

River Mile 13.1 Year 3 Isolation Cap Inspection Report

ESCI #5249

Portland General Electric Company, (PGE)

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Project Background

The River Mile (RM) 13.1 Study Area is located on the eastern shore of the lower Willamette River in downtown Portland, Oregon (Figure 1). The RM 13.1 Study Area was one of nine focus areas identified by the Oregon Department of Environmental Quality (DEQ) during the 2008 Downtown Portland Sediment Study (Sediment Study). The Sediment Study indicated elevated concentrations of arsenic, lead, mercury, polychlorinated biphenyls (PCBs), dioxins/furans, pesticides, and polycyclic aromatic hydrocarbons (PAHs) were found in the sediment.

In 2011, Portland General Electric Company (PGE) prepared a Remedial Investigation (RI) Report to document the constituents found in surface and subsurface sediments during previous investigations and determine if they were present at concentrations potentially posing an unacceptable risk to human health and ecological receptors. Based on the results of the 2011 RI Report, PGE prepared a Feasibility Study (FS) to describe and evaluate suitable remedial alternatives for contaminated sediment above risk-based screening levels (2014). The FS recommended the installation of an isolation cap over approximately 47,000 square feet (sq. ft.), with reactive amendment in two discrete areas (the amended cap areas) identified as “hot spots” to manage impacted sediment at RM 13.1. DEQ issued the Record of Decision (ROD) in April 2015 that selected isolation caps for the two areas identified in the RI: RM 13.5 and RM 13.1.

Prior to construction of the remedial action, PGE conducted an Emergency Action Project inside the RM 13.1 Study Area between February 23, 2016 and March 31, 2016. The action filled a scoured depression that was identified beneath four submerged electrical cables. The scoured depression was caused by a leak in the City of Portland’s (City’s) 30-inch-diameter pressurized water main; the leak was repaired by the City prior to implementation of the Emergency Action. During the Emergency Action, divers inspected, repaired, and removed debris from the submerged cables. Approximately 2,274 cubic yards (CY) of sand and gravel armor were placed to fill in the scour hole to support and cover the cables.

Sampling was conducted in July 2017 to evaluate potential changes to sediment conditions in the study area as a result of the scoured depression from the City’s water main leakage. The results of the sampling are summarized in the RM 13.1 Additional Surface Sediment Characterization Field Report (AECOM, 2018a). Additional sediment sampling will be conducted in the future as part of the 5- and 10-year cap inspection events to confirm that the Study Area surface-weighted average concentrations (SWACs) continue to decrease, eventually falling below mean upriver background concentrations (MUBCs) for indicator constituents of concern (COCs).

The RM 13.1 Isolation Cap was constructed in September and October 2017 per the requirements of the DEQ approved Remedial Design (RD) and Consent Judgment (CJ). The construction of the isolation cap was documented in the River Mile 13.1 Sediment Isolation Cap Construction Completion Report (AECOM, 2018b). The isolation cap is constructed with medium to coarse Columbia River sand and varies in thickness with no less than 21 inches at any location.

Monitoring of the remedy is required by DEQ. The monitoring requirements are documented in the River Mile 13.5 and 13.1 Cap Inspection, Monitoring, and Maintenance Plan (IMMP) (AECOM, 2018c). The Year 1 isolation cap inspection activities were completed in January and April 2019. In January and April 2021, the Year 3 isolation cap inspection activities were completed including a visual assessment of the shoreline area and a bathymetric survey of the

subtidal cap area. This report summarizes the inspection activities and evaluation of the results of Year 3 activities.

Inspection Objectives

Specific objectives for the cap inspection monitoring and maintenance program, as outlined in the IMMP, include:

- Ensuring cap protectiveness over time by adhering to the cap thickness requirements of the isolation cap;
- Ensuring cap stability over time by adhering to slope design specifications and maintaining the integrity of the armor layer; and
- Identifying maintenance requirements necessary to ensure the cap remains protective through isolation of the underlying impacted sediment.

Inspection Requirements

The RM 13.5 and 13.1 Cap IMMP required a series of periodic post-construction inspections. The inspections are designed to be conducted during the seasonal high-water period in April. Table 1 provides a summary of the required post-construction inspection requirements. Following the Year 10 (April 2028) inspection, monitoring will be conducted every 10 years through Year 30, or as determined by the DEQ based on the results of the previous monitoring events.

Isolation cap inspection surveys are also required following the occurrence of a 100-year flood or significant seismic event. A 100-year flood event in the lower Willamette River is defined as a river stage of 32.2 feet NAVD88 or a river discharge of 375,000 cubic feet per second (cfs). A significant local seismic event is defined as an earthquake in excess of magnitude 6. If one of these events occurs, a bathymetric survey will be conducted when river levels recede, and surveying conditions are satisfactory and safe to complete within the River. Appendix A shows the river flows from May 2017 through August 2021. No floods, high river flow, or significant seismic events occurred since construction of the cap.

Physical integrity monitoring will be conducted as part of the cap inspection to detect and evaluate changes in the cap stability and cap thickness over time. Cap monitoring requirements include the following:

- Complete a high-resolution multi-beam bathymetric survey to evaluate whether the cap thickness and slopes are consistent with baseline conditions per the performance criteria.
- Visually inspect the shoreline cap area at low seasonal water level and low tide, if multi-beam bathymetric surveys cannot cover the full extent of the cap area. Visual inspections are intended to identify areas of eroded armor stone or damage to the armor layers from debris or human activities.

If determined to be necessary by the Project Engineer, follow-up surveys, stability evaluations, and/or cap maintenance will be completed.

Table 1. Post Construction Inspections

Cap Inspection	Due Date	Bathymetric Survey Status	River Elevation (ft) (gage height)	Visual Shoreline Inspection Status	River Elevation (ft) (gage height)	Required Action
Six Month	May 2018	Bathymetric Survey Completed 04/9/2018	9.6 ft	Completed June 13, 2018		
2018	9.0 ft	No maintenance activities required.				
Year 1	April 2019	Bathymetric Survey Completed 04/10/2019	12.75 ft	Completed January 31, 2019	3.25 ft	No maintenance activities required.
Year 3	April 2021 ¹	Bathymetric Survey Completed 06/15/2021	4.56 ft	Completed April 12, 2021	2.29 ft	No maintenance activities required.
Year 5 (Including sediment sampling)	April 2023	--	--	--	--	--
Year 10 (Including sediment sampling)	April 2028	--	--	--	--	--
Year 20	April 2038	--	--	--	--	--
Year 30	April 2048	--	--	--	--	--

¹ The bathymetric survey was completed after the scheduled due date due to low water conditions.

Year 3 Isolation Cap Inspection Results

The Year 3 isolation cap inspection included the following activities.

Visual Shoreline Monitoring and Inspection

A visual shoreline inspection was completed by PGE on April 12, 2021. During the inspection, the isolation cap appeared to be in very good condition, specifically the shoreline riprap and sediment cap armor stone. Shoreline inspection notes/observations for RM 13.1 are included in Appendix B of this report.

Bathymetric Survey

The bathymetric survey field work was completed on June 15, 2021 by Solmar Hydro Inc. The following figures from the June 15, 2021 bathymetric survey are included in of this report:

- Figure 1. RM 13.1 Site Location Map and Bathymetric Survey
- Figure 2. Willamette River RM 13.1 – Bathymetric Survey Sun-Illuminated Digital Terrain Model (1-ft contours)
- Figure 3. Willamette RM 13.1 – Isolation Cap Volume Analysis: 2018 to 2021 Survey
- Figure 4. Willamette RM 13.1 – Isolation Cap Volume Analysis: 2019 to 2021 Survey
- Figure 5. Willamette River RM 13.1 – Sun Illuminated Backscatter

The IMMP states that the bathymetric survey should be conducted between the months of March and May when the Willamette River water surface elevation generally exceeds +9-ft NAVD88. During 2021 the water levels were unusually low, with the gage height maximum measured at 8.03-ft NAVD88 from March to May. The surveyors closely monitored water levels to conduct the survey at a time when the survey would collect the maximum amount of data despite not meeting the River elevation requirements. Consequently, the bathymetric survey was completed in June after the water level peaked. Because the water depth was too shallow to cover the upper shoreline area, only 67% of the cap area was covered by the bathymetric survey, the survey event was augmented by the shoreline inspection which included an evaluation of erosion/loss of cover material as part of the regular visual shoreline inspection discussed above. The extent of the multi-beam bathymetric survey is provided on Figure 2.

Industry standard quality assurance and performance tests (i.e., from the USACE Hydrographic Surveying Manual, EM 1110-2-1003) that were completed prior to surveying indicated that the survey data met the IMMP specification of 0.15 feet for horizontal and vertical accuracies.

Evaluation of the Results

Table 2 provides a summary of the cap performance evaluation criteria identified in the IMMP. Figure 3 presents a comparison of the June 15, 2021 cap survey to the April 2018 post-construction survey to assess potential cap erosion or evidence of slope instability. Figure 4 presents a comparison of the June 15, 2021 cap survey to the April 2019 Year 1 post-construction survey to assess ongoing or potential excess cap erosion or evidence of slope instability.

In accordance with the IMMP, the area of the cap exceeding 3 inches net elevation loss was estimated. The Year 1 Inspection Report (April 2018 to April 2019) noted that approximately 18% of the cap surface experienced 3 inches or greater net elevation loss over the reporting period. That analysis was conducted by overlaying two CAD interpolation layers rather than comparing the raw data set from each survey; that method introduced inconsistencies in the evaluate and false cut/fill areas. The current cut/fill analysis in this report was conducted using the raw data which provides more detailed and accurate results; all cut/fill comparisons will utilize this methodology moving forward.

Table 2. Evaluation Criteria for Cap Integrity Monitoring

Monitoring Parameter		Data Evaluation of the Parameter	Decision Criteria	Decision	Follow-up Proposed Actions	Outcome
Data	Bathymetry Data Quality Assurance	Review the QA/QC documentation provided by survey contractor.	Is the documentation missing any of the QA/QC requirements identified in Sections 3.2.2 and 4.1 of the IMMP or is the survey coverage less than 85 percent of the survey extents?	No	No additional action is necessary.	
				Yes, or unknown	Engineer will review the deficiency identified in the QA/QC and determine the impact of the deficiency and will recommend additional actions, if necessary. If shoreline coverage is not possible due to water depth, a visual inspection will be conducted.	The coverage of the survey is less than 85 percent of the cap extent due to the unusually low water levels in the Willamette River. However, the lack of survey data is supplemented by the observations from the visual shoreline inspection.
Cap Integrity	Surficial debris/large obstructions	Prepare a sun-illuminated digital terrain model figure with surface elevation contour intervals. Identify the approximate length, width, and type of any surficial objects/large obstructions.	Do the surficial objects appear to be greater than an area 10 feet by 10 feet in size and/or is the object adversely impacting the cap?	No	No additional action is necessary.	Surficial objects do not appear to be greater than an area 10 feet by 10 feet and do not adversely impact the cap.
				Yes, or unknown	Engineer will review to determine if a follow-up survey is needed to further characterize the object(s). Additional maintenance recommendations may be required, including debris removal, based on the Engineer's review.	
	Presence of the armor layer	Prepare a sun-illuminated digital terrain model figure with surface elevation contour intervals. Identify any anomalies that appear to be sloughing areas, areas of significant scour or accumulation at the bottom of slopes, or areas where the elevation contours appear to be anomalous compared to final as-built survey.	Are there any anomalies greater than an area 10 feet by 10 feet in size that appear to indicate a failure of cap stability, such as a sloughing event, significant deposition of material along the bottom of the cap that would indicate a sloughing event, or significant erosion of the armor stone?	No	No additional action is necessary.	
				Yes, or unknown	Conduct a follow-up survey (e.g., diver or camera), if deemed necessary by an engineer, to determine if the armor stone is missing and sand isolation layer exposed or if new finer-grained material has been deposited. The Engineer will review information from the follow-up survey and make additional recommendations for maintenance, if necessary. The nature of the disturbance to the cap identified during the inspection monitoring event will be the basis for any design modifications.	A review of the shoreline investigation results indicated that armor stone is still present and in good condition. An engineer reviewed the results of the bathymetry survey and determined that the cap remains stable. While there are multiple areas (greater than 10 feet by 10 feet) of the cap that have elevations lower than post-construction elevations, there is no evidence of sloughing or cap failure. A follow-up survey is not warranted at this time. See the Evaluation of the Results section for additional detail.

Monitoring Parameter		Data Evaluation of the Parameter	Decision Criteria	Decision	Follow-up Proposed Actions	Outcome
Cap Integrity (cont'd)	Presence of the armor layer	Visual inspection of the shoreline armor, including photographs.	Is 3 inches or more of the armor material missing, displaced, or moving at the shoreline.	No	No additional action is necessary.	No, there is no visual sign of 3 inches or greater of armor material missing, displaced or moving at the shoreline.
				Yes	The Engineer will review information from the follow-up survey and make additional recommendations for maintenance and or design modifications, if necessary.	
	Public use evaluation	Multiple lines of evidence: evaluation of visual inspection and bathymetry results, notices, etc.	In the 5-year review, is there evidence that public use activities are having a significant adverse effect on the cap?	No	No additional action is necessary.	No, there is no evidence of public impact to the cap. Visual inspection of the shoreline indicates the armor stone is present and in good condition.
				Yes	The Engineer will review information from the survey and make additional recommendations for maintenance or design modifications, or other actions if necessary. Discuss with DEQ.	
Slope Stability	Elevation grades across the top of the armor layer	Calculate the slope across the extent of the isolation cap (top surface).	Has the grade across the isolation cap increased to greater than the as-built slope (a maximum slope of 2.5H:1V) or changed substantially (greater than 50 percent) over an area larger than 50 feet by 50 feet in size? Is there any evidence of slope failure, such as stone accumulation at the bottom slopes?	No	No additional action is necessary.	There is no evidence that the grade across the isolation cap increased to greater than the as-built slope. There is also no evidence of slope failure.
				Yes, or unknown	Conduct a follow-up visual or bathymetry survey to provide visual evidence of the change. Engineer will review results of the follow-up survey and additional recommendations for maintenance, if necessary.	

Monitoring Parameter		Data Evaluation of the Parameter	Decision Criteria	Decision	Follow-up Proposed Actions	Outcome
Cap Thickness	Changes in surface elevation (evaluate deposition and scour processes)	Prepare bathymetry figure comparing the post- construction surface elevations and the current survey event surface elevations.	Is there a negative elevation change of greater than 3 inches across 10 percent or more of the cap area that has not already been identified and addressed during previous monitoring assessments? The total cap square footages are: RM 13.1: 59,000 square feet (isolation layer and armor extent).	No	Compare current surface elevation to pre-construction elevations to verify the minimum cap thickness is met, including the thickness for the isolation layer and the armor layer. The Engineer will review the results to determine if the extent of the decrease in thickness adversely impacts the effectiveness of the cap.	
				Yes or unknown	Compare current surface elevation to pre-construction elevations to verify the minimum cap thickness is met, including the thickness for the isolation layer and the armor layer. The Engineer will review the results to determine if the extent of the decrease in thickness adversely impacts the effectiveness of the cap.	The total area with greater than 3 inches of decreased cap elevation is 10.5% based on 67% of the cap being surveyed; this is an accumulation of smaller isolated areas across the cap. The shoreline survey conducted on April 12, 2021 indicated the armor stone was still present and in good condition. An engineer reviewed the results of the bathymetry survey and determined that the cap remains stable. See the Evaluation of the Results section for additional detail.
				If minimum cap thickness is not maintained	Conduct a follow-up survey to visually characterize the condition of the cap if needed for the evaluation. The Engineer will review results to determine if the change represents an unacceptable level of scour. The Engineer will make additional recommendations for maintenance, if necessary.	All survey and visual inspection information indicates the cap armor layers are present; therefore, the isolation materials are still present, and the cap is effective. The overall cap thickness was designed to be protective for at least 100 years, so a limited reduction in thickness would not pose a risk. Areas showing a loss of elevation will be further evaluated following the Year 5 Inspection to determine if maintenance activities are warranted.

The current Year 3 assessment (April 2018 to June 2021) as shown on Figure 3 indicates that 10.5% of the cap has experienced 3 inches or greater net elevation loss since the installation of the cap based on the current survey comparison. The results of the 2019-2021 difference map (Figure 4) indicates that a total area of approximately 3.8% of the cap surface has experienced 3 inches or greater net elevation loss in the two-year time period.

As the area exhibiting 3 inches or greater of net elevation loss since the installation of the cap slightly exceeds the criterion of 10% identified in the IMMP (Table 1), the data were further evaluated to determine if these areas represent a potential risk to the integrity and performance of the cap. Areas greater than 10 feet by 10 feet were specifically evaluated. Generally, the areas of elevation loss are limited in size and occur intermittently across the entire cap area (Figure 3). The largest area exhibiting erosion greater than 3 inches is approximately 530 square feet (sq.ft.) in size. The cap material in this area consists of 6 inches of 1-3 inch well-graded rounded gravel over a sand isolation layer. There are three areas along the shoreline exhibiting erosion greater than 3 inches and are approximately 250 sq.ft., 220 sq.ft., and 210 sq.ft. in size (exceeding the default 100 sq.ft. de minimis area). The cap material in these areas consist of 1 foot of 3-6 inch well-graded rounded stone over a sand isolation layer. One smaller area exhibiting erosion greater than 3 inches is located at the geocell cap. This area is approximately 150 sq.ft. in size and consists of a 1-foot thick cap comprised of geocell infilled with 2-4 inch angular stone. This area is just outside of the carbon amended area. Finally, there are five small regularly shaped areas within the cap showing several feet of elevation loss (Figures 3 and 4) that are associated with the removal of ecology block anchors which were part of the previous dock at the site. The dock was permanently removed in early 2021. The dock (and anchors) was removed during cap construction and the ecology block anchors placed on top of the cap when the dock was replaced; therefore, these areas do not represent a loss of cap material or armor stone, but of material placed on top of the cap.

As was described in the Year 1 report, areas of minor elevation change are likely a smoothing of the cap surface or settling of the cap materials rather than a loss of cover material. None of the areas exhibiting signs of erosion are in areas where amendment material was placed to isolate impacts to surface water; consequently, the loss or smoothing of cover material does not constitute a lack of environmental protection.

A review of the bathymetry (Figure 2) and backscatter results (Figure 5) does not indicate significant scour holes or evidence of cap stability issues such as a slope failure. It is likely that the cap surface is continuing to 'smooth', as high spots are slowly leveled off and low spots filled in. The smoothing process is most pronounced closer to the shoreline. The April 2021 visual inspection of the shoreline, where bathymetric data is unavailable, confirmed the armor stone was still present and in good condition. Both the sun-illuminated and backscatter results (Figure 2 and Figure 5 respectively) show no significant surficial debris or large obstructions in the cap area.

Conclusions

The Year 1 evaluation noted that the observed erosion or movement of cap materials reflects the erosion (smoothing and leveling) of localized high spots (mounds) of cap material that remained following construction of the cap. This material is, in turn, moving into adjacent shallow depressions in the cap surface and does not represent a risk to the integrity or protectiveness of the cap. The Year 3 evaluation shows that some minor localized movement and episodic thinning and infilling has continued, as the cap surface materials adjust to prevailing hydrodynamic conditions.

Based on review of the bathymetric survey data and shoreline inspection, the RM 13.1 isolation cap was generally found to be in good condition and remains stable and protective. Approximately 10.5% of the cap area exhibited a reduction of 3 inches or greater in elevation from 2018 to 2021. The erosion areas measuring greater than 10 feet by 10 feet are in areas where no amendment was placed, and material loss is occurring in the top layer of stone. These areas will be monitored during future cap inspections, but due to location, do not pose a risk to cap protectiveness at this time.

For the shoreline area, PGE will continue to conduct shoreline evaluations under low water conditions to confirm that human activity is not compromising the integrity of the cap; the IMMP specifically requires a 5-year review of human induced impacts to the armor layer. PGE will coordinate with DEQ on the results of future monitoring events, and when and if any future maintenance actions are required.

Follow-up Action

The Year 3 RM 13.1 Isolation Cap Inspection and required bathymetric survey conducted in June 2021, the visual shoreline inspection in April 2021, and the evaluation of the results show that no further follow-up action is required at this time. The cap remains intact and protective. Areas identified in this report for ongoing focused monitoring will be revisited during the 2023 inspection event to confirm the ongoing stability and protectiveness of the cap.

The Year 5 RM 13.1 Isolation Cap Inspection will be completed in April/May 2023 as required under the ROD and IMMP.

References

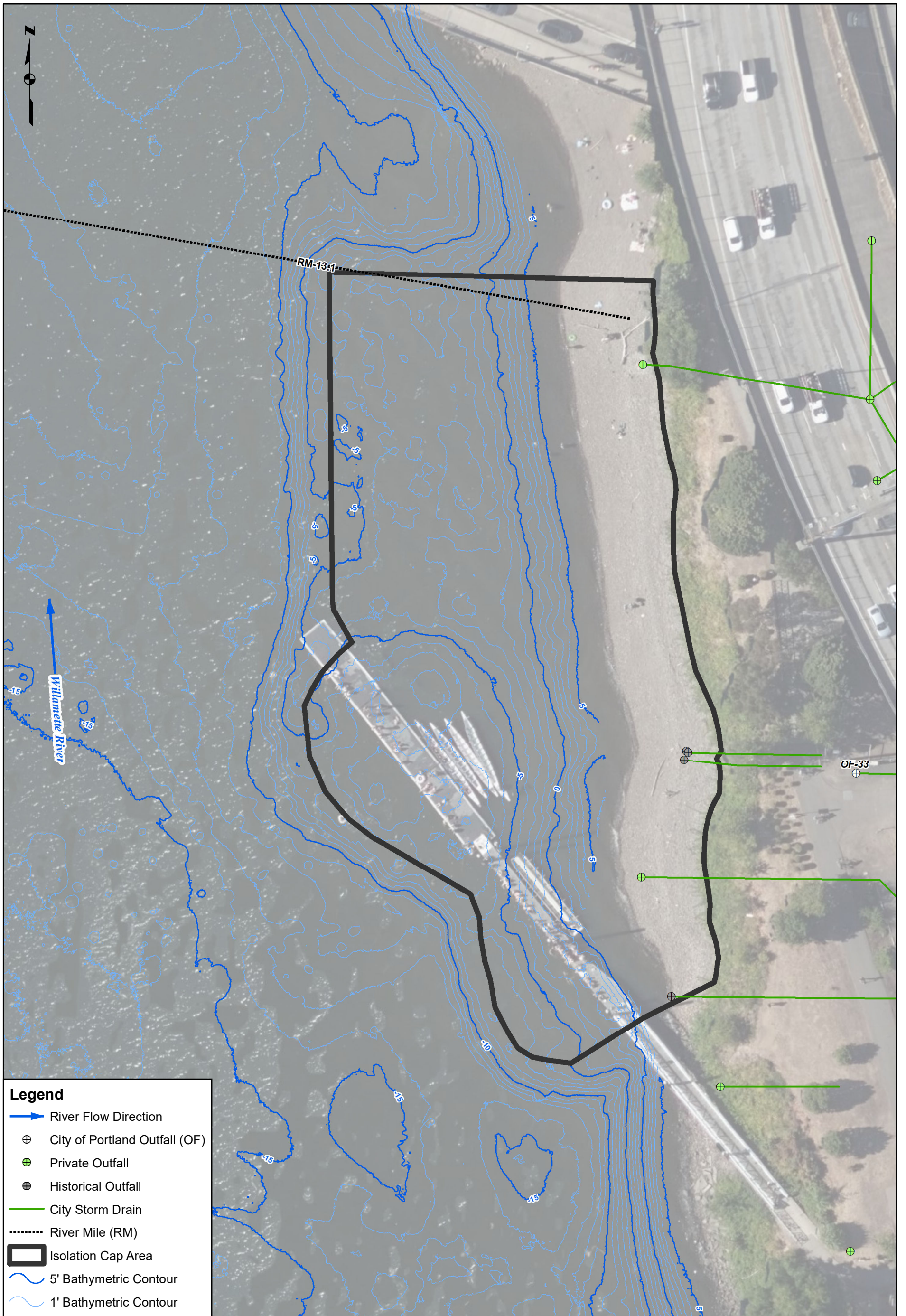
DEQ. 2015. Record of Decision, Selected Remedy for PGE Willamette River Sediment Sites. Prepared by Oregon Department of Environmental Quality, Northwest Regional Office, April 2015.

AECOM. 2018a. Additional Surface Sediment Characterization Field Report, River Mile 13.1. Prepared for Portland General Electric Company, Portland, Oregon, May 31, 2018.










AECOM. 2018b. River Mile 13.1 Sediment Isolation Cap Construction Completion Report. Prepared for Portland General Electric Company, Portland, Oregon. February 16, 2018.

AECOM. 2018c. River Mile 13.5 and 13.1 Cap Inspection, Monitoring, and Maintenance Plan. Prepared for Portland General Electric Company, Portland, Oregon. June 22, 2018.

PGE. 2021. River Mile 13.1 Year 3 Isolation Cap Inspection Report. April 12, 2021.



Legend

-  River Flow Direction
-  City of Portland Outfall (OF)
-  Private Outfall
-  Historical Outfall
-  City Storm Drain
-  River Mile (RM)
-  Isolation Cap Area
-  5' Bathymetric Contour
-  1' Bathymetric Contour

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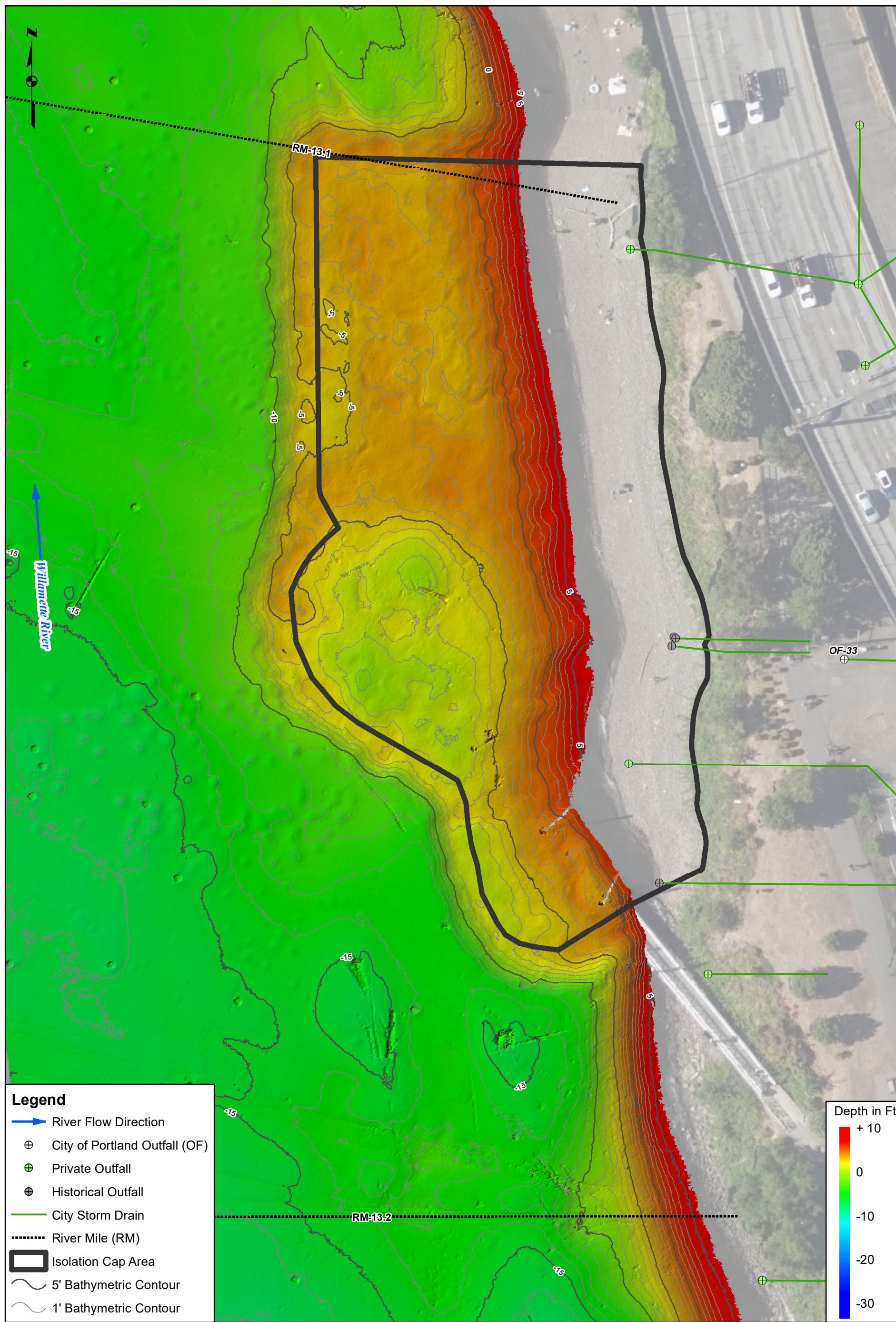


FIGURE 1 – RM 13.1 SITE LOCATION MAP AND BATHYMETRIC SURVEY

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PGE
RM 13.1 CAP EVALUATION
PORTLAND, OREGON





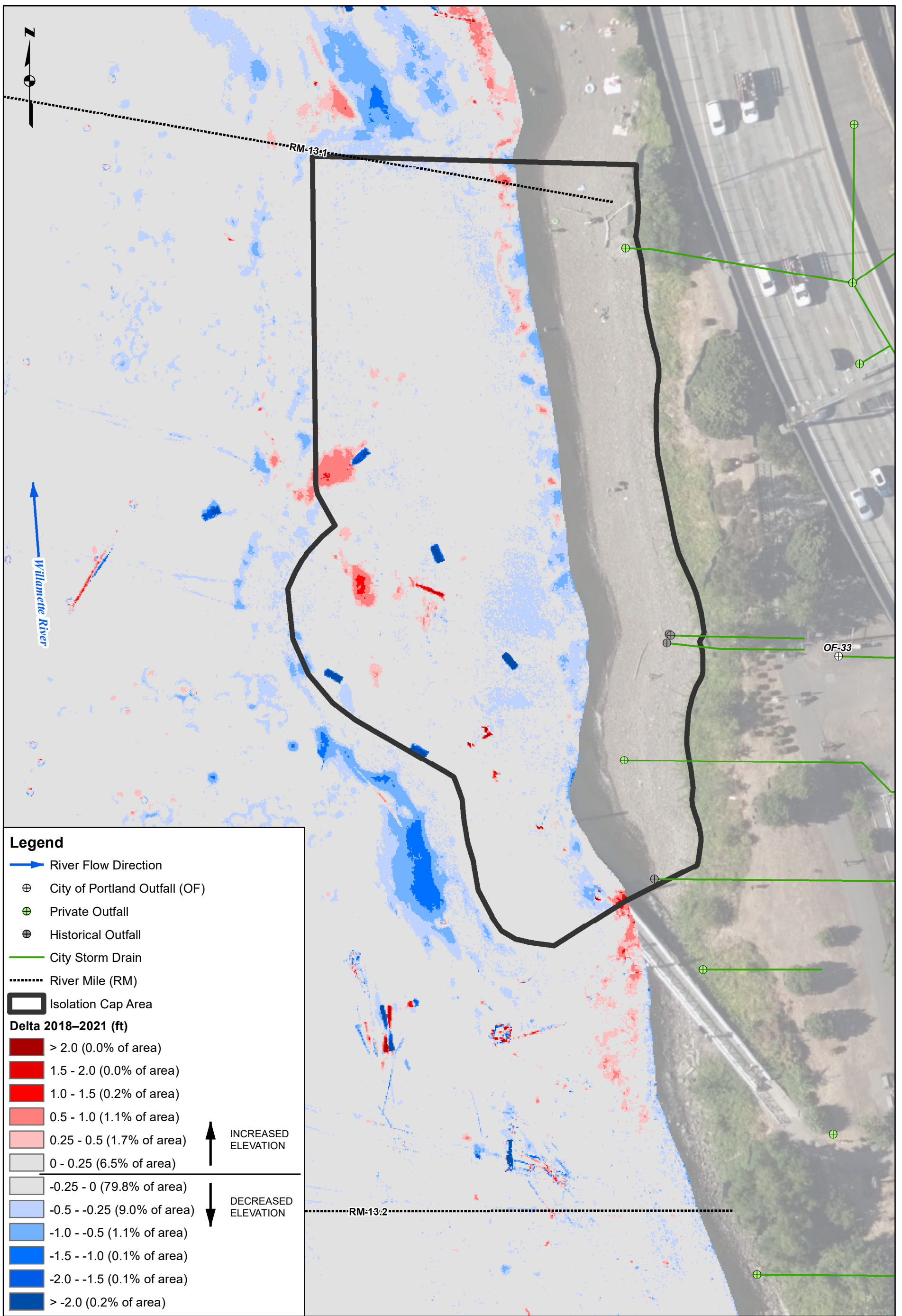
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20 0 20 40
SCALE IN FEET

**FIGURE 2 – RM 13.1 BATHYMETRIC SURVEY
SUN-ILLUMINATED DIGITAL TERRAIN MODEL**

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RM 13.1 CAP EVALUATION
PORTLAND, OREGON



Legend

- River Flow Direction
- City of Portland Outfall (OF)
- Private Outfall
- Historical Outfall
- City Storm Drain
- River Mile (RM)
- Isolation Cap Area

Delta 2018–2021 (ft)

	> 2.0 (0.0% of area)	↑ INCREASED ELEVATION
	1.5 - 2.0 (0.0% of area)	
	1.0 - 1.5 (0.2% of area)	
	0.5 - 1.0 (1.1% of area)	
	0.25 - 0.5 (1.7% of area)	
	0 - 0.25 (6.5% of area)	↓ DECREASED ELEVATION
	-0.25 - 0 (79.8% of area)	
	-0.5 - -0.25 (9.0% of area)	
	-1.0 - -0.5 (1.1% of area)	
	-1.5 - -1.0 (0.1% of area)	
	> -2.0 (0.2% of area)	

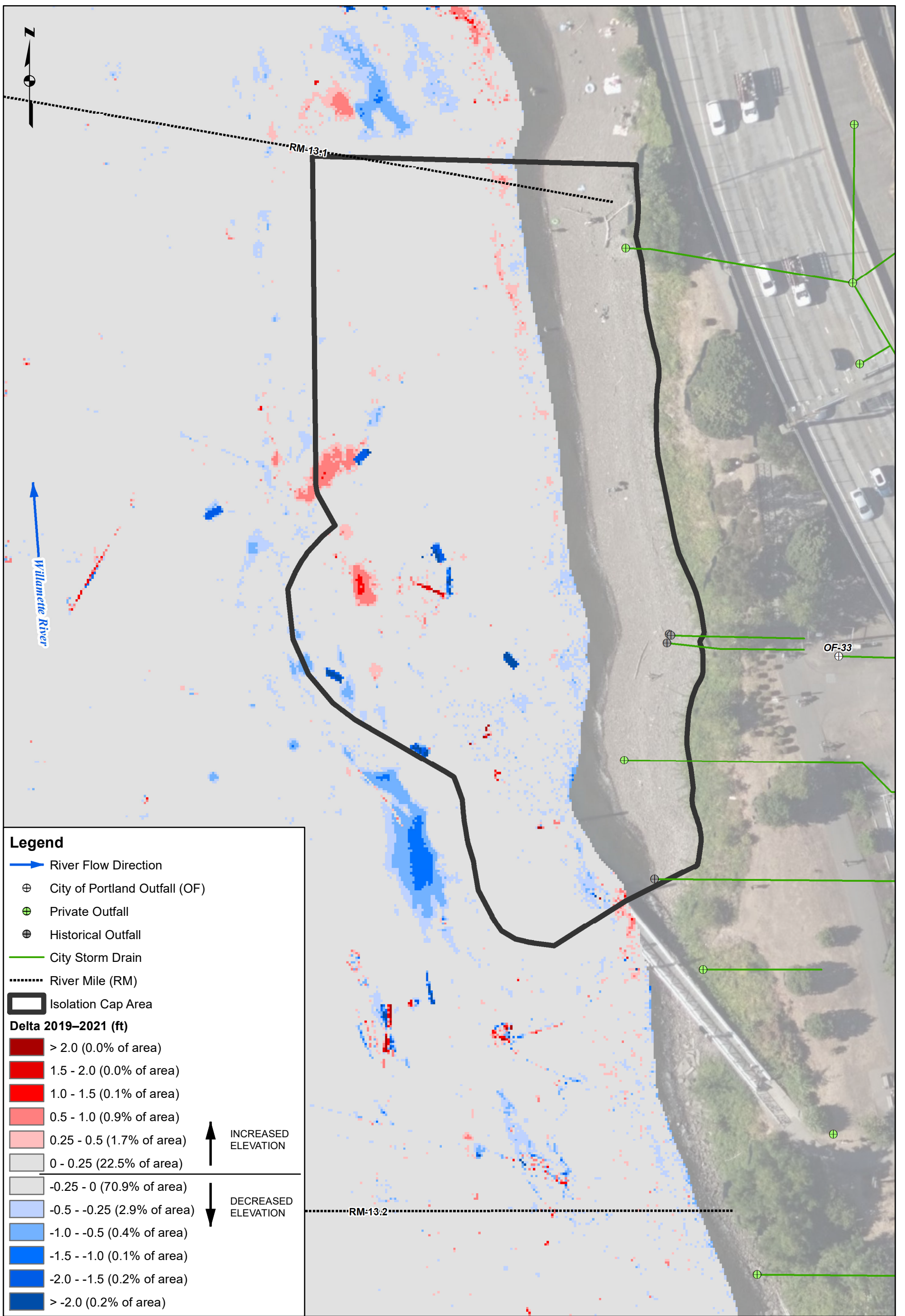
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FIGURE 3 - ISOLATION CAP ANALYSIS: 2018 TO 2021 SURVEY

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RM 13.1 CAP EVALUATION
PORTLAND, OREGON



Legend

- River Flow Direction
- City of Portland Outfall (OF)
- Private Outfall
- Historical Outfall
- City Storm Drain
- River Mile (RM)
- Isolation Cap Area

Delta 2019–2021 (ft)

	> 2.0 (0.0% of area)	INCREASED ELEVATION
	1.5 - 2.0 (0.0% of area)	
	1.0 - 1.5 (0.1% of area)	
	0.5 - 1.0 (0.9% of area)	
	0.25 - 0.5 (1.7% of area)	
	0 - 0.25 (22.5% of area)	
	-0.25 - 0 (70.9% of area)	DECREASED ELEVATION
	-0.5 - -0.25 (2.9% of area)	
	-1.0 - -0.5 (0.4% of area)	
	-1.5 - -1.0 (0.1% of area)	
	-2.0 - -1.5 (0.2% of area)	
	> -2.0 (0.2% of area)	

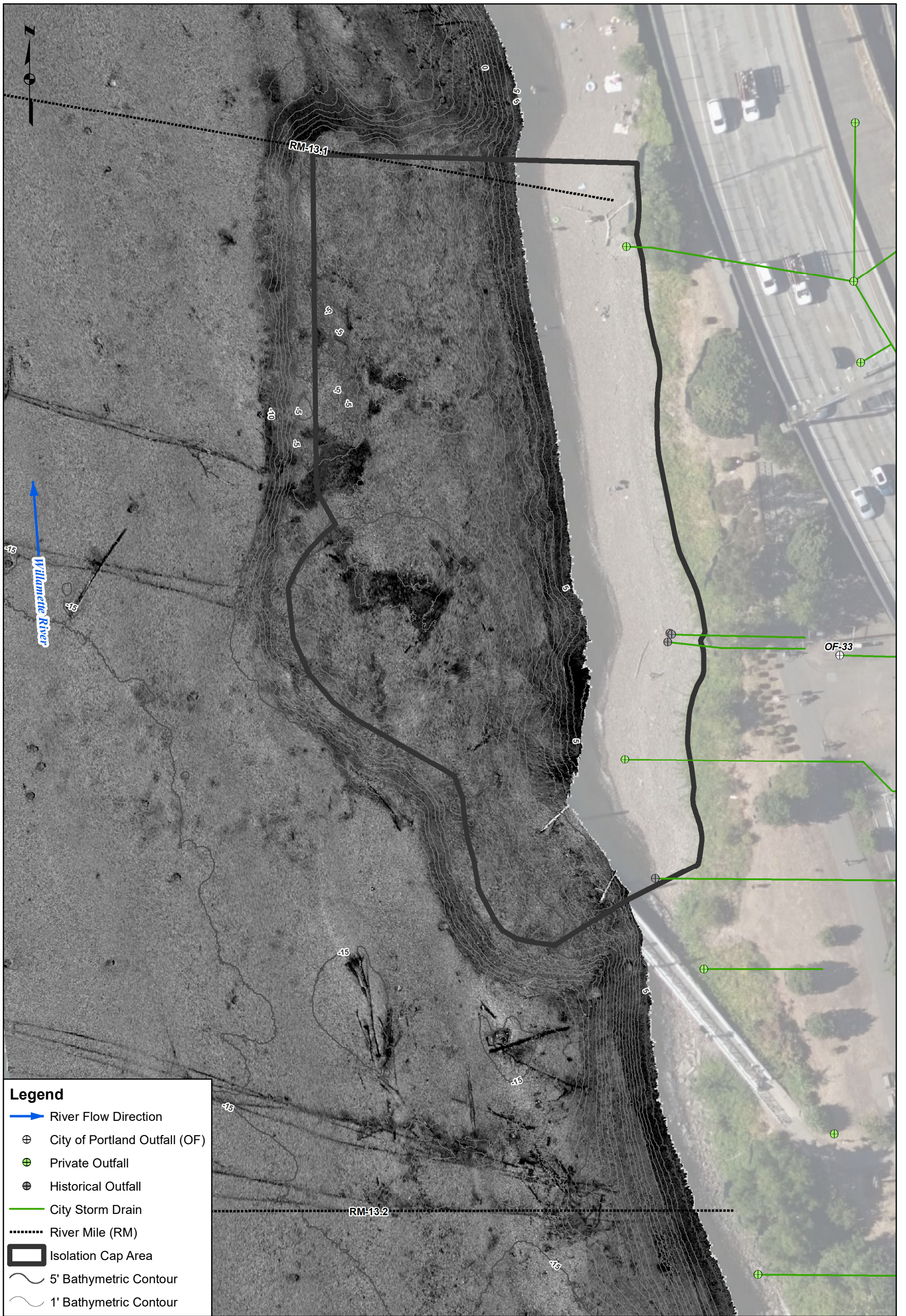
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FIGURE 4 - ISOLATION CAP ANALYSIS: 2019 TO 2021 SURVEY

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RM 13.1 CAP EVALUATION
PORTLAND, OREGON



Legend

- River Flow Direction
- City of Portland Outfall (OF)
- Private Outfall
- Historical Outfall
- City Storm Drain
- River Mile (RM)
- Isolation Cap Area
- 5' Bathymetric Contour
- 1' Bathymetric Contour

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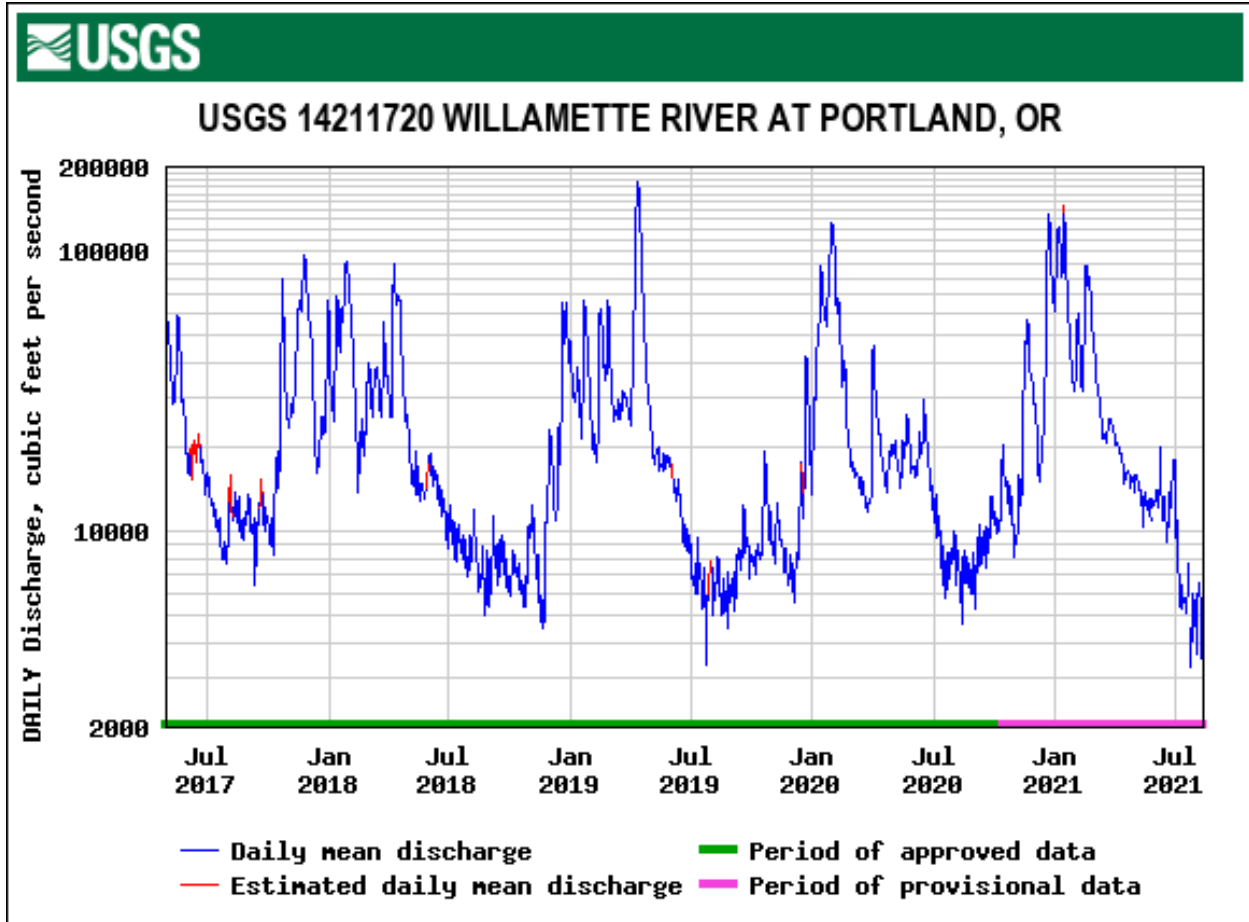
FIGURE 5 – RM 13.1 SUN ILLUMINATED BACKSCATTER

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PGE
RM 13.1 CAP EVALUATION
PORTLAND, OREGON

Appendix A USGS Water Discharge (Mean)

Willamette River at Portland Oregon May 2017 to August 2021 Graph



A 100-year flood event in the lower Willamette River is defined as a discharge of 375,000 cubic feet per second (cfs).

Appendix B River Mile (RM 13.1) Sediment Cap Visual Shoreline Inspection

**Portland General Electric Company (PGE)
River Mile (RM 13.1) Sediment Cap Visual Shoreline
Inspection Year 3 Construction Monitoring Survey
Field Notes, Observations, & Photo Log
April 12, 2021**

(High tide: 5:49 am – 2.92 ft / Low tide: 2:14 pm – 0.33 ft / High tide: 6:21 pm – 2.43 ft)

Inspection performed by: Brandy Domina, PGE,
Environmental Specialist

Field Notes

- Arrived and started inspection at 2:35 pm.
Location: South (downriver) of RM 13.1 Sediment Cap Area from the public dock.
- Weather during inspection was sunny and 64°F.
- Homeless camps and activities observed along the Springwater Trail above the cap location. Several “pirate” boats observed anchored outside the cap boundary.
- Sediment cap and riprap in very good condition.
- Homeless camp observed on the beach area of the cap and along the Springwater Trail.
- From shoreline, the armor stone and cap were observed in good condition with no low areas or sluffing observed.
- From shoreline/beach, the water pipe was observed at approximately 30 ft above the current water level.
- Difficult to walk on armor stone/riprap, but cap was observed to be in good condition with no contamination or oil sheen observed on water or shoreline.
- Completed visual inspection at 3:00 pm.
Location: North (upriver) from RM 13.1 at Springwater Trail.

Observations

1. General coverage of armor stone and areas of inconsistent cover (slumping, mounding, loss).

Comments: At the time of the visual inspection, the coverage of the armor stone looked intact with no inconsistencies in coverage observed.

2. Areas of newly deposited sediment within the interstitial spaces of the armor stone or on top.

Comments: At the time of the visual inspection, no visible areas of newly deposited sediment in the cap area was observed. Isolation cap appears to be in very good condition and is consistent with the Year 1 bathymetric survey performed on April 10, 2019.

3. Any apparent loss of sediment cap material (stone armor or sand).

Comments: At the time of the visual inspection, there was no visible or apparent loss of sediment area. Isolation cap appears to be in good condition and is consistent with the previous bathymetric survey performed.

4. Presence of significant debris that could undermine the physical integrity of the cap.

Comments: No damage to the physical integrity of the cap was observed. The only debris observed was some minor trash and homeless camps toward the top of the riprap/shoreline area.




5. Presence of vegetation.



Comments: During the visual inspection of the shoreline, heavy vegetation along the riverbank and shoreline was observed. The vegetation observed above the cap near the Springwater Trail mainly consisted of blackberry bushes. No vegetation was observed on the cap or armor stone.




6. Visible signs or indicators of potential recontamination (i.e., sheen or staining) on the surface of the cap.




Comments: No visual signs of contamination or oil sheens were observed on the shoreline or river water at the RM 13.1 Sediment Cap.

Photo Log

<p>Photo No.1</p>	<p>Date: 1/31/2019</p>	
<p>Direction Photo Taken:</p> <p>South to north</p>		
<p>Description:</p> <p>Looking at the RM 13.1 sediment cap from the public dock</p>		
<p>Photo No.2</p>	<p>Date: 4/21/22</p>	
<p>Direction Photo Taken:</p> <p>South to north</p>		
<p>Description:</p> <p>Looking at the RM 13.1 sediment cap from the public dock</p>		
<p>Photo No.3</p>	<p>Date: 1/31/2019</p>	
<p>Direction Photo Taken:</p> <p>South to north</p>		
<p>Description:</p> <p>View of the riprap/shoreline from the public dock</p>		

<p>Photo No.4</p>	<p>Date: 4/12/2021</p>	
<p>Direction Photo Taken:</p> <p>South to north</p>		
<p>Description:</p> <p>View of the riprap/shoreline from the public dock</p>		
<p>Photo No.5</p>	<p>Date: 1/31/2019</p>	
<p>Direction Photo Taken:</p> <p>South to north</p>		
<p>Description:</p> <p>Another view at the riprap/shoreline from the public dock</p>		
<p>Photo No.6</p>	<p>Date: 4/12/2021</p>	
<p>Direction Photo Taken:</p> <p>South to north</p>		
<p>Description:</p> <p>Another view of the riprap/shoreline from the public dock</p>		

<p>Photo No.7</p>	<p>Date: 1/19/2019</p>	
<p>Direction Photo Taken: North to south</p>		
<p>Description: Looking at RM 13.1 from the riprap/shoreline</p>		
<p>Photo No.8</p>	<p>Date: 4/12/2021</p>	
<p>Direction Photo Taken: North to south</p>		
<p>Description: Looking at RM 13.1 from the riprap/shoreline</p>		
<p>Photo No.9</p>	<p>Date: 1/31/2019</p>	
<p>Direction Photo Taken: South to north</p>		
<p>Description: Looking at RM 13.1 from the riprap/shoreline</p>		

<p>Photo No.10</p>	<p>Date: 4/12/2021</p>	
<p>Direction Photo Taken:</p> <p>South to north</p>		
<p>Description:</p> <p>Looking at RM 13.1 from the riprap/shoreline</p>		
<p>Photo No.9</p>	<p>Date: 1/31/2019</p>	
<p>Direction Photo Taken:</p> <p>West to east</p>		
<p>Description:</p> <p>Looking at the City of Portland water pipe looking up from river shoreline</p>		
<p>Photo No.9</p>	<p>Date: 4/12/2021</p>	
<p>Direction Photo Taken:</p> <p>West to east</p>		
<p>Description:</p> <p>Looking at the City of Portland water pipe looking up from river shoreline</p>		

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