Condit Hydroelectric Project Decommissioning

FERC Project No. 2342

ANNUAL SEDIMENT ASSESSMENT REPORT - 2012

Prepared by:

RIVERBEND ENGINEERING, LLC

And

JR MERIT INDUSTRIAL CONTRACTORS

Prepared for:

PACIFICORP ENERGY
A DIVISION OF PACIFICORP

September 27, 2012

This document is considered Public Information.

Annual Sediment Assessment Report - 2012

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1.0 Introduction

1.1 Project Description

PacifiCorp Energy owns and operates the Condit Hydroelectric Project, which was completed in 1913 on the White Salmon River in Skamania County and Klickitat County, Washington. In 1991, PacifiCorp Energy filed an application with the Federal Energy Regulatory Commission (FERC) for a new license authorizing the continued operation and maintenance of the project. Following PacifiCorp Energy's evaluation of the economic impacts of the FERC recommendations contained within the Final Environmental Impact Statement (FEIS), it determined that the mandatory conditions would render the project uneconomic to operate. After consultation with project stakeholders, the Condit Settlement Agreement was signed by PacifiCorp Energy and project stakeholders to decommission the hydroelectric project resolving all issues in the proceeding for relicensing the project. The Condit Hydroelectric Project is currently being removed as outlined in the Project Removal Design Report dated March 15, 2011, 12 supporting management plans, the Washington Department of Ecology 401 Certification Order No. 8049, the US Army Corps of Engineers 404 Permit NWP-2004-523, and the FERC Surrender Order.

A specific Management Plan was developed (Sediment Assessment, Stabilization, and Management Plan, PacifiCorp Energy, 2011) to address sediment stability and management issues that were expected to occur in the decommissioning process. This plan identified general goals and procedures for 1) performing a post-dewatering-assessment, 2) mapping the sediment which remains in the reservoir area, 3) estimating the quantity of sediment remaining in the reservoir area, 4) evaluating the stability of sediment slopes and banks in the reservoir area, 5) determining corrective actions as needed, and 6) evaluating fish passage through the former reservoir.

1.2 Regulatory Requirements

A Section 404 permit was issued for this project (US Army Corps of Engineers, Regulatory Division, May 13, 2011). The 404 permit requires that the applicant (PacifiCorp Energy) implement the Management Plan (Sediment Assessment, Stabilization, and Management Plan, PacifiCorp Energy, 2011) as approved by the FERC.

A Section 401 water quality certification was issued for this project (Washington Department of Ecology, Water Quality Certification Order No. 8049, October 12, 2010). The 401 certification requires that the applicant (PacifiCorp Energy) implement the Management Plan (Sediment Assessment, Stabilization, and Management Plan, PacifiCorp Energy, 2011). The 401 Certification establishes "Interim Limits" to assess and manage reservoir sediments, including 1) mapping the sediment which remains in the reservoir area, 2) estimating the quantity of sediment remaining in the reservoir area, 3) evaluating the stability of sediment slopes and banks in the reservoir area, 4) determining corrective actions as needed, and 5) evaluating fish passage through the former reservoir.

The Federal Energy Regulatory Commission has issued the Order Accepting Surrender of License, Authorizing Removal of Project Facilities, and Dismissing Application for New License (FERC, December 16, 2010 (FERC December 2010 SO)); Order on Rehearing, Denying Stay, and Dismissing

Extension of Time Request (FERC, April 21, 2011 (FERC April 2011 SO)); and Order Modifying and Approving Sediment Assessment, Stabilization and Management Plan (FERC, May 12, 2011) for the project. The FERC April 2011 SO slightly modified Ordering Paragraph M of the FERC December 2010 SO regarding the Reservoir Sediment Assessment and Stabilization Plan. The FERC April 2011 SO required PacifiCorp Energy to submit a Sediment Assessment, Stabilization, and Management Plan in accordance with the Ecology 401 Certification. The FERC Order Modifying and Approving Sediment Assessment, Stabilization, and Management Plan (FERC, May 12, 2011) incorporated elements of the Sediment Assessment, Stabilization, and Management Plan into their requirements. In December 2011 PacifiCorp Energy submitted a Draft Sediment Behavior Report to FERC and to the Washington Department of Ecology. The draft report summarized the sediment conditions observed in the first 60 days after breach of the dam. In February of 2012 PacifiCorp Energy submitted the Post-Reservoir-Dewatering Assessment Report, as required in the May 2011 FERC order. That Report quantified the sediments remaining in the reservoir area, based on LiDAR data collected on December 21, 2011. That report included the plan for grading and stabilization of the remaining sediments.

2.0 Sediment Behavior After the Dam Breach

2.1 Natural Sediment Movement in the First 60 Days

The Post-Reservoir-Dewatering Assessment Report (PacifiCorp Energy, February 2012) documented the dramatic evacuation of sediment from the reservoir area in the first few hours after the breach event. That report included topographic data collected as LiDAR points on December 21, 2011, 58 days after the breach. By the time of the LiDAR survey the rate of river bed elevation change within the reservoir area had decreased to a visually undetectable level, and large mass wasting events had ceased to occur. As sediment mobilization rates decreased, the turbidity measurements at the powerhouse also decreased, with base flow turbidity measurements in the 20-50 nephelometric turbidity units (NTU) range. This trend of decreasing baseline turbidity continued through the winter months.

2.2 Mechanical Movement of Sediment

Beginning in January 2012, the Contractor began to implement the grading plan within the former reservoir area. Soil conditions were still quite wet, and winter rains did not help matters. Various types of heavy equipment were tested on the soft soils, and more than one piece of equipment got stuck before soil conditions began to dry out in late April. Low ground pressure excavator machines proved to be the most useful, as conventional bulldozers were simply too heavy to move across the deep sediment deposits, at least during the first few months. The typical approach to sediment removal was to begin at the top of slope (per the grade stakes), excavate the soil and side-cast that material towards the river. After several passes the pile of soil was far enough down the rough graded slope for the machinery to cast the soil into the river. In Locations 2, 3 and 4 the soils were fine grained enough that no sediment bars were created in the river. In the upstream sections of Location 5 the gravel fraction of the soil was much greater, and the sediment disposal operations resulted in some temporary gravel bars in the river. Those bars have since disappeared. In this manner the rough grading was completed in most locations by the middle of July. In June, the soils had dried out enough to begin using a small dozer. Dozers were used to finish-grade the soil surfaces, and to track up and down the slopes, leaving a roughened surface texture ideal for hydroseeding.

2.3 Management of Tributary Drainages

Beginning in July, the Contractor commenced work on the shaping of tributary stream channels that drain into the former reservoir area. A total of ten tributaries drain into the reservoir area, eight of which cross sediment deposits, and four of those are ephemeral. The initial approach was to allow these tributary channels to erode down through the reservoir sediments, and to observe if a hard surface was exposed. While a considerable amount of downcutting was observed, only in the larger perennial tributaries did a coarse layer of alluvium become exposed (Mill Creek, and un-named stream #13, Location 4). Commencing in early

August, the Contractor completed the grading of a small "valley" landform around each creek location, from the edge of the former reservoir to the edge of the current White Salmon River channel. The valley landform creates an opportunity for riparian plant establishment, and allows for some additional channel erosion or lateral migration (should that occur) without causing large eroding soil banks.

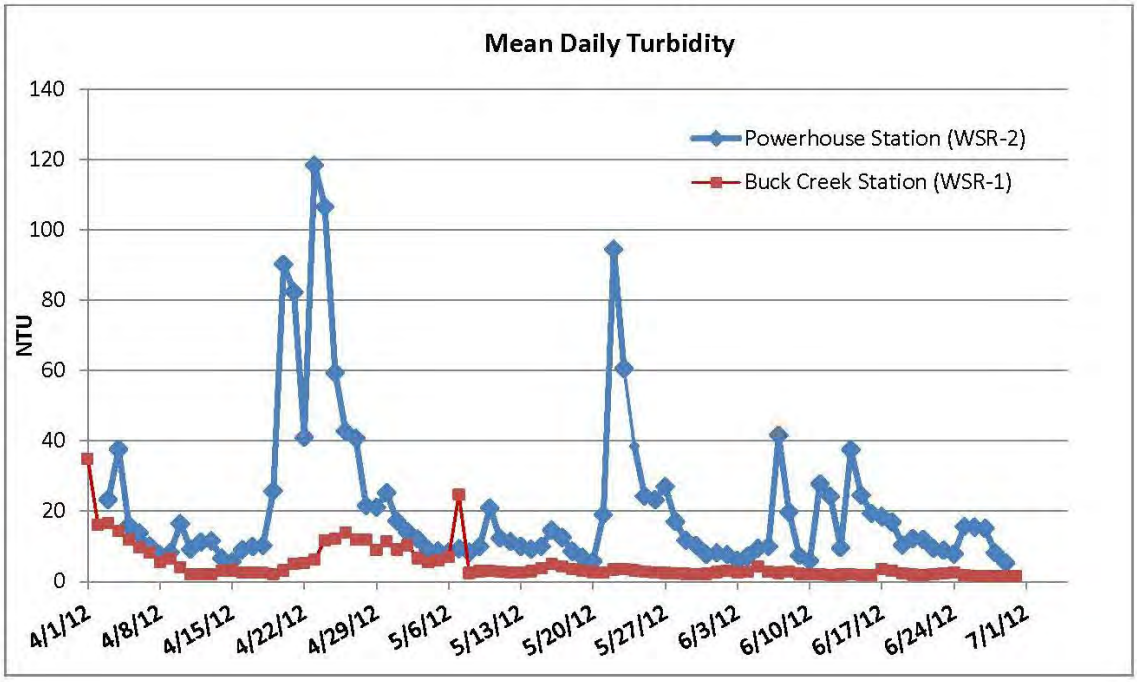
In July the Contractor began the installation of small check dam type structures on the eight tributary streams. These check dams were installed to reduce the likelihood of future stream channel downcutting, and to increase the quantity of local groundwater available for the riparian plant zone along each stream bank. The check dams were constructed with logs and tree trunks to partially mimic the natural look of deadfall in an upland creek. Design criteria for these check dams included a primary weir opening capable of passing the 10-yr return frequency event, and water drops at each weir limited to 3-4 ft max. In Mill Creek, the drop height was reduced to avoid creating a barrier to potential fish migration. The as-built condition of the log weir structures constructed in Mill Creek within the former reservoir area have been evaluated by a fish biologist, and several of the structures do not have adequate pool depth to allow for fish passage. PacifiCorp Energy and the Contractor will monitor this location during the winter months, and will make modifications to the structures in the summer of 2013 if barriers to fish migration are still present.

Log check dams installed on Mill Creek.

2.4 Water Quality and Air Quality Issues

Sediment concentrations in the White Salmon River, measured as turbidity, have steadily decreased since February, with the exception of times when reservoir sediment disposal was

being conducted, and times when a rainfall/runoff event occurred. The graph of turbidity in the White Salmon River shown below indicates that after the beginning of May, background turbidity levels in the river measured at the Buck Creek site (upstream of the former reservoir) remained at a consistently low level. Turbidity levels measured at the powerhouse site (downstream of the former reservoir) show the influence of sediment management activities, but also indicate the overall trend towards stability in the project site, when downstream turbidity measurements approach the upstream levels.



Measured turbidity for the period April through June, 2012 in the White Salmon River upstream and downstream of the project site.

As the summer of 2012 progressed, winds blowing up the canyon and across the graded reservoir sediments were generating a significant amount of blowing dust. Local homeowners raised concerns and PacifiCorp Energy took steps to mitigate the problem. Silt fences were installed at regular intervals across the largest exposed soil sites, perpendicular to the wind direction. That action reduced the dust somewhat, but did not eliminate the problem. In early August the Contractor used hydroseeding equipment to apply a tackifier and mulch mixture to the majority of exposed soils within the reservoir area. This mitigation step effectively eliminated the blowing dust problem.

3.0 Current Conditions: September, 2012

3.1 Finished Grade Topography

A grading plan for reservoir sediments was proposed in February 2012, and was part of the Post-Reservoir-Dewatering Assessment Report (PacifiCorp Energy, February 2012). That plan has been implemented by the Contractor, insofar as site conditions have allowed. Topographic maps of the "as-built" contours are included in Appendix A and Appendix B. Appendix A provides a comparison of the as-built contours and elevations, with contours and elevation data taken from a 1912 topographic map of the pre-dam reservoir. Appendix B shows the as-built contours overlaid on a current aerial photograph. Appendix B includes several representative cross sections in the reservoir area that compare the December 2011LiDAR topography with the proposed grading plan and the September 2012 as-built topographic map. Inevitably, there were some deviations from the approved grading plan where site conditions were found to be different than expected. The most significant deviations from the grading plan are summarized as follows:

1. When pre-reservoir slopes with tree stumps were exposed, that surface was left intact.
2. A low bench next to the river was proposed in several locations. When the excavation encountered stumps or bedrock in these locations, the bench was not excavated to the planned elevations, instead the bench was graded "up and over" the hard outcrop.
3. In Location 5, the west end grading exposed a deep sandy soil deposit. This soil was deemed unsuitable for planting, and the sand was mostly removed. The underlying silty clay material was mixed with the residual sands to create a suitable soil substrate for planting.

The topographic map and contours shown in Appendix B represent the land topography that is expected to persist for years to come. The revegetation effort has commenced on this finished grade surface, beginning with hydroseeding in September, 2012, and continuing with tree and shrub planting planned to begin in February, 2013.

Note: A LiDAR survey was conducted on July 28, 2012. The data files are being submitted to the Washington Department of Ecology concurrent with this report. However, final grading of the reservoir sediments was not complete at the time of the LiDAR flight, and thus the LiDAR data by itself does not correctly illustrate the "as-built" condition. Ground surveys were conducted in the latter part of August for areas that were finish-graded after the LiDAR flight. This ground survey data was converted to contours, and the contours were merged with the LiDAR-based contours, to create an accurate "as-built" topographic map of the reservoir area. The contour maps shown in Appendix A and Appendix B show this composite and current contour data. A separate AutoCAD drawing of the as-built contours has been submitted in addition to the LiDAR data set.

3.2 Estimated Sediment Quantities

The volume of sediment removed from the reservoir area by mechanical means has been calculated as the numeric difference between the LiDAR ground surface measured on December 21, 2012 and the as-built composite topographic map. Table No. 1 lists the estimated quantities of sediment removed in the past seven months.

Table No. 1
Volume of Sediment Removed by Mechanical Means

Location	Estimated Volume (Cubic Yards)
Location 1	2,740
Location 2	12,570
Location 3	64,570
Location 4	77,150
Location 5 & 6	86,210
Total Estimated Sediment Volume Removed since January, 2012:	**243,240 CY**

3.3 Engineered Log Jams

The Woody Debris Management Plan (PacifiCorp Energy, March, 2011) required PacifiCorp Energy to evaluate the construction of large woody debris structures (also known as Engineered Log Jams, "ELJ's") as part of the overall river restoration effort. At the location of Condit dam and the related reservoir, the White Salmon River runs through a relatively narrow valley with steep sideslopes. The river has a moderately steep gradient and is incised with a limited meander pattern, and only small, infrequent alluvial deposition zones. This set of circumstances does not lend itself to the natural formation of woody debris jams, except where the river makes a bend and the woody debris is able to pile up on the outside of the bend. A total of seven ELJ's have been constructed as part of this project. The locations of the ELJ's have been selected to maximize the benefits to restoration of a riparian floodplain adjacent to the river. In this capacity the ELJ's help to reduce shear stress from the river and to protect the low-lying bench areas next to the river from erosion damage during high flow events. This gives the riparian vegetation transplants more time to become established before they must withstand the full force of flood flows. The ELJ's have not been constructed for in-stream aquatic habitat, although scour effects may create some habitat cover next to these structures.

Engineered Log Jam structures: Location 4 in the foreground, Location 3 in the background (downstream). Purpose is to reduce soil erosion on the riverbanks in areas where a riparian bench has been constructed. Note: partial coverage of hydroseed and mulch is visible on the left, along with weed barriers for upcoming tree plantings.

3.4 Sediment Changes Observed with Repeated Photography

Changes in the landform of the reservoir area have been monitored by taking repeat photographs from the same vantage point over time. Appendix C includes the latest set of comparison photographs from five photo monitoring point locations. These paired sets of photos compare the pre-grading condition to the post grading condition. Photographs from these same locations dating back to the pre-dam breach condition can be found in the Post-Reservoir-Dewatering Assessment Report (PacifiCorp Energy, February 2012).

4.0 Future Monitoring of the Reservoir Sediments

4.1 Additional Photo Documentation

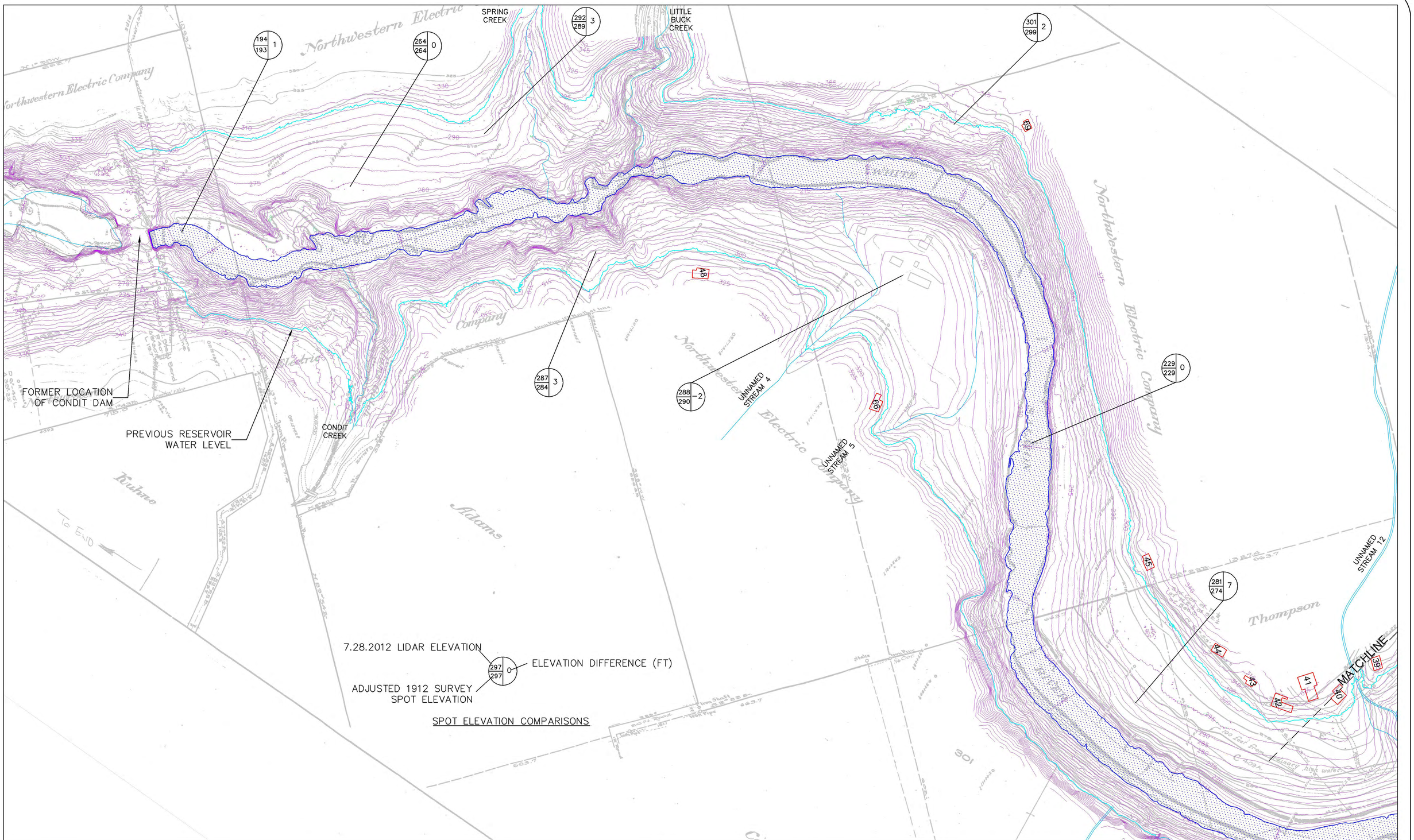
Photographs will be taken from the established photo points in August of 2013, and will be included in the 2013 edition of the Annual Sediment Assessment Report. Comparative images from this report will be provided.

4.2 LiDAR Surveys

LiDAR surveys are required by the "Sediment Assessment, Stabilization, and Management Plan" (PacifiCorp Energy, March 15, 2011) and by the FERC Surrender Order. The first LiDAR survey occurred on December 21, 2011. The second LiDAR survey occurred on July 28, 2012. The third LiDAR survey is tentatively planned for August of 2013. That LiDAR-based topographic mapping will be included in the Annual Sediment Assessment Report due to FERC and the Washington Department of Ecology by the end of September 2013.

4.3 Annual Sediment Assessment Report

An Annual Sediment Assessment Report will be completed by the end of September, 2013. That report will include the LiDAR-based topographic mapping from the third LiDAR survey planned for August, 2013. It will also include a narrative assessment of sediment stability, and sediment monitoring photos from the established photo monitoring points. Significant changes to the landform and topography will be documented.



EXISTING CABINS

7.28.2012 LIDAR CONTOURS (5 FT CONTOUR INTERVALS)

SCANNED 1912 PRE DAM SURVEY NGW ENGINEERS
NOTE SURVEY ON CONDIT DAM DATUM

N

100 200 400

SCALE IS 1" = 100' ON 24X36 SIZE SHEET
ALL OTHER SHEETS USE SCALE BAR
HORIZONTAL DATUM IS NAD 83

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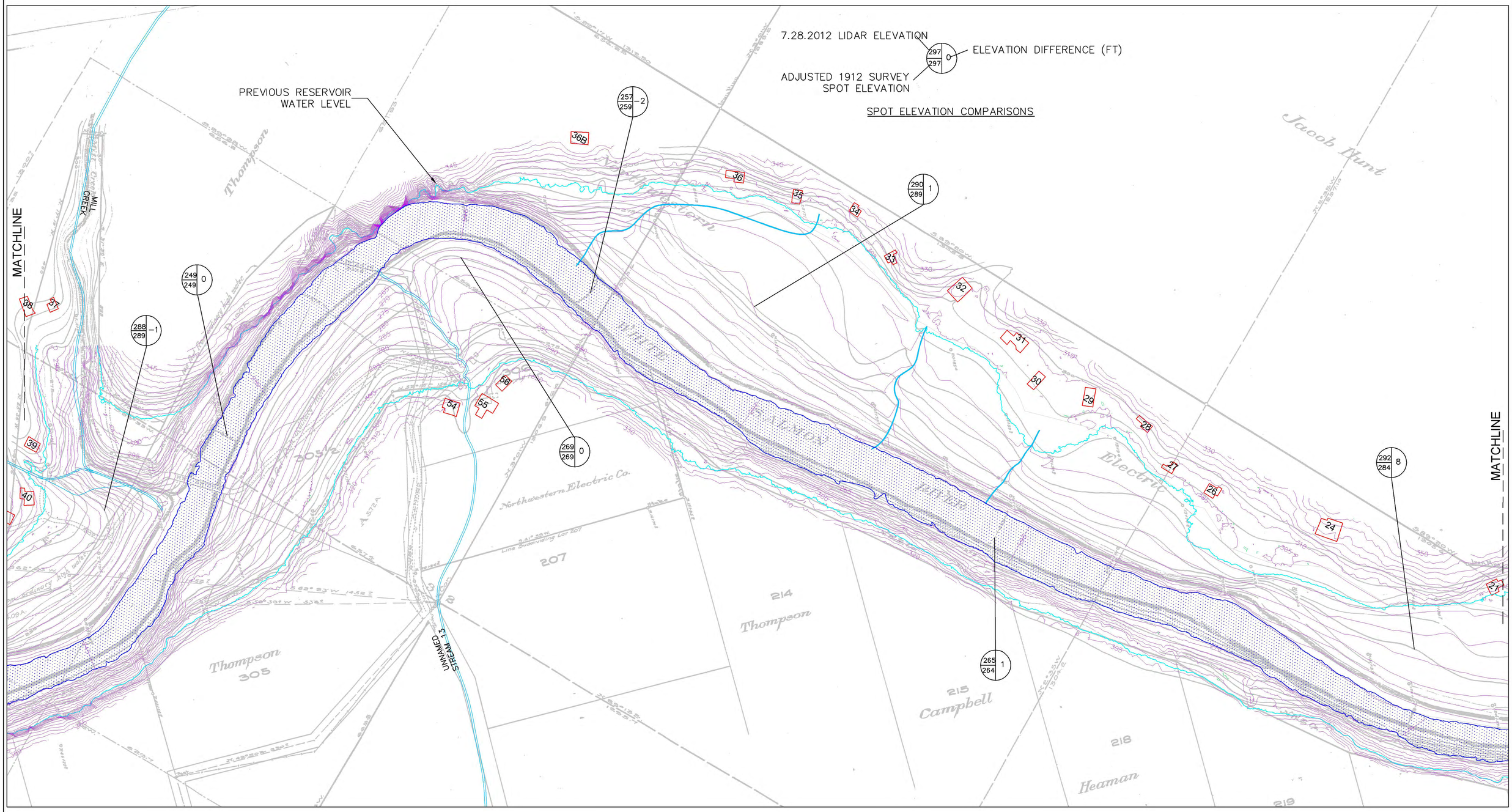
CONDIT DAM DECOMMISSIONING

FIGURE A1
TOPOGRAPHIC COMPARISON MAP
SOUTH SECTION

Scale: 1" = 100 ft | 9/24/2012



EXISTING CABINS

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CONDIT DAM DECOMMISSIONING

FIGURE A2
TOPOGRAPHIC COMPARISON MAP
CENTRAL SECTION

Scale: 1" = 100 ft 9/24/2012

#	EXISTING CABINS
	07.28.2012 LIDAR CONTOURS (5 FT CONTOUR INTERVALS)
	SCANNED 1912 PRE DAM SURVEY NGW ENGINEERS NOTE SURVEY ON CONDIT DAM DATUM

100 200 400

SCALE IS 1" = 100' ON 24X36 SIZE SHEET
ALL OTHER SHEETS USE SCALE BAR
HORIZONTAL DATUM IS NAD 83

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FIGURE A3
TOPOGRAPHIC COMPARISON MAP
NORTH SECTION

Scale: 1" = 100 ft 9/24/2012

SPRING CREEK

LITTLE BUCK CREEK

LOCATION #1

CROSS SECTION #1
SEE SHEET B4

CROSS SECTION #2
SEE SHEET B4

LIMITS OF GRADING

CROSS SECTION #3
SEE SHEET B4

PREVIOUS RESERVOIR WATER LEVEL

LOCATION 2

FORMER LOCATION OF CONDIT DAM

CONDIT CREEK

UNNAMED STREAM 4

UNNAMED STREAM 5

LOCATION 3

UNNAMED STREAM 12

MATCHLINE

CROSS SECTION #4
SEE SHEET B4

NOTE: LOCATION 2 AND LOCATION 5 CONTOUR DATA SUPPLEMENTED WITH GROUND SURVEY FROM SEPTEMBER 2012

DATE OF PHOTOGRAPHY 8/6/2012

#	EXISTING CABINS
	7.28.2012 LIDAR CONTOURS (1 FT CONTOUR INTERVALS)
	7.28.2012 LIDAR CONTOURS (5 FT CONTOUR INTERVALS)

N

100 200 400

SCALE IS 1" = 100' ON 24X36 SIZE SHEET
ALL OTHER SHEETS USE SCALE BAR
HORIZONTAL DATUM IS NAD 83

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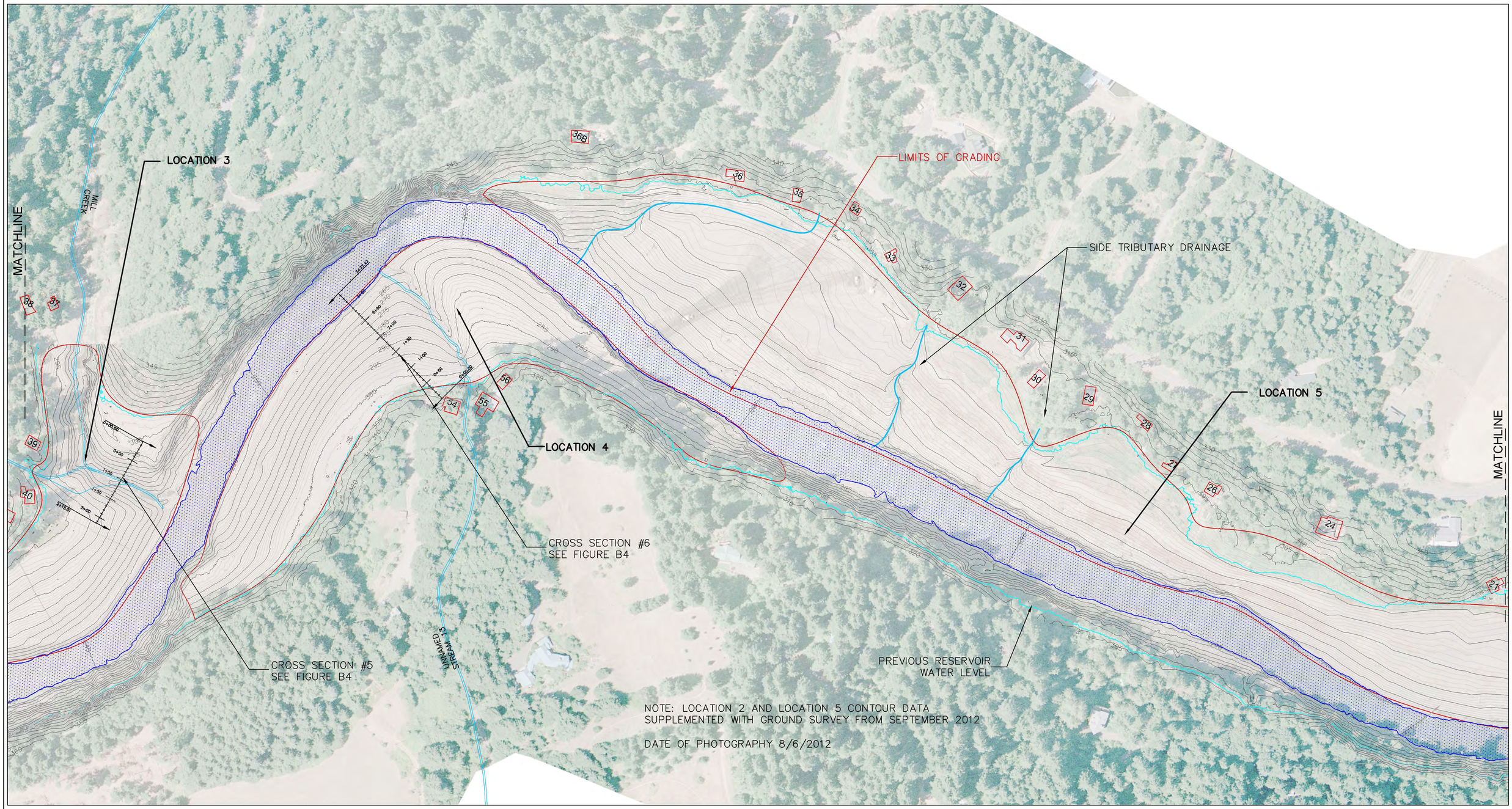
CONDIT DAM DECOMMISSIONING

FIGURE B1
AS BUILT TOPOGRAPHIC MAP
SOUTH SECTION

Scale: 1" = 100 ft | 9/24/2012



[#] EXISTING CABINS

7.28.2012 LIDAR CONTOURS (1 FT CONTOUR INTERVALS)

7.28.2012 LIDAR CONTOURS (5 FT CONTOUR INTERVALS)

N

100 200 400

SCALE IS 1" = 100' ON 24X36 SIZE SHEET
ALL OTHER SHEETS USE SCALE BAR
HORIZONTAL DATUM IS NAD 83

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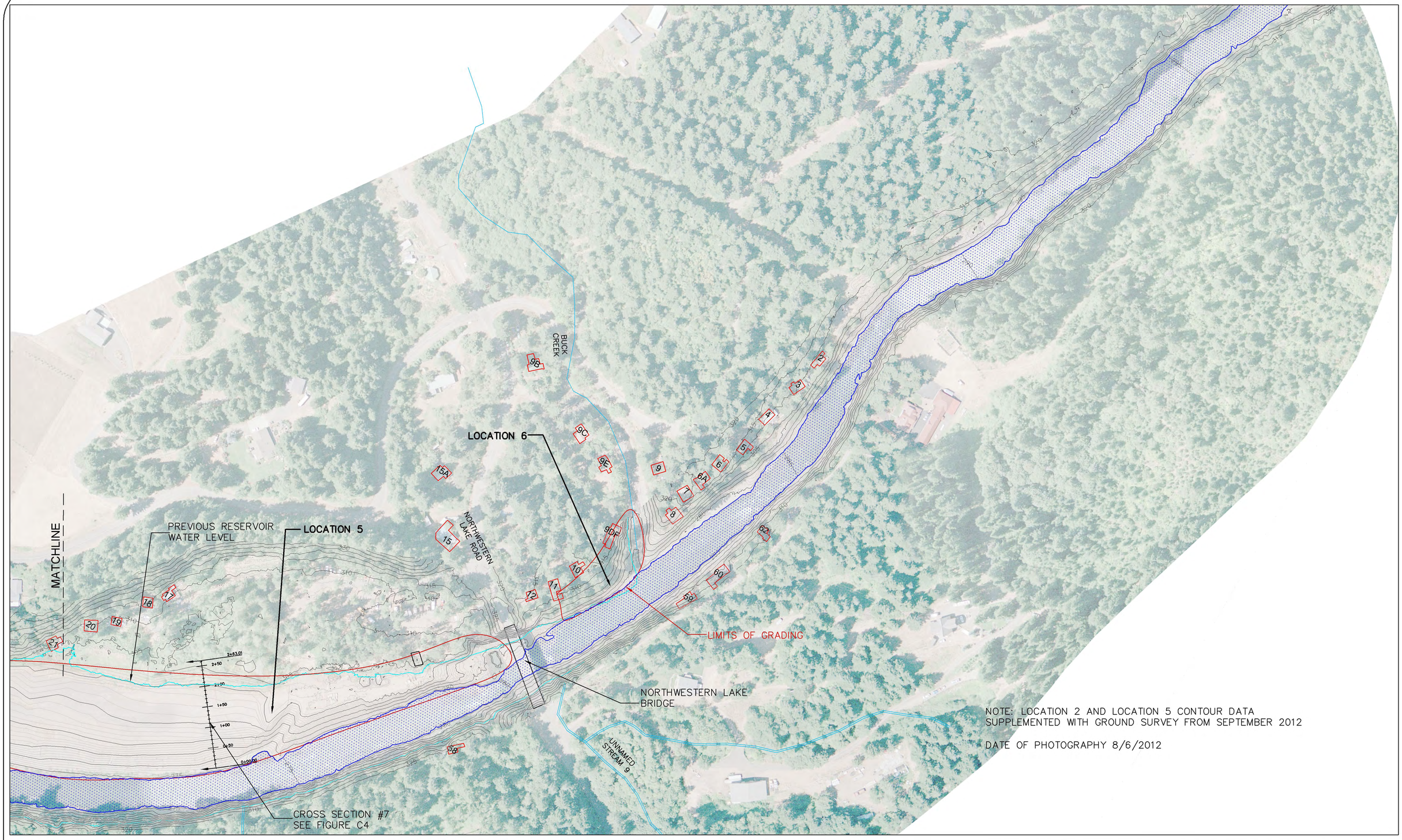
CONDIT DAM DECOMMISSIONING

FIGURE B2
AS BUILT TOPOGRAPHIC MAP
CENTRAL SECTION

Scale: 1" = 100 ft | 9/24/2012



[#] EXISTING CABINS

7.28.2012 LIDAR CONTOURS (1 FT CONTOUR INTERVALS)

7.28.2012 LIDAR CONTOURS (5 FT CONTOUR INTERVALS)

N

100 200 400

SCALE IS 1" = 100' ON 24X36 SIZE SHEET
ALL OTHER SHEETS USE SCALE BAR
HORIZONTAL DATUM IS NAD 83

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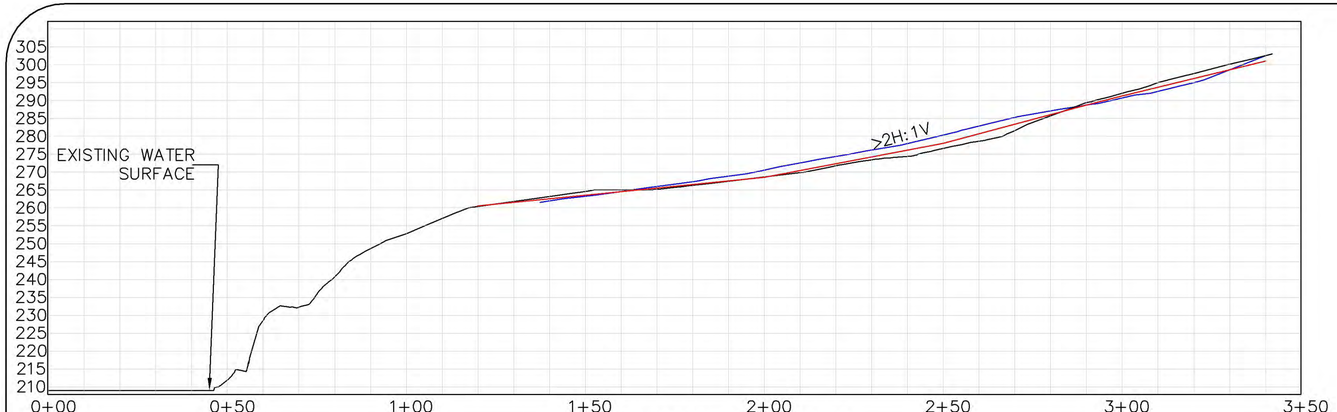
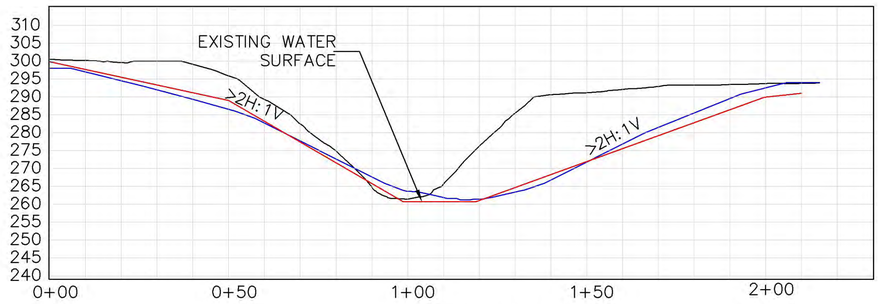
CONDIT DAM DECOMMISSIONING

FIGURE B3
AS BUILT TOPOGRAPHIC MAP
NORTH SECTION

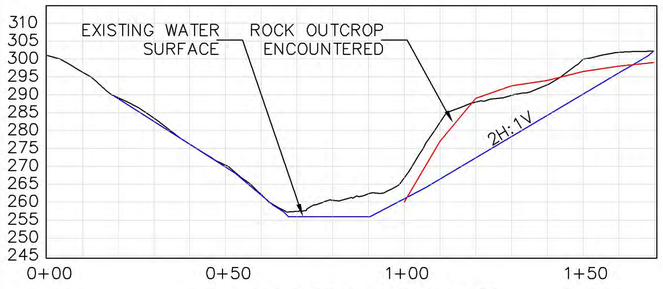
Scale: 1" = 100 ft | 9/24/2012



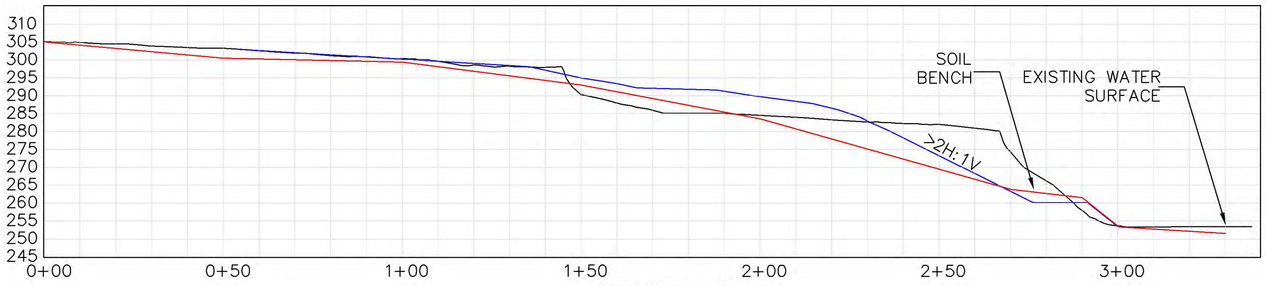
CROSS SECTION #1 STA 5+00
SCALE 1"=20'



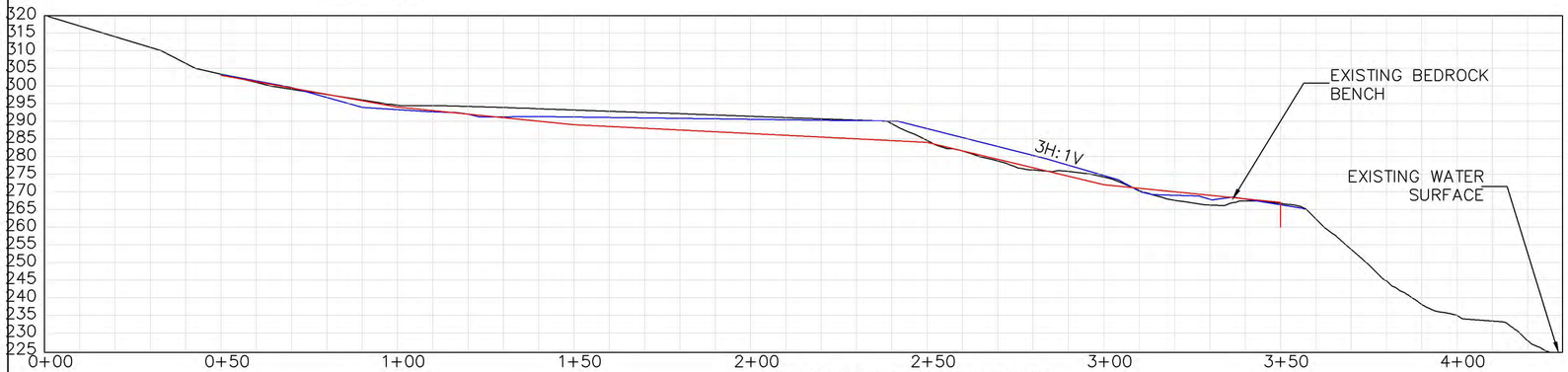
CROSS SECTION #5
SCALE 1"=20'



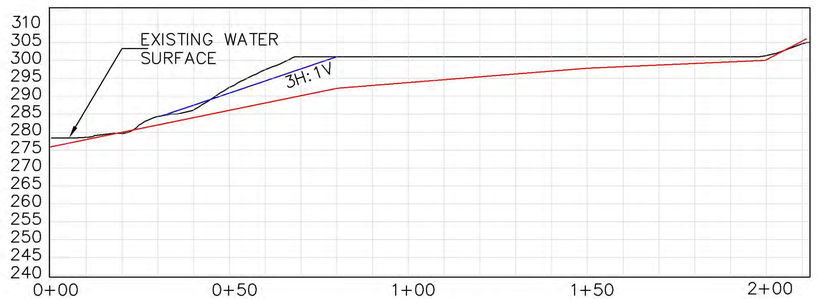
CROSS SECTION #2 STA 12+50
SCALE 1"=20'



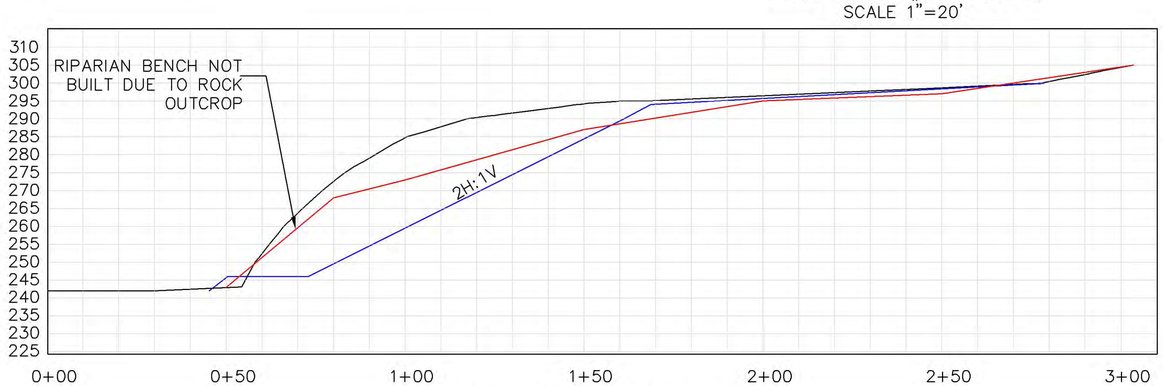
CROSS SECTION #6
SCALE 1"=20'



CROSS SECTION #3 STA 24+00
SCALE 1"=20'



CROSS SECTION #7
SCALE 1"=20'



CROSS SECTION #4 STA 36+00
SCALE 1"=20'

CURRENT PROFILE AUGUST 2012
GRADING PLAN FEB. 2012
DECEMBER 2011 LIDAR

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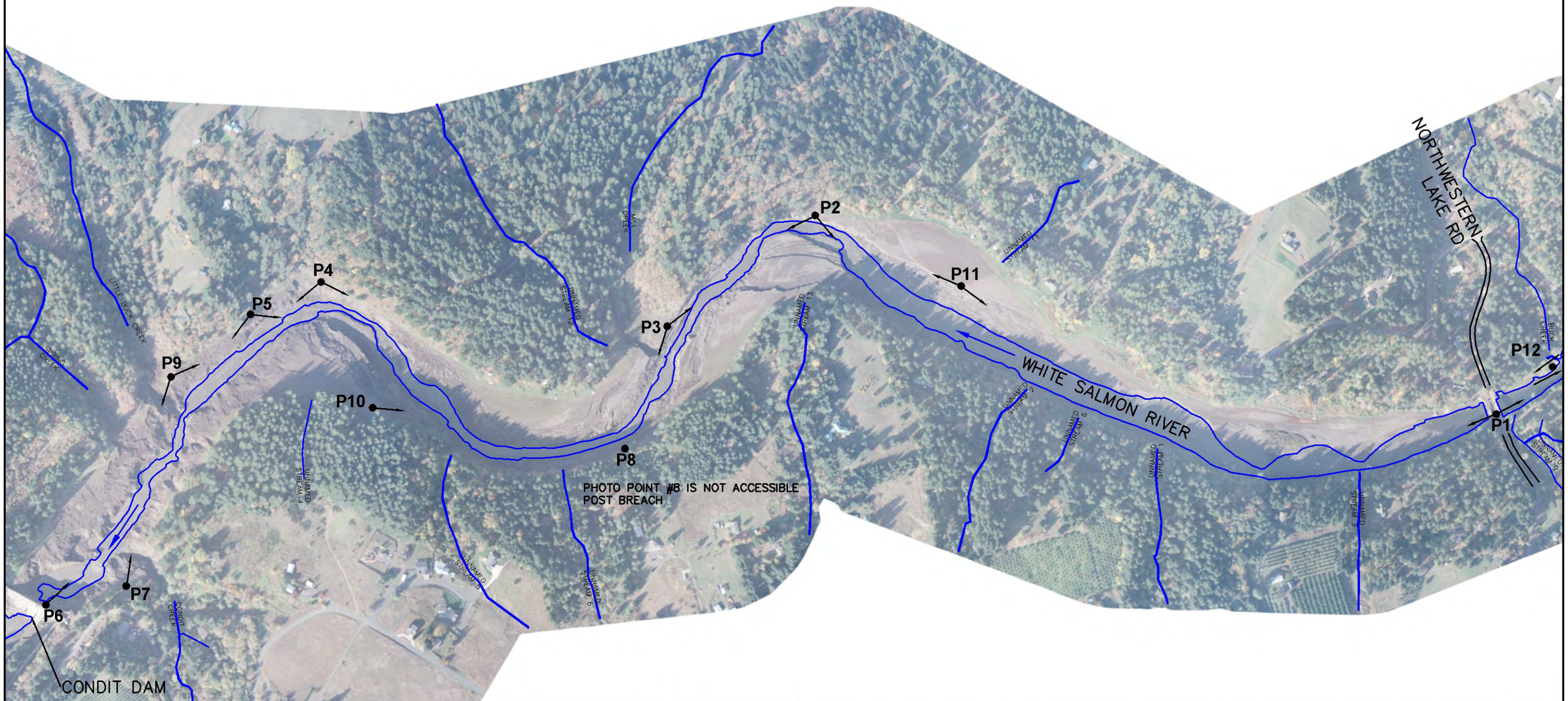
CONDIT DAM DECOMMISSIONING

FIGURE B4
AS BUILT CROSS SECTIONS
IN THE RESERVOIR AREA

Scale: 1" = 100 ft | 9/24/2012



11-4-2011 WATER SURFACE

N

250 500 1000

SCALE IS 1" = 500' ON 11x17 SIZE SHEET
ALL OTHER SIZES USE SCALE BAR
HORIZONTAL DATUM IS NAD 83

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CONDIT DAM DECOMMISSIONING

WHITE SALMON RIVER 2011
PHOTO POINT LOCATIONS

Scale: 1" = 500 ft

12-15-2011

Sheet 1 of 1

Comparison Photos from photo points Nos. 1, 2, 3, 4 and 6. Grading work and sediment movement has altered the other locations for photo points.

Photo Point #1 Looking Downstream 11.30.11

Photo Point #1 Looking Downstream 8.28.12

Photo Point #1 Looking Upstream 11.30.11

Photo Point #1 Looking Upstream 8.28.12

Photo Point #2 Looking Downstream 11.30.11

Photo Point #2 Looking Downstream 8.28.12

Photo Point #2 Looking Upstream 11.30.11

Photo Point #2 Looking Upstream 8.28.12

Photo Point #3 Looking Downstream 11.30.11

Photo Point #3 Looking Downstream 8.28.12

Photo Point #3 Looking Upstream 11.30.11

Photo Point #3 Looking Upstream 8.28.12

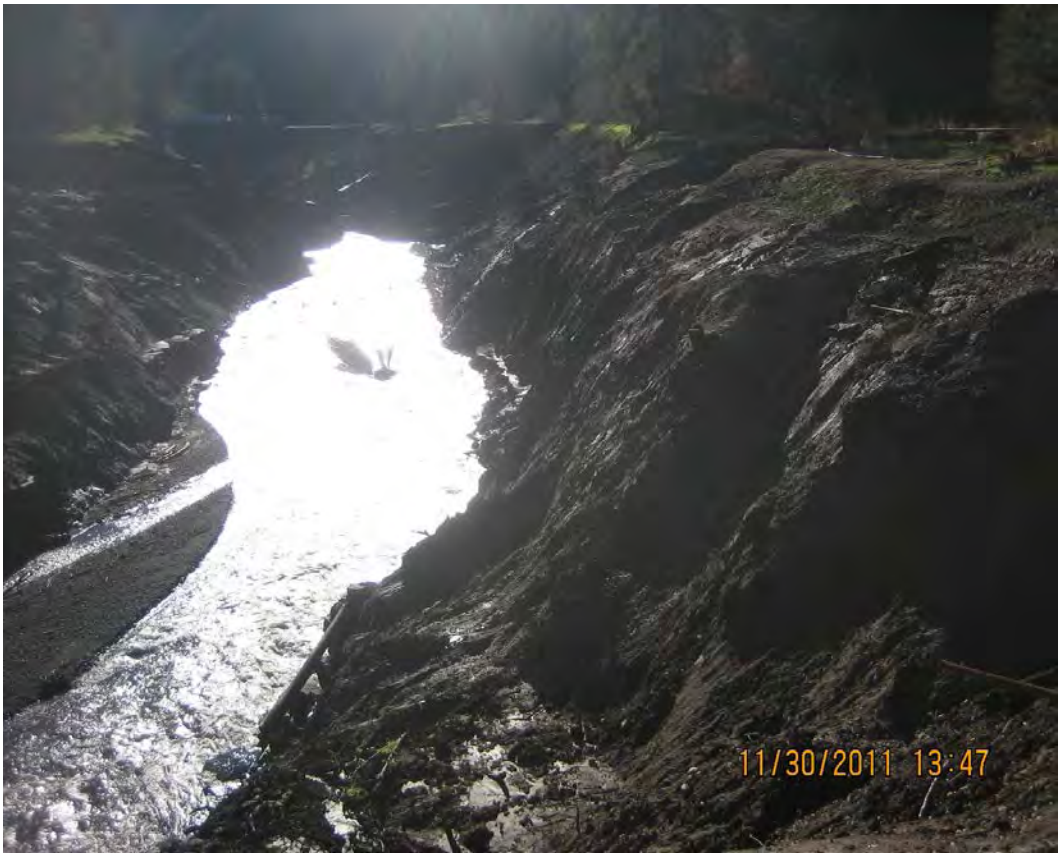

Photo Point #4 Looking Downstream 11.30.11

Photo Point #4 Looking Downstream 8.28.12

Photo Point #4 Looking Upstream 11.30.11

Photo Point #4 Looking Upstream 8.28.12

Photo Point #6 Looking Upstream 11.30.11

Photo Point #6 Looking Upstream 8.28.12
Note: photo vantage point slightly different since the dam no longer exists.