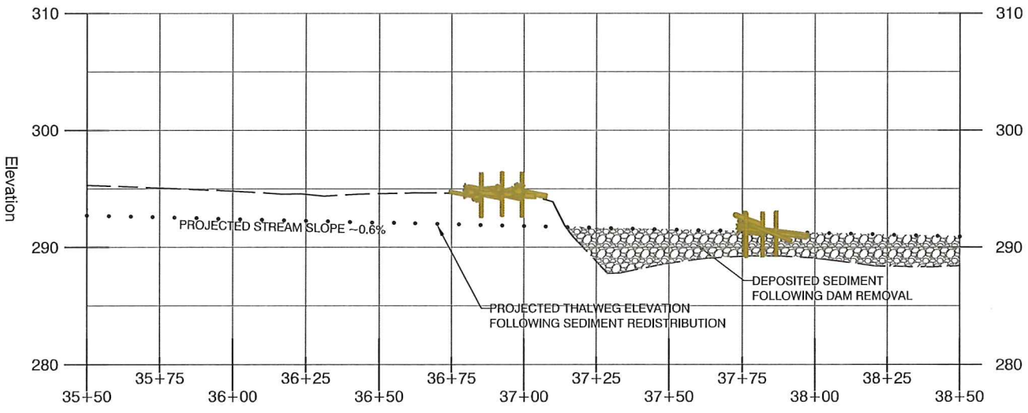
NO.	REVISION	BY	DATE
1	?????	XXX	XX/XX/XX

PROJECT: XXXX | DRAFTER: MC | DESIGNER: AR | CHECKED BY: AR | APROVED: AR

SHEET 5 OF 9

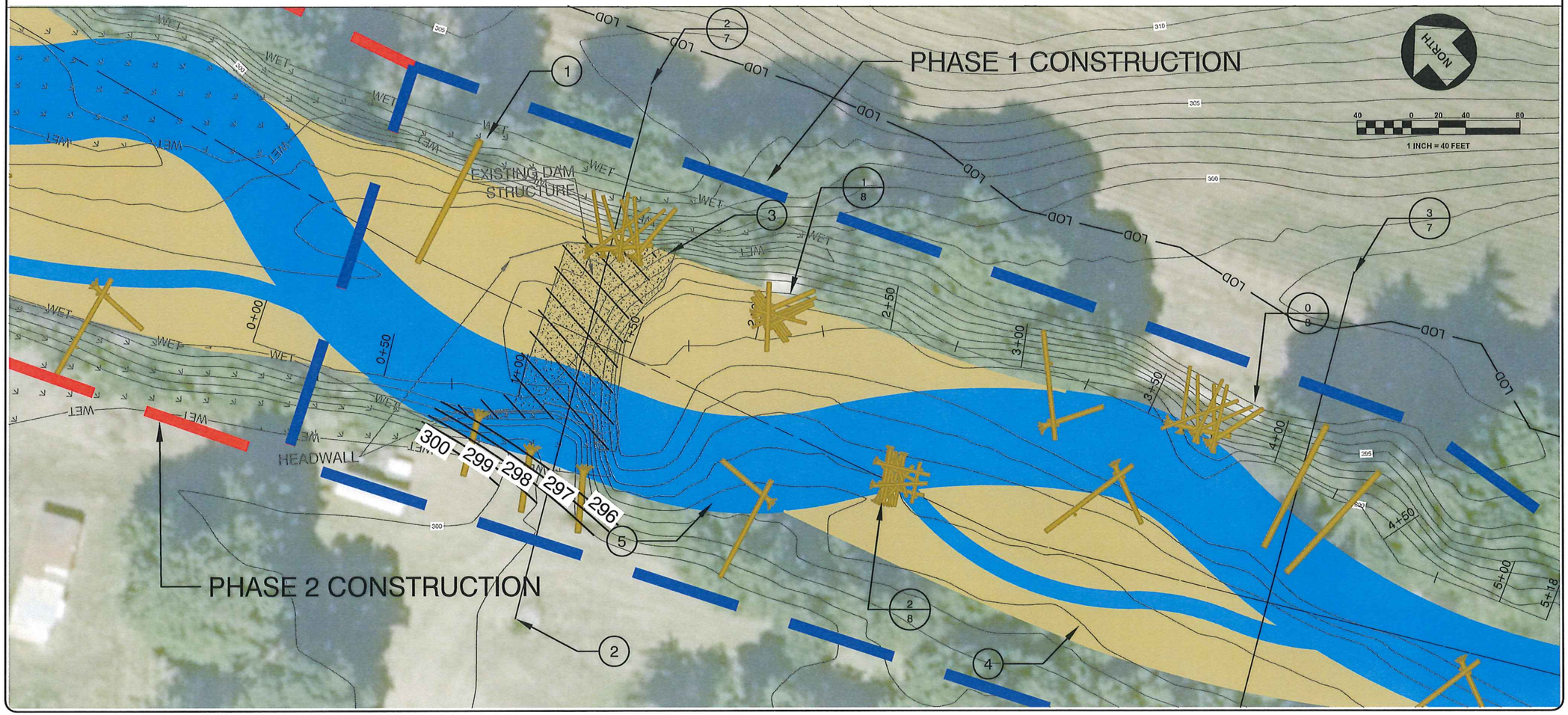


PROPOSED CONSTRUCTION
STA. 0+00 TO 3+00



POST CONSTRUCTION
STA. 0+00 TO 3+00

50 0 25 50 100
1 INCH = 50 FEET



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DESIGNER: AR

DRAFTER: MC

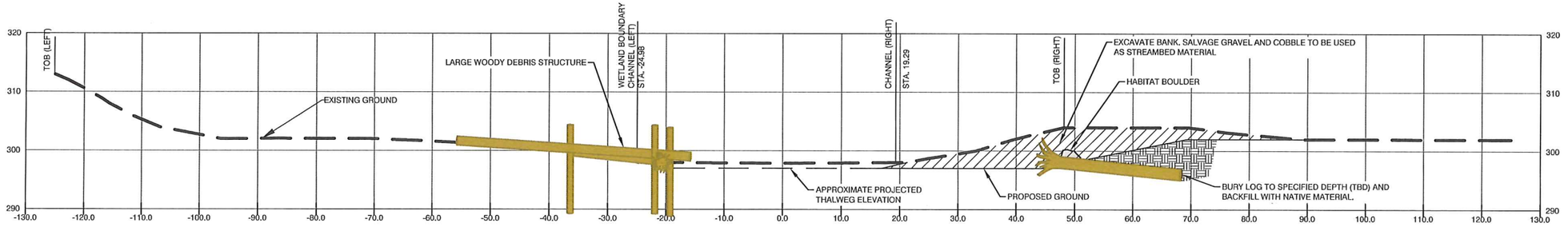
PROJECT: XXXX

BALM GROVE
DAM REMOVAL & STREAM RESTORATION

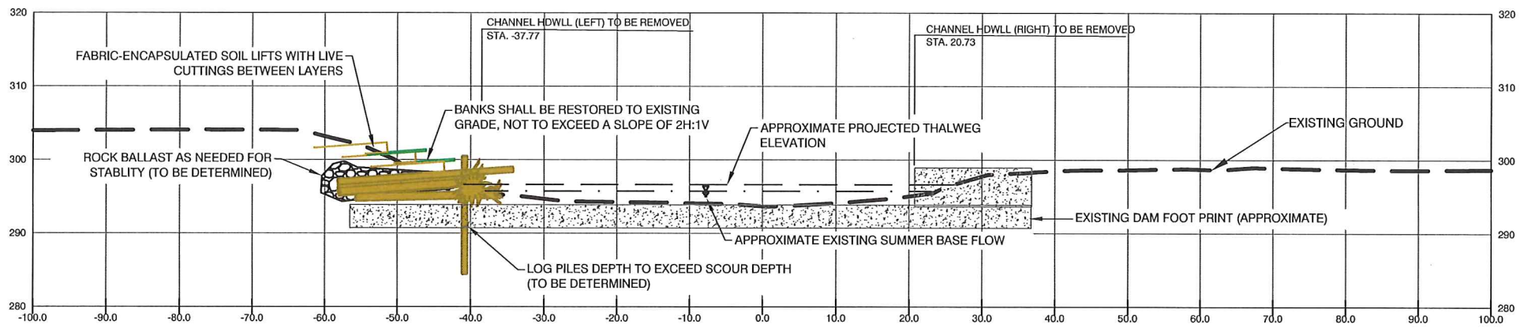
PROPOSED- DAM REMOVAL
PLAN & PROFILE
STA. 35+50 TO 38+50

NO.	REVISION	BY	DATE
1	?????	XXX	XX/XX/XX

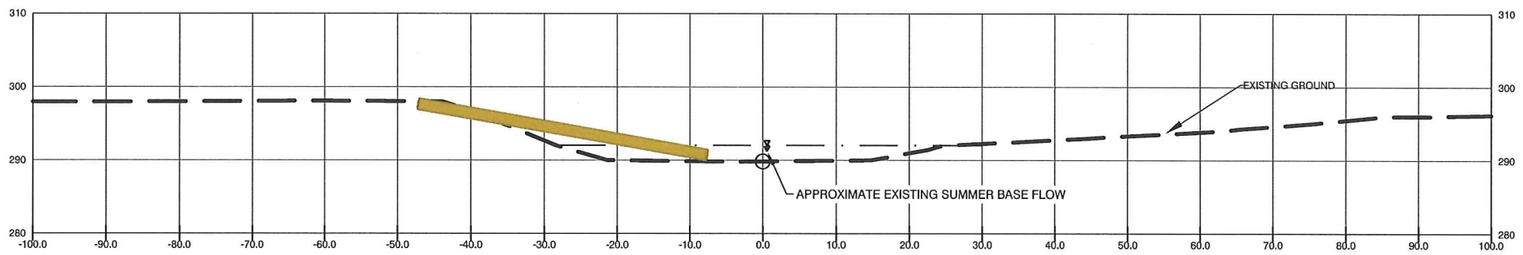
SHEET 6 OF 9



UPSTREAM CROSS SECTION — 1/7



DAM CROSS SECTION — 2/7



DOWNSTREAM CROSS SECTION — 3/7

20 0 10 20 40

1 INCH = 20 FEET

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DRAFTER: MC

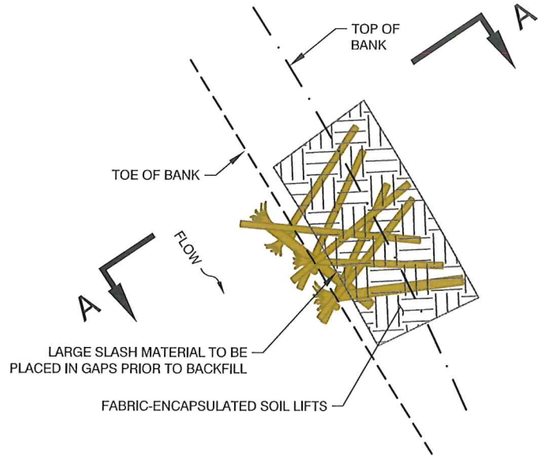
PROJECT: XXXX

BALM GROVE
DAM REMOVAL & STREAM RESTORATION

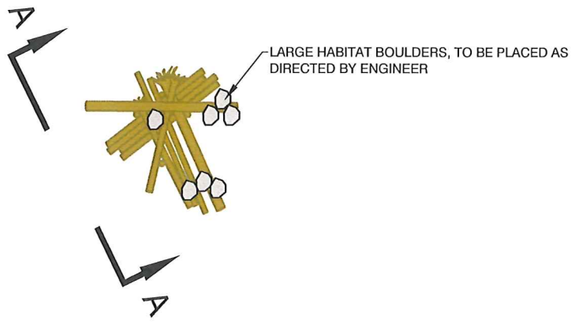
CROSS SECTIONS
(TYPICAL)

NO.	REVISION	BY	DATE
1	?????	XXX	XX/XX/XX

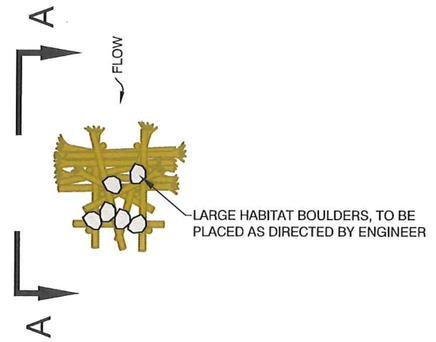
SHEET
7 OF 9



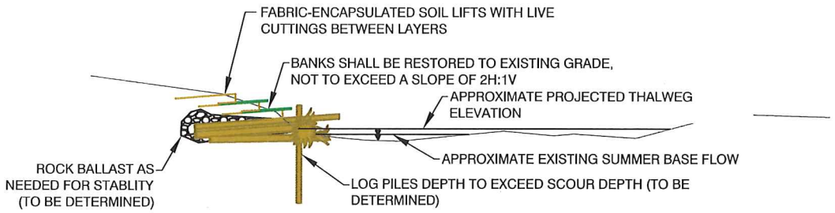
BANK STRUCTURE, TYP
SCALE: NTS



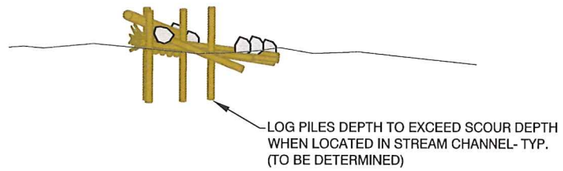
HABITAT STRUCTURE 1, TYP
SCALE: NTS



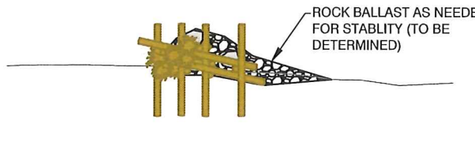
HABITAT STRUCTURE 2, TYP
SCALE: NTS



BANK STRUCTURE SECTION A-A
SCALE: NTS

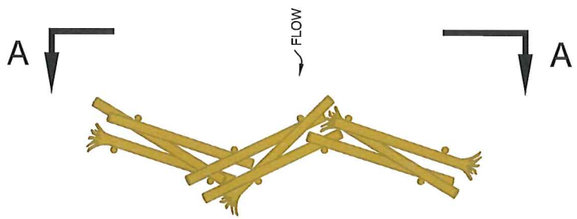


HABITAT STRUCTURE 1 SECTION A-A
SCALE: NTS

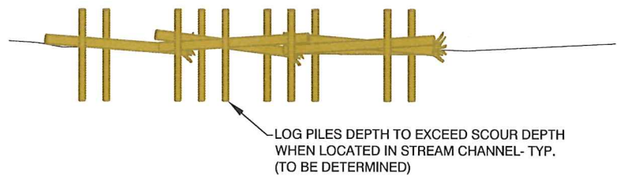


HABITAT STRUCTURE 2 SECTION A-A
SCALE: NTS

NOTE;
ALL LOG STRUCTURES TO BE FIELD FIT AS DIRECTED BY DISTRICT ENGINEER.



HABITAT STRUCTURE 3, TYP
SCALE: NTS



HABITAT STRUCTURE 3 SECTION A-A
SCALE: NTS

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BALM GROVE
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NO.	REVISION	BY	DATE
1	?????	XXX	XX/XX/XX

CONSTRUCTION DETAILS

DESIGNER: AR
DRAFTER: MC
CHECKED BY: AR
APPROVED: AR
PROJECT: XXXX

SHEET
8 OF 9