



December 6, 2013

Mr. Charles Gruenenfelder
Washington State Department of Ecology
Eastern Regional Office
N. 4601 Monroe
Spokane, Washington 99205

RE: Final Report
2013 Annual Performance Monitoring
Black Sand Beach Project
Stevens County, Washington
URS Job No. 36310197

Dear Mr. Gruenenfelder:

Presented in this letter report is a summary of the third annual performance monitoring event conducted at Black Sand Beach in Stevens County, Washington on October 9, 2013. The purpose of this report is to document changes in the Black Sand Beach, including sediment erosion and/or re-deposition, since completion of the Black Sand Beach project in October 2010. The 2013 annual performance monitoring event was performed in accordance with a Washington Department of Ecology (Ecology) – approved Performance Monitoring Plan dated March 2010.

Similar to the 2011 and 2012 annual performance monitoring events, the 2013 annual performance monitoring event included obtaining photographs, making visual observations, and performing a topographical survey of the Black Sand Beach. Additionally, this report provides figures showing river flow rates and stage elevations obtained from the United States Geological Survey (USGS) website from the time when the construction As-Built topographic survey was completed (November 1, 2010) to the time of the 2013 annual performance monitoring event (October 9, 2013). These figures are intended to provide information relating to river conditions that resulted in the changes to the Black Sand Beach configuration (i.e., erosion and deposition) that are documented in this report.

BACKGROUND

The Black Sand Beach is a locally recognized beach along the southeastern bank of the Columbia River just downstream from the USGS Columbia River Auxiliary Gage Station (also referred to as USGS gauging station or gauging station) at approximately river mile 743.

The Black Sand Beach project, which was performed in September and October of 2010, consisted of removing approximately 9,100 tons (about 6,500 cubic yards) of sediment containing granulated slag from the upland portion of this beach; loading and transporting these sediments to the Trimac facility located at 9595 Highway 22A, Trail, British Columbia for future recycling at the Teck Metals, Ltd.

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Facility in Trail, British Columbia; replacing the beach with clean fill materials; and returning temporary road improvements to their original primitive conditions.

The project was conducted by Teck American Incorporated (TAI) pursuant to an Interim Action Voluntary Cleanup Agreement (VCP Agreement) between TAI and Ecology dated July 13, 2009. The VCP Agreement is consistent with the Model Toxics Control Act (MTCA), Chapter 70.105D RCW, and implemented under Chapter 173-340 WAC.

The project was performed in accordance with the Ecology-approved "*Final Work Plan for Black Sand Beach, Stevens County, Washington*" dated August 2010 and associated documents. Completion of the project was documented in "*Black Sand Beach Project Completion Report & Performance Monitoring Plan, Black Sand Beach, Stevens County, Washington*" dated March 2011 (Completion Report).

As described in the VCP Agreement and consistent with the approved Performance Monitoring Plan provided in the Completion Report, TAI will perform annual monitoring for a three year period (through 2013) for a maximum of five years following completion of the Black Sand Beach project (through 2015). Following the three year period, Ecology will evaluate findings from the annual monitoring program and discuss with TAI possible modifications to the monitoring program including, but not limited to, a possible reduction in the duration of annual performance monitoring. The purpose of the annual performance monitoring is to record changes in site conditions, including sediment erosion and/or re-deposition that may occur in the project site area.

FIELD MONITORING SUMMARY

The 2013 performance monitoring event was performed by URS (Paul McCullough) on October 9, 2013 in accordance with the Ecology-approved Performance Monitoring Plan. The monitoring event consisted of performing a topographic survey (Daniel Sampson of Survey Solutions) within the area where sediments were removed and replaced, documenting visual observations, and obtaining photographs at pre-selected stations identified in the Completion Report.

Stakeholders that were present during the 2013 annual performance monitoring event included:

- The Washington State Department of Ecology (Charles Gruenenfelder and Jeremy Schmidt);
- The Washington State Department of Natural Resources (Arne Johnson);
- The Citizens for a Clean Columbia (Joe Wichmann);
- HDR|HydroQual (Mark Velleux);
- Local Resident/Adjacent Property Owner (Matt Wolohan); and
- TAI (Dave Enos and Kris McCaig).

The surveyed elevation of the upper Columbia River near the site at the time of the October 9, 2013 monitoring event was 1,297.9 feet above mean sea level (amsl) based on the North American Vertical Datum of 1988 (NAVD88). The river elevation at the time of the “As-Built” topographic survey performed on November 1, 2010 was 1299.3 feet amsl (NAVD88).

RESULTS

Results of the 2013 annual performance monitoring event, and previous monitoring events, are included in the following attachments:

- **Table 1 – Surface Elevation Measurement and Visual Observation Monitoring Results.** Table 1 compares surface elevations at established surface elevation monitoring locations at the time of the As-Built survey on November 1, 2010 and the 2011 through 2013 Annual Performance Monitoring Surveys conducted on October 3, 2011, October 8, 2012, and October 9, 2013, respectively. Visual observations of the beach sediments are also recorded for the October 9, 2013 monitoring event.
- **Figure 1 - 2010 Topographic Survey Map:** Figure 1 illustrates 1-foot (ft) topographic elevation contours at time of the As-Built Survey following completion of the Black Sand Beach project. The topographic survey was performed by a licensed land surveyor (Survey Solutions) on November 1, 2010.
- **Figure 2 - 2011 Topographic Survey Map:** Figure 2 illustrates 1-ft topographic elevation contours at the time of the 2011 Annual Performance Monitoring (October 3, 2011). This topographic survey was performed by Survey Solutions.
- **Figure 3 - 2012 Topographic Survey Map:** Figure 3 illustrates 1-ft topographic elevation contours at the time of the 2012 Annual Performance Monitoring (October 8, 2012). This topographic survey was performed by Survey Solutions.
- **Figure 4 – 2013 Topographic Survey Map:** Figure 4 illustrates 1-ft topographic elevation contours at the time of the 2013 Annual Performance Monitoring (October 9, 2013). This topographic survey was performed by Survey Solutions.
- **Figure 5 – ISOpach 2010 Survey vs 2011 Survey:** Figure 5 illustrates 0.5-ft contours depicting the difference in surface elevations between the 2010 and 2011 surveys. These contours illustrate areas where erosion and deposition have occurred. The calculated volume difference between the November 1, 2010 and October 3, 2011 topographical features is a net decrease (loss) of 401 cubic yards, as calculated using Autodesk Civil 3D® 2011 and survey measurement data from Survey Solutions.
- **Figure 6 – ISOpach 2011 Survey vs 2012 Survey:** Figure 6 illustrates 0.5-ft contours depicting the difference in surface elevations between the 2011 and 2012 surveys. These contours illustrate areas where erosion and deposition have occurred. The calculated volume difference between the October 3, 2011 and October 8, 2012 topographical features is a net decrease (loss) of 77 cubic yards, as calculated using Autodesk Civil 3D® 2012 and survey measurement data from Survey Solutions.
- **Figure 7 – ISOpach 2010 Survey vs 2012 Survey:** Figure 7 illustrates 0.5-ft contours depicting the difference in surface elevations between the 2010 (As-Built) and 2012 surveys. These

contours illustrate areas where erosion and deposition have occurred. The calculated volume difference between the November 1, 2010 and October 8, 2012 topographical features is a net decrease (loss) of 479 cubic yards, as calculated using Autodesk Civil 3D® 2012 and survey measurement data from Survey Solutions.

- **Figure 8 – ISOpach 2012 Survey vs 2013 Survey:** Figure 8 illustrates 0.5-ft contours depicting the difference in surface elevations between the 2012 and 2013 surveys. These contours illustrate areas where erosion and deposition have occurred. The calculated volume difference between the October 8, 2012 and October 9, 2013 topographical features is a net decrease (loss) of 149 cubic yards, as calculated using Autodesk Civil 3D® 2012 and survey measurement data from Survey Solutions.
- **Figure 9 – ISOpach 2010 Survey vs 2013 Survey:** Figure 9 illustrates 0.5-ft contours depicting the difference in surface elevations between the 2010 (As-Built) and 2013 surveys. These contours illustrate areas where erosion and deposition have occurred. The calculated volume difference between the November 1, 2010 and October 9, 2013 topographical features is a net decrease (loss) of 627 cubic yards, as calculated using Autodesk Civil 3D® 2012 and survey measurement data from Survey Solutions.
- **Figure 10 – Performance Monitoring Locations:** Figure 10 depicts locations of pre-selected photographic stations and surface elevation monitoring point stations. These stations were identified in the Completion Report for subsequent monitoring and are intended to provide a consistent set of locations to document changes in beach conditions over time.
- **Figure 11 – 2010 As-Built Photographs:** Figure 11 presents a map showing positions and approximate directions that photographs were taken, as well as the corresponding photograph. Photographs depicted on this figure were taken in October 2010 and are consistent with those presented in Appendix E of the Completion Report.
- **Figure 12 – Performance Monitoring Locations and 2011 Photographs:** Figure 12 provides photographs taken during the October 3, 2011 Annual Performance Monitoring event. Surface elevations shown on this figure are based on the October 3, 2011 topographic survey.
- **Figure 13 – Performance Monitoring Locations and 2012 Photographs:** Figure 13 provides photographs taken during the October 8, 2012 Annual Performance Monitoring event. Surface elevations shown on this figure are based on the October 8, 2012 topographic survey.
- **Figure 14 – Performance Monitoring Locations and 2013 Photographs:** Figure 14 provides photographs taken during the October 9, 2013 Annual Performance Monitoring event. Surface elevations shown on this figure are based on the October 9, 2013 topographic survey.
- **Figure 15 – Discharge at USGS 12399500 Columbia River at International Boundary.** Figure 15 depicts a time-series graph of the Columbia River discharge in cubic feet per second (cfs) measured at USGS station 12399500, Columbia River at International Boundary during the period November 1, 2010 through October 9, 2013. This graph is courtesy of the USGS and was downloaded from the USGS website at the following address: http://waterdata.usgs.gov/usa/nwis/uv?site_no=12399500. Measured river discharges are compared to median daily statistics of river discharge over a 74 year period to allow comparison of measured discharges since completion of the As-Built survey to historic average values. As illustrated on Figure 15, river flows since completion of the Black Sand Beach project to present have generally been at or above historic values over the last 74 years.

- **Figure 16 – Gage Height at USGS 12399500 Columbia River at International Boundary Auxiliary Station.** Figure 16 illustrates river elevations at USGS Auxiliary Gage Station No. 12399500 during the period November 1, 2010 through October 9, 2013. This graph is courtesy of the USGS and was downloaded from the USGS website address identified above. This graph compares the measured gage heights at this gauging station to median daily statics over a 9 year period. As illustrated on this figure, river elevations since completion of the As-built survey have generally been at or above historic trends.
- **Appendix A – Photographic Log:** Appendix A presents photographs of the site at each of the designated photographic stations (PP-1 through PP-11). Each photo station is on a single page to facilitate a side-by-side comparison of photographs from 2010 through 2013.
- **Appendix B – Supplemental Photographic Log:** Appendix B presents additional photographs taken during the 2013 Annual Performance Monitoring Event.
- **Appendix C – Large Photograph Maps:** Appendix C provides Figures 11 through 14 on larger “D-size” paper.

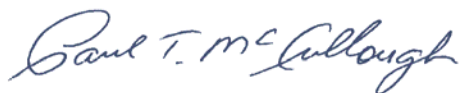
PROFESSIONAL ENGINEER’S STATEMENT

URS was retained by TAI to perform the Black Sand Beach Project and to conduct the 2011 through 2013 Performance Monitoring events at Black Sand Beach in Stevens County, Washington. In that role, URS, represented by the undersigned, maintained active involvement in the planning and implementation of the various project activities, including performance monitoring.

This report is intended for the sole use of TAI. The scope of services performed by URS in preparing this report may not be appropriate to satisfy the needs of other users, and any use or re-use of this document or of its findings presented herein is at the sole risk of said user. The services performed by URS have been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in Washington. The findings presented in this report are based on conditions observed at specific site locations at the time of the observation. Conditions may change over distance and time. No other warranty is expressed or implied.

As the designated URS representative, I hereby conclude that, to the best of my knowledge, the work summarized in this report has been satisfactorily completed in substantial compliance with the Completion Report and other related documents.

Sincerely,



Paul T. McCullough, P.E.
Senior Project Engineer

Mr. Chuck Gruenenfelder
Washington State Department of Ecology
December 6, 2013
Page 6

Attachments

cc: Kris McCaig, TAI (one copy + electronic DVD)
Karin Diven, DFW (electronic DVD)
Tim Erkel, USACE (electronic DVD)
Arne Johnson, DNR (electronic DVD)
Joseph Wichmann, CCC (one copy + electronic DVD)
Matt Wolohan, Adjacent Land Owner (one copy + electronic DVD)

TABLES

Table 1
Surface Elevation Measurement and Visual Observation Monitoring Results
Black Sand Beach, Northport, Washington

Location Id	Washington State Plane, North Zone, NAD 83 US FT		WGS 84		Surface Elevation ^{1,2} NAVD 88, US FT.								2013 Visual Observations ^{4,5}
	Northing	Easting	Lat	Long	1-Nov-10	3-Oct-11	8-Oct-12	9-Oct-13	2010 TO 2011 Change (ft)	2011 TO 2012 Change (ft)	2012 TO 2013 Change (ft)	2010 TO 2013 Change (ft)	
E-1	734841.076	2405298.862	48.97101	-117.64829	1299.29	--	--	1297.52	--	--	--	1.77	E1 in water 2011 and 2012. Moved observation point to E-1R in 2012
E-1R	734835.67	2405302.85	48.97100	-117.64829	--	--	1298.43	1299.69	--	--	-1.260	--	~<5% coarse (>2 mm); approximately 10-15 percent of fine fraction black silica glass.
E-2	734784.592	2405242.019	48.97086	-117.64853	1299.39	1298.65	1298.42	1298.31	0.736	0.230	0.111	1.08	~50% coarse (>2 mm); approximately 10 percent of fine fraction black silica glass.
E-3	734743.033	2405180.007	48.97075	-117.64880	1299.28	1299.24	1299.27	1298.98	0.035	-0.025	0.287	0.30	~40% coarse (>2 mm); approximately 15 percent of fine fraction black silica glass.
E-4	734717.573	2405196.222	48.97068	-117.64874	1304.80	1304.06	1303.44	1304.25	0.741	0.622	-0.814	0.55	<10% coarse (>2 mm); approximately 5 -10 percent of fine fraction black silica glass.
E-5	734764.950	2405256.421	48.97080	-117.64848	1304.33	1305.74	1305.94	1305.85	-1.411	-0.195	0.086	-1.52	~40% coarse (>2 mm); approximately < 5 percent of fine fraction black silica glass.
E-6	734815.170	2405321.316	48.97093	-117.64820	1304.48	1305.19	1305.16	1305.30	-0.712	0.036	-0.145	-0.82	~50% coarse (>2 mm); approximately 25 percent of fine fraction black silica glass.
E-7	734692.594	2405214.770	48.97061	-117.64866	1306.71	1305.34	1305.37	1305.19	1.366	-0.021	0.175	1.52	>95% coarse (>2 mm); < 10 percent of fine fraction black silica glass.
E-8	734738.178	2405277.467	48.97073	-117.64840	1305.80	1305.65	1305.18	1304.15	0.146	0.477	1.025	1.65	>70% coarse (>2 mm); approximately 5 percent of fine fraction black silica glass.
E-9	734781.507	2405341.661	48.97084	-117.64812	1305.63	1305.80	1305.77	1305.61	-0.168	0.029	0.158	0.02	>95% coarse (>2 mm); approximately 40-50 percent of fine fraction black silica glass.
E-10	734700.576	2405276.494	48.97062	-117.64841	1306.68	1306.30	1306.69	1306.13	0.376	-0.385	0.559	0.55	~60% coarse (>2 mm); less than 1.5 percent of fine fraction black silica glass.
E-11	734747.683	2405345.491	48.97074	-117.64811	1306.42	1306.40	1306.53	1306.24	0.020	-0.125	0.288	0.18	>95% coarse (>2 mm); less than 1 percent of fine fraction black silica glass.
E-12	734668.683	2405296.797	48.97053	-117.64833	1310.98	1310.94	1310.90	1310.63	0.038	0.046	0.267	0.35	~ 20% coarse (> 2 mm); less than 1.5 percent of fine fraction black silica glass.
E-13	734846.991	2405410.101	48.97101	-117.64782	1299.35	1299.33	1299.30	1298.91	0.014	0.039	0.385	0.44	>95 % coarse (> 2 mm); approximately 10-15 percent black silica glass.
E-14	734853.020	2405459.923	48.97102	-117.64762	1299.28	1298.47	1298.46	1298.34	0.811	0.005	0.123	0.94	~ 20% coarse (> 2 mm); approximately 15 percent of fine fraction black silica glass.
E-15	734854.195	2405513.926	48.97102	-117.64739	1299.37	1299.32	1299.38	1299.18	0.049	-0.059	0.201	0.19	~ 5% coarse (> 2 mm); approximately 5 percent of fine fraction black silica glass.
E-16	734809.862	2405394.109	48.97091	-117.64790	1305.09	1303.32	1303.32	1303.16	1.770	0.008	0.156	1.93	>80% coarse (>2 mm); approximately 5 percent of fine fraction black silica glass.
E-17	734808.467	2405442.281	48.97090	-117.64770	1305.48	1306.68	1306.52	1305.83	-1.198	0.158	0.692	-0.35	~ 10% coarse (> 2 mm); approximately 20 percent of fine fraction black silica glass.
E-18	734809.245	2405492.399	48.9709	-117.64749	1305.71	1305.72	1305.56	1305.29	-0.010	0.159	0.274	0.42	<5% coarse (> 2 mm); less than 1.5 percent of fine fraction black silica glass.
E-19	734769.189	2405375.738	48.9708	-117.64798	1307.33	1305.85	1305.39	1305.26	1.479	0.460	0.134	2.07	>90% coarse (>2 mm); less than 5% of fine fraction black silica glass.
E-20	734774.538	2405448.834	48.97081	-117.64768	1308.45	1308.53	1308.68	1308.02	-0.075	-0.149	0.656	0.43	~ 5% coarse (> 2 mm); less than 5 percent of fine fraction black silica glass.
E-21	734729.067	2405385.597	48.97069	-117.64795	1309.66	1309.48	1309.40	1309.16	0.182	0.073	0.244	0.50	~ 5% coarse (> 2 mm); less than 3 percent of fine fraction black silica glass.

Notes

¹ Locations of Surface Elevation Monitoring Points are noted in Figure 8, Performance Monitoring Locations of report titled: "Completion Report & Performance Monitoring Plan" dated March 2011.

² The topographic surveys on 11/1/10, 10/3/11, 10/10/12, and 10/9/2013 were performed by Survey Solutions using Trimble R-8 GPS Receivers with a TSC2 Controller and realtime kinematic survey procedures.

³ A positive change in surface elevation corresponds to a lower elevation at the time of the performance monitoring survey compared to the benchmark year.
A negative change in elevation corresponds to a higher elevation at the time of the performance monitoring survey compared the benchmark year.

⁴ Visual observations of beach materials was conducted at each accessible Surface Elevation Monitoring Point on October 9, 2013 by a qualified person. A qualified person is either a Washington State Licensed Geologist (LG) or an engineer/scientist who has received site-specific training in the following: 1) identification of sedimentary deposits of the Upper Columbia River basin, 2) recognition of amorphous silica-rich glass, 3) particle size and percentage estimation, 4) soil/sediment classification systems, and 5) recording of observations.

⁵ Vitreous, conchoidal fractures, translucent appearance (consistent with the appearance of granulated slag).

FIGURES

NO.	DATE	BY	REVISION DESCRIPTION
1	10/28/11	PTM	2011 PERFORMANCE MONITORING REPORT
2	11/22/12	PTM	2012 PERFORMANCE MONITORING REPORT
3	11/15/13	PTM	2013 PERFORMANCE MONITORING REPORT



EQUIPMENT AND PROCEDURES
 THIS SURVEY WAS PERFORMED BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON WITH TRIMBLE R-8 GPS RECEIVERS WITH A TSC2 CONTROLLER USING REAL TIME KINEMATIC SURVEY PROCEDURES.

SURVEYOR'S NOTES

- THE PURPOSE OF THIS SURVEY WAS TO CONDUCT A TOPOGRAPHIC SURVEY.
- HORIZONTAL DATUM, WASHINGTON STATE PLANE, NORTH ZONE. VERTICAL DATUM, NAVD 88. BASED ON WSDOT STATION "YONDER", LOCATED 0.25 MILES SOUTH OF WANETA BORDER CROSSING AND 52' WEST OF THE CENTERLINE OF THE WANETA CUSTOMS ROAD, THREE INCH BRASS CAP IN CEMENT, 745,055.705' N, 2,409,429.512' E, ELEV. 1,457.071'.
- THIS MAP SHOWS ELEVATION DATA COLLECTED ON 11/01/2010, WITHIN THE NEW SAND LIMIT BOUNDARY AND ELEVATION DATA FROM 12/20/2006 MAPPING OUTSIDE SAID NEW SAND LIMIT.
- THE WATER LEVEL STAFF GAUGE, 304' NORTHEAST OF SURVEY CONTROL #1 WAS 1296.56' AT 11:26 AM 11/01/2010 (NOTE: EQUALS 1299.46' USING THIS SURVEY DATUM).
- SOURCE: SURVEY SOLUTIONS, SPOKANE, WASHINGTON.

GENERAL NOTE:
 SEE TABLE 1 FOR SURFACE MONITORING POINT ELEVATION DATA.

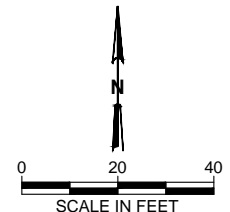
LEGEND

---	PROPERTY LINE
- - - -	EDGE OF WATER
●	PHOTO STATION
●	SURFACE ELEVATION MONITORING LOCATION
⊗	PORTION OF UNUSED ACCESS ROAD LEADING TO BLACK SAND BEACH
▨	MATERIAL PLACED TO BLOCK ROAD ACCESS PER WDNR (LARGE ROCKS AND ROOT BALLS)
⊠	LIMITS OF REPLACED BEACH SAND
⊞	ROCK EROSION PROTECTION PAD WITH SMALL COBBLE TOPPING
⊞	EXPOSED ROCK OUTCROPPING

BLACK SAND BEACH PROJECT
 STEVENS COUNTY, WASHINGTON

**FIGURE 1
 2010 TOPOGRAPHIC
 SURVEY MAP**

DESIGNED BY: PTM/HDL	 1501 4TH AVENUE, SUITE 1400 SEATTLE, WA 98101-1616 (206) 438-2700	SHEET
DRAWN BY: CFS		DRAWING NO.
CHECKED BY: RDE		
APPROVED BY: PTM		
REVISION: REV 3		
DATE: NOV 2013		



NO.	DATE	BY	REVISION DESCRIPTION
1	10/28/11	PTM	2011 PERFORMANCE MONITORING REPORT
2	11/22/12	PTM	2012 PERFORMANCE MONITORING REPORT
3	11/15/13	PTM	2013 PERFORMANCE MONITORING REPORT



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- SURVEYOR'S NOTES**
1. THE PURPOSE OF THIS SURVEY WAS TO CONDUCT A TOPOGRAPHIC SURVEY.
 2. HORIZONTAL DATUM, WASHINGTON STATE PLANE, NORTH ZONE. VERTICAL DATUM, NAVD 88. BASED ON WSDOT STATION "YONDER", LOCATED 0.25 MILES SOUTH OF WANETA BORDER CROSSING AND 52' WEST OF THE CENTERLINE OF THE WANETA CUSTOMS ROAD, THREE INCH BRASS CAP IN CEMENT, 745,055.705' N, 2,409,429.512' E, ELEV. 1,457.071'.
 3. THIS MAP SHOWS NEW ELEVATION DATA COLLECTED ON 10/03/2011, GENERALLY WITHIN THE LIMITS OF THE REPLACEMENT SAND AS DESIGNATED ON THE 2010 AS-BUILT TOPOGRAPHIC SURVEY CONDUCTED ON 11/01/2010.
 4. THE WATER LEVEL STAFF GAUGE, 304' NORTHEAST OF SURVEY CONTROL #1 WAS 1296.43' AT 10:45 AM 10/03/2011 (NOTE: EQUALS 1299.33' USING THIS SURVEY DATUM).
 5. SOURCE: SURVEY SOLUTIONS, SPOKANE, WASHINGTON.

GENERAL NOTE:
 SEE TABLE 1 FOR SURFACE MONITORING POINT ELEVATION DATA.

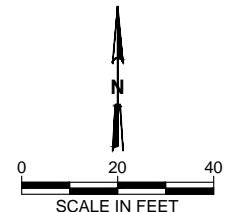
LEGEND

	PROPERTY LINE
	EDGE OF WATER
	2011 SURVEY LIMITS
	PP-8 PHOTO STATION
	E-21 SURFACE ELEVATION MONITORING LOCATION
	ROCK EROSION PROTECTION PAD WITH SMALL COBBLE TOPPING
	EXPOSED ROCK OUTCROPPING

BLACK SAND BEACH PROJECT
 STEVENS COUNTY, WASHINGTON

FIGURE 2
2011 TOPOGRAPHIC SURVEY MAP

DESIGNED BY: PTM/HDL	 1501 4TH AVENUE, SUITE 1400 SEATTLE, WA 98101-1616 (206) 438-2700	SHEET
DRAWN BY: CFS		DRAWING NO.
CHECKED BY: RDE		
APPROVED BY: PTM		
REVISION: REV 3		
DATE: NOV 2013		



NO.	DATE	BY	REVISION DESCRIPTION
1	10/28/11	PTM	2011 PERFORMANCE MONITORING REPORT
2	11/22/12	PTM	2012 PERFORMANCE MONITORING REPORT
3	11/15/13	PTM	2013 PERFORMANCE MONITORING REPORT



EQUIPMENT AND PROCEDURES
 THIS SURVEY WAS PERFORMED BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON WITH TRIMBLE R-8 GPS RECEIVERS WITH A TSC2 CONTROLLER USING REAL TIME KINEMATIC SURVEY PROCEDURES.

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 3. THIS MAP SHOWS NEW ELEVATION DATA COLLECTED ON 10/08/2012, GENERALLY WITHIN THE LIMITS OF THE REPLACEMENT SAND AS DESIGNATED ON THE 2010 AS-BUILT TOPOGRAPHIC SURVEY CONDUCTED ON 11/01/2010.
 4. THE WATER LEVEL STAFF GAUGE, 304' NORTHEAST OF SURVEY CONTROL #1 WAS 1295.62' AT 1:15 PM 10/08/2012 (NOTE: EQUALS 1298.52' USING THIS SURVEY DATUM).
 5. SOURCE: SURVEY SOLUTIONS, SPOKANE, WASHINGTON.

GENERAL NOTE:
 SEE TABLE 1 FOR SURFACE MONITORING POINT ELEVATION DATA.

LEGEND

	PROPERTY LINE
	EDGE OF WATER
	2012 SURVEY LIMITS
	PP-8 PHOTO STATION
	E-21 SURFACE ELEVATION MONITORING LOCATION
	ROCK EROSION PROTECTION PAD WITH SMALL COBBLE TOPPING
	EXPOSED ROCK OUTCROPPING, APPROXIMATE LOCATION

BLACK SAND BEACH PROJECT
 STEVENS COUNTY, WASHINGTON

**FIGURE 3
 2012 TOPOGRAPHIC
 SURVEY MAP**

DESIGNED BY: PTM/HDL	 1501 4TH AVENUE, SUITE 1400 SEATTLE, WA 98101-1616 (206) 438-2700	SHEET
DRAWN BY: CFS		DRAWING NO.
CHECKED BY: RDE		
APPROVED BY: PTM		
REVISION: REV 3 DATE: NOV 2013		

NO.	DATE	BY	REVISION DESCRIPTION
1	10/28/11	PTM	2011 PERFORMANCE MONITORING REPORT
2	11/22/12	PTM	2012 PERFORMANCE MONITORING REPORT
3	11/15/13	PTM	2013 PERFORMANCE MONITORING REPORT



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- SURVEYOR'S NOTES**
1. THE PURPOSE OF THIS SURVEY WAS TO CONDUCT A TOPOGRAPHIC SURVEY.
 2. HORIZONTAL DATUM, WASHINGTON STATE PLANE, NORTH ZONE. VERTICAL DATUM, NAVD 88. BASED ON WSDOT STATION "YONDER", LOCATED 0.25 MILES SOUTH OF WANETA BORDER CROSSING AND 52' WEST OF THE CENTERLINE OF THE WANETA CUSTOMS ROAD, THREE INCH BRASS CAP IN CEMENT, 745,055.705' N, 2,409,429,512' E, ELEV. 1,457.071'.
 3. THIS MAP SHOWS NEW ELEVATION DATA COLLECTED ON 10/08/2012, GENERALLY WITHIN THE LIMITS OF THE REPLACEMENT SAND AS DESIGNATED ON THE 2010 AS-BUILT TOPOGRAPHIC SURVEY CONDUCTED ON 11/01/2010.
 4. THE WATER LEVEL STAFF GAUGE, 304' NORTHEAST OF SURVEY THE WATER LEVEL ON THE STAFF GAUGE, 304' NORTHEAST OF SURVEY CONTROL #1 READS 1295.07' AT 12:20 PM 10/9/2013 (EQUALS 1297.97' THIS SURVEY DATUM).
 5. SOURCE: SURVEY SOLUTIONS, SPOKANE, WASHINGTON.

GENERAL NOTE:
 SEE TABLE 1 FOR SURFACE MONITORING POINT ELEVATION DATA.


LEGEND

	PROPERTY LINE
	EDGE OF WATER
	2013 SURVEY LIMITS
	PP-8 PHOTO STATION
	E-21 SURFACE ELEVATION MONITORING LOCATION
	ROCK EROSION PROTECTION PAD WITH SMALL COBBLE TOPPING
	EXPOSED ROCK OUTCROPPING, APPROXIMATE LOCATION










BLACK SAND BEACH PROJECT
 STEVENS COUNTY, WASHINGTON

**FIGURE 4
 2013 TOPOGRAPHIC
 SURVEY MAP**

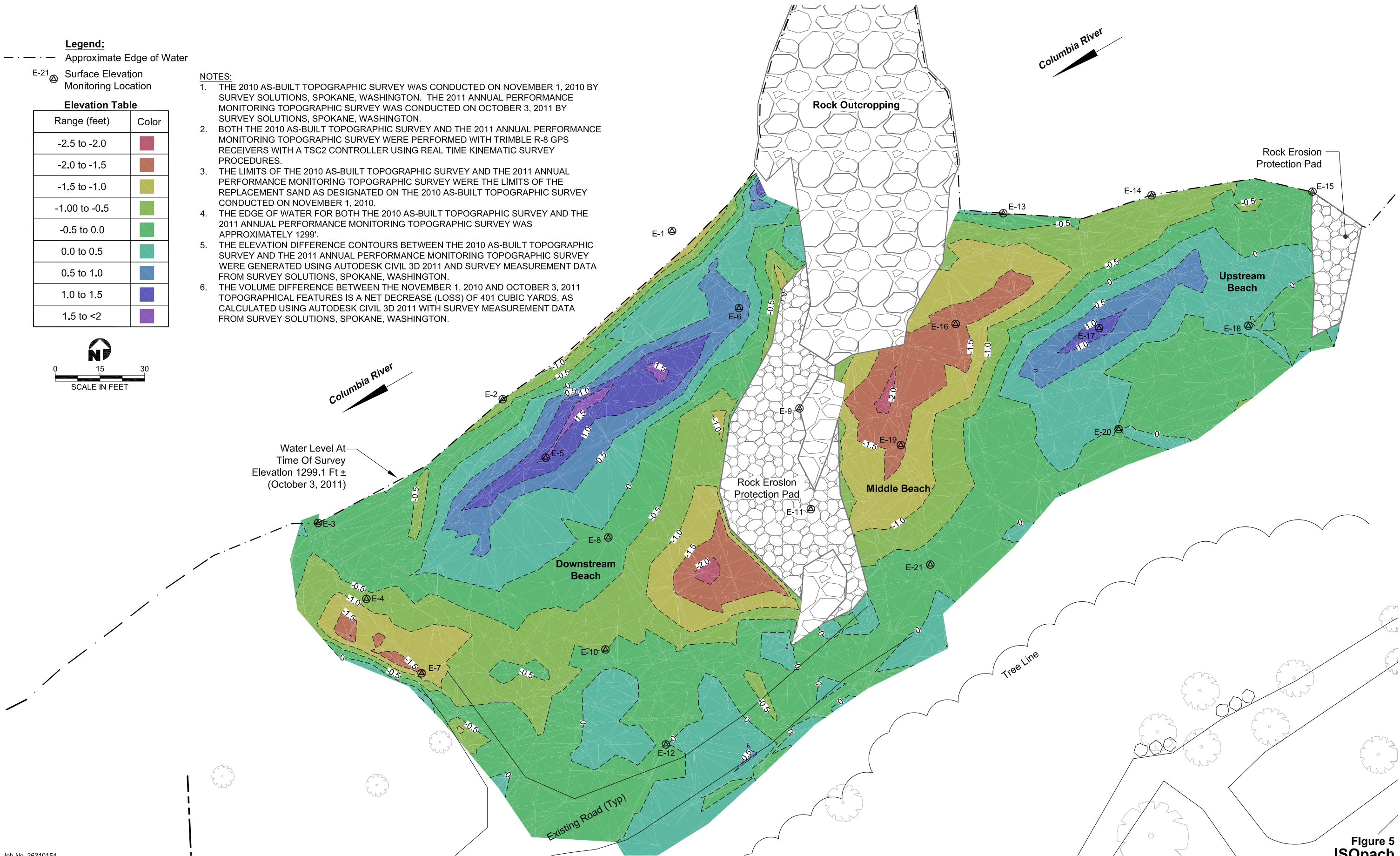
DESIGNED BY: PTM/HDL	 1501 4TH AVENUE, SUITE 1400 SEATTLE, WA 98101-1616 (206) 438-2700	SHEET
DRAWN BY: CFS		DRAWING NO.
CHECKED BY: RDE		
APPROVED BY: PTM		
REVISION: REV 3		
DATE: NOV 2013		

Legend:
 - - - - - Approximate Edge of Water
 E-21  Surface Elevation Monitoring Location

Elevation Table

Range (feet)	Color
-2.5 to -2.0	
-2.0 to -1.5	
-1.5 to -1.0	
-1.00 to -0.5	
-0.5 to 0.0	
0.0 to 0.5	
0.5 to 1.0	
1.0 to 1.5	
1.5 to <2	

- NOTES:**
1. THE 2010 AS-BUILT TOPOGRAPHIC SURVEY WAS CONDUCTED ON NOVEMBER 1, 2010 BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON. THE 2011 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WAS CONDUCTED ON OCTOBER 3, 2011 BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON.
 2. BOTH THE 2010 AS-BUILT TOPOGRAPHIC SURVEY AND THE 2011 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE PERFORMED WITH TRIMBLE R-8 GPS RECEIVERS WITH A TSC2 CONTROLLER USING REAL TIME KINEMATIC SURVEY PROCEDURES.
 3. THE LIMITS OF THE 2010 AS-BUILT TOPOGRAPHIC SURVEY AND THE 2011 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE THE LIMITS OF THE REPLACEMENT SAND AS DESIGNATED ON THE 2010 AS-BUILT TOPOGRAPHIC SURVEY CONDUCTED ON NOVEMBER 1, 2010.
 4. THE EDGE OF WATER FOR BOTH THE 2010 AS-BUILT TOPOGRAPHIC SURVEY AND THE 2011 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WAS APPROXIMATELY 1299'.
 5. THE ELEVATION DIFFERENCE CONTOURS BETWEEN THE 2010 AS-BUILT TOPOGRAPHIC SURVEY AND THE 2011 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE GENERATED USING AUTODESK CIVIL 3D 2011 AND SURVEY MEASUREMENT DATA FROM SURVEY SOLUTIONS, SPOKANE, WASHINGTON.
 6. THE VOLUME DIFFERENCE BETWEEN THE NOVEMBER 1, 2010 AND OCTOBER 3, 2011 TOPOGRAPHICAL FEATURES IS A NET DECREASE (LOSS) OF 401 CUBIC YARDS, AS CALCULATED USING AUTODESK CIVIL 3D 2011 WITH SURVEY MEASUREMENT DATA FROM SURVEY SOLUTIONS, SPOKANE, WASHINGTON.



Job No. 36310154
 J:\GIS\Projects\Teck\Black Sand Beach\SubTasks\Design\R09 Asbuilt (2013)\Figure 5 (ISOpach - 2010 vs 2011).dwg
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Figure 5
ISOpach
2010 Asbuilt Survey vs 2011 Survey

Black Sand Beach
 Northport, Washington

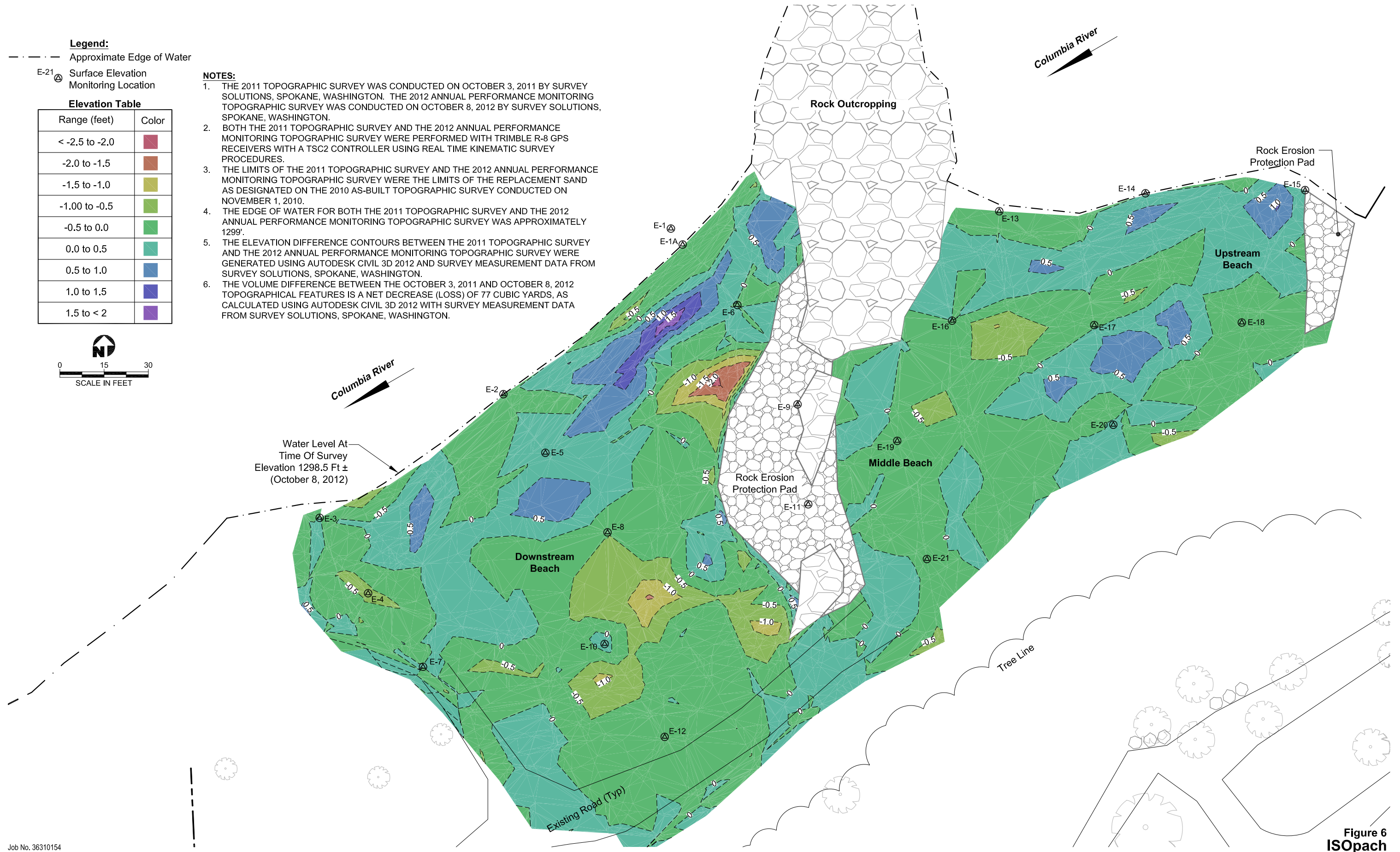
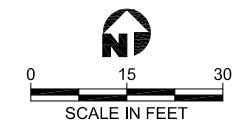
Legend:
 - - - - - Approximate Edge of Water
 E-21 Surface Elevation Monitoring Location

Elevation Table

Range (feet)	Color
< -2.5 to -2.0	
-2.0 to -1.5	
-1.5 to -1.0	
-1.00 to -0.5	
-0.5 to 0.0	
0.0 to 0.5	
0.5 to 1.0	
1.0 to 1.5	
1.5 to < 2	

NOTES:

1. THE 2011 TOPOGRAPHIC SURVEY WAS CONDUCTED ON OCTOBER 3, 2011 BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON. THE 2012 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WAS CONDUCTED ON OCTOBER 8, 2012 BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON.
2. BOTH THE 2011 TOPOGRAPHIC SURVEY AND THE 2012 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE PERFORMED WITH TRIMBLE R-8 GPS RECEIVERS WITH A TSC2 CONTROLLER USING REAL TIME KINEMATIC SURVEY PROCEDURES.
3. THE LIMITS OF THE 2011 TOPOGRAPHIC SURVEY AND THE 2012 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE THE LIMITS OF THE REPLACEMENT SAND AS DESIGNATED ON THE 2010 AS-BUILT TOPOGRAPHIC SURVEY CONDUCTED ON NOVEMBER 1, 2010.
4. THE EDGE OF WATER FOR BOTH THE 2011 TOPOGRAPHIC SURVEY AND THE 2012 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WAS APPROXIMATELY 1299'.
5. THE ELEVATION DIFFERENCE CONTOURS BETWEEN THE 2011 TOPOGRAPHIC SURVEY AND THE 2012 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE GENERATED USING AUTODESK CIVIL 3D 2012 AND SURVEY MEASUREMENT DATA FROM SURVEY SOLUTIONS, SPOKANE, WASHINGTON.
6. THE VOLUME DIFFERENCE BETWEEN THE OCTOBER 3, 2011 AND OCTOBER 8, 2012 TOPOGRAPHICAL FEATURES IS A NET DECREASE (LOSS) OF 77 CUBIC YARDS, AS CALCULATED USING AUTODESK CIVIL 3D 2012 WITH SURVEY MEASUREMENT DATA FROM SURVEY SOLUTIONS, SPOKANE, WASHINGTON.



Job No. 36310154
 J:\GIS\Projects\Teck\Black Sand Beach\SubTasks\Design\R09 Asbuilt (2013)\Figure 6 (ISOpach - 2011 vs 2012).dwg
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Figure 6
ISOpach
2011 Survey vs 2012 Survey
 Black Sand Beach
 Northport, Washington

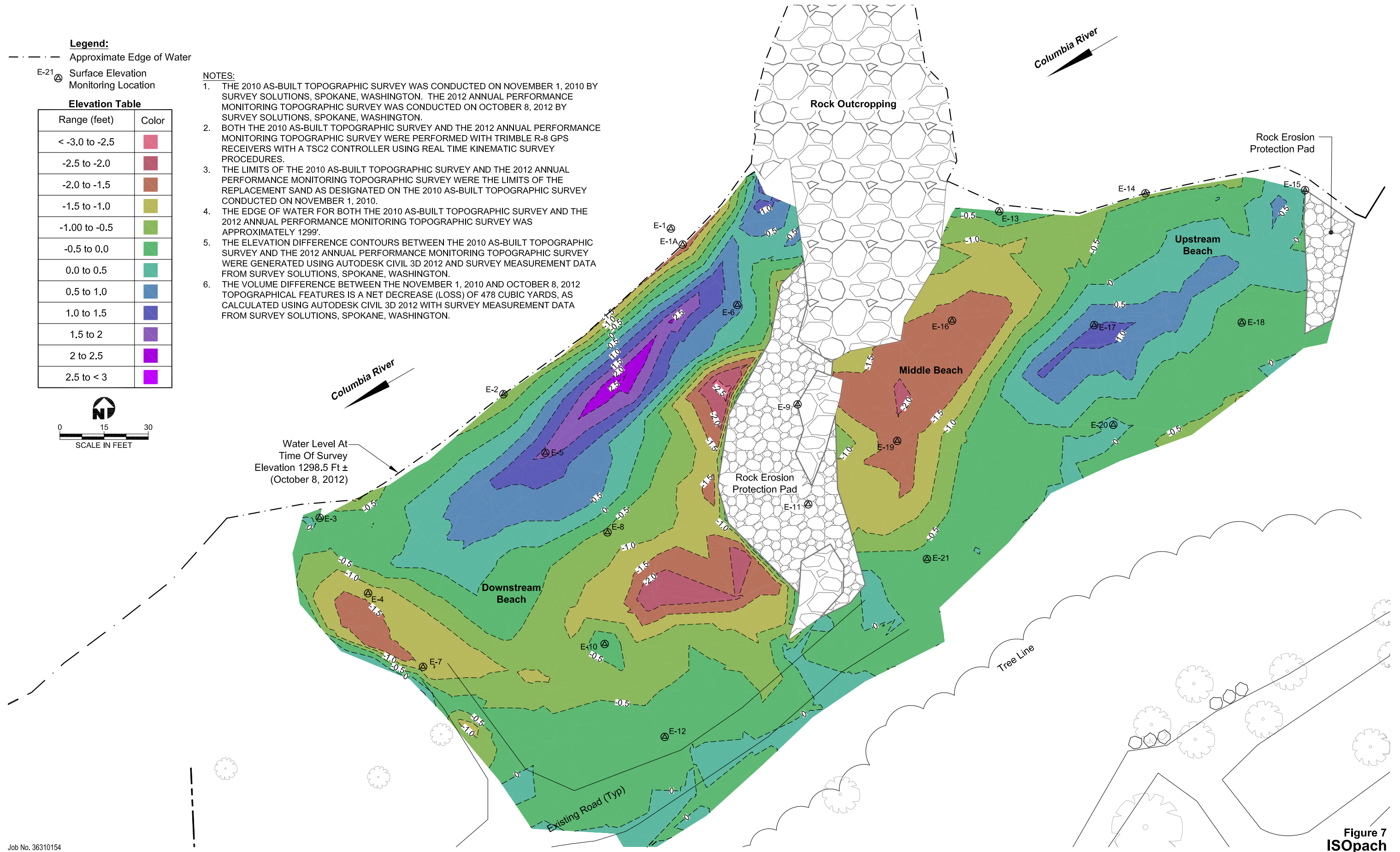
Legend:
 - - - - - Approximate Edge of Water
 E-21 Surface Elevation Monitoring Location

Elevation Table

Range (feet)	Color
< -3.0 to -2.5	
-2.5 to -2.0	
-2.0 to -1.5	
-1.5 to -1.0	
-1.00 to -0.5	
-0.5 to 0.0	
0.0 to 0.5	
0.5 to 1.0	
1.0 to 1.5	
1.5 to 2	
2 to 2.5	
2.5 to < 3	

NOTES:

1. THE 2010 AS-BUILT TOPOGRAPHIC SURVEY WAS CONDUCTED ON NOVEMBER 1, 2010 BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON. THE 2012 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WAS CONDUCTED ON OCTOBER 8, 2012 BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON.
2. BOTH THE 2010 AS-BUILT TOPOGRAPHIC SURVEY AND THE 2012 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE PERFORMED WITH TRIMBLE R-8 GPS RECEIVERS WITH A TSC2 CONTROLLER USING REAL TIME KINEMATIC SURVEY PROCEDURES.
3. THE LIMITS OF THE 2010 AS-BUILT TOPOGRAPHIC SURVEY AND THE 2012 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE THE LIMITS OF THE REPLACEMENT SAND AS DESIGNATED ON THE 2010 AS-BUILT TOPOGRAPHIC SURVEY CONDUCTED ON NOVEMBER 1, 2010.
4. THE EDGE OF WATER FOR BOTH THE 2010 AS-BUILT TOPOGRAPHIC SURVEY AND THE 2012 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WAS APPROXIMATELY 1299'.
5. THE ELEVATION DIFFERENCE CONTOURS BETWEEN THE 2010 AS-BUILT TOPOGRAPHIC SURVEY AND THE 2012 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE GENERATED USING AUTODESK CIVIL 3D 2012 AND SURVEY MEASUREMENT DATA FROM SURVEY SOLUTIONS, SPOKANE, WASHINGTON.
6. THE VOLUME DIFFERENCE BETWEEN THE NOVEMBER 1, 2010 AND OCTOBER 8, 2012 TOPOGRAPHICAL FEATURES IS A NET DECREASE (LOSS) OF 478 CUBIC YARDS, AS CALCULATED USING AUTODESK CIVIL 3D 2012 WITH SURVEY MEASUREMENT DATA FROM SURVEY SOLUTIONS, SPOKANE, WASHINGTON.




Job No. 36310154
 J:\GIS\Projects\Teck\Black Sand Beach\SubTasks\Design\R09 Asbuilt (2013)\Figure 7 (ISOpach - 2010 vs 2012).dwg
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Figure 7
ISOpach
2010 Survey vs 2012 Survey

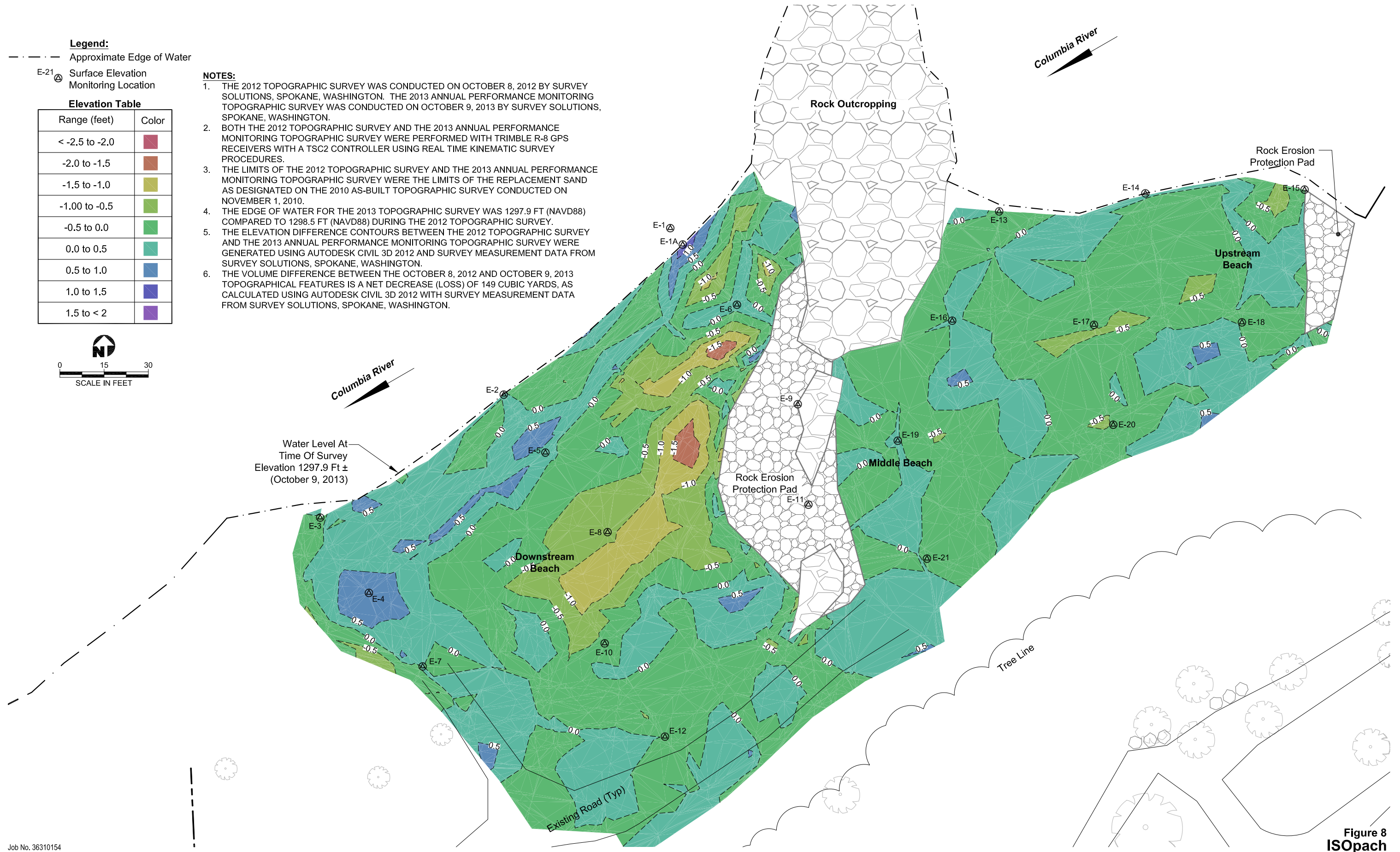
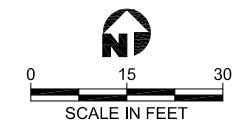
Black Sand Beach
 Northport, Washington

Legend:
 - - - - - Approximate Edge of Water
 E-21  Surface Elevation Monitoring Location

Elevation Table

Range (feet)	Color
< -2.5 to -2.0	
-2.0 to -1.5	
-1.5 to -1.0	
-1.00 to -0.5	
-0.5 to 0.0	
0.0 to 0.5	
0.5 to 1.0	
1.0 to 1.5	
1.5 to < 2	

- NOTES:**
1. THE 2012 TOPOGRAPHIC SURVEY WAS CONDUCTED ON OCTOBER 8, 2012 BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON. THE 2013 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WAS CONDUCTED ON OCTOBER 9, 2013 BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON.
 2. BOTH THE 2012 TOPOGRAPHIC SURVEY AND THE 2013 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE PERFORMED WITH TRIMBLE R-8 GPS RECEIVERS WITH A TSC2 CONTROLLER USING REAL TIME KINEMATIC SURVEY PROCEDURES.
 3. THE LIMITS OF THE 2012 TOPOGRAPHIC SURVEY AND THE 2013 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE THE LIMITS OF THE REPLACEMENT SAND AS DESIGNATED ON THE 2010 AS-BUILT TOPOGRAPHIC SURVEY CONDUCTED ON NOVEMBER 1, 2010.
 4. THE EDGE OF WATER FOR THE 2013 TOPOGRAPHIC SURVEY WAS 1297.9 FT (NAVD88) COMPARED TO 1298.5 FT (NAVD88) DURING THE 2012 TOPOGRAPHIC SURVEY.
 5. THE ELEVATION DIFFERENCE CONTOURS BETWEEN THE 2012 TOPOGRAPHIC SURVEY AND THE 2013 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE GENERATED USING AUTODESK CIVIL 3D 2012 AND SURVEY MEASUREMENT DATA FROM SURVEY SOLUTIONS, SPOKANE, WASHINGTON.
 6. THE VOLUME DIFFERENCE BETWEEN THE OCTOBER 8, 2012 AND OCTOBER 9, 2013 TOPOGRAPHICAL FEATURES IS A NET DECREASE (LOSS) OF 149 CUBIC YARDS, AS CALCULATED USING AUTODESK CIVIL 3D 2012 WITH SURVEY MEASUREMENT DATA FROM SURVEY SOLUTIONS, SPOKANE, WASHINGTON.



Job No. 36310154
 J:\GIS\Projects\Teck\Black Sand Beach\SubTasks\Design\R09 Asbuilt (2013)\Figure 8 (ISOpach - 2012 vs 2013).dwg
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Figure 8
ISOpach
2012 Survey vs 2013 Survey

Black Sand Beach
 Northport, Washington

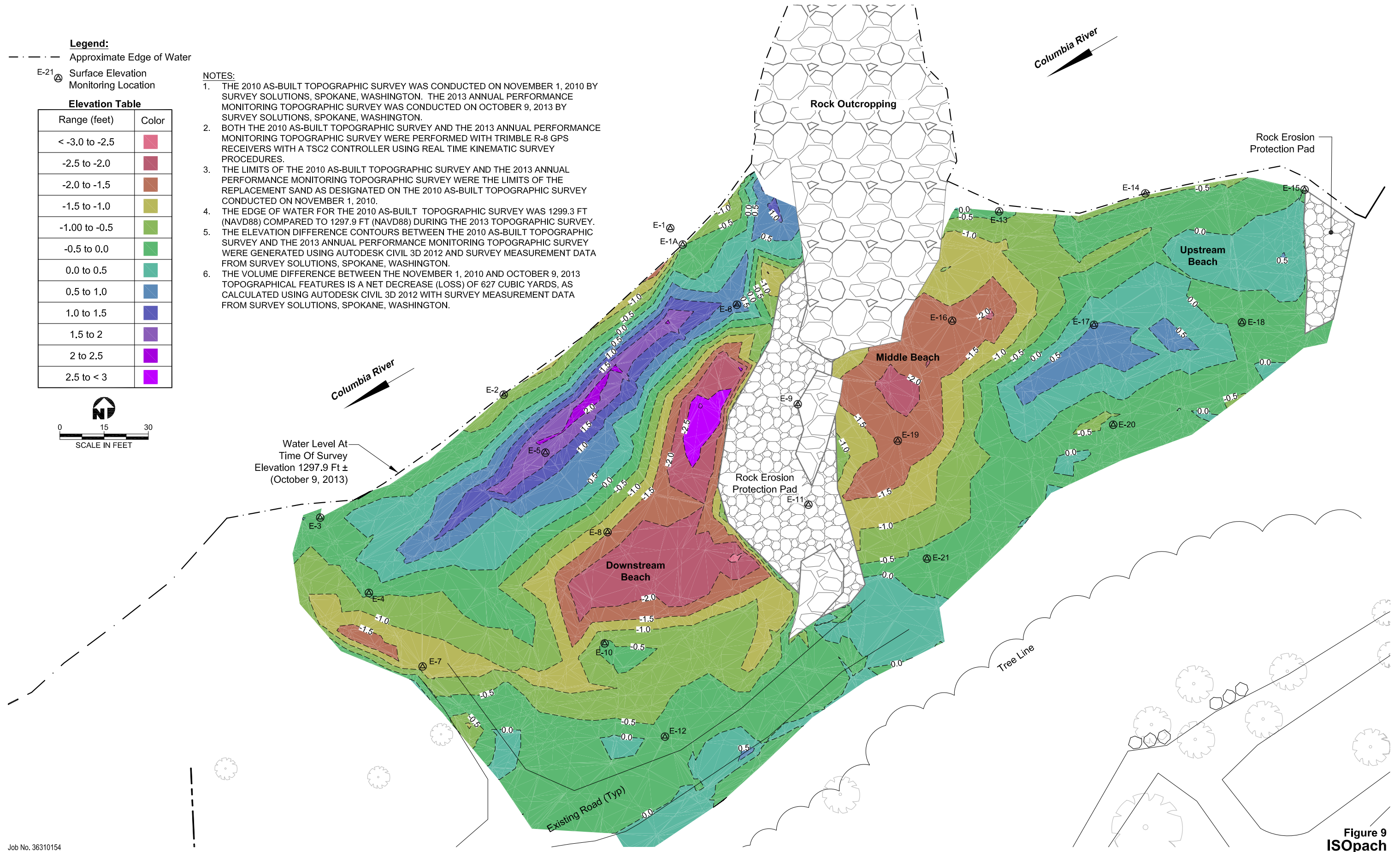
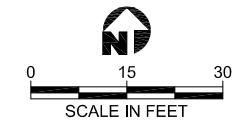
Legend:
 - - - - - Approximate Edge of Water
 E-21 Surface Elevation Monitoring Location

Elevation Table

Range (feet)	Color
< -3.0 to -2.5	
-2.5 to -2.0	
-2.0 to -1.5	
-1.5 to -1.0	
-1.00 to -0.5	
-0.5 to 0.0	
0.0 to 0.5	
0.5 to 1.0	
1.0 to 1.5	
1.5 to 2	
2 to 2.5	
2.5 to < 3	

NOTES:

1. THE 2010 AS-BUILT TOPOGRAPHIC SURVEY WAS CONDUCTED ON NOVEMBER 1, 2010 BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON. THE 2013 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WAS CONDUCTED ON OCTOBER 9, 2013 BY SURVEY SOLUTIONS, SPOKANE, WASHINGTON.
2. BOTH THE 2010 AS-BUILT TOPOGRAPHIC SURVEY AND THE 2013 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE PERFORMED WITH TRIMBLE R-8 GPS RECEIVERS WITH A TSC2 CONTROLLER USING REAL TIME KINEMATIC SURVEY PROCEDURES.
3. THE LIMITS OF THE 2010 AS-BUILT TOPOGRAPHIC SURVEY AND THE 2013 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE THE LIMITS OF THE REPLACEMENT SAND AS DESIGNATED ON THE 2010 AS-BUILT TOPOGRAPHIC SURVEY CONDUCTED ON NOVEMBER 1, 2010.
4. THE EDGE OF WATER FOR THE 2010 AS-BUILT TOPOGRAPHIC SURVEY WAS 1299.3 FT (NAVD88) COMPARED TO 1297.9 FT (NAVD88) DURING THE 2013 TOPOGRAPHIC SURVEY.
5. THE ELEVATION DIFFERENCE CONTOURS BETWEEN THE 2010 AS-BUILT TOPOGRAPHIC SURVEY AND THE 2013 ANNUAL PERFORMANCE MONITORING TOPOGRAPHIC SURVEY WERE GENERATED USING AUTODESK CIVIL 3D 2012 AND SURVEY MEASUREMENT DATA FROM SURVEY SOLUTIONS, SPOKANE, WASHINGTON.
6. THE VOLUME DIFFERENCE BETWEEN THE NOVEMBER 1, 2010 AND OCTOBER 9, 2013 TOPOGRAPHICAL FEATURES IS A NET DECREASE (LOSS) OF 627 CUBIC YARDS, AS CALCULATED USING AUTODESK CIVIL 3D 2012 WITH SURVEY MEASUREMENT DATA FROM SURVEY SOLUTIONS, SPOKANE, WASHINGTON.



Job No. 36310154
 J:\GIS\Projects\Teck\Black Sand Beach\SubTasks\Design\R09 Asbuilt (2013)\Figure 9 (ISOpach - 2010 vs 2013).dwg
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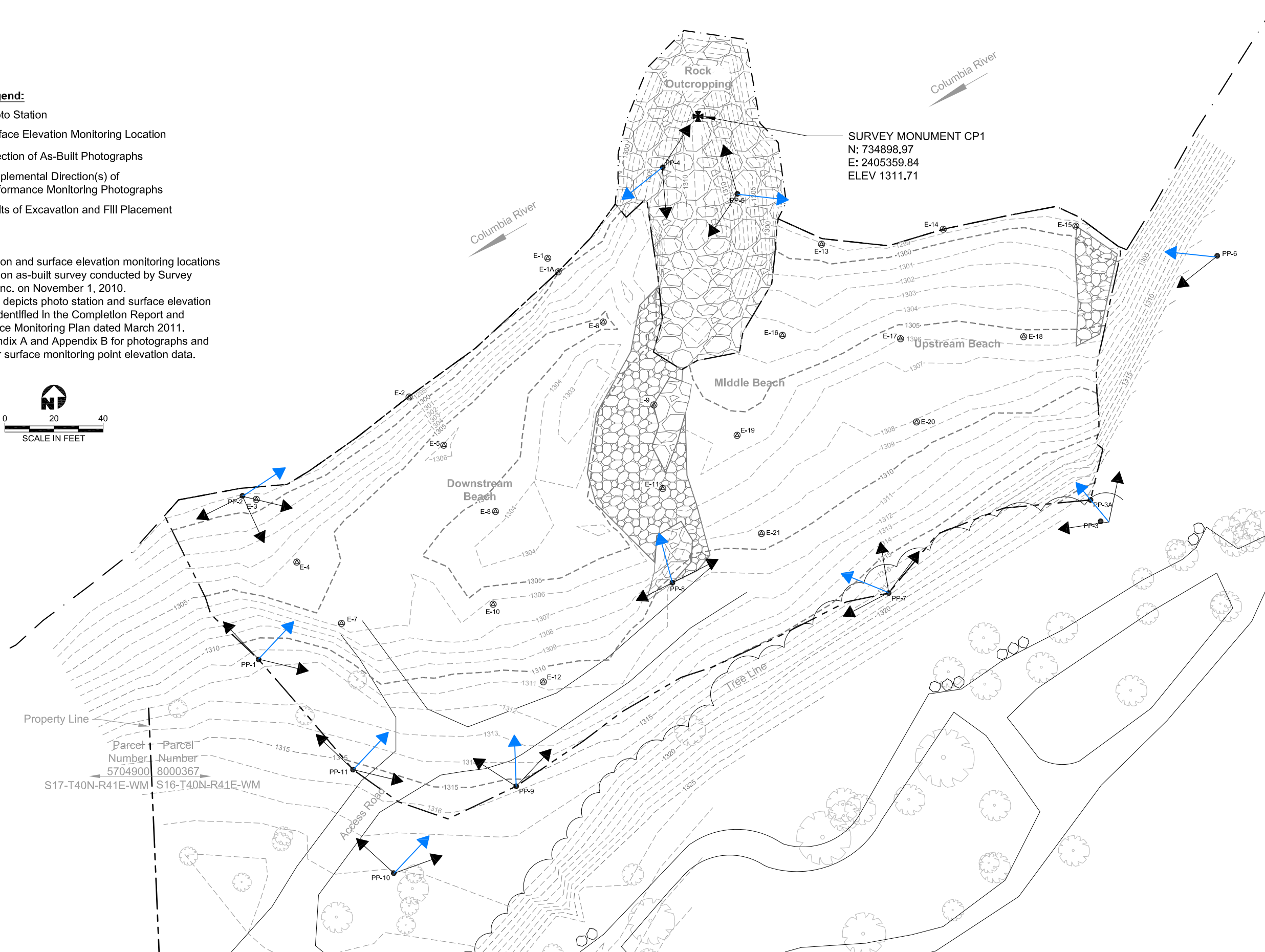
Figure 9
ISOpach
2010 Survey vs 2013 Survey

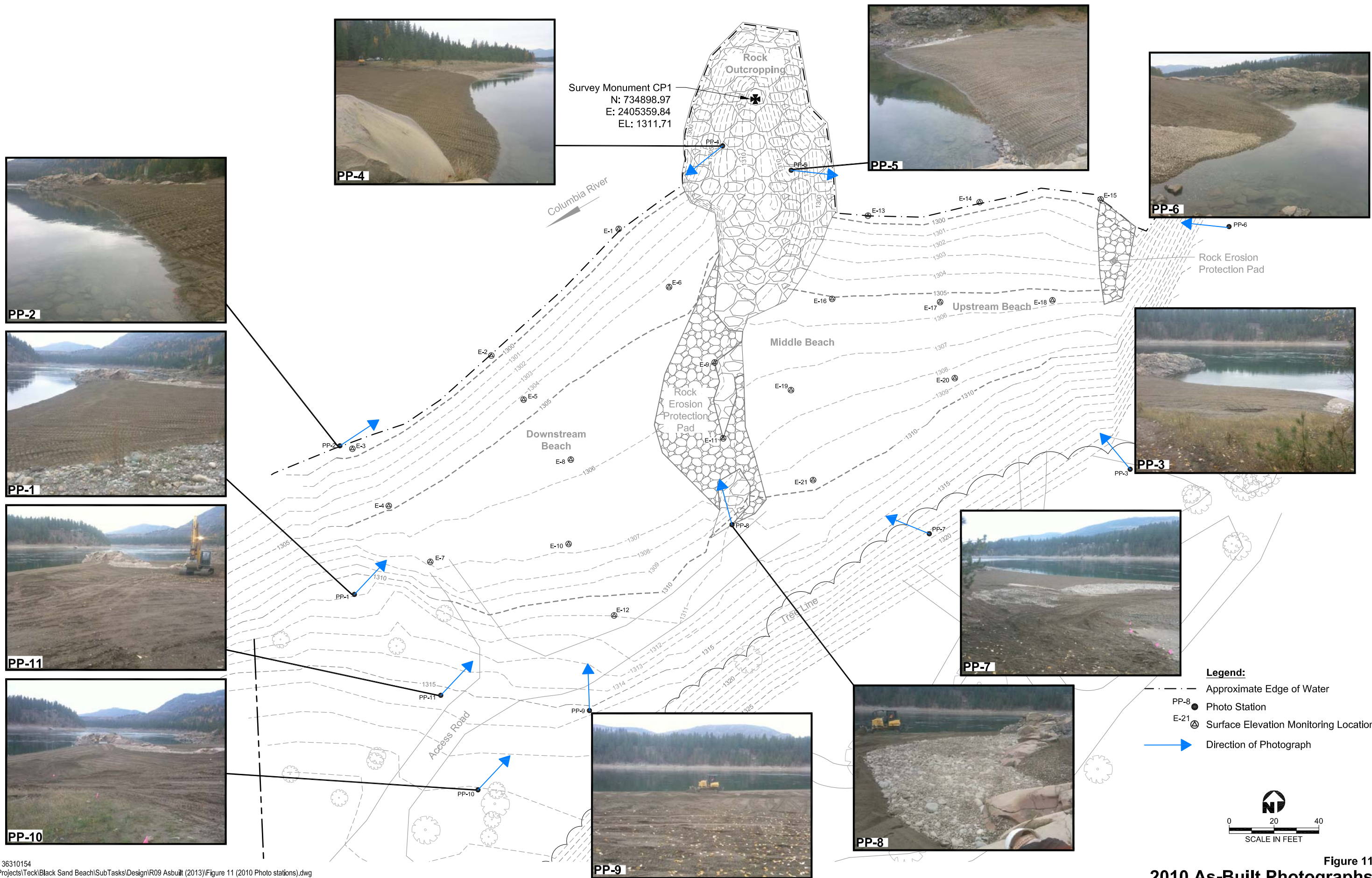
Black Sand Beach
 Northport, Washington

- Legend:**
- PP-8 ● Photo Station
 - E-21 ⊙ Surface Elevation Monitoring Location
 - ➡ Direction of As-Built Photographs
 - ➡ Supplemental Direction(s) of Performance Monitoring Photographs
 - ▭ Limits of Excavation and Fill Placement

Notes:

1. Photo station and surface elevation monitoring locations are based on as-built survey conducted by Survey Solutions Inc. on November 1, 2010.
2. This figure depicts photo station and surface elevation locations identified in the Completion Report and Performance Monitoring Plan dated March 2011.
3. See Appendix A and Appendix B for photographs and Table 1 for surface monitoring point elevation data.



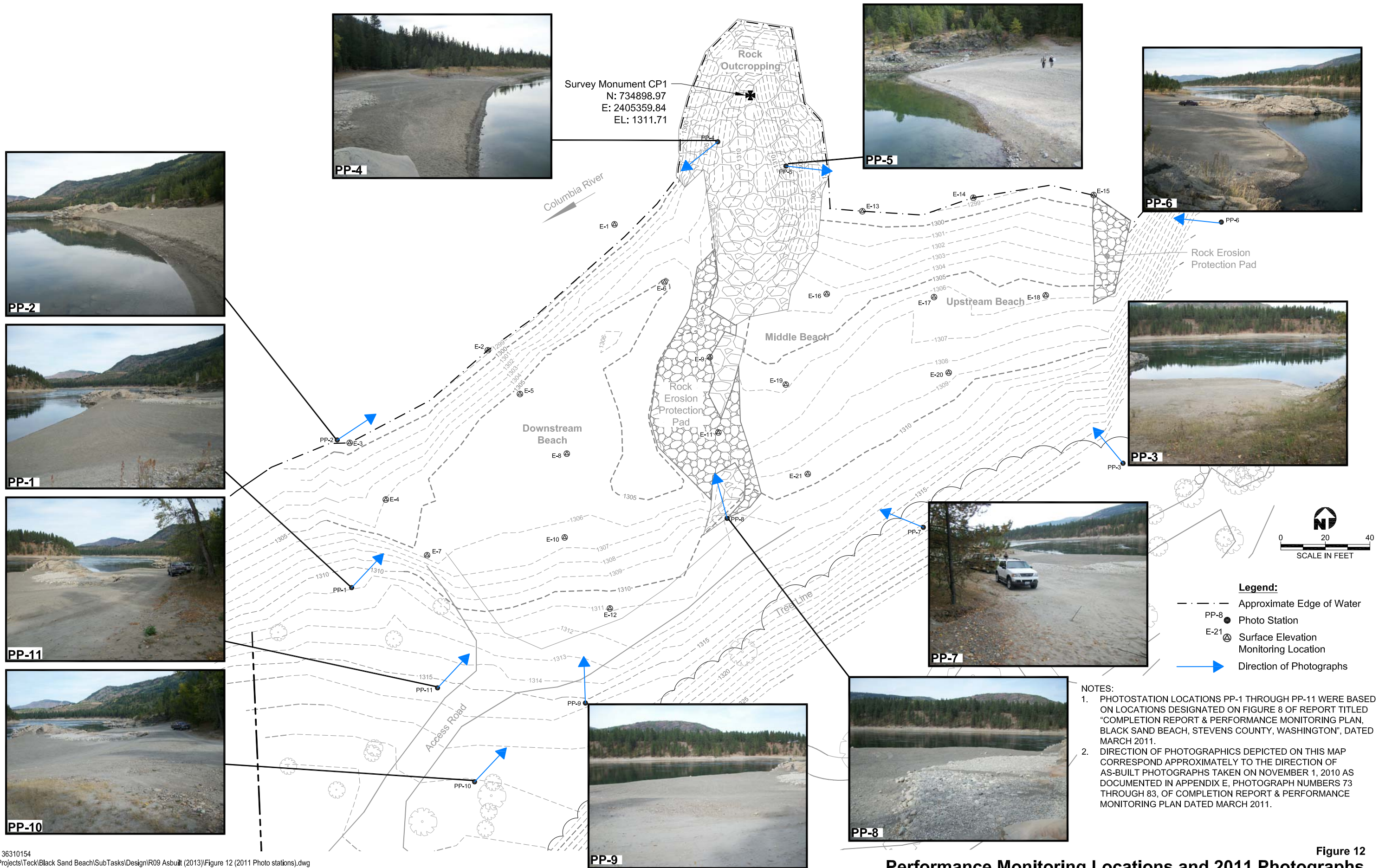


Survey Monument CP1
 N: 734898.97
 E: 2405359.84
 EL: 1311.71

Job No. 36310154
 J:\GIS\Projects\Teck\Black Sand Beach\SubTasks\Design\R09 Asbuilt (2013)\Figure 11 (2010 Photo stations).dwg
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Figure 11
2010 As-Built Photographs
 Black Sand Beach
 Northport, Washington

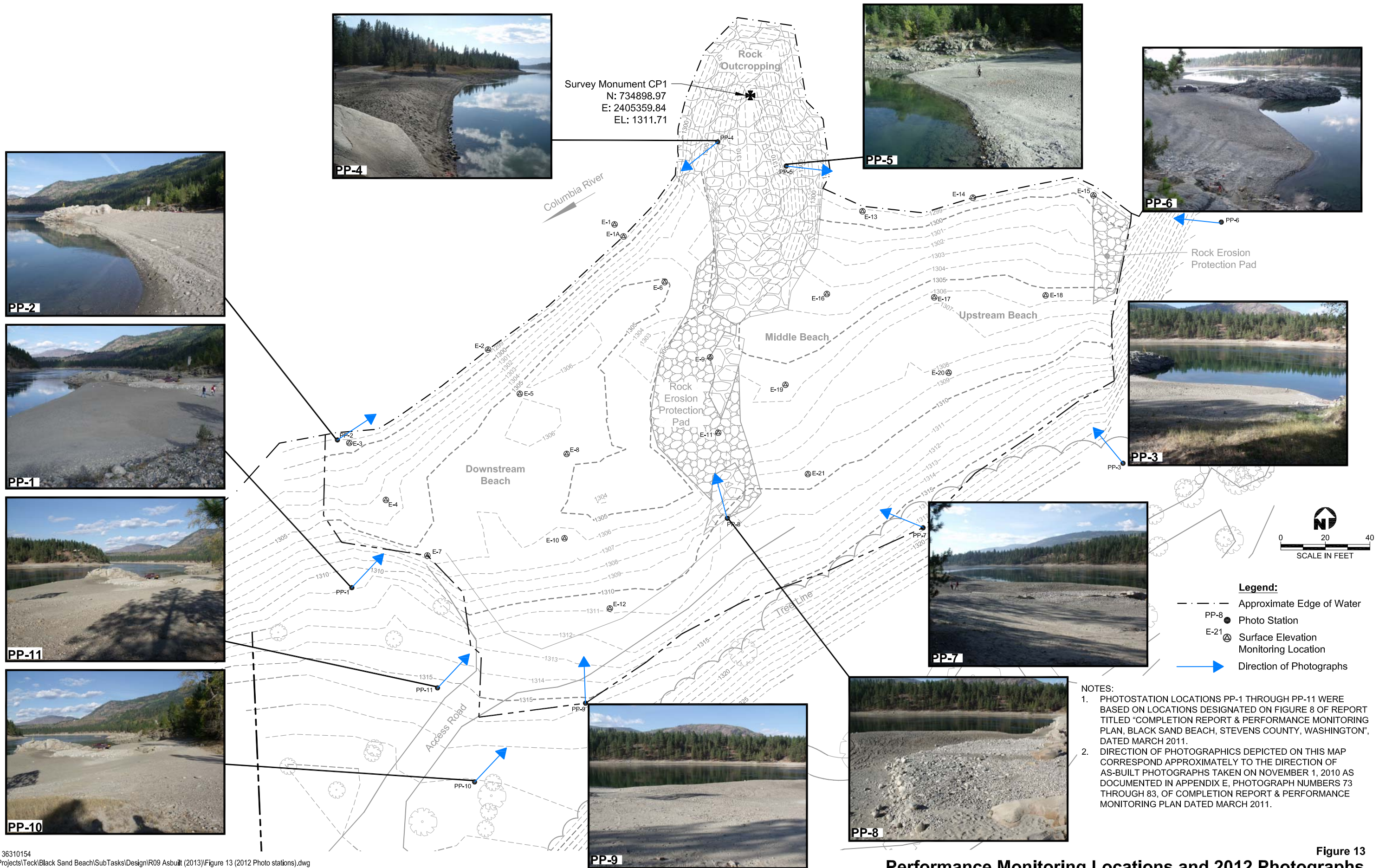


- NOTES:**
1. PHOTOSTATION LOCATIONS PP-1 THROUGH PP-11 WERE BASED ON LOCATIONS DESIGNATED ON FIGURE 8 OF REPORT TITLED "COMPLETION REPORT & PERFORMANCE MONITORING PLAN, BLACK SAND BEACH, STEVENS COUNTY, WASHINGTON", DATED MARCH 2011.
 2. DIRECTION OF PHOTOGRAPHICS DEPICTED ON THIS MAP CORRESPOND APPROXIMATELY TO THE DIRECTION OF AS-BUILT PHOTOGRAPHS TAKEN ON NOVEMBER 1, 2010 AS DOCUMENTED IN APPENDIX E, PHOTOGRAPH NUMBERS 73 THROUGH 83, OF COMPLETION REPORT & PERFORMANCE MONITORING PLAN DATED MARCH 2011.

Figure 12
Performance Monitoring Locations and 2011 Photographs
 Black Sand Beach
 Northport, Washington

Job No. 36310154
 J:\GIS\Projects\Teck\Black Sand Beach\SubTasks\Design\R09 Asbuilt (2013)\Figure 12 (2011 Photo stations).dwg
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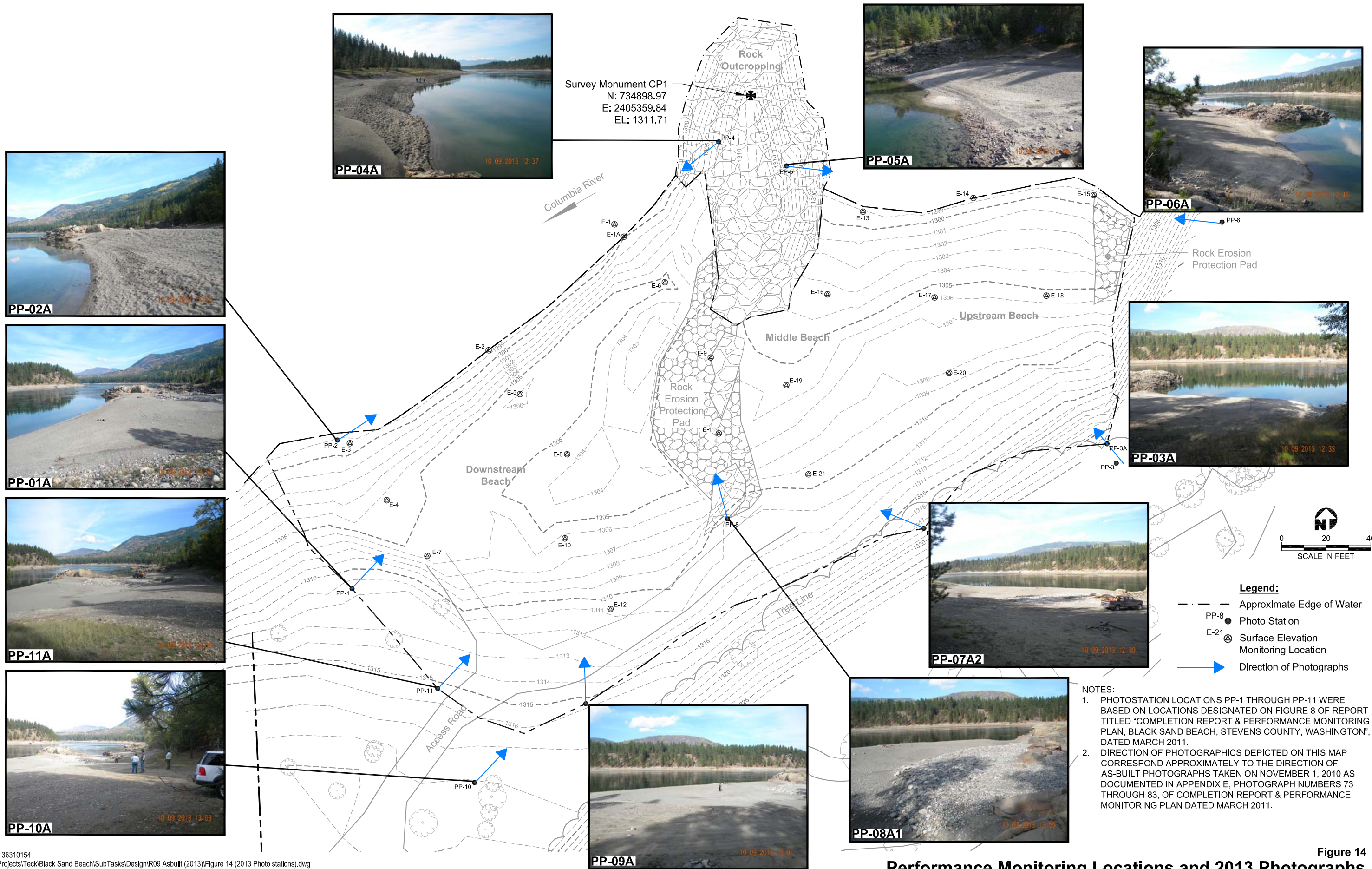




Job No. 36310154
 J:\GIS\Projects\Teck\Black Sand Beach\SubTasks\Design\R09 Asbuilt (2013)\Figure 13 (2012 Photo stations).dwg
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Figure 13
Performance Monitoring Locations and 2012 Photographs
 Black Sand Beach
 Northport, Washington



Job No. 36310154
 J:\GIS\Projects\Teck\Black Sand Beach\SubTasks\Design\R09 Asbuilt (2013)\Figure 14 (2013 Photo stations).dwg
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Figure 14
Performance Monitoring Locations and 2013 Photographs
 Black Sand Beach
 Northport, Washington

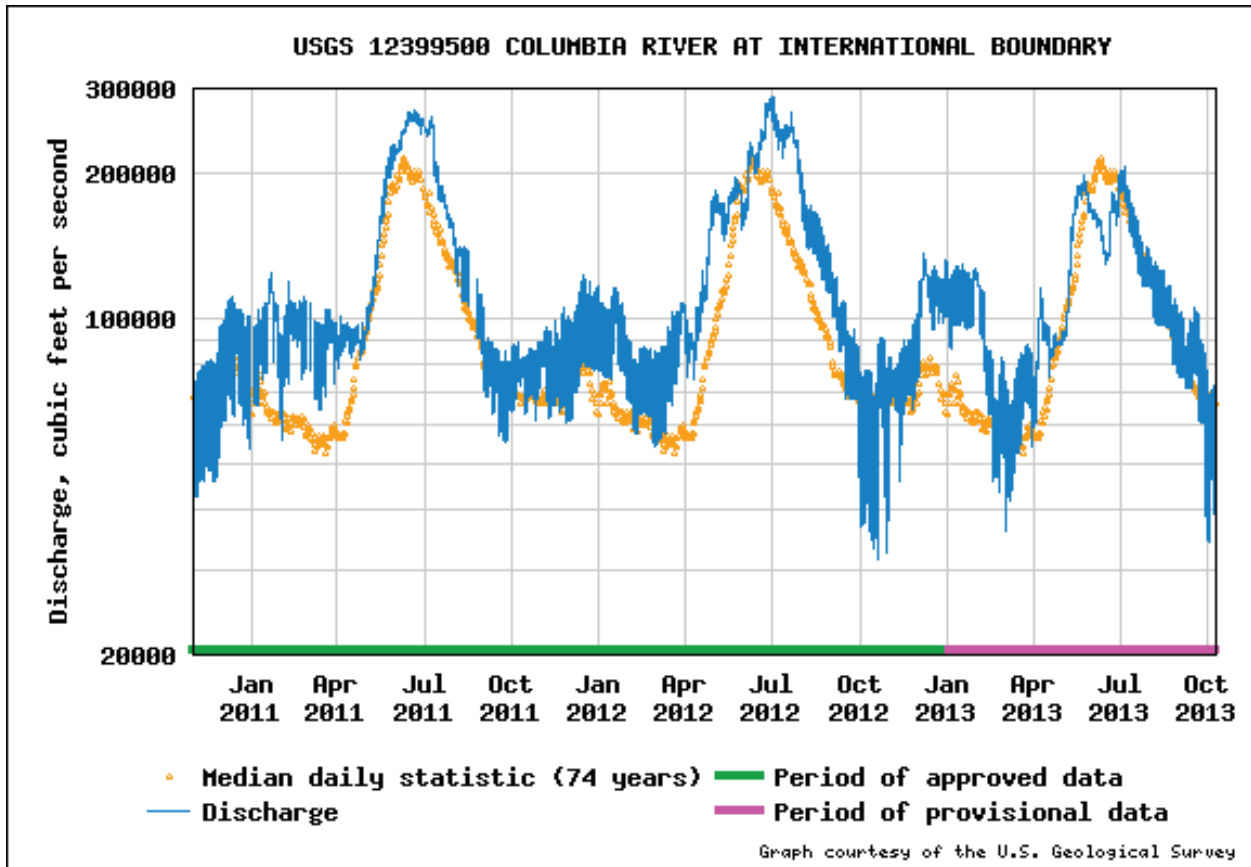


Figure 15
Discharge at USGS
Columbia River Station 12399500
at International Boundary

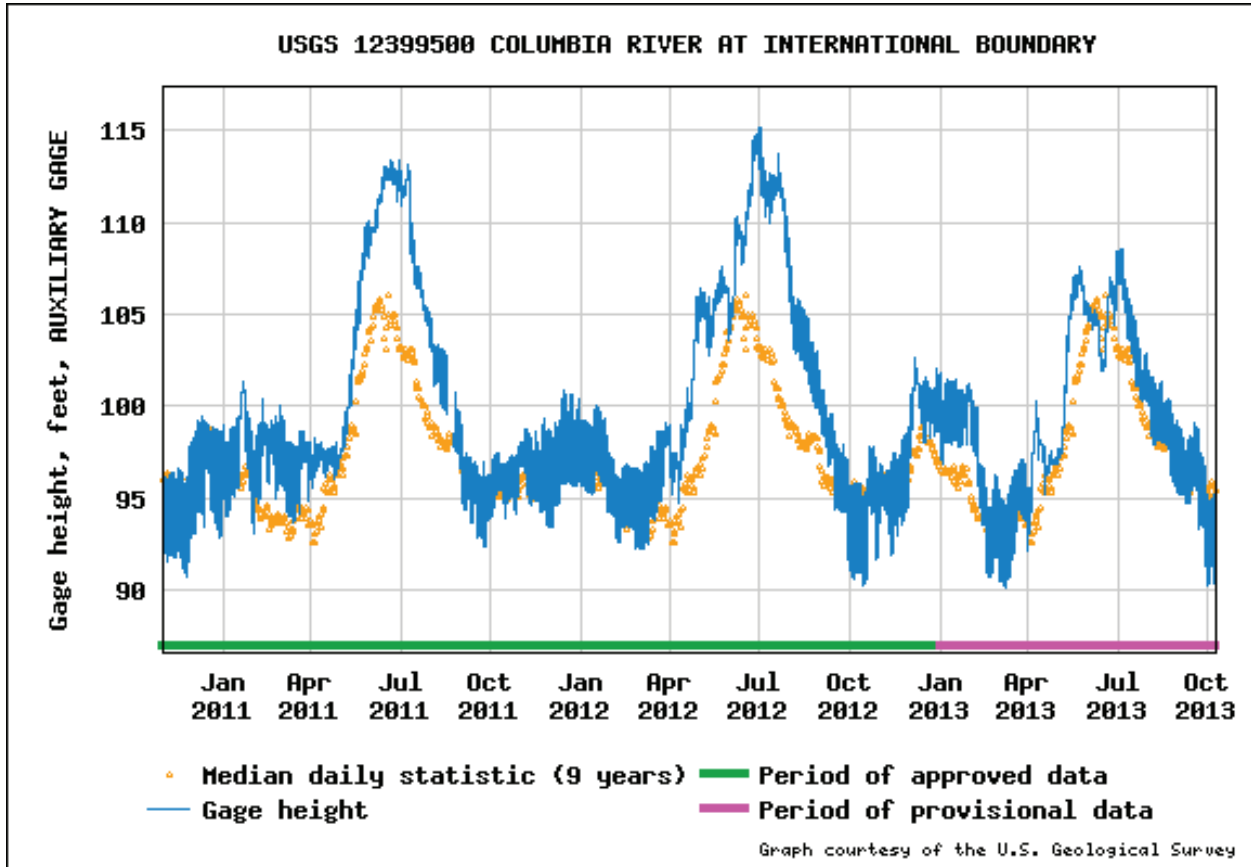


Figure 16
Gage Height at USGS
Columbia River Auxiliary Station 12399500
at International Boundary

APPENDIX A
PHOTOGRAPHIC LOG

Photo No.

1a

Photo Taken: 10/28/10

Direction Taken: Northeast

Description:

Photo Station No. 1
(Completion Report and Performance Monitoring Plan, March 2010)

Washington State Plane, North Zone NAD 83, US Ft

N. 734678.06
E. 2405180.90



Photo No.

1b

Photo Taken: 10/03/11

Direction Taken: Northeast

Description:

Photo Station No. 1
(2011 Annual Performance Monitoring Report, December 2011)

Washington State Plane, North Zone NAD 83, US Ft

N. 734678.06
E. 2405180.90



Photo No.

1c

Photo Taken: 10/08/12

Direction Taken: Northeast

Description:

Photo Station No. 1
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone NAD 83, US Ft

N. 734678.06
E. 2405180.90



Photo No.

1d

Photo Taken: 10/09/13

Direction Taken: Northeast

Description:

Photo Station No. 1

Washington State Plane, North Zone NAD 83, US Ft

N. 734678.06
E. 2405180.90



Photo No.

2a

Photo Taken: 10/28/10

Direction Taken: Northeast

Description:

Photo Station No. 2
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone NAD 83, US Ft

N. 734744.33
E. 2405174.42



Photo No.

2b

Photo Taken: 10/03/11

Direction Taken: Northeast

Description:

Photo Station No. 2
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone NAD 83, US Ft

N. 734744.33
E. 2405174.42



Photo No.

2c

Photo Taken: 10/08/12

Direction Taken: Northeast

Description:

Photo Station No. 2
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone NAD 83, US Ft

N. 734744.33
E. 2405174.42



Photo No.

2d

Photo Taken: 10/09/13

Direction Taken: Northeast

Description:

Photo Station No. 2
Washington State Plane, North Zone NAD 83, US Ft

N. 734744.33
E. 2405174.42



Photo No.

3a

Photo Taken: 10/28/10

Direction Taken: Northwest

Description:

Photo Station No. 3
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone NAD 83, US Ft

N. 734733.88
E. 2405527.09



Photo No.

3b

Photo Taken: 10/03/11

Direction Taken: Northwest

Description:

Photo Station No. 3
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone NAD 83, US Ft

N. 734733.88
E. 2405527.09



Photo No.

3c

Photo Taken: 10/08/12

Direction Taken: Northwest

Description:

Photo Station No. 3
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone NAD 83, US Ft

N. 734733.88
E. 2405527.09



Photo No.

3d

Photo Taken: 10/09/13

Direction Taken: Northwest

Description:

Photo Station No. 3
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone NAD 83, US Ft

N. 734733.88
E. 2405527.09



Photo No.

4a

Photo Taken: 10/28/10

Direction Taken: Southwest

Description:

Photo Station No. 4
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone NAD 83, US Ft

N. 734878.14
E. 2405345.23



Photo No.

4b

Photo Taken: 10/03/11

Direction Taken: Southwest

Description:

Photo Station No. 4
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone NAD 83, US Ft

N. 734878.14
E. 2405345.23



Photo No.

4c

Photo Taken: 10/08/12

Direction Taken: Southwest

Description:

Photo Station No. 4
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone NAD 83, US Ft

N. 734878.14
E. 2405345.23



Photo No.

4d

Photo Taken: 10/09/13

Direction Taken: Southwest

Description:

Photo Station No. 4
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone NAD 83, US Ft

N. 734878.14
E. 2405345.23



Photo No.

5a

Photo Taken: 10/28/10

Direction Taken: Northeast

Description:

Photo Station No. 5
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734867.28
E. 2405375.81



Photo No.

5b

Photo Taken: 10/03/11

Direction Taken: Northeast

Description:

Photo Station No. 5
(2011 Annual Performance Monitoring Report, December 2011)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734867.28
E. 2405375.81



Photo No.

5c

Photo Taken: 10/08/12

Direction Taken: Northeast

Description:

Photo Station No. 5
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734867.28
E. 2405375.81



Photo No.

5d

Photo Taken: 10/09/13

Direction Taken: Northeast

Description:

Photo Station No. 5
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734867.28
E. 2405375.81



Photo No.

6a

Photo Taken: 10/28/10

Direction Taken: West

Description:

Photo Station No. 6
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734842.12
E. 2405571.21



Photo No.

6b

Photo Taken: 10/03/11

Direction Taken: West

Description:

Photo Station No. 6
(2011 Annual Performance Monitoring Report, December 2011)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734842.12
E. 2405571.21



Photo No.

6c

Photo Taken: 10/08/12

Direction Taken: West

Description:

Photo Station No. 6
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734842.12
E. 2405571.21



Photo No.

6d

Photo Taken: 10/09/13

Direction Taken: West

Description:

Photo Station No. 6
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734842.12
E. 2405571.21



Photo No.

7a

Photo Taken: 10/28/10

Direction Taken: Northwest

Description:

Photo Station No. 7
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734705.11
E. 2405437.47

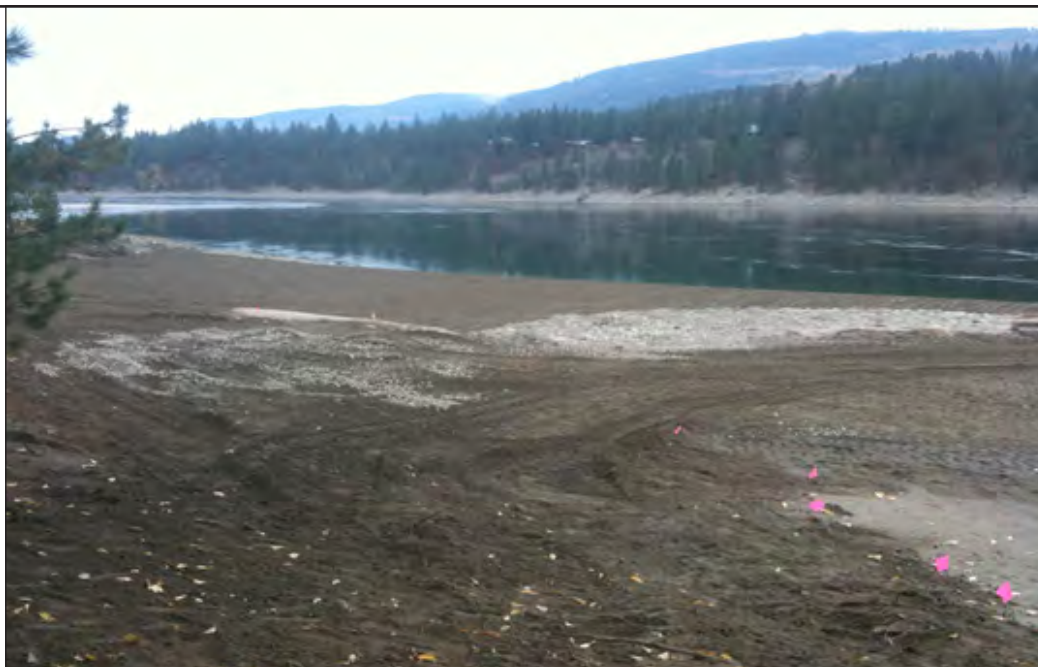


Photo No.

7b

Photo Taken: 10/03/11

Direction Taken: Northwest

Description:

Photo Station No. 7
(2011 Annual Performance Monitoring Report , December 2011)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734705.11
E. 2405437.47



Photo No.

7c

Photo Taken: 10/08/12

Direction Taken: Northwest

Description:

Photo Station No. 7
(2012 Annual Performance Monitoring Report , November 2011)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734705.11
E. 2405437.47



Photo No.

7d

Photo Taken: 10/09/13

Direction Taken: Northwest

Description:

Photo Station No. 7
(2012 Annual Performance Monitoring Report , November 2011)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734705.11
E. 2405437.47



Photo No.

8a

Photo Taken: 10/28/10

Direction Taken: Northwest

Description:

Photo Station No. 8
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734709.15
E. 2405349.41



Photo No.

8b

Photo Taken: 10/03/11

Direction Taken: Northwest

Description:

Photo Station No. 8
(2011 Annual Performance Monitoring Report, December 2011)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734709.15
E. 2405349.41



Photo No.

8c

Photo Taken: 10/08/12

Direction Taken: Northwest

Description:

Photo Station No. 8
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734709.15
E. 2405349.41



Photo No.

8d

Photo Taken: 10/09/13

Direction Taken: Northwest

Description:

Photo Station No. 8
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone, NAD 83, US Ft

N. 734709.15
E. 2405349.41



Photo No.

9a

Photo Taken: 10/28/10

Direction Taken: North

Description:

Photo Station No. 9
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734626.25
E. 2405285.80



Photo No.

9b

Photo Taken: 10/03/11

Direction Taken: North

Description:

Photo Station No. 9
(2011 Annual Performance Monitoring Report, December 2011)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734626.25
E. 2405285.80



Photo No.

9c

Photo Taken: 10/08/12

Direction Taken: North

Description:

Photo Station No. 9
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734626.25
E. 2405285.80



Photo No.

9d

Photo Taken: 10/09/13

Direction Taken: North

Description:

Photo Station No. 9
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734626.25
E. 2405285.80



Photo No.

10a

Photo Taken: 10/28/10

Direction Taken: North

Description:

Photo Station No. 10
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734590.89
E. 2405236.06



Photo No.

10b

Photo Taken: 10/03/11

Direction Taken: North

Description:

Photo Station No. 10
(2011 Annual Performance Monitoring Report, December 2011)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734590.89
E. 2405236.06



Photo No.

10c

Photo Taken: 10/08/12

Direction Taken: North

Description:

Photo Station No. 10
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734590.89
E. 2405236.06



Photo No.

10d

Photo Taken: 10/09/13

Direction Taken: North

Description:

Photo Station No. 10
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734590.89
E. 2405236.06



Photo No.

11a

Photo Taken: 10/28/10

Direction Taken: Northeast

Description:

Photo Station No. 11
(Completion Report and Performance Monitoring Plan, March 2011)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734633.06
E. 2405219.44



Photo No.

11b

Photo Taken: 10/03/11

Direction Taken: Northeast

Description:

Photo Station No. 11
(2011 Annual Performance Monitoring Report, December 2011)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734633.06
E. 2405219.44



Photo No.

11c

Photo Taken: 10/08/12

Direction Taken: Northeast

Description:

Photo Station No. 11
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734633.06
E. 2405219.44



Photo No.

11d

Photo Taken: 10/09/13

Direction Taken: Northeast

Description:

Photo Station No. 11
(2012 Annual Performance Monitoring Report, November 2012)

Washington State Plane, North Zone
NAD 83, US Ft

N. 734633.06
E. 2405219.44



APPENDIX B
SUPPLEMENTAL PHOTOGRAPHIC LOG

Photo No.

B-01

Photo Taken: 10/09/13

Direction Taken:
Northeast

Description:

Photo Station No. 1



Photo No.

B-02

Photo Taken: 10/09/13

Direction Taken:
West

Description:

Photo Station No. 1



Photo No.

B-03

Photo Taken: 10/09/13

Direction Taken:
Northwest

Description:

Photo Station No. 1



Photo No.

B-04

Photo Taken: 10/09/13

Direction Taken:
Northeast

Description:

Photo Station No. 2



Photo No.

B-05

Photo Taken: 10/09/13

Direction Taken:
Northeast

Description:

Photo Station No. 2



Photo No.

B-06

Photo Taken: 10/09/13

Direction Taken:
Southeast

Description:

Photo Station No. 2



Photo No.

B-07

Photo Taken: 10/09/13

Direction Taken: South

Description:

Photo Station No. 2



Photo No.

B-08

Photo Taken: 10/09/13

Direction Taken:
West

Description:

Photo Station No. 2



Photo No.

B-09

Photo Taken: 10/09/13

Direction Taken:
Northwest

Description:

Photo Station No. 3



Photo No.

B-10

Photo Taken: 10/09/13

Direction Taken:
Northeast

Description:

Photo Station No. 3



Photo No.

B-11

Photo Taken: 10/09/13

Direction Taken:
West

Description:

Photo Station No. 3



Photo No.

B-12

Photo Taken: 10/09/13

Direction Taken:
Southwest

Description:

Photo Station No. 4



Photo No.

B-13

Photo Taken: 10/09/13

Direction Taken:
North

Description:

Photo Station No. 4



Photo No.

B-14

Photo Taken: 10/09/13

Direction Taken: North

Description:

Photo Station No. 4



Appendix B

Supplemental Photographic Log

Job No. 36310197 | BSB Photo Log - Appendix B.indd

URS

Black Sand Beach Project, Stevens County, Washington
Teck American Incorporated

Photo No.

B-15

Photo Taken: 10/09/13

Direction Taken: South

Description:

Photo Station No. 4



Photo No.

B-16

Photo Taken: 10/09/13

Direction Taken:
East

Description:

Photo Station No. 5



Photo No.

B-17

Photo Taken: 10/09/13

Direction Taken: South

Description:

Photo Station No. 5



Photo No.

B-18

Photo Taken: 10/09/13

Direction Taken: South

Description:

Photo Station No. 5



Photo No.

B-19

Photo Taken: 10/09/13

Direction Taken: North

Description:

Photo Station No. 5



Photo No.

B-20

Photo Taken: 10/09/13

Direction Taken:
Northwest

Description:

Photo Station No. 6



Appendix B

Supplemental Photographic Log

Job No. 36310197 | BSB Photo Log - Appendix B.indd

URS

Black Sand Beach Project, Stevens County, Washington
Teck American Incorporated

Photo No.

B-21

Photo Taken: 10/09/13

Direction Taken:
West

Description:

Photo Station No. 6



Photo No.

B-22

Photo Taken: 10/09/13

Direction Taken:
Northwest

Description:

Photo Station No. 7



Photo No.

B-23

Photo Taken: 10/09/13

Direction Taken:
Northwest

Description:

Photo Station No. 7



Photo No.

B-24

Photo Taken: 10/09/13

Direction Taken:
Northwest

Description:

Photo Station No. 7



Photo No.

B-25

Photo Taken: 10/09/13

Direction Taken: North

Description:

Photo Station No. 7



Photo No.

B-26

Photo Taken: 10/09/13

Direction Taken: North

Description:

Photo Station No. 7



Photo No.

B-27

Photo Taken: 10/09/13

Direction Taken:
Northeast

Description:

Photo Station No. 7



Photo No.

B-28

Photo Taken: 10/09/13

Direction Taken:
Southwest

Description:

Photo Station No. 7



Appendix B

Supplemental Photographic Log

Job No. 36310197 | BSB Photo Log - Appendix B.indd

URS

Black Sand Beach Project, Stevens County, Washington
Teck American Incorporated

Photo No.

B-29

Photo Taken: 10/09/13

Direction Taken: North

Description:

Photo Station No. 8



Photo No.

B-30

Photo Taken: 10/09/13

Direction Taken: North

Description:

Photo Station No. 8



Photo No.

B-31

Photo Taken: 10/09/13

Direction Taken:
Northeast

Description:

Photo Station No. 8



Photo No.

B-32

Photo Taken: 10/09/13

Direction Taken:
Southwest

Description:

Photo Station No. 8



Photo No.

B-33

Photo Taken: 10/09/13

Direction Taken: North

Description:

Photo Station No. 9



Photo No.

B-34

Photo Taken: 10/09/13

Direction Taken:
Northeast

Description:

Photo Station No. 9



Photo No.

B-35

Photo Taken: 10/09/13

Direction Taken:
Northwest

Description:

Photo Station No. 9



Photo No.

B-36

Photo Taken: 10/09/13

Direction Taken:
Northeast

Description:

Photo Station No. 10



Photo No.

B-37

Photo Taken: 10/09/13

Direction Taken:
East

Description:

Photo Station No. 10



Photo No.

B-38

Photo Taken: 10/09/13

Direction Taken:
Northwest

Description:

Photo Station No. 10



Photo No.

B-39

Photo Taken: 10/09/13

Direction Taken:
Northeast

Description:

Photo Station No. 11



Photo No.

B-40

Photo Taken: 10/09/13

Direction Taken:
East

Description:

Photo Station No. 11



Photo No.

B-41

Photo Taken: 10/09/13

Direction Taken:
Northwest

Description:

Photo Station No. 11



Photo No.

B-42

Photo Taken: 10/09/13

Direction Taken:

Description:

USGS Gage



Appendix B

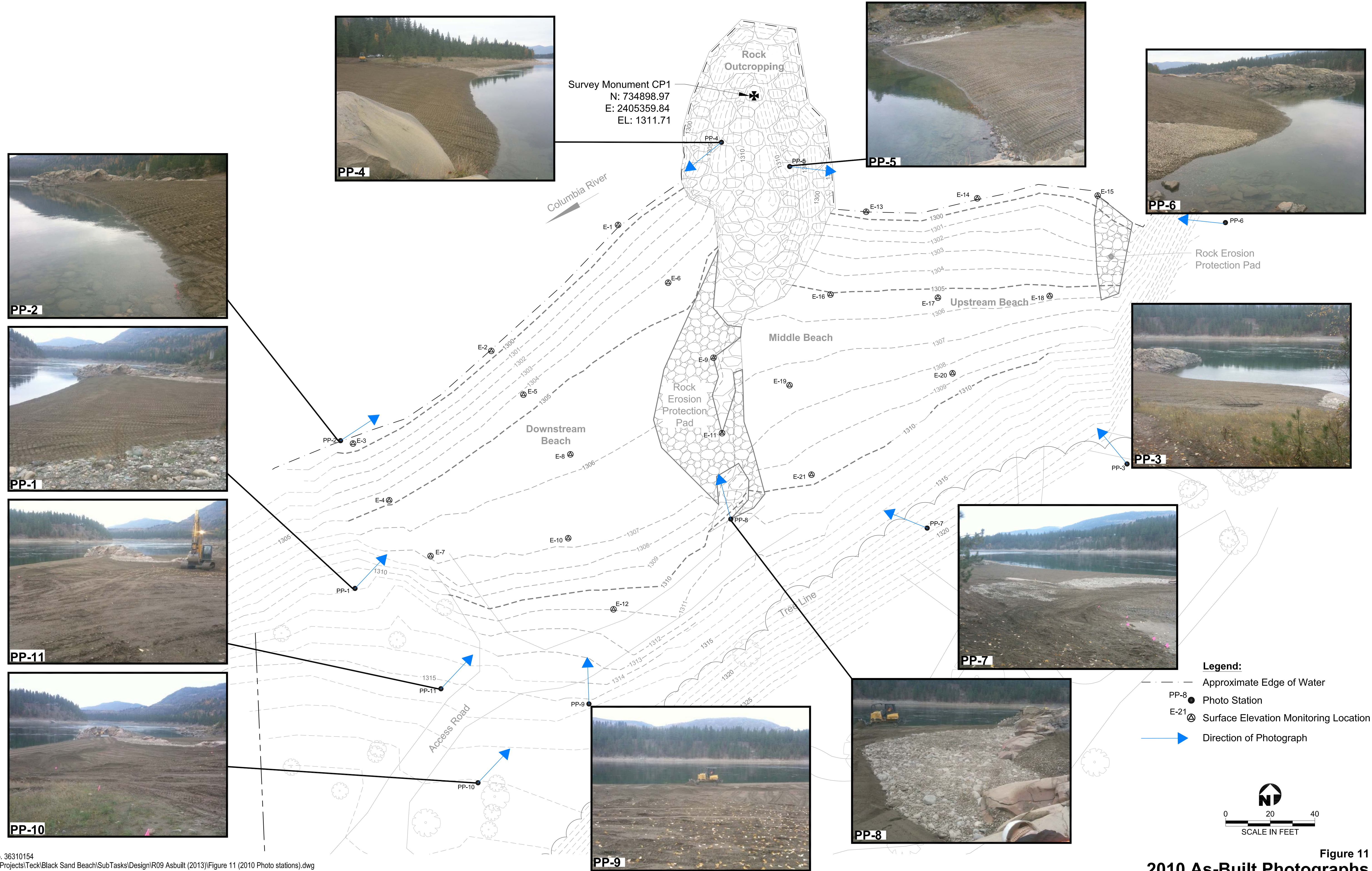
Supplemental Photographic Log

Job No. 36310197 | BSB Photo Log - Appendix B.indd

URS

Black Sand Beach Project, Stevens County, Washington
Teck American Incorporated

APPENDIX C
LARGE PHOTOGRAPHIC MAPS



Job No. 36310154
J:\GIS\Projects\Teck\Black Sand Beach\SubTasks\Design\R09 Asbuilt (2013)\Figure 11 (2010 Photo stations).dwg
Mod: 12/09/2013, 11:25 | Plotted: 12/09/2013, 11:33 | john_knobbs



Figure 11
2010 As-Built Photographs
Black Sand Beach
Northport, Washington

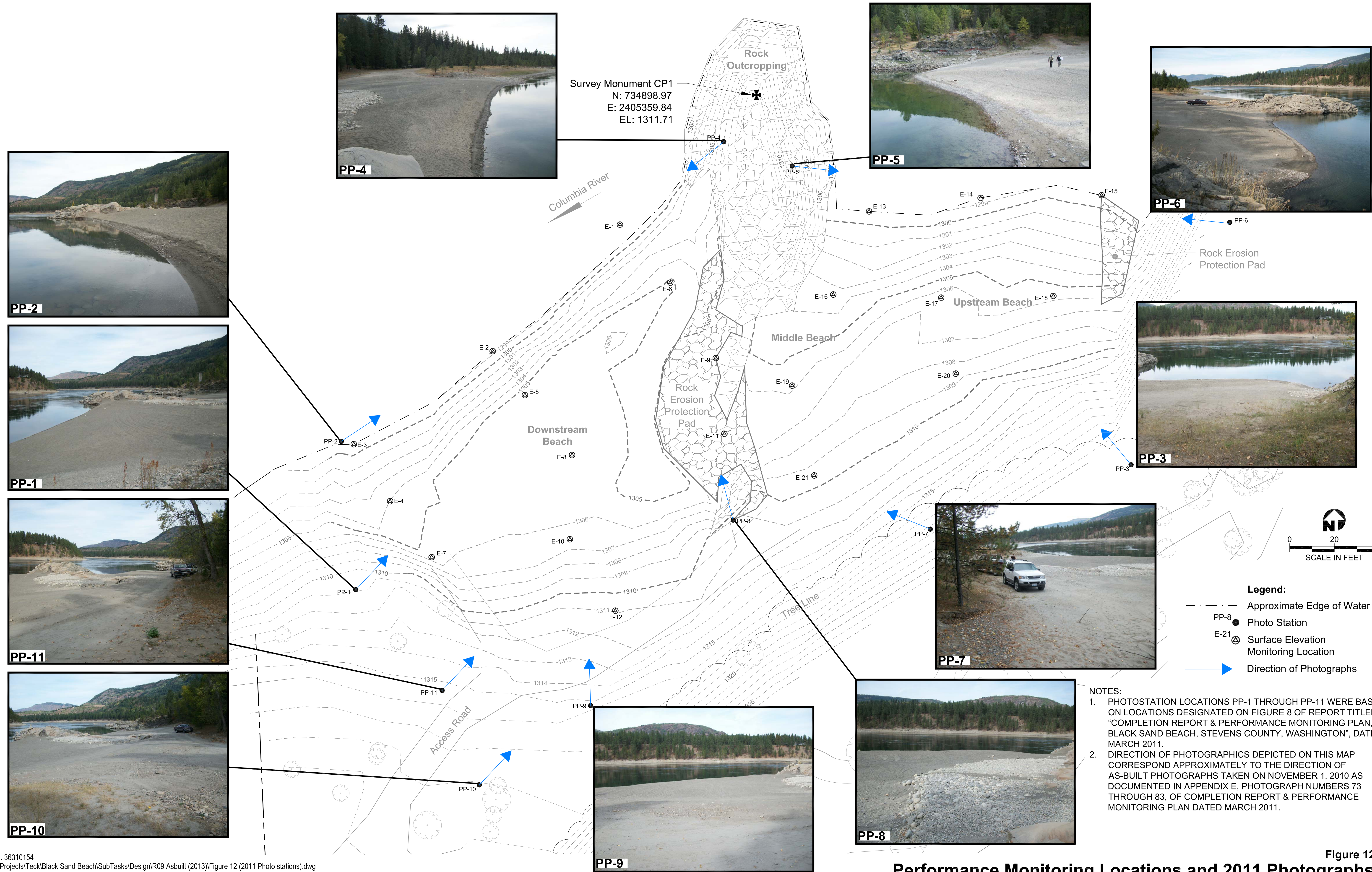


Figure 12
Performance Monitoring Locations and 2011 Photographs
 Black Sand Beach
 Northport, Washington

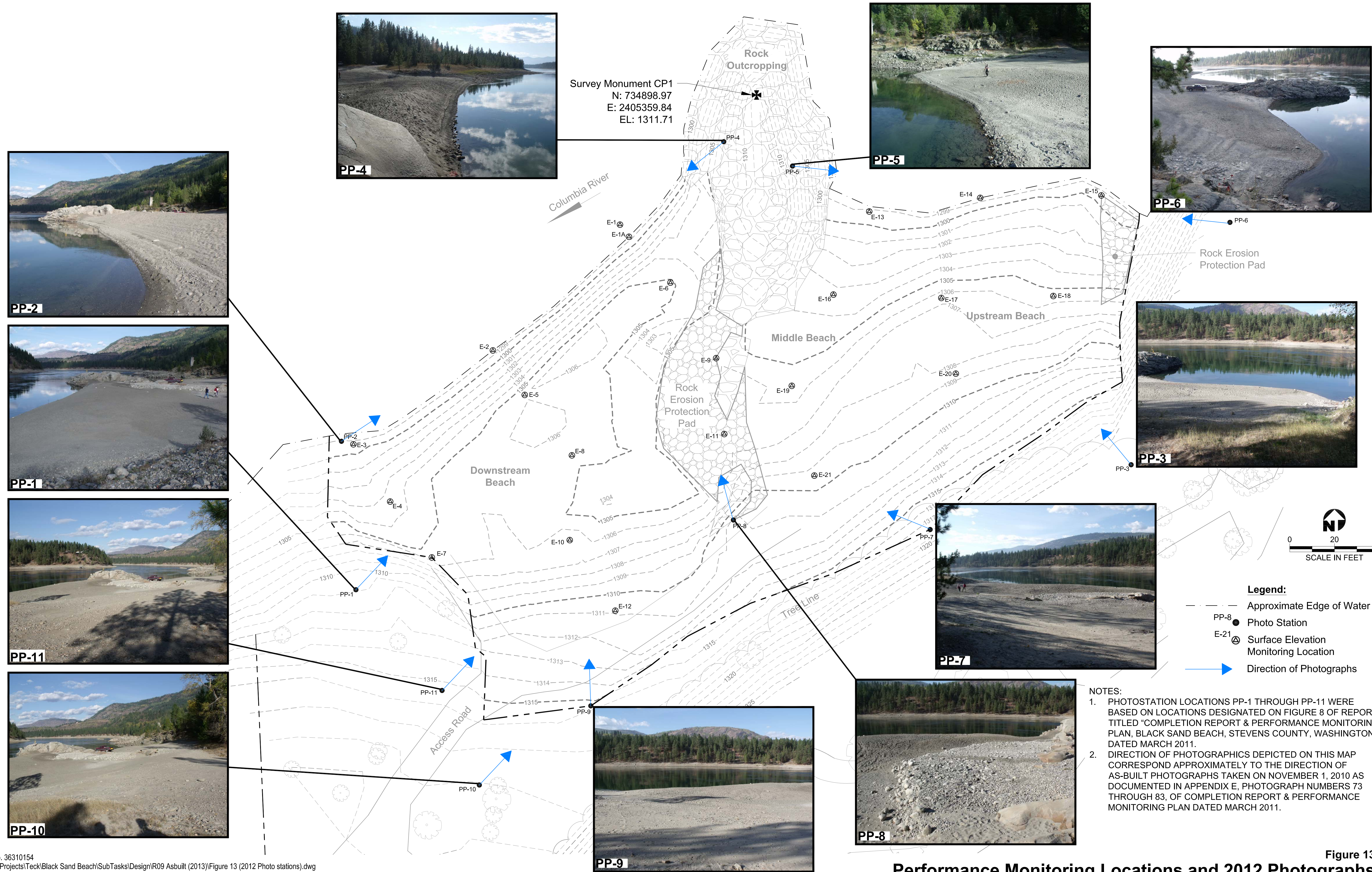


Figure 13
Performance Monitoring Locations and 2012 Photographs
 Black Sand Beach
 Northport, Washington

