

CENWS-OD-TS-NR

MEMORANDUM FOR FILE

April 7, 2016

SUBJECT: DMMP TIER 1 EVALUATION OF THE YAKAMA NATION UNDERWOOD IN LIEU BOAT BASIN DREDGING, WHITE SALMON/COLUMBIA RIVERS.

1. **Introduction.** This memorandum documents the Tier 1 evaluation by the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) of the Yakama Underwood In Lieu Site boat basin and access ramp maintenance dredging (Figures 1, 2, and 3). This evaluation resulted in a no-test determination.
2. **Project.** The Underwood In-Lieu Site (In Lieu) is a historic tribal village site near the confluence of the White Salmon and Columbia Rivers that provides access to traditional fishing areas. In 2011, the Condit Dam at river mile 3.3 of the White Salmon River was intentionally breached, releasing large volumes of sediment downriver. As expected, subsequent deposition of sediments at the In Lieu site occurred following the dam removal. Navigational access to the In Lieu Site boat basin (including a floating dock and paved boat ramp) from the White Salmon and Columbia Rivers ceased shortly thereafter in 2011.

The Yakama Nation Fisheries proposes to remove approximately 13,000 cubic yards (cy) of accumulated sediment from the In Lieu site boat basin to restore access to the main channel of the White Salmon and Columbia Rivers. The Yakama Nation proposes to reuse the excavated sediment to create a riparian island complex as part of a project to create and improve aquatic and riparian wetland habitat.

3. **Evaluation.** The sediment proposed for removal at the In Lieu site was deposited as a result of removal of the former Condit Dam, installed in 1913, which was located at river mile 3.3 on the White Salmon River. Since the reservoir (Northwestern Lake) behind Condit Dam was formed in 1913, more than 2 million cy of sediment accumulated in Northwestern Lake. Modeling predicted that river erosion would remove between 1.6 – 2.2 million cy of sediment from the reservoir following the dam removal (PacifiCorp Energy, 2011). The In Lieu site filled in almost completely with sand within a few days of actual dam removal (PacifiCorp Energy, 2011b).

Prior to dam removal, two major chemical and biological sampling studies were performed between 2006 and 2008 on sediment samples taken from Northwestern Lake to determine whether the accumulated sediment met established criteria for open-water release. A third study was conducted to characterize pre-dam removal sediment quality at the In Lieu Site. The three studies' activities are summarized briefly below:

- Kleinfelder (2007a) – In December 2006, sediment samples were collected from four main sub-areas (at varying depths below mudline) within Northwestern Lake; bioassay testing was triggered for fine-grained sediments at the sampling location nearest the dam by the sediment mercury data.

- Kleinfelder (2007b) – In July 2007, an additional seven samples were collected in the fine-grained sediments nearest the dam for mercury analysis, ten sediment/soil samples were collected to establish area background mercury concentrations, and a mercury bioaccumulation study was performed on the fine-grained sediment nearest the dam.
- Kleinfelder (2008) - In May 2008, sediment was collected from the In Lieu Site, analyzed for bulk mercury and total organic carbon, and used for a mercury bioaccumulation study.

Review of the initial Kleinfelder (2007a) characterization data indicates that most of the current DMMP freshwater chemicals of concern were not present in the sediments of Northwestern Lake. Pesticides and mercury were the only chemicals identified in sediment that exceeded Dredged Material Evaluation Framework (DMEF) screening levels available at that time (USACE, 1998). In 2009, the Portland Sediment Evaluation Team (PSET) evaluated the information available and determined that the sediment confined behind Condit Dam was suitable for unconfined in-water placement based on several considerations, including the occurrence of naturally elevated background mercury in this area and the anticipated reduction in the toxicity of mercury due to demethylation (USACE, 2009).

Since 2009, additional data has been collected from the In Lieu site and updated screening levels have been published. A follow-up study of shallow sediment mercury concentrations at four locations in the Columbia River (including the In Lieu site) was conducted in November 2011 and September 2012; biological testing was conducted at the In Lieu site (Kleinfelder, 2013). An updated evaluation of all currently available data is provided in the following sections.

4. **Pesticides.** In December 2006, sediment concentrations of 4,4'-DDD and 4,4'-DDE slightly exceeded the DMEF Screening Level (0.0069 mg/kg) at two sample locations in Northwestern Lake, but the detected concentrations did not exceed the DMEF Bioaccumulation Trigger Level of 0.05 mg/kg (Kleinfelder, 2007a). The current DMMP freshwater SL1 for the sum of 2,4'-DDD and 4,4'-DDD is 0.310 mg/kg; the SL1 for the sum of 2,4'-DDE and 4,4'-DDE is 0.021 mg/kg. Although the 2,4'-DDx isomers were not measured in 2006, DMMP concern regarding these pesticides is low since no concentrations of the 4,4'-DDx isomers exceeded 2015 DMMP screening levels, other chlorinated pesticides were either non-detect or detected at very low concentrations, and PCBs were not detected in any samples.
5. **Mercury.** In December 2006, mercury was detected at concentrations ranging from 0.020 to 2.030 mg/kg in Northwestern Lake sediment; concentrations in 11 of the 15 samples exceeded the DMEF screening Level (0.41 mg/kg) (Kleinfelder, 2007a).

Subsequent comparison of the December 2006 data to the then newly-released interim Northwest Regional Sediment Evaluation Framework (RSET, 2006) indicated that the sediment mercury concentrations also exceeded the 2006 SEF upper screening level (SL2) of 0.75 mg/kg, which corresponded to a concentration at which minor adverse effects may be observed in more sensitive groups of benthic organisms.

Upon request by the Portland Sediment Evaluation Team (PSET), a supplemental sampling and analysis of Northwestern Lake sediments was completed in July of 2007 (Kleinfelder, 2007b). Sample results again indicated the presence of mercury in fine-grained surface sediments near the

dam (0.094 to 0.881 mg/kg) at concentrations that exceeded both the 2006 SL1 (0.28 mg/kg) and SL2 (0.75 mg/kg).

The combined average concentration of mercury from the December 2006 and July 2007 sediment samples collected nearest the dam was 0.78 mg/kg. Pre-breach mercury concentrations measured at the In Lieu site in July 2007 and May 2008 were similar (0.72 mg/kg and 1.20 mg/kg, respectively) (Kleinfelder, 2007b, 2008).

The 2011 and 2012 sediment analyses indicated that total mercury concentrations decreased very slightly at the In Lieu site post-dam breach. The 2011 and 2012 total mercury concentrations were 0.35 and 0.9 mg/kg, respectively, which are similar to the pre-breach concentration measured in 2007 and 2008.

Methylmercury was also present in very low concentrations (<0.0005 and 0.00096 mg/kg in 2011 and 2012, respectively) in the fine-grained sediments (obtained by sieving), but the lack of pre-breach methylmercury sediment data precludes a direct before-and-after comparison at the In Lieu site (Kleinfelder, 2013). For comparison, methylmercury concentrations from fine-grained sediments at mouth of the Klickitat River (12.1 miles upstream of the In Lieu site) were 0.00246 and 0.00052 mg/kg in 2011 and 2012, respectively (Kleinfelder, 2013). This data suggests that other background sources of methylmercury to the Columbia River exist.

Biological Testing

December 2006 sediment mercury concentrations exceeded the DMEF bioaccumulation trigger level (1.5 mg/kg) in sediment nearest the dam, thus triggering freshwater bioassay testing; the bioassay tests indicated that the sediment had no adverse effect on the life cycles of test species (Kleinfelder, 2007a).

In July 2007, a bioaccumulation test was performed on the lake sediments collected (Kleinfelder, 2007b). However, due to concerns regarding the representativeness of the reference sediment used in the bioaccumulation study, RSET requested an additional bioaccumulation study be performed using sediment from the In-Lieu site. In May 2008, sediment sample material was collected from the In Lieu site for the requested additional bioaccumulation study (Kleinfelder, 2008).

The July 2007 and May 2008 bioaccumulation testing detected average mercury concentrations in the tissue of worms exposed to the In-Lieu and Northwestern Lake sediments of 0.186 and 0.347 mg/kg, respectively. Since the sediment mercury concentrations from the In-Lieu site exceeded the Northwestern Lake bioassay sediment, the observed difference in worm tissue concentrations was believed to be due to differences in mercury bioavailability associated with mercury methylation and demethylation. Accumulated deep water sediments such as those found behind the Condit dam are expected to generate anaerobic conditions that favor more toxic methylated forms of mercury. Thus the release of sediments was presumed to result in aerobic conditions that favor the less-toxic demethylated form of mercury.

The November 2011 and September 2012 bioaccumulation tests using In Lieu sediments produced slightly higher average tissue mercury concentrations (0.174 and 0.294 mg/kg) than the May 2008

pre-breach bioaccumulation test (0.186 mg/kg) in oligochaete worms of the species *Lumbriculus* (Kleinfelder, 2013).

Background Sources of Mercury

Mercury is a native element commonly found in rocks associated with Cascade Range volcanic activity. Direct runoff from nearby Mount Adams, a Cascades Range volcano, feeds into the White Salmon River. There are no known anthropogenic point sources of mercury within the White Salmon River basin. USGS Professional Paper 1270 indicates that two background mercury measurements collected near the confluence of the White Salmon and Columbia Rivers are somewhere between 0.13 and 1.3 mg/kg, but an exact concentration is not available (Shacklette, 1984). In 2013, Oregon Department of Environmental Quality (ODEQ) released background metals data for various regions with the state of Oregon, including the Cascade Range, which lies immediately south of the confluence of the White Salmon and Columbia Rivers and likely represents similar volcanic geology as the White Salmon River watershed. Background mercury concentrations in Oregon's Cascade Range ranged from 0.02 to 1.23 mg/kg. The combined average mercury concentration of the sediments near the dam in Northwestern Lake as measured in 2006 and 2007 was 0.78 mg/kg, which lies within the range of background sediment mercury concentrations reported in the USGS and Oregon background metal studies.

The average local area background mercury concentration from the July 2007 study was 0.142 mg/kg (Kleinfelder, 2007b). However, supplemental mercury analysis performed on the fine-grained portions of seven of the ten background upstream sample locations produced a significantly greater average mercury concentration of 0.48 mg/kg. This is more comparable to the sediment mercury concentrations observed in the predominantly fine-grained samples from behind the dam and is indicative of a locally elevated natural background mercury source.

Post dam-breach sediment samples collected upstream of the In Lieu site also had comparable or larger concentrations of methylmercury than the In Lieu site, indicating that other (upstream) sources of methylmercury are also present on the Columbia River and that mercury is naturally elevated in the local background (Kleinfelder, 2013).

6. **Other Chemical Considerations.** Since the RSET evaluation of the Northwestern sediments in 2009, the following additional freshwater chemicals have been added to the DMMP and draft 2015 SEF standard sediment screening lists: selenium, butyl tins, beta-hexachlorocyclohexane, carbazole, endrin ketone, and bulk petroleum hydrocarbons (diesel- and motor oil-range). Given the low concentrations of the other freshwater chemicals of concern detected in the Northwestern Lake sediment and the location and known historical uses of both the Northwestern Lake and In Lieu project site area, the lack of this additional chemical data is of low concern to the DMMP agencies.
7. **Summary.** Sediment mercury concentrations at the In Lieu site exceed the current DMMP freshwater SL of 0.66 mg/kg; however, the concentrations appear to be due to natural sources and are comparable to background metals data from the area and upstream on the Columbia River. The source of the accumulated sediment proposed for removal at the In Lieu site appears to be predominantly the sediment previously trapped behind the former Condit Dam. A review of EPA's Cleanups in My Community and Ecology's ISIS database did not reveal any cleanup sites within or

near the project area or immediate watershed. No significant anthropogenic sources of mercury are known to exist along the White Salmon River watershed.

8. **Tier 1 Determination.** On the basis of the above information, the DMMP agencies have determined that the sediment exposed by dredging will meet the State of Washington antidegradation standard. Therefore, no further DMMP testing is required for this project.

Flow-lane disposal of the sediment is not proposed. The Yakama Nation Fisheries plans to re-use the excavated sediment to create a riparian island habitat at the In Lieu site.

This determination does *not* constitute final agency approval of the project. During the public comment period that follows a public notice, resource agencies will provide input on the overall project. A final decision will be made after full consideration of agency input, and after an alternatives analysis is done under section 404(b)(1) of the Clean Water Act.

9. **References.**

GEC, 2009. Supplemental Mercury Sediment Analysis: Estimated Mercury Concentrations and Turbidity Resulting from Removal of Condit Dam, January 6.

Kleinfelder, 2007a. Sediment Sampling and Analysis Report, Northwestern Lake, Condit Hydroelectric Project. March.

Kleinfelder, 2007b. Supplemental Evaluation of Mercury in Sediments Report, Northwestern Lake, Condit Hydroelectric Project, FERC Project No. 2342, November 2007.

Kleinfelder, 2008. Updated Evaluation of Mercury Bioaccumulation, Underwood In Lieu Fishing access Site, Northwestern Lake – Condit Hydroelectric Project, FERC Project No. 2342, White Salmon, Washington, December 4.

Kleinfelder, 2013. September 2012 Year 1 Sediment Sampling Report, Condit Hydroelectric Project, FERC Project No. 2342, March 15.

ODEQ, 2013. Development of Oregon Background Metals Concentrations in Soil, Technical Report, Land Quality Division Cleanup Program, March 2013.

PacifiCorp Energy, 2011. Sediment Assessment, Stabilization, and Management Plan. Condit Hydroelectric Project Decommissioning, FERC Project No. 2342, March 15, 2011.

RSET, 2006. Northwest Regional Sediment Evaluation Framework, Interim Final.

Shacklette, H. T. and J. G. Boerngen, 1984. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States. U.S. Geological Survey Professional Paper 1270.

USACE, 1998. Dredged Material Evaluation Framework, Lower Columbia River Management Area, November 1998.

USACE, 2009. Memorandum for: Portland District Regulatory. Subject: Project Review Group Review of NWP-2004-523- Condit Dam Removal, January 23, 2009.

10. Signatures.

signed copy on file in DMMO - Seattle District office

Date Heather Whitney Fourie - Seattle District Corps of Engineers

Date Erika Hoffman - Environmental Protection Agency

Date Laura Inouye, Ph.D. - Washington Department of Ecology

Date Celia Barton - Washington Department of Natural Resources

Copies Furnished:
Dave Martin, USACE Regulatory
Laura Inouye, Ph.D., Ecology
Erika Hoffman, EPA
Celia Barton, DNR
DMMO File

Figure 1. Overview Site Map

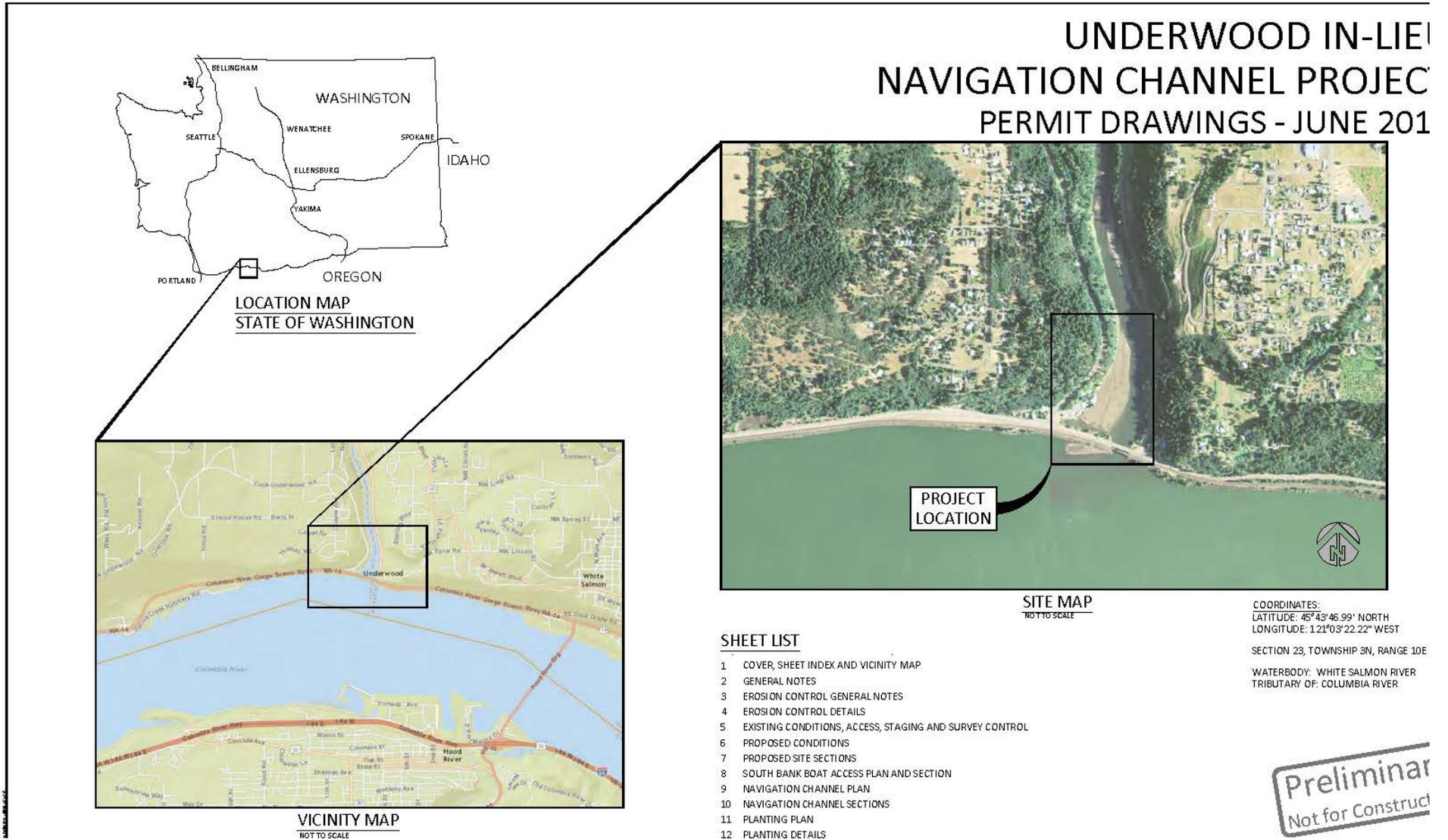
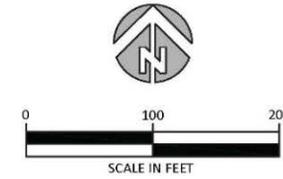
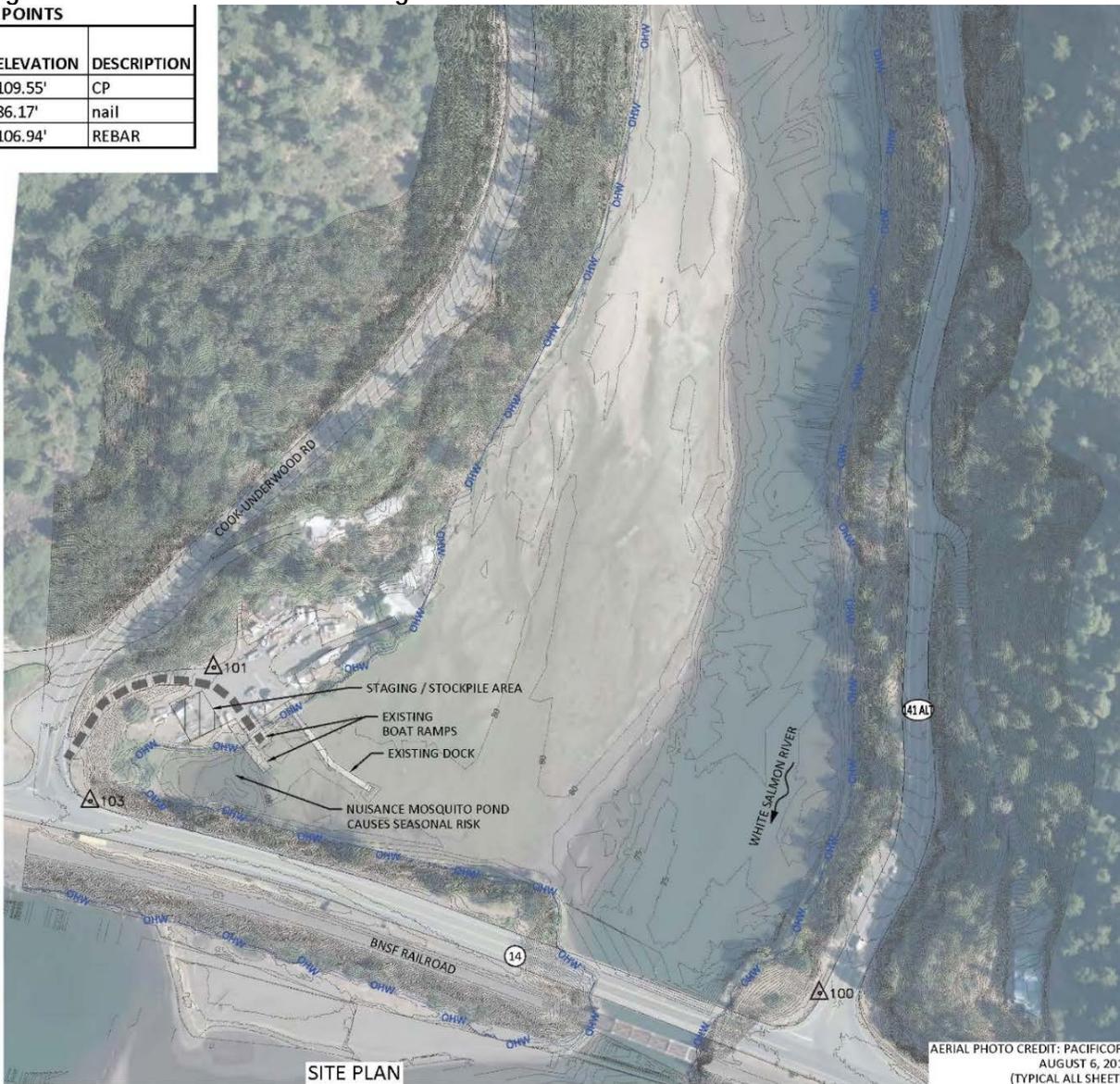


Figure 2. Underwood In Lieu Existing Site Plan

ELEVATION	DESCRIPTION
109.55'	CP
86.17'	nail
106.94'	REBAR



LEGEND

- EXISTING ACCESS ROAD
- STAGING/STOCKPILE AREA
- EXISTING CONTOURS (1' INTERVAL)
- 101 SURVEY CONTROL POINT

Preliminary
Not for Construction

SITE PLAN

AERIAL PHOTO CREDIT: PACIFICORP
AUGUST 6, 2013
(TYPICAL ALL SHEETS)

DF, LK	MC, GJ, JE	----
DRAWN	DESIGNED	CHECKED
----	6/11/15	----
APPROVED	DATE	PROJECT

CONFEDERATED BANDS AND TRIBES OF THE YAKAMA NATION
UNDERWOOD IN-LIEU
NAVIGATION CHANNEL PROJECT



501 Parkway Avenue, Suite 101
Hazel River, OR 97051
541.386.9003
www.interfluve.com

EXISTING CONDITIONS,
ACCESS, STAGING AND
SURVEY CONTROL

Figure 3. Underwood In Lieu Site Proposed Construction Plan

