Lewis River Aquatic Fund Projects (SA 7.5.3.2)
Project Closeout Report

Project Title:	**Lewis River Hydroelectric Project** ***Eagle Island Site B & C Habitat Restoration***
Project Approved By:	Aquatic Coordination Committee April 2012
Original Project Sponsor:	Cowlitz Indian Tribe
Project Funding	$84,000
Project Description (work completed):	The Natural Resources Department of the Cowlitz Indian Tribe used ACC funding to leverage $401,730 dollars of Salmon Recovery Funding from the State of Washington to implement a restoration project on the North Fork Lewis River to enhance habitat quality for Lower Columbia Chinook, coho, and steelhead, all listed as *Threatened* under the *Endangered Species Act*. During the 2014 summer, the Cowlitz Indian Tribe restored 2,700 linear feet of shoreline with over 400 pieces of wood. The large wood was between 20 to 50 feet in length, 14 – 40 inches in diameter. Site B was constructed with eight structures including one apex bar jam installed to split and maintain flows into and throughout two side channel locations. Seven scour pool structures were installed to add and maintain scour pools throughout the adjacent gravel bar. The eight structures are also habitat wood, providing shade and refugia from velocity and predators. Adjacent to Site B over a dozen large to very large logs were placed onto the floodplain as riparian roughness. Site C was constructed with one apex jam at the head of the island and 10 scour jams of 2-3 logs with pilings. The scour jams are located near the channel outlet and are intended to assist water flow through the existing channel. More structures are in place on the project site than are reflected in the construction drawings. Availability of materials and field-fitting of structures to existing conditions allowed us the opportunity to expand the project. InterFluve was onsite during the entirety of the construction period providing engineering and construction oversight. Warning signs will be in place at both ends of the side channels and on the apex bar jams at the upstream entrance of the project sites. During construction low water conditions allowed the project to be largely constructed in the dry. Only one isolated pool was impacted. Prior to entering the area, the pool was dewatered using standard BMP for fish screening and fish rescue. Fish rescue was done over a two hour period.

Log structures were anchored with 20 to 40 foot piles driven up to into the substrate. The logs were bolted to the pilings to hold and pin the logs in place (see construction drawings for detail).

Two acres of riparian seed mix was spread out over the project site wherever bare soil was exposed. The seed mix consisted of blue wildrye (elymus glaucus), red fescue (festuca rubra), tufted hairgrass (deschampsta cespitosa), western mannagrass (glyceria occidentialis), and American sloughgrass (beckmannia syziagachne) at 18 pounds of seed mix per acre.

Over 2,500 trees and shrubs for this project will be installed on the project in early 2015. These plantings will cover 2 acres of the project area providing shade, organic inputs into the system and future sources of woody debris in the system. The plantings will consist of the following species and numbers:

Oregon Ash	Fraxinus latifolia	100
Bigleaf Maple	Acer macrophyllum	130
Douglas Fir	Pseudotsuga menziesii	130
Red Alder	Alnus rubra	325
Black Cottonwood	Populus balsamifera	125
Willow (spp)	Salix Spp	515
Douglas Spirea	Spirea douglasii	225
Snowberry	Symphoricarpos alba	585
Beaked Hazelnut	Corylus cornuta	715
Red Elderberry	Sambuca racemosa	875

Workforce:

Personnel:	Rudy Salakory, Amy Boyd, Eli Asher (Program Manager, Restoration Ecologists, Cowlitz Indian Tribe)
Contractors:	William Norris P.E., InterFluve Kysar & Koistinen Columbia Helicopters Watters Excavation Plas Newydd

Schedule Summary:

Construction completed September 2014
Plantings installed Winter 2015
Effectiveness monitoring until 2024

Problems Encountered:

Delays were experienced between the 30% design document that was agreed upon by the Technical Oversight Group(TOG) that consisted of

Clark County, PacifiCorp, Lower Columbia Fish Recovery Board, Washington Department of Fish and Wildlife (WDFW) and the Cowlitz Tribe, and the final design that was implemented (attached). At the 90% design stage WDFW fisheries changed their habitat design criteria (HDC) for the project area. The entire project was then required to be redesigned to incorporate the new WDFW HDC. The product that emerged from that effort was radically different from the original proposal. The Tribe, along with Washington State Department of Natural Resources (WDNR) returned to the original project philosophy, which was eventually agreed to by WDFW. This effort took the better part of a year. However, when the final design was agreed upon by the Tribe and WDFW, the project proceeded without further delay.

Things that went well: Project construction went well. Construction including hauling logs to the site, flying them with a helicopter, and storing them by volume and type near the project sites. During late August the main contractor mobilized in via the pre-established construction route. Construction proceeded as planned and the structures were constructed with engineer oversight. Demobilization included pulling out and abandoning the access route. The final project activity was grading the staging site to PacifiCorp's requested standard.

Work Not Completed: Tree and shrub planting (Winter 2015)

Lessons Learned: Establish clear project goals and expectations with project partners as early as possible during design. Redesign is expensive and time consuming.

Lessons Learned: Continue to develop strategies to engage closely with partnering and permitting agencies.

Lessons Learned: Lessons learned from Eagle Island A were included into B and C.

Attachments: Photos of the project and descriptions follow. Also attached are stamped construction drawings.

Columbia Helicopters lifted logs to Sites A and B in late June 2014.

Apex jam location as first wood is placed at Site B.

Looking downstream where Site B scour pool structures were later constructed.


Apex jam during Site C construction.

Looking downstream at Site C during construction.

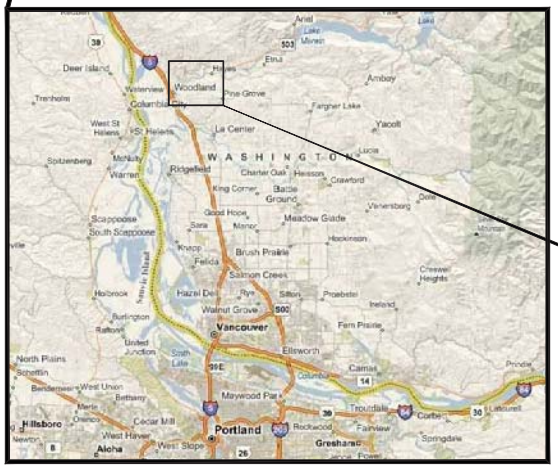
Site B apex jam with side channel entries excavated to the right and left of the structure.

Site B lateral scour jams.

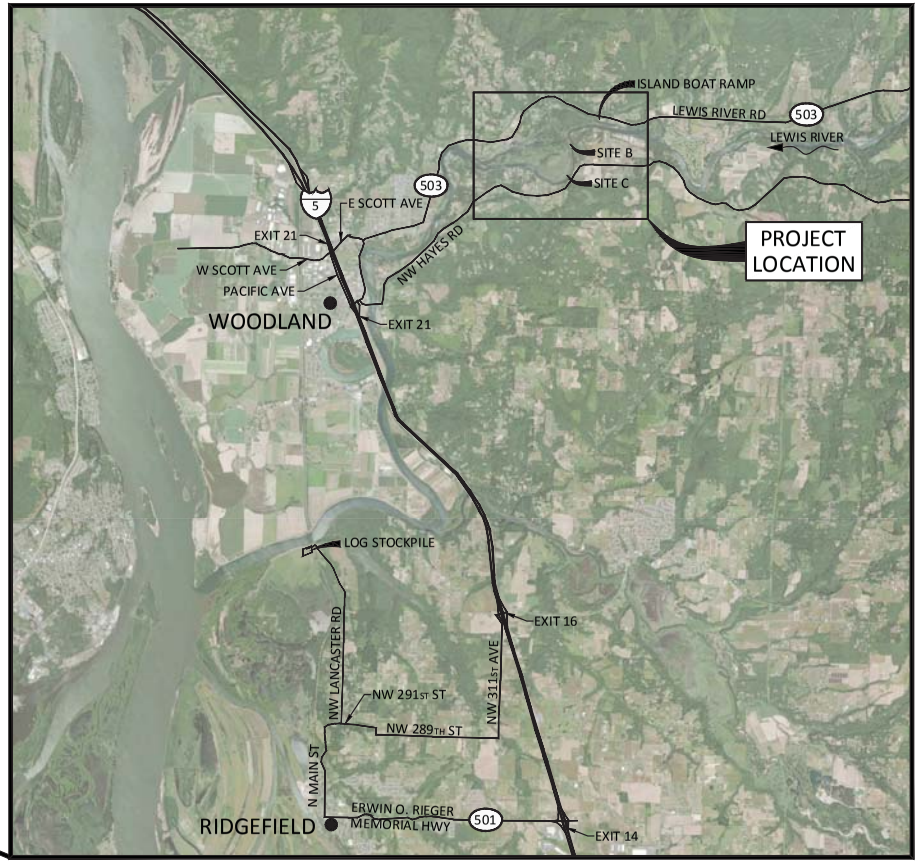
Looking downstream at Site C apex jam with reconnected water flow to the right of the picture.

Looking up channel at Site C lateral scour jams.

LOCATION MAP
STATE OF WASHINGTON



VICINITY MAP



SITE MAP

ABBREVIATIONS

LW	LARGE WOOD
ESC	EROSION SEDIMENT AND CONTROL
FES	FABRIC ENCAPSULATED SOIL
FT	FEET
FTR	FULLY THREADED ROD
STA	STATION
ELEV	ELEVATION
IN	INCH
APPROX	APPROXIMATE
YR	YEAR
'	FEET
"	INCH
°	DEGREES
/	PERCENT
INV	INVERT
DIA	DIAMETER
HDPE	HIGH DENSITY POLYETHYLENE
OHW	ORDINARY HIGH WATER

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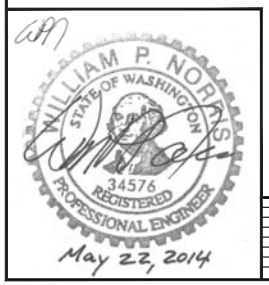

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Habitat Restoration – Site B and C
Woodland, Washington

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COVER, SHEET INDEX, AND VICINITY MAP

EXISTING DATA

GENERAL TOPOGRAPHIC INFORMATION IS PROVIDED FROM LIDAR FROM CLARK COUNTY AND SPECIFIC PROJECT AREA SURVEY PERFORMED BY INTER-FLUVE, INC.

SOILS

LEWIS RIVER SAND AND GRAVEL.

UTILITIES

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR HAVING UTILITIES LOCATED PRIOR TO CONSTRUCTION ACTIVITIES.

THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE AFFECTED UTILITY SERVICE TO REPORT ANY DAMAGED OR DESTROYED UTILITIES. THE CONTRACTOR SHALL PROVIDE EQUIPMENT OR LABOR TO AID THE AFFECTED UTILITY SERVICE IN REPAIRING DAMAGED OR DESTROYED UTILITIES AT NO COST TO THE OWNER.

CONSTRUCTION ACCESS

THE CONTRACTOR SHALL ENTER THE SITE FROM ISLAND BOAT RAMP OFF LEWIS RIVER ROAD.

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR OBTAINING ANY REQUIRED TRAFFIC CONTROL OR ACCESS PERMITS.

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING ANY REQUIRED TRAFFIC CONTROL INCLUDING, BUT NOT LIMITED TO, SIGNAGE AND FLAGGERS.

ALL SAPLING AND TREES TO BE TRANSPLANTED OR REMOVED SHALL BE APPROVED BY THE ENGINEER AND CLEARLY MARKED.

ALL EQUIPMENT, MATERIALS AND PERSONNEL SHALL REMAIN WITHIN THE LIMITS OF DISTURBANCE.

THE CONTRACTOR SHALL KEEP THE WORK AREAS IN A NEAT CONDITION FREE OF DEBRIS AND LITTER FOR THE DURATION OF THE PROJECT.

CONTRACTOR SHALL ESTABLISH ACCESS INCLUDING TRIMMING AND REMOVAL OF TREES IN ACCORDANCE WITH LANDOWNER ACCESS AGREEMENT

EQUIPMENT ACCESS SHALL BE ACROSS THE EAGLE ISLAND NORTH CHANNEL FROM THE ISLAND BOAT RAMP AREA. SANITARY FACILITIES ARE PROVIDED AT THE NORTH ISLAND BOAT RAMP.

EQUIPMENT ACCESS ACROSS THE NORTH FORK LEWIS RIVER, EAGLE ISLAND NORTH CHANNEL SHALL BE ONLY FOR VEHICLES REQUIRED FOR CONSTRUCTION. STEEL PLATES SHALL BE PLACED UPON GRAVELS IN THE NORTH FORK LEWIS RIVER, EAGLE ISLAND NORTH CHANNEL. STEEL PLATES SHALL BE OF SUFFICIENT WIDTH AND LENGTH TO SUPPORT ALL CONSTRUCTION TRAFFIC WITHOUT ALLOWING TRACKS OR TIRES DIRECT CONTACT ON THE RIVER BED. FUEL SHALL BE SUPPLIED BY A PORTABLE FUEL STORAGE TANK. SECONDARY CONTAINMENT IS REQUIRED DURING STORAGE AND TRANSPORT OF THE PORTABLE FUEL STORAGE TANK. STEEL CABLE SHALL BE TRANSPORTED TO THE ISLAND DURING INITIAL CONSTRUCTION VEHICLE ACCESS. LARGE WOOD SHALL BE TRANSPORTED FROM THE END OF NW LANCASTER ROAD VIA PUBLIC ROADS TO THE ISLAND BOAT RAMP. LARGE WOOD SHALL BE TRANSPORTED FROM THE ISLAND BOAT RAMP TO THE SITE B AND SITE C STAGING AREAS VIA HELICOPTER.

COFFERDAM

WORK AREA(S) SHALL BE ISOLATED BY COFFERDAMS INSTALLED UPSTREAM AND DOWNSTREAM OF ENHANCEMENT AREA. COFFERDAM MAY BE CONSTRUCTED WITH SAND FILLED BULK BAGS AND LINED WITH PLASTIC SHEETING ADJACENT TO ACTIVE FLOW IN THE CHANNEL.

DEWATERING OF WORK AREA(S) SHALL OCCUR CONCURRENT WITH FISH RESCUE. THE OWNER WILL BE RESPONSIBLE FOR CONDUCTING AND COORDINATING THE FISH RESCUE. THE CONTRACTOR SHALL COORDINATE DEWATERING WITH FISH RESCUE ACTIVITIES.

PUMPING SHALL BE PERFORMED TO KEEP WORK AREA DEWATERED. PUMPED DISCHARGE SHALL RELEASE SEDIMENT-LADEN WATER IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OR INCREASE TURBIDITY OF SURFACE WATERS. (SEE CONTROL DEWATERING).

FISH RESCUE

COFFERDAM SHALL BE INSTALLED TO ISOLATE WORK.

INITIAL DEWATERING SHALL OCCUR SLOWLY BY INCREMENTALLY REDUCING COFFERDAMMED AREAS OVER A PERIOD OF 30 MINUTES TO ALLOW TIME FOR FISH TO FIND RESIDUAL POOLS WITHOUT RISK OF SUDDEN STRANDING.

RESIDUAL POOLS WITHIN THE DEWATERED CONSTRUCTION SITE SHALL BE PUMPED DRY USING SCREENED PUMP INTAKES. TRAPPED FISH SHALL BE RESCUED.

FISH BARRIERS AND PUMP INTAKES SHALL ADHERE TO NMFS SCREENING CRITERIA. NATIONAL MARINE FISHERIES SERVICE JUVENILE FISH SCREEN CRITERIA (REVISED FEBRUARY 16, 1995) AND ADDENDUM: JUVENILE FISH SCREEN CRITERIA FOR PUMP INTAKES (MAY 9, 1996)

ALL FISH RESCUE EFFORTS SHALL BE SUPERVISED BY A QUALIFIED FISHERIES/AQUATIC BIOLOGIST EXPERIENCED WITH THE COLLECTION AND HANDLING OF SALMONID FISHES FROM CONSTRUCTION SITES.

ALL FISH TRAPPED IN RESIDUAL POOLS WITHIN THE PROJECT AREA WILL BE CAREFULLY COLLECTED BY SEINE AND/OR DIP NETS AND PLACED IN CLEAN TRANSFER CONTAINERS WITH ADEQUATE VOLUME OF WATER AND HELD WITHIN NO LONGER THAN 10 MINUTES.

CAPTURED FISHES SHALL BE IMMEDIATELY RELEASED TO DOWNSTREAM OR UPSTREAM OF THE CONSTRUCTION SITE, DEPENDING ON SPECIES AND LIFESTAGE.

TREE SALVAGE

ANY REMOVED VEGETATION GREATER THAN 6 INCHES DIAMETER AND 15 FEET LONG SHOULD BE INCORPORATED INTO LOG JAM STRUCTURES. CONTRACTOR IS RESPONSIBLE FOR REMOVING SMALLER CLEARING AND GRUBBING DEBRIS FROM THE SITE AT THE END OF THE PROJECT UNLESS DIRECTED BY THE ENGINEER.

LIVE TREES

ALL TREES NOT MARKED FOR REMOVAL SHALL BE LEFT STANDING UNDISTURBED. LOGGING ACTIVITY SHALL NOT DEBARK OR DAMAGE LIVE TREES.

EROSION CONTROL

THE CONTRACTOR IS ADVISED THAT THE PROJECT AREA DRAINS TO A SALMON BEARING STREAM AND/OR STATE WATERS AND THAT THE CONTRACTOR IS RESPONSIBLE TO PROTECT THE RECEIVING WATERS FROM DELETERIOUS EFFECTS OF CONSTRUCTION.

THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE EROSION CONTROL MEASURES SHOWN OR DESCRIBED IN THE CONTRACT DOCUMENTS AND ANY ADDITIONAL MEASURES THAT MAY BE REQUIRED BY THE CONTRACTOR'S MEANS AND METHODS OF CONSTRUCTION AS NEEDED TO CONTROL EROSION AND SEDIMENT AT THE CONSTRUCTION SITE AND TO PREVENT VIOLATION OF SURFACE WATER QUALITY, GROUND WATER QUALITY, OR SEDIMENT MANAGEMENT STANDARDS. EROSION CONTROL MEASURES SHALL BE MAINTAINED THROUGHOUT THE COURSE OF CONSTRUCTION AND UNTIL ALL DISTURBED EARTH IS STABILIZED IN FINISH GRADES.

CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND MAINTAINING ALL NECESSARY EROSION CONTROL FACILITIES TO COMPLY WITH APPLICABLE EROSION CONTROL REGULATIONS.

AN APPROVED EROSION AND SEDIMENT CONTROL (ESC) PLAN IS PROVIDED IN THESE DRAWINGS. THE BID AND CONSTRUCTION CONTRACT ARE BASED UPON IT. THE CONTRACTOR SHALL BE SOLEY RESPONSIBLE FOR PROVIDING EROSION CONTROL MEASURES TO COMPLY WITH APPLICABLE REGULATIONS AND PERMITS.

THE FOLLOWING RECOMMENDATIONS FOR AN ESC PLAN WILL PROVIDE A GUIDELINE FOR THE CONTRACTOR TO DEVELOP AND IMPLEMENT AN ESC PLAN.

A. THE IMPLEMENTATION OF THESE RECOMMENDATIONS FOR AN ESC PLAN AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED, AND VEGETATION IS ESTABLISHED.

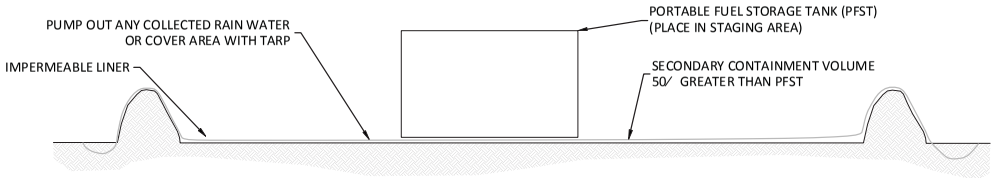
B. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE CONTRACTOR FOR THE DURATION OF CONSTRUCTION.

C. ESC FACILITIES AS APPROXIMATELY SHOWN ON THIS PLAN ARE TO BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT ENTER THE RIVER, OR VIOLATE APPLICABLE WATER STANDARDS.

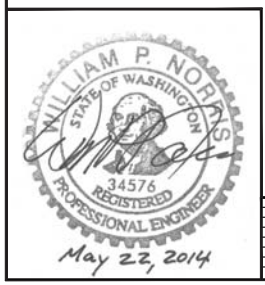
D. THE ESC FACILITIES SHOWN ON THE ESC PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.

E. THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.

F. FROM OCTOBER 1 - APRIL 30, NO SUBSTANTIALLY UNWORKED SOILS SHALL REMAIN EXPOSED FOR MORE THAN TWO DAYS AT A TIME. FROM MAY 1 - SEPT 30 NO SUBSTANTIALLY UNWORKED SOILS SHALL REMAIN EXPOSED FOR MORE THAN SEVEN DAYS AT A TIME.



1/2 DETAIL - TYPICAL PORTLABLE FUEL STORAGE TANK
NOT TO SCALE



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Lewis River – Eagle Island Habitat Restoration – Site B and C Woodland, Washington

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EROSION CONTROL NOTES AND DETAILS I

SHEET 2 OF 15

SILT FENCES

1. THE SILT FENCE SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, SILT FENCE SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 12 INCH OVERLAP, AND BOTH ENDS SECURELY FASTENED TO THE POST, OR OVERLAP 2'X2" POSTS AND ATTACH AS APPROVED BY THE ENGINEER.

2. THE SILT FENCE IS TO BE INSTALLED AT LOCATIONS SHOWN ON THE PLAN ALONG THE DOWNHILL PERIMETER OF DISTURBED AREAS. THE FENCE POSTS SHALL BE SPACED A MAXIMUM OF 4 FEET APART AND DRIVEN SECURELY INTO THE GROUND A MINIMUM OF 12 INCHES.

3. THE SILT FENCE SHALL HAVE A MINIMUM VERTICAL BURIAL OF 6 INCHES. ALL EXCAVATED MATERIAL FROM FILTER FABRIC FENCE INSTALLATION SHALL BE BACKFILLED AND COMPACTED, ALONG THE ENTIRE DISTURBED AREA.

4. STANDARD OR HEAVY DUTY SILT FENCE SHALL HAVE MANUFACTURED STITCHED LOOPS FOR 2' x 2' POST INSTALLATION.

5. SILT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY PROTECTED AND STABILIZED.

6. SILT FENCES SHALL BE INSPECTED BY THE CONTRACTOR IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

7. ON PROJECT COMPLETION THE CONTRACTOR SHALL REMOVE ALL SILT FENCES AND TEMPORARY EROSION CONTROL MEASURES FROM THE PROJECT SITE.

INSPECTION AND MAINTENANCE

ALL BEST MANAGEMENT PRACTICES (BMPs) SHALL BE INSPECTED, MAINTAINED, AND REPAIRED AS NEEDED TO ASSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. ALL ON-SITE EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED AT LEAST ONCE EVERY SEVEN DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCHES OF RAIN PER 24 HOUR PERIOD.

SEDIMENT MUST BE REMOVED FROM SILT FENCES BEFORE IT REACHES APPROXIMATELY ONE THIRD THE HEIGHT OF THE FENCE, ESPECIALLY IF HEAVY RAINS ARE EXPECTED.

STABILIZE SOILS AND PROTECT SLOPES

FROM MAY 1 THROUGH SEPTEMBER 30, ALL EXPOSED SOILS SHALL BE PROTECTED FROM EROSION BY MULCHING, PLASTIC SHEETING, OR OTHER APPROVED MEASURES WITHIN ONE WEEK OF GRADING. FROM OCTOBER 1 THROUGH APRIL 30, ALL EXPOSED SOILS MUST BE PROTECTED WITHIN 2 DAYS OF GRADING. SOILS SHALL BE STABILIZED BEFORE A WORK SHUTDOWN, HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT TRAPPING MEASURES. HYDROSEED AS SOON AS PRACTICAL ALL DISTURBED AREAS NOT INDICATED IN THE CONTRACT DOCUMENTS FOR OTHER PERMANENT STABILIZATION MEASURES.

DESIGN, CONSTRUCT, AND PHASE CUT AND FILL SLOPES IN A MANNER THAT WILL MINIMIZE EROSION. REDUCE SLOPE VELOCITIES ON DISTURBED SLOPES BY PROVIDING TEMPORARY BARRIERS.

AFTER FINAL SITE STABILIZATION

ALL TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION IS ACHIEVED OR AFTER THE TEMPORARY BMPs ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED FROM THE SITE OR INCORPORATED INTO FINISHED GRADING. DISTURBED SOIL AREAS RESULTING FROM REMOVAL SHALL BE PERMANENTLY STABILIZED.

CONTROL POLLUTANTS

CONTRACTOR MUST PREPARE A SPILL PREVENTION CONTROL AND COUNTER MEASURE (SPCC) PLAN AND IMPLEMENT REQUIRED MEASURES TO CONTROL POLLUTANTS. SEE THE SPECIAL PROVISIONS.

ALL POLLUTANT DISCHARGES OTHER THAN SEDIMENT THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER, GROUNDWATER, OR SOILS TO REMAIN ON SITE.

THE USE OF LIME, FLY ASH, OR OTHER SOIL AMENDMENTS THAT COULD ALTER THE PH OF DISCHARGE WATERS IS PROHIBITED.

SEDIMENT CONTROLS

CONTRACTOR SHALL PREPARE A STORMWATER POLLUTION PREVENTION PLAN (SWPPP), AND IMPLEMENT AND MAINTAIN REQUIRED MEASURES. THE DUFF LAYER, NATIVE TOP SOIL, AND NATURAL VEGETATION SHALL BE RETAINED IN AN UNDISTURBED STATE TO THE MAXIMUM EXTENT PRACTICABLE. THE CONTRACTOR SHALL MARK ALL AREAS WHICH ARE NOT TO BE DISTURBED, INCLUDING SETBACKS, SENSITIVE/CRITICAL AREAS AND THEIR BUFFERS. TREES AND DRAINAGE COURSES NOT TO BE DISTURBED SHALL BE MARKED AND FLAGGED BEFORE CONSTRUCTION ACTIVITIES ARE INITIATED. THESE AREAS SHALL BE PROTECTED BY THE CONTRACTOR WITH BARRIER FENCING AS SHOWN ON THE DRAWING AND AS DIRECTED BY THE ENGINEER WHEN CONSTRUCTION ACTIVITIES ARE INITIATED.

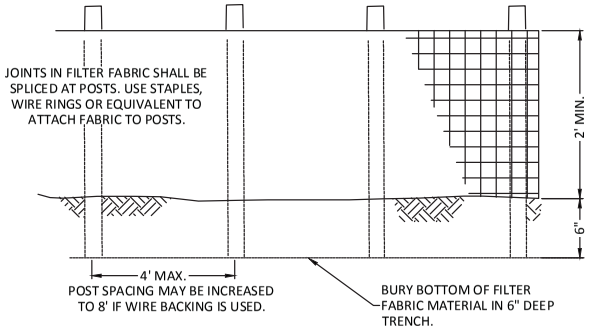
THE CONTRACTOR MAY ELECT TO CONSTRUCT TEMPORARY SEDIMENTATION PONDS, TANKS, OR OTHER FACILITIES AS NECESSARY TO CONTROL RUNOFF AND/OR TO FILTER DEWATERING DISCHARGE.

CONTROL DEWATERING

HIGHLY TURBID OR CONTAMINATED DEWATERING WATER FROM CONSTRUCTION EQUIPMENT OPERATION SHALL BE PREVENTED FROM DELIVERING SEDIMENT TO THE RIVER. DISPOSAL OPTIONS FOR DEWATERING DISCHARGE INCLUDE:

1. SEDIMENT-LADEN WATER MAY BE PUMPED TO AN UPLAND AREA AND ALLOWED TO SHEET FLOW OVER UNDISTURBED GROUND THROUGH EXISTING VEGETATION TO INFILTRATE INTO THE GROUND.

2. USE OF AN APPROPRIATELY SIZED AND MAINTAINED SEDIMENTATION BAG (DIRTBAG) OR OTHER SEDIMENTATION FACILITY WITH OUTFALL TO A DITCH OR SWALE FOR SMALL VOLUMES OF LOCALIZED DEWATERING.



1/3 DETAIL - SILT FENCE
NOT TO SCALE

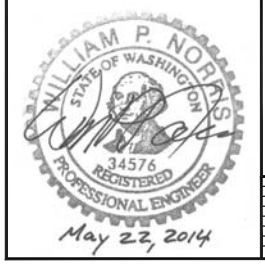
NOTES:

1. FENCE SHALL NOT BE INSTALLED ON SLOPES STEEPER THAN 2:1.

2. JOINTS IN FILTER FABRIC SHALL BE OVERLAPPED 12 INCHES AT POST.

3. USE STAPLES, WIRE RINGS, OR EQUIVALENT TO ATTACH FABRIC.

4. REMOVE SEDIMENT WHEN IT REACHES 1/3 FENCE HEIGHT.



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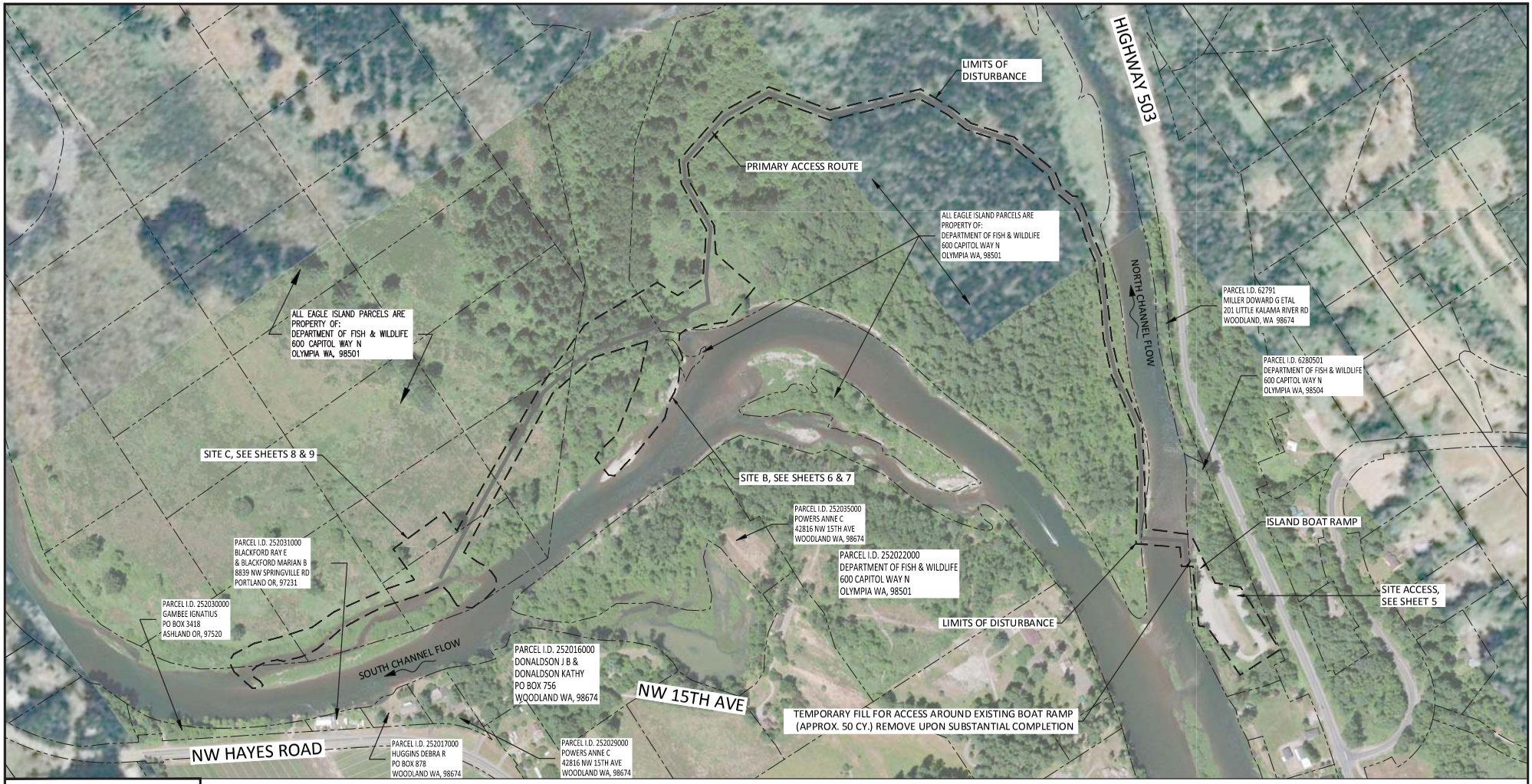
EROSION CONTROL NOTES AND DETAILS II

SHEET 3 OF 15



WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED
PROFESSIONAL ENGINEER
May 22, 2014

SITE PLAN

0 400 800
SCALE IN FEET

LEGEND

- ACCESS ROUTE
- PROPERTY LINES
- LIMITS OF DISTURBANCE

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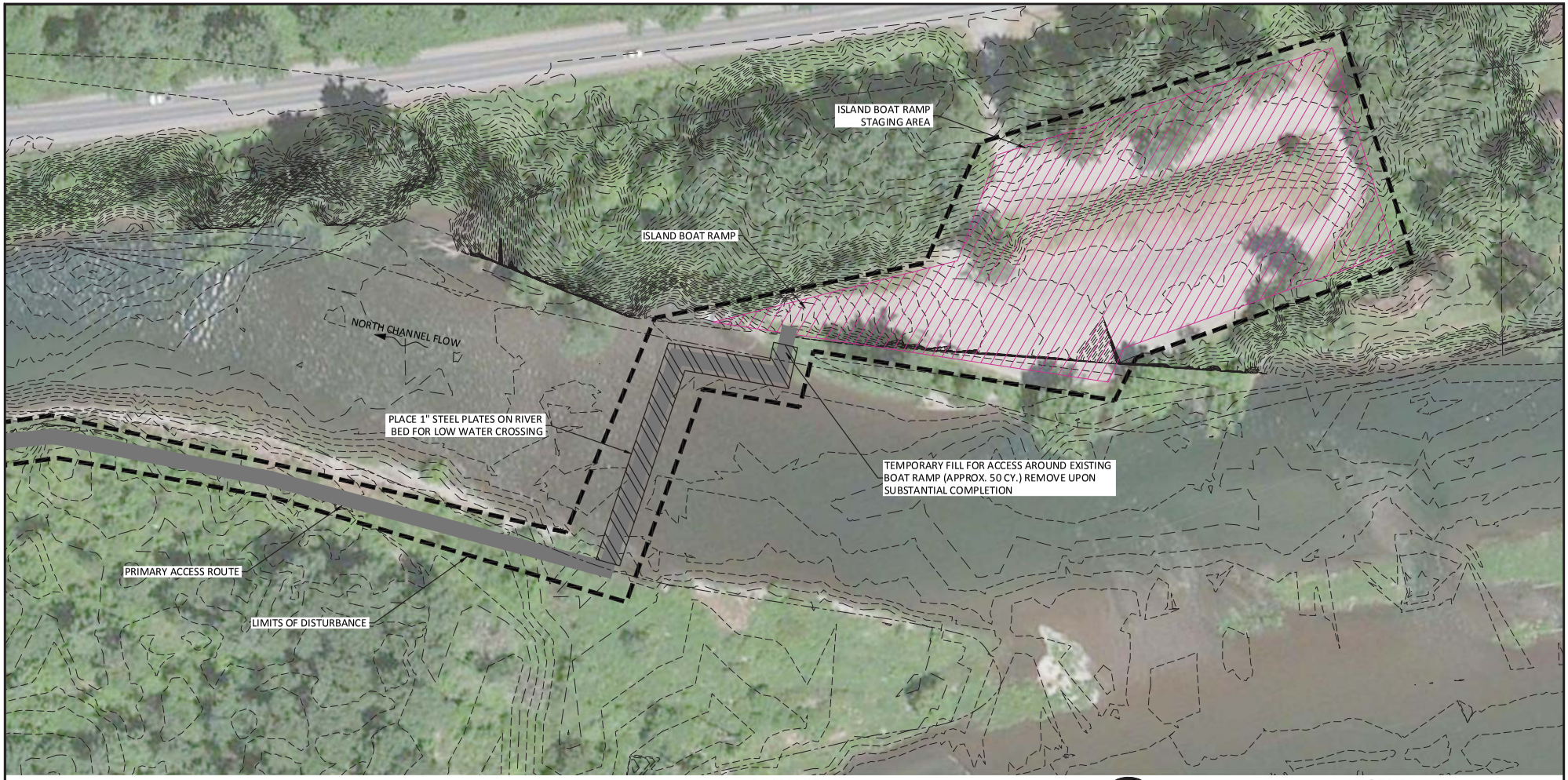
SITE PLAN AND ACCESS

SHEET
4 OF 15



PLAN VIEW

LEGEND

- TAX PARCELS
- CONTOURS (1 FT.)
- CONTOURS (5 FT.)
- ACCESS ROUTE
- STAGING/STOCKPILE
- LIMITS OF DISTURBANCE

0 80 160

SCALE IN FEET

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED
PROFESSIONAL ENGINEER
May 22, 2014

NO.	BY	DATE	REVISION

RP	BN	BN,GJ
DRAWN	DESIGNED	CHECKED
BN	05/22/14	
APPROVED	DATE	PROJECT

Lewis River – Eagle Island Habitat Restoration – Site B and C Woodland, Washington

COWLITZ INDIAN TRIBE

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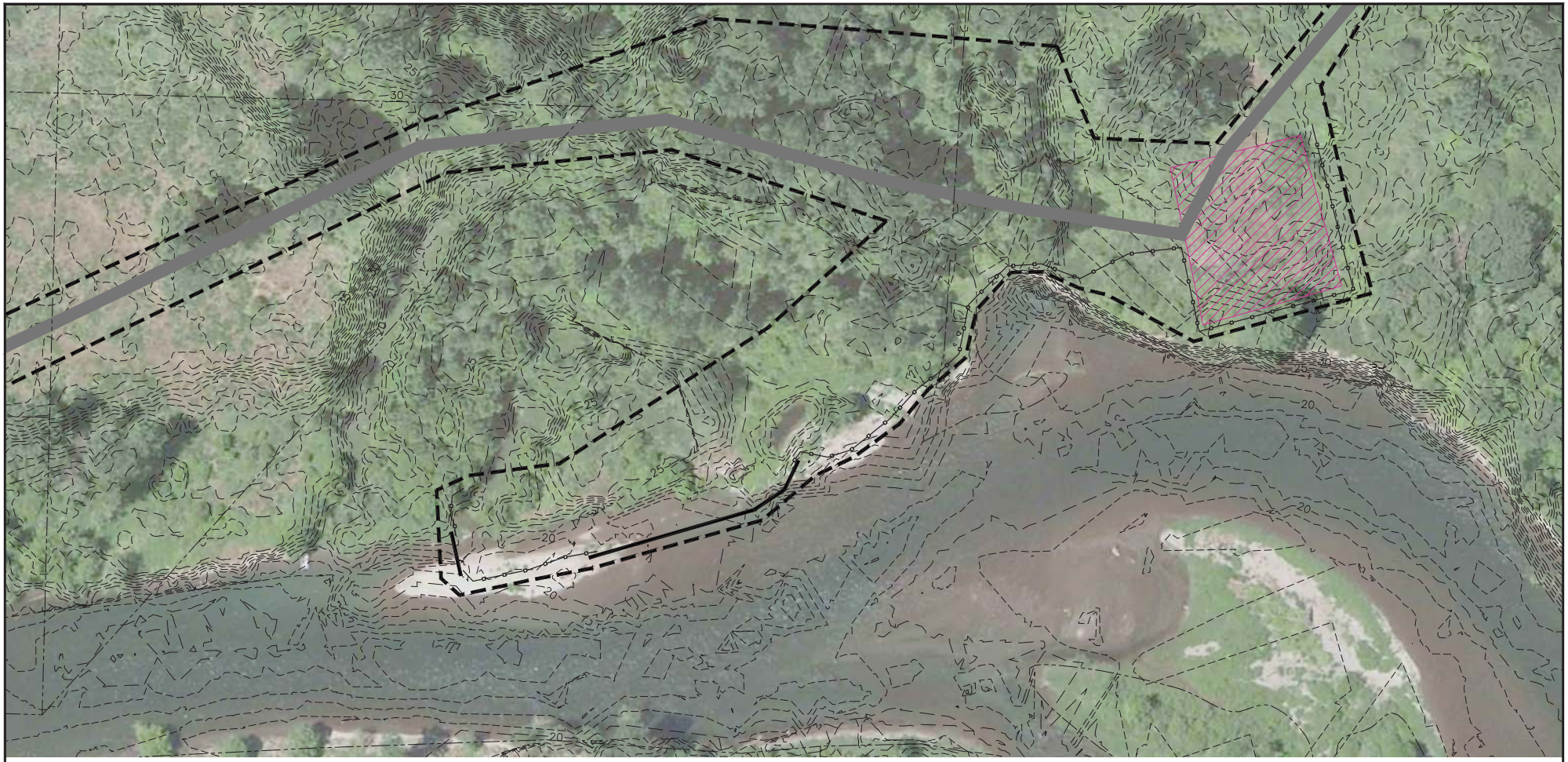
ISLAND ACCESS EROSION AND SEDIMENT CONTROL PLAN

SHEET 5 OF 15



PLAN VIEW

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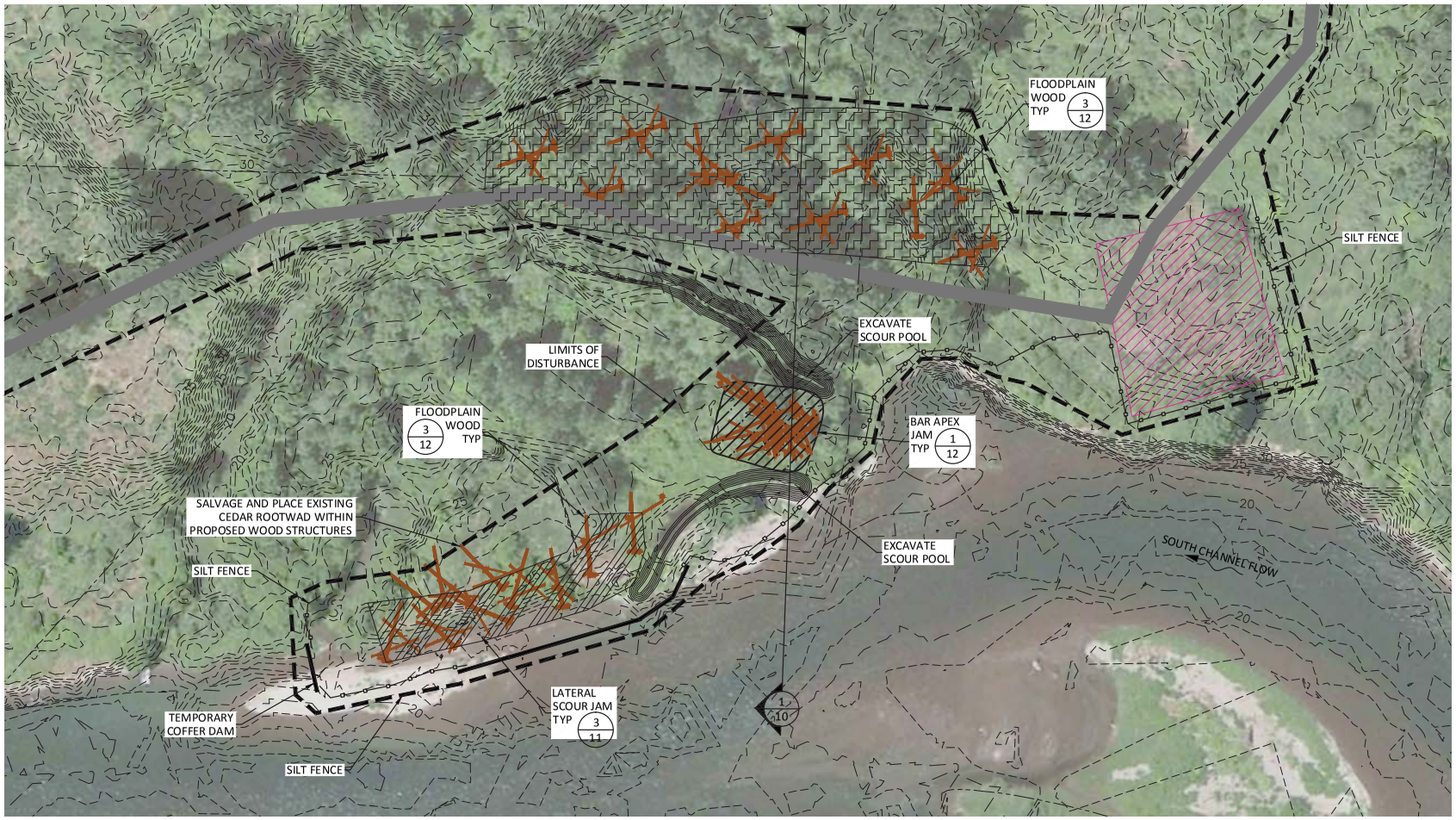
SHEET
OF 15



PLAN VIEW

0 100 200
SCALE IN FEET

LEGEND

- CONTOURS (1 FT.)
- CONTOURS (5 FT.)
- PROPOSED CONTOURS (1 FT.)
- PROPOSED CONTOURS (5 FT.)
- LIMITS OF DISTURBANCE
- SILT FENCE
- ACCESS ROUTE
- TAX PARCEL
- STAGING/STOCKPILE
- LATERAL SCOUR POOL JAM 3/12 4/12
- FLOODPLAIN WOOD 1/12 2/12
- BAR APEX JAM
- WOOD

NOTES:

1. SPECIFIC ORIENTATION OF LOGS AND BALLAST MATERIALS MAY VARY FROM PLAN VIEW DRAWING DEPENDING ON SIZE AND SHAPE OF MATERIAL ACQUIRED AND SITE CONDITIONS AT TIME OF CONSTRUCTION.
2. MINIMIZE DISTURBANCE TO EXISTING WOODY DEBRIS (LOG JAMS).

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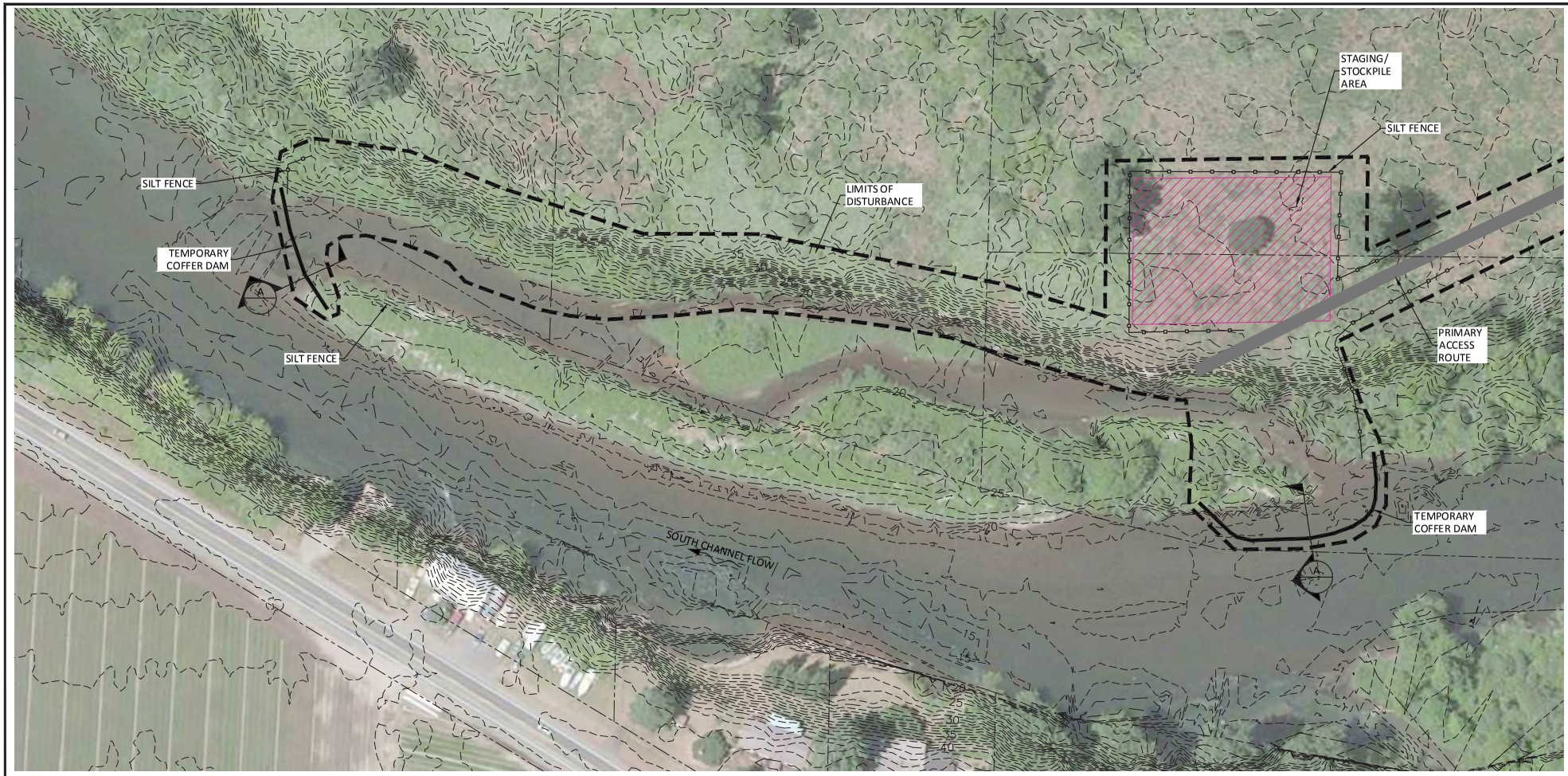
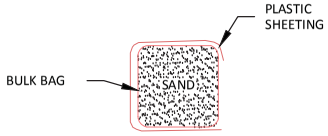
SITE B PLAN

SHEET 7 OF 15



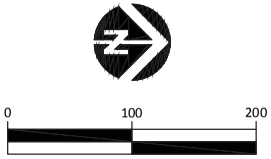
PLAN VIEW



A
-
SECTION
NOT TO SCALE

NOTES:

1. PLACE COFFER DAMS PRIOR TO PERFORMING IN-WATER WORK.
2. REMOVE COFFER DAMS AFTER IN-WATER WORK IS COMPLETE.



LEGEND

- TAX PARCELS
- CONTOURS (1 FT.)
- CONTOURS (5 FT.)
- ACCESS ROUTE
- STAGING/STOCKPILE
- LIMITS OF DISTURBANCE
- SILT FENCE

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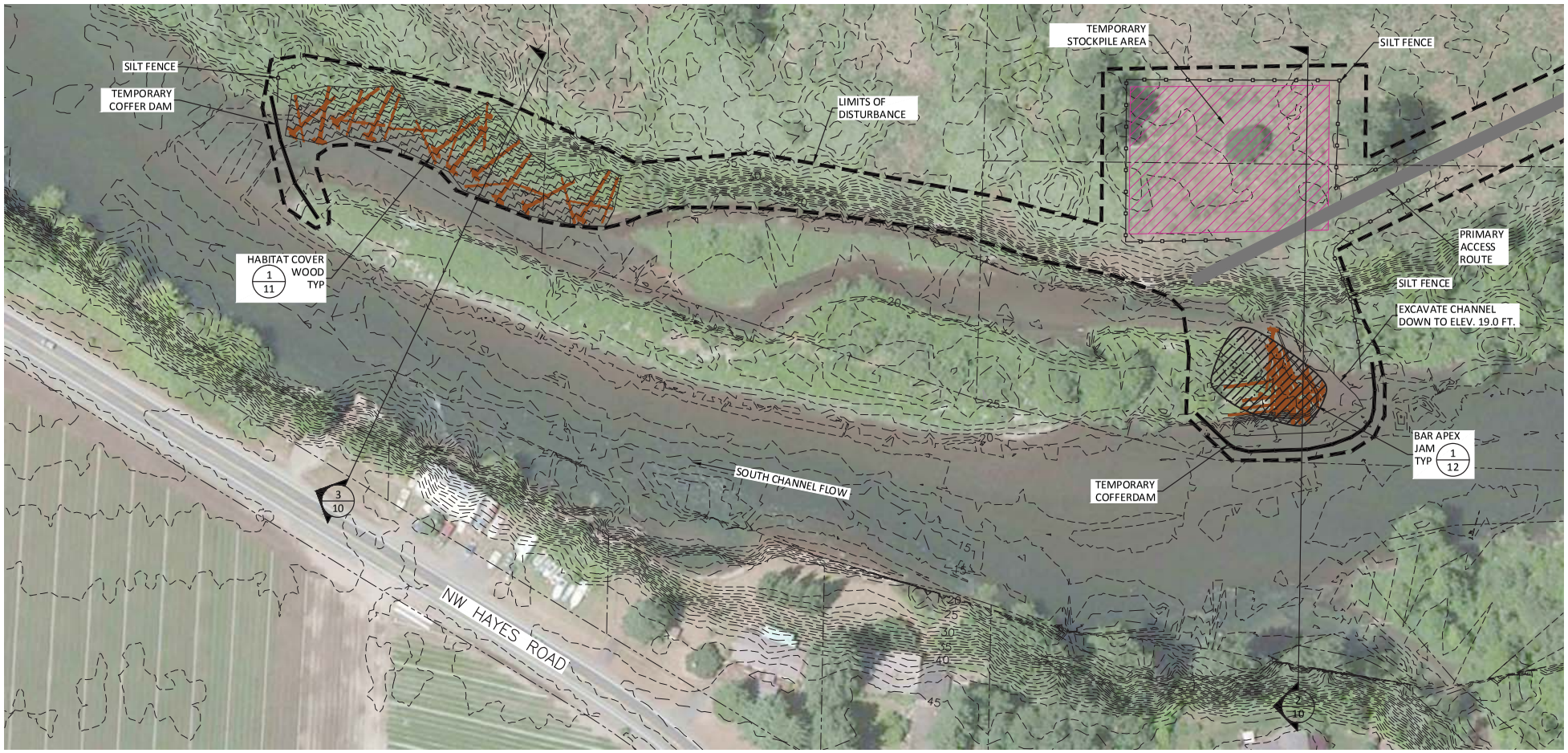
SITE C EROSION AND SEDIMENT CONTROL PLAN

SHEET 8 OF 15



PLAN VIEW

NOTE:

SPECIFIC ORIENTATION OF LOGS AND BALLAST MATERIALS MAY VARY FROM PLAN VIEW DRAWING DEPENDING ON SIZE AND SHAPE OF MATERIAL ACQUIRED AND SITE CONDITIONS AT TIME OF CONSTRUCTION.

0 100 200

SCALE IN FEET

LEGEND

- CONTOURS (1 FT.)
- CONTOURS (5 FT.)
- PROPOSED CONTOURS (1 FT.)
- PROPOSED CONTOURS (5 FT.)
- LIMITS OF DISTURBANCE
- SILT FENCE
- ACCESS ROUTE
- TAX PARCELS
- STAGING/STOCKPILE
- LATERAL SCOUR POOL JAM 3/12 4/12
- HABITAT WOOD 1/11 2/11
- BAR APEX JAM
- WOOD

WILLIAM P. NORRIS STATE OF WASHINGTON 34576 REGISTERED PROFESSIONAL ENGINEER

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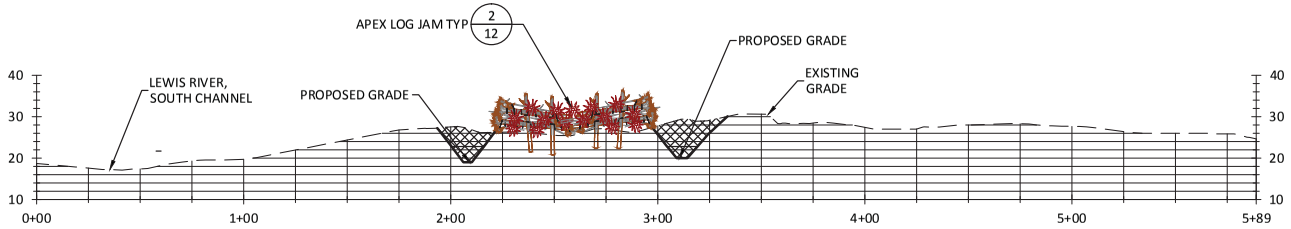
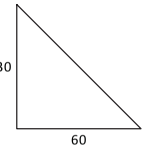
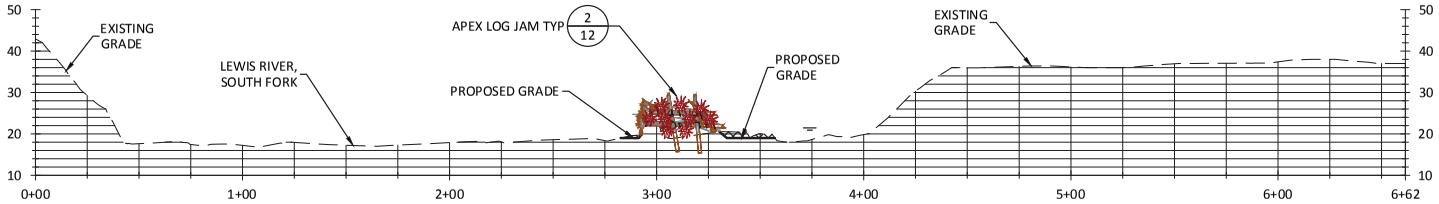
SITE C PLAN

SHEET 9 OF 15



1/10 CROSS SECTION





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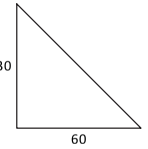

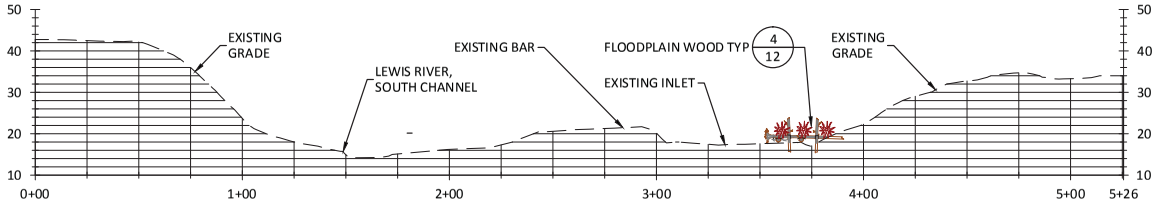

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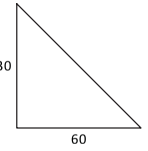

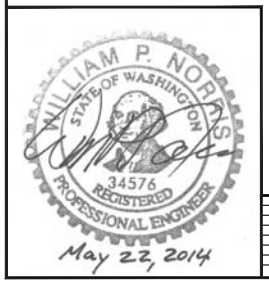

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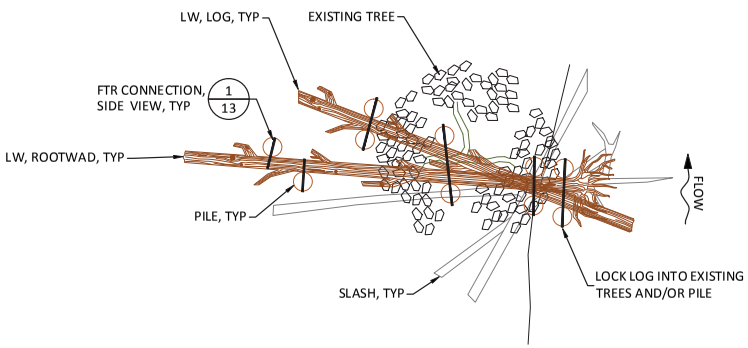
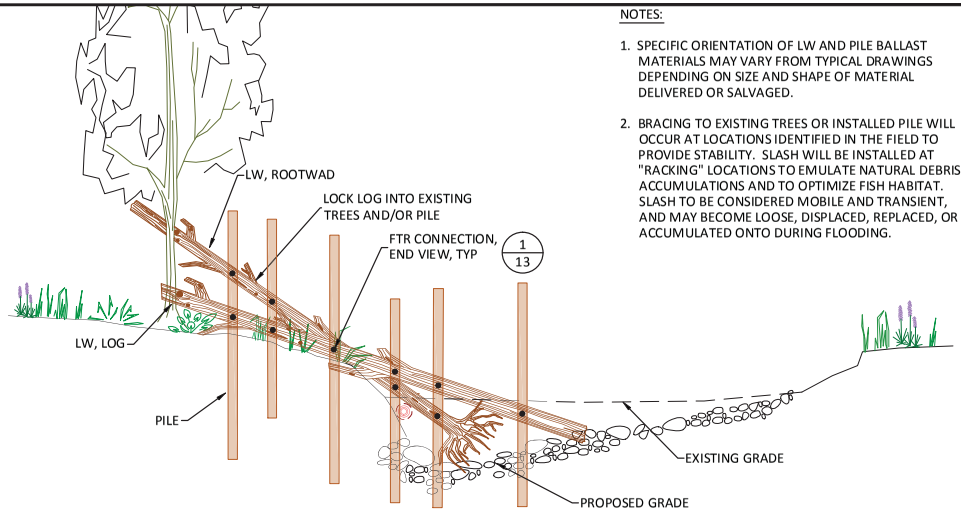
CROSS SECTIONS

SHEET
10 OF 15



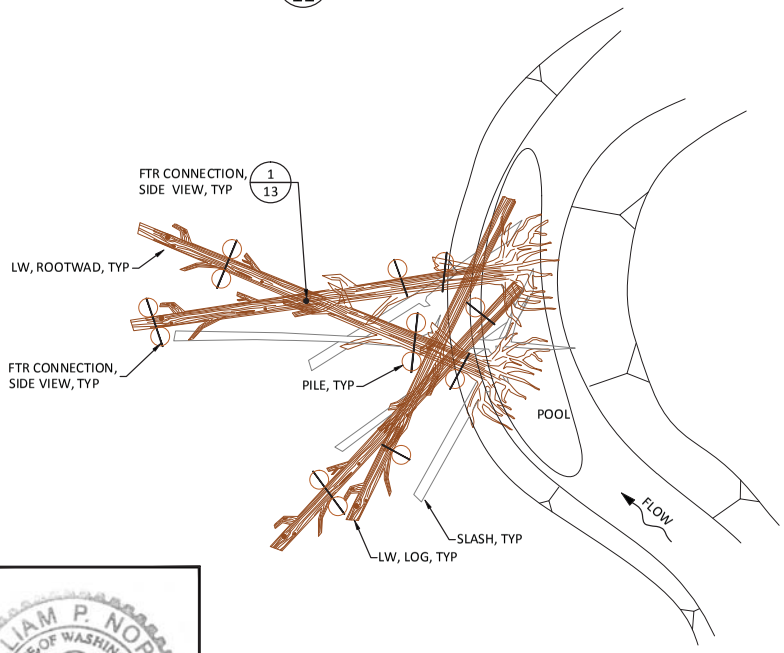
1/11 PLAN VIEW - TYPICAL HABITAT WOOD COVER
NOT TO SCALE



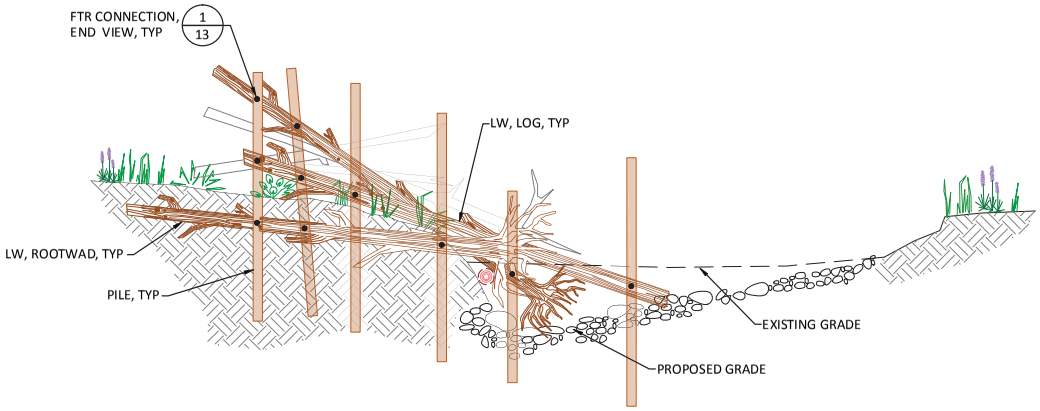
2/11 SECTION VIEW - TYPICAL HABITAT WOOD COVER
NOT TO SCALE

NOTES:

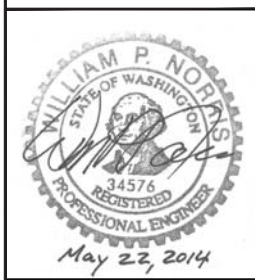
1. SPECIFIC ORIENTATION OF LW AND PILE BALLAST MATERIALS MAY VARY FROM TYPICAL DRAWINGS DEPENDING ON SIZE AND SHAPE OF MATERIAL DELIVERED OR SALVAGED.
2. BRACING TO EXISTING TREES OR INSTALLED PILE WILL OCCUR AT LOCATIONS IDENTIFIED IN THE FIELD TO PROVIDE STABILITY. SLASH WILL BE INSTALLED AT "RACKING" LOCATIONS TO EMULATE NATURAL DEBRIS ACCUMULATIONS AND TO OPTIMIZE FISH HABITAT. SLASH TO BE CONSIDERED MOBILE AND TRANSIENT, AND MAY BECOME LOOSE, DISPLACED, REPLACED, OR ACCUMULATED ONTO DURING FLOODING.



3/11 PLAN VIEW - TYPICAL LATERAL SCOUT POOL JAM
NOT TO SCALE



4/11 SECTION VIEW - TYPICAL LATERAL SCOUT POOL JAM
NOT TO SCALE



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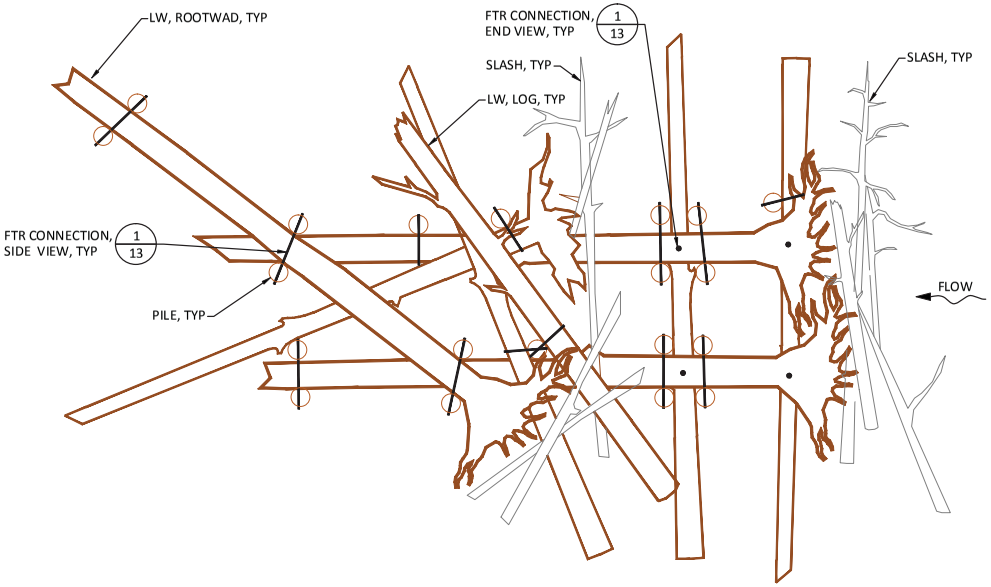
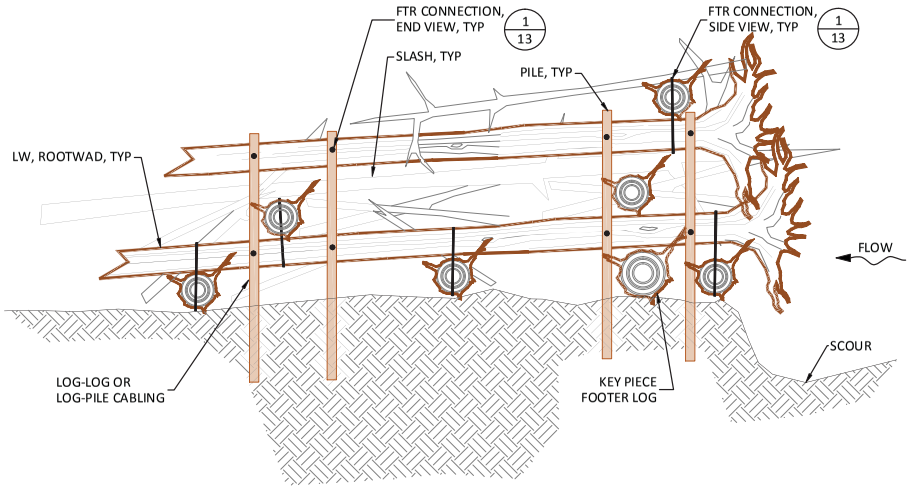
TYPICAL DETAILS I

SHEET 11 OF 15



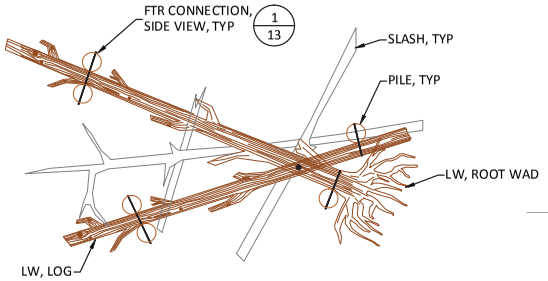
1/12 PLAN VIEW - TYPICAL BAR APEX LOG JAM
NOT TO SCALE



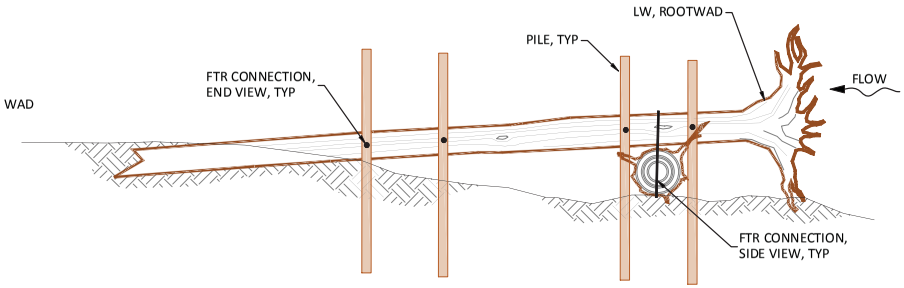
2/12 SECTION VIEW - TYPICAL BAR APEX LOG JAM
NOT TO SCALE

NOTES:

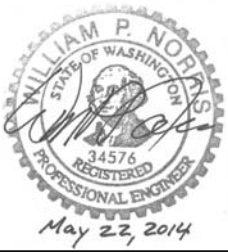
1. SPECIFIC ORIENTATION OF LW AND PILE BALLAST MATERIALS MAY VARY FROM TYPICAL DRAWINGS DEPENDING ON SIZE AND SHAPE OF MATERIAL DELIVERED OR SALVAGED, TO BE DETERMINED BY ENGINEER.
2. BRACING TO EXISTING TREES OR INSTALLED PILE WILL OCCUR AT LOCATIONS IDENTIFIED IN THE FIELD TO PROVIDE STABILITY. SLASH WILL BE INSTALLED AT "RACKING" LOCATIONS TO EMULATE NATURAL DEBRIS ACCUMULATIONS AND TO OPTIMIZE FISH HABITAT. SLASH TO BE CONSIDERED MOBILE AND TRANSIENT, AND MAY BECOME LOOSE, DISPLACED, REPLACED, OR ACCUMULATED ONTO DURING FLOODING.



3/12 PLAN VIEW - TYPICAL FLOODPLAIN WOOD
NOT TO SCALE



4/12 SECTION VIEW - TYPICAL FLOODPLAIN WOOD
NOT TO SCALE



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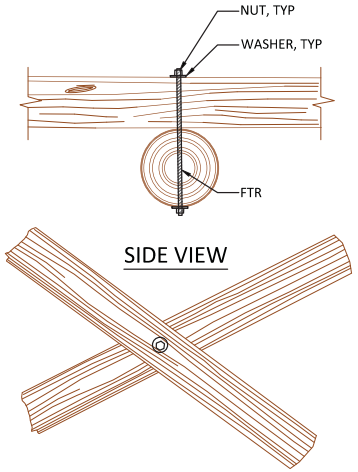
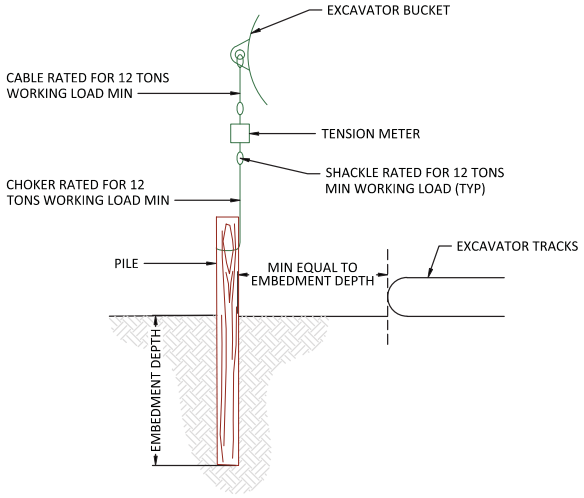
TYPICAL DETAILS II

SHEET 12 OF 15



1. PIN LW TO LW OR PILEING
2. DRILL 1-3/8" HOLE THROUGH LW OR PILE
3. INSERT 1-1/4" DIA FTR
4. INSTALL WASHER AND NUT
5. FILE OR GRIND OFF SHARP EDGES

1/13 FTR CONNECTION
NOT TO SCALE



2/13 PILE TESTING
NOT TO SCALE

PILES

ALL VERTICAL PILESS SHALL BE INSTALLED USING VIBRASONIC PILE DRIVING EQUIPMENT. INSTALLATION BY EXCAVATION OR HAMMERING WILL NOT BE ALLOWED.

ACCEPTABLE MINIMUM VIBRASONIC PILE DRIVING EQUIPMENT SHALL INCLUDE: HMC MOVAX SONIC SIDE GRIP VIBRATORY PILE DRIVER - MODEL SP80 OR EQUIVALENT.

PILES SHALL BE 10-INCH MINIMUM TO 16-INCH MAXIMUM.

RIGGING

RIGGING FOR PILE TESTING SHALL CONFORM TO THE TENSION SCALE MANUFACTURER'S RECOMMENDATIONS.

CHOKERS, CABLES AND AND SHACKLES SHALL HAVE MINIMUM WORKING LOAD RATING OF 12 TONS. FITTINGS SHALL BE SIZED ACCORDINGLY

TESTING

TESTING OF PILES SHALL BE PERFORMED IN THE PRESENCE OF THE ENGINEER.

EACH PILE TEST SHALL HAVE UPWARD LOAD GRADUALLY INCREASED AND AS CLOSELY ALIGNED TO AXIS OF PILE AS POSSIBLE. RECORD THE PILE DIAMETER, EMBEDMENT DEPTH AND MAXIMUM FORCE REQUIRED TO MOVE THE PILE . UP TO A TOTAL OF THREE LOADINGS MAY BE REQUIRED AT EACH EMBEDMENT DEPTH.

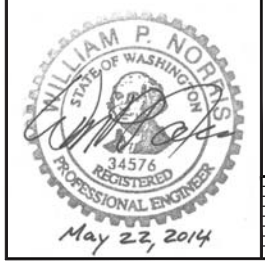
PROOF TESTS SHALL BE MADE AT UP TO FOUR EMBEDMENT DEPTHS TO BE DETERMINED IN THE FIELD. AS A GUIDELINE TEST EMBEDMENT DEPTHS MAY INCLUDE 6', 8', 10', AND 12'.

EXCAVATOR CONDUCTING PULL OUT LOADING SHALL BE POSITIONED NO CLOSER THAN EMBEDMENT DEPTH OF PILE IF POSSIBLE. IF A CLOSER POSITIONING IS REQUIRED, EXCAVATOR SHALL BE NO CLOSER THAN THAT REQUIRED TO GENERATE DESIRED LOADING WITH DISTANCE FROM PILE NOTED IN THE TEST RECORD.

PULL OUT RESISTANCE READING SHALL BE COMPARED AGAINST EXCAVATOR MAX LIFT OFFSET TABLE.

10% OF PRODUCTION PILES SHALL BE PROOF TESTED. IF RESULTS VARY MORE THAN 50% THEN IT SHOULD BE ANTICIPATED THAT UP TO 25% OF THE PRODUCTION PILES SHALL BE PROOF TESTED.

CONSTRUCTED DRIVEN PILE EMBEDMENT DEPTH SPECIFIED IN THE DRAWINGS MAY BE REDUCED OR INCREASED, PENDING PULL OUT TEST RESULTS, AT THE CONTRACTOR'S EXPENSE.



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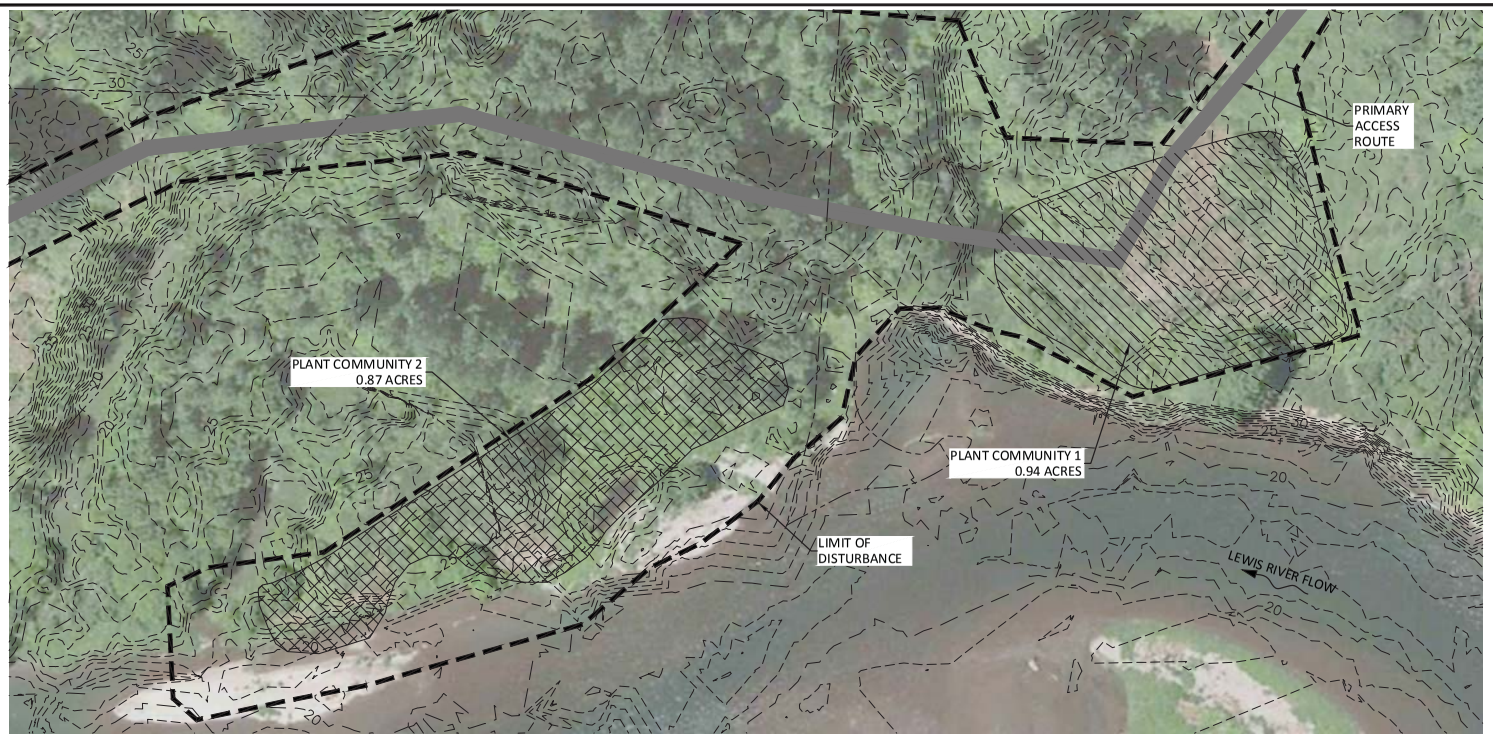
TYPICAL DETAILS III

SHEET 13 OF 15



PLAN VIEW

0 100 200

SCALE IN FEET

LEGEND

- CONTOURS (1 FT.)
- CONTOURS (5 FT.)
- TAX PARCELS
- ACCESS ROUTE
- LIMITS OF DISTURBANCE
- PLANT COMMUNITY 1 (0.94 ACRES)
- PLANT COMMUNITY 2 (0.87 ACRES)

NOTE:

SITE ACCESS ROADS AND OTHER DISTURBED AREAS TO BE SEEDED WITH NATIVE EROSION CONTROL SEED MIX.

Plant Community 1
Upland Restoration Community (0.94 acres)

Common Name	Scientific Name	Plant Form	Minimum Size	Required Number
Trees – approximately 15 foot spacing on center				
Red alder	Alnus rubra	Bare root	24"	125
Big leaf maple	Acer macrophyllum	Bare root	5 gal/24 "	50
Douglas - fir	Pseudot menzi		5 gal./24 "	50
			Total Trees	225
Shrubs – approximately 5				
Evergreen huckl eberry	Vaccir ovatum		2 gal./24 "	375
Beaked hazelnut	Corylus cornuta	Bare root	2 gal./24 "	275
Snowberry	Symphoricarpos alba	Bare root	2 gal./24 "	225
			Total Shrubs	875

NOT IN CONTRACT

Seed - Upland mix for staging area restoration - Seed at approximately 20 lbs/ acre

Blue Wildrye	Elymus glaucus	40% of composition by weight
California brome	Bromus carinatus	40% of composition by weight
Red fescue	Festuca rubra	20% of composition by weight

Plant Community 2
Riparian Tree/Shrub Community (0.87 acres)

Common Name	Scientific Name	Plant Form	Minimum Size	Required Number
Trees – approximately 15 foot spacing on center				
Black cottonwood	Populus balsamifera	Bare root	24"	75
Oregon Ash	Fraxinus l		24"	50
			Total Trees	125
Shrubs – approximately 5				
Pacific willow	Salix lasi		36"	200
Sitka willow	Salix sitchensis	Bare root	36"	200
Douglas spiraea	Spiraea douglasii	Bare root	24"	175
			Total Shrubs	575

NOT IN CONTRACT

RIPARIAN SEED MIX
SEED MIX CONTENTS - SEED AT APPROXIMATELY 18 LBS/ACRE

COMMON NAME	LATIN NAME	% OF SEED MIX (BY WEIGHT)
BLUE WILDRYE	ELYMUS GLAUCUS	46
RED FESCUE	FESTUCA RUBRA	38
TUFTED HAIRGRASS	DESCHAMPSTA CESPITOSA	12
WESTERN MANNAGRASS	GLYCERIA OCCIDENTALIS	2
AMERICAN SLOUGHGRASS	BECKMANNIA SYZIGACHNE	2

WILLIAM P. NORRIS
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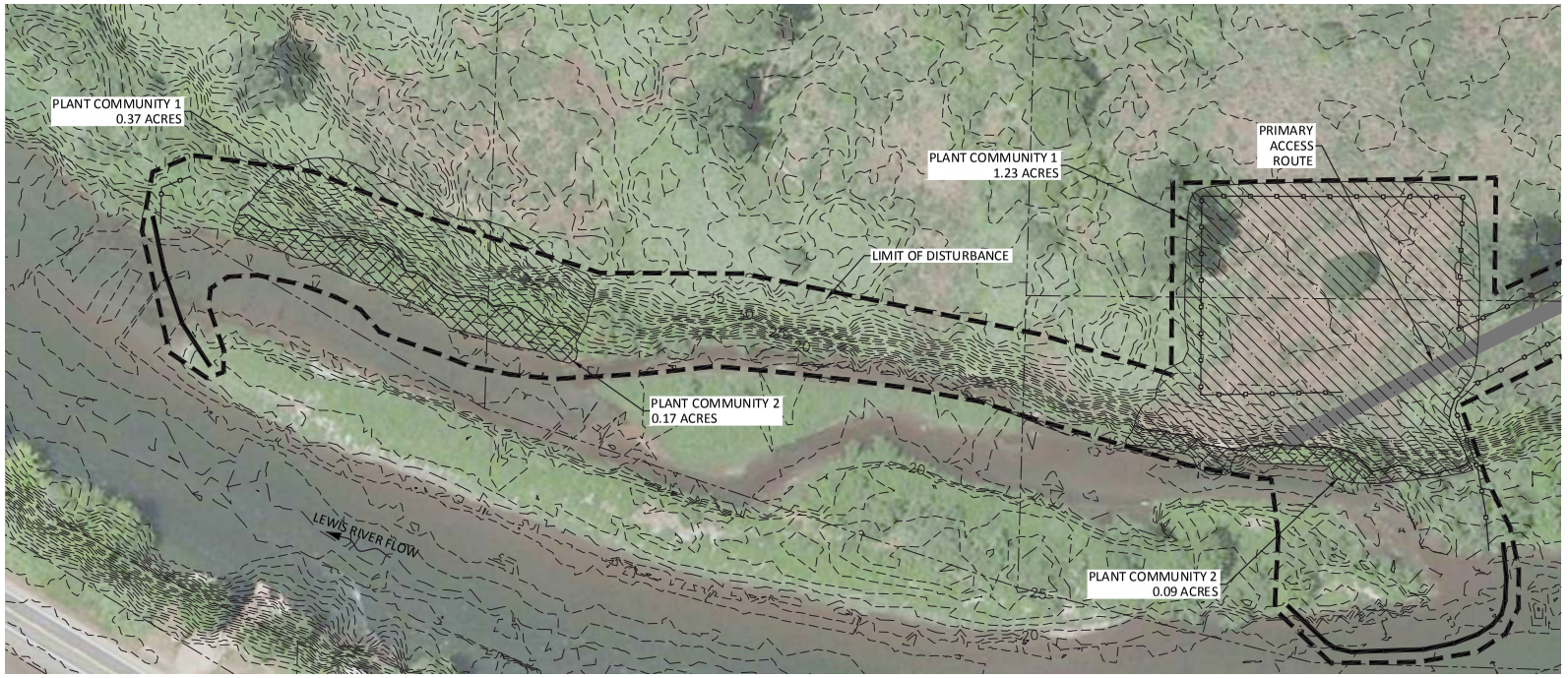
SITE B RE-VEGETATION PLAN

SHEET
14 OF 15



0 100 200

SCALE IN FEET

LEGEND

- CONTOURS (1 FT.)
- CONTOURS (5 FT.)
- TAX PARCELS
- ACCESS ROUTE
- LIMITS OF DISTURBANCE
- PLANT COMMUNITY 1 (1.60 ACRES)
- PLANT COMMUNITY 2 (0.26 ACRES)

NOTE:
SITE ACCESS ROADS AND OTHER DISTURBED AREAS TO BE SEEDED WITH NATIVE EROSION CONTROL SEED MIX.

PLAN VIEW

Plant Community 1
Upland Staging Area Restoration (1.60 acres)

Common Name	Scientific Name	Plant Form	Minimum Size	Required Number
Trees – approximately 15 foot spacing on center				
Red alder	Alnus rubra	Bare root	24"	200
Big leaf maple	Acer macrophyllum	Bare root	5 gal/24 "	80
Douglas - fir	Pseudot menzi		5 gal./24 "	80
			Total Trees	360
Shrubs – approximately 5				
Evergreen huckleberry	Vaccin ovatum		2 gal./24 "	600
Beaked hazelnut	Corylus cornuta	Bare root	2 gal./24 "	440
Snowberry	Symphoricarpos alba	Bare root	2 gal./24 "	360
			Total Shrubs	1400

NOT IN CONTRACT

Seed - Upland mix for staging area restoration - Seed at approximately 20 lbs/ acre		
Blue Wildrye	Elymus glaucus	40% of composition by weight
California brome	Bromus carinatus	40% of composition by weight
Red fescue	Festuca rubra	20% of composition by weight

Plant Community 2
Floodplain Tree/Shrub Community (0.26 acres)

Common Name	Scientific Name	Plant Form	Minimum Size	Required Number
Trees – approximately 15 foot spacing on center				
Oregon Ash	Fraxinus latifolia	Bare root	24"	50
			Total Trees	50
Shrubs – approximately 5				
Pacific wil low	Salix lasi		36"	65
Red- osier dogwood	Cornus s		36"	50
Douglas spiraea	Spiraea douglasii	Bare root	36"	50
			Total Shrubs	165

NOT IN CONTRACT

RIPARIAN SEED MIX
SEED MIX CONTENTS - SEED AT APPROXIMATLY 18 LBS/ACRE

COMMON NAME	LATIN NAME	% OF SEED MIX (BY WEIGHT)
BLUE WILDRYE	ELYMUS GLAUCUS	46
RED FESCUE	FESTUCA RUBRA	38
TUFTED HAIRGRASS	DESCHAMPSTA CESPITOSA	12
WESTERN MANNAGRASS	GLYCERIA OCCIDENTALIS	2
AMERICAN SLOUGHGRASS	BECKMANNIA SYZIGACHNE	2

WILLIAM P. NORRIS
STATE OF WASHINGTON
34576
REGISTERED
PROFESSIONAL ENGINEER
May 22, 2014

NO.	BY	DATE	REVISION

RP	BN	BN,GJ
DRAWN	DESIGNED	CHECKED
BN	05/22/14	
APPROVED	DATE	PROJECT

Lewis River – Eagle Island
Habitat Restoration – Site B and C
Woodland, Washington

COWLITZ INDIAN TRIBE

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SITE C RE-VEGETATION PLAN

SHEET
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