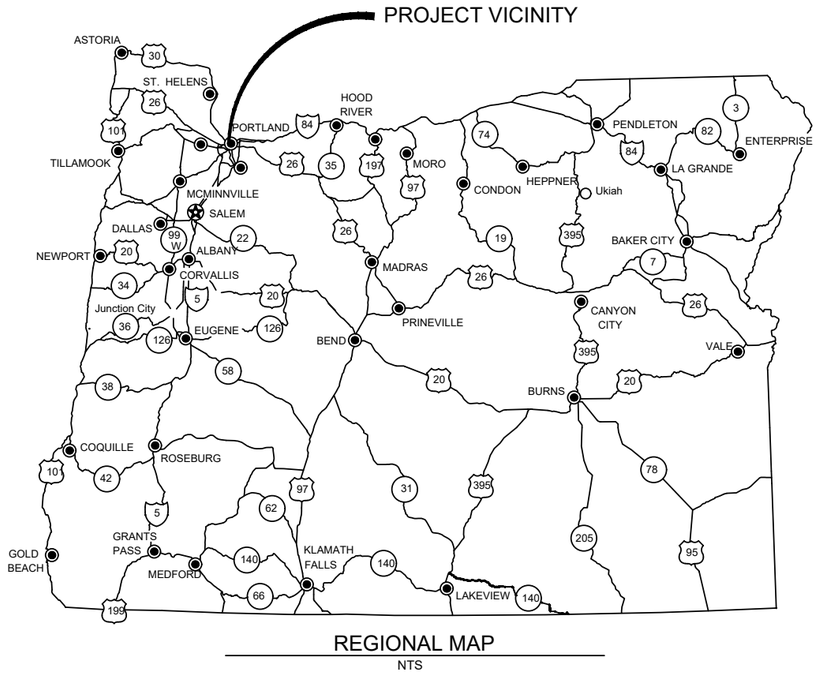
60% DESIGN
NOVEMBER 2023

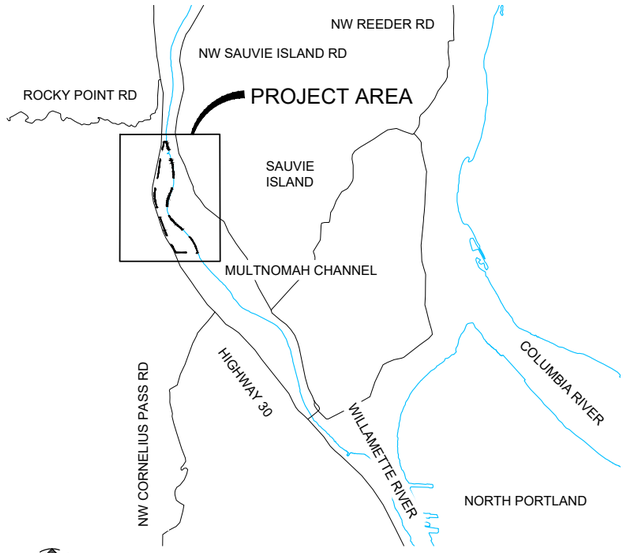
MULTNOMAH CHANNEL MARSH NATURAL AREA

#20200017

MULTNOMAH COUNTY, OR

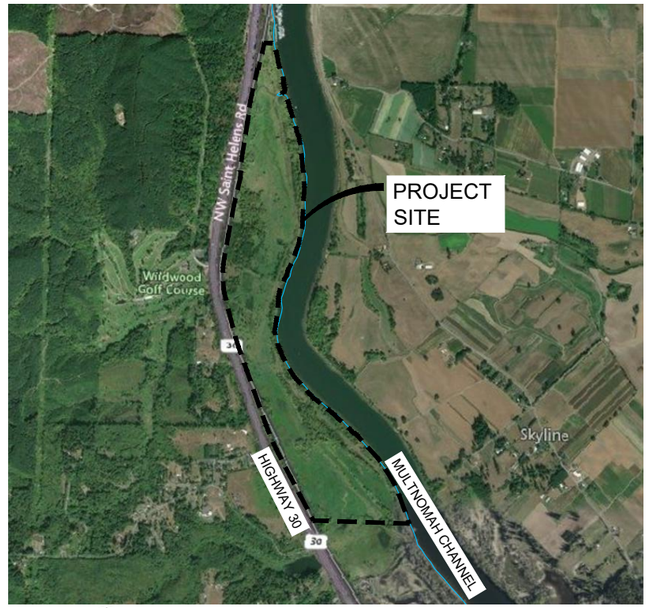


REGIONAL MAP
NTS



N

PROJECT VICINITY
NTS



N

PROJECT AREA
NTS

PROJECT TEAM

PROJECT SPONSOR

LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

JENNY DEZSO
jdezso@estuarypartnership.org

ENGINEERING PRIME CONSULTANT

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

ROWYN COOPER-CAROSELLI, PE
rowyn@wolfwaterresources.com

PROJECT INFO

SPATIAL REFERENCE
HORIZONTAL: NAD83 OREGON STATE PLANE NORTH, INTL FEET
VERTICAL: FEET NAVD88

PROJECT SITE LOCATION:
MULTNOMAH COUNTY, OR
LATITUDE: 45°40'45.84"N
LONGITUDE: 122°52'16.32"W
WATERBODY: MULTNOMAH CHANNEL/ WILLAMETTE RIVER

ODFW IN-WATER WORK WINDOW
JULY 1 - OCTOBER 31

SHEET INDEX

SHEET NUMBER	SHEET NAME	SHEET DESCRIPTION
1	G1.0	COVER
2	G1.1	GENERAL NOTES
3	G2.0	HIP CONSERVATION NOTES 1
4	G2.1	HIP CONSERVATION NOTES 2
5	G2.2	HIP CONSERVATION NOTES 3
6	C1.0	EXISTING CONDITIONS PLAN - NORTH
7	C1.1	EXISTING CONDITIONS PLAN - SOUTH
8	C2.0	ENHANCEMENT CONSTRUCTION OVERVIEW PLAN - NORTH
9	C2.1	ENHANCEMENT CONSTRUCTION OVERVIEW PLAN - SOUTH
10	C3.0	NORTH SLOUGH GRADING PLAN & PROFILE
11	C3.0.1	NORTH SLOUGH SECTIONS
12	C3.1	SWALE GRADING PLAN & SECTION
13	C3.2	CENTRAL MPL GRADING PLAN & SECTION

SHEET INDEX

SHEET NUMBER	SHEET NAME	SHEET DESCRIPTION
14	C3.3	UPLAND GRADING PLAN & SECTION
15	C3.4	SOUTH WETLAND GRADING PLAN & SECTION
16	C3.5	SOUTH SLOUGH GRADING PLAN & PROFILE
17	C3.5.1	SOUTH SLOUGH SECTIONS
18	C4.0	NORTH LEVEE BREACH PLAN & ELEVATIONS
19	C4.1	SOUTH LEVEE BREACH PLAN & ELEVATIONS
20	C5.0	HABITAT DETAILS 1
21	C5.1	HABITAT DETAILS 2
22	C5.2	HABITAT DETAILS 3
23	C6.0	TESC DETAILS 1
24	C6.1	TESC DETAILS 2
25	L1.0	PLANTING DETAILS

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP
MULTNOMAH CHANNEL MARSH NATURAL AREA
MULTNOMAH COUNTY, OR

COVER

REVISION NUMBER

No.	Date	Revision

Date: 11/08/2023
Designed By: RCC
Drawn By: DK
Checked By: AJ

SCALE: 0 1"

JOB NO. 20200017

SHEET NO. G1.0

1 OF 25

DWG: Z:\Shared\W2\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\G1.0 COVER.dwg USER: dkelley
DATE: Nov 08, 2023 3:56pm XREFS:X-TB-W2r-22x34

GENERAL NOTES:

1. DRIVING DIRECTIONS: FROM PORTLAND TAKE I-405 N AND TAKE EXIT 3 FOR US-30 W TOWARDS ST. HELENS. CONTINUE ON US-30 W FOR 13 MILES.
2. SOURCE OF TERRAIN IS 2019 LIDAR FROM METRO/OLC.
3. HORIZONTAL DATUM IS NAD83 OREGON STATE PLANE NORTH, INT. FT.
4. VERTICAL DATUM IS NAVD88, FT.
5. ALL SCALES SHOWN ARE FOR 22" X 34" SHEETS.

WORK PERIODS:

1. WORK WITHIN ORDINARY HIGH WATER SHALL BE LIMITED TO JULY 1 THROUGH OCTOBER 31.
2. SEE SHEET G2.2 FOR REVEGETATION TIMING.

CONSTRUCTION NOTES:

1. ALL EQUIPMENT SHALL BE WASHED PRIOR TO MOBILIZATION TO THE SITE TO MINIMIZE THE INTRODUCTION OF FOREIGN MATERIALS AND FLUIDS TO THE PROJECT SITE. ALL EQUIPMENT SHALL BE FREE OF OIL, HYDRAULIC FLUID, AND DIESEL FUEL LEAKS. TO PREVENT INVASION OF NOXIOUS WEEDS OR THE SPREAD OF WHIRLING DISEASE SPORES. ALL EQUIPMENT SHALL BE POWER WASHED OR CLEANED TO REMOVE MUD AND SOIL PRIOR TO MOBILIZATION INTO THE PROJECT AREA. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO INSURE THAT ADEQUATE MEASURES HAVE BEEN TAKEN.
2. THE CONTRACTOR SHALL ATTEND A MANDATORY PRE-BID MEETING ON SITE.
3. ALL WORK SHALL CONFORM TO THE CURRENT EDITIONS OF ODOT STANDARD PLANS & SPECIFICATIONS UNLESS INDICATED OTHERWISE BY CONTRACT DOCUMENTS.
4. CONTRACTOR SHALL SUBMIT AN ACCESS, STAGING, AND STOCKPILE PLAN TO OPR FOR APPROVAL PRIOR TO MOBILIZATION.
5. SOME STAGING AREAS ARE SHOWN WITHIN 150 FT OF A WETLAND AND ARE INTENDED FOR TEMPORARY STOCKPILE OF NATURAL CONSTRUCTION MATERIALS (LOGS, SLASH, PLANT MATERIALS ETC.). NO OVERNIGHT STORAGE OF THE HEAVY EQUIPMENT OR REFUELING OF ANY KIND SHALL BE ALLOWED WITHIN 150 FT OF A WETLAND UNLESS OTHERWISE AUTHORIZED.
6. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR OBTAINING ANY REQUIRED TRAFFIC CONTROL OR ACCESS PERMITS.
7. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING ANY REQUIRED TRAFFIC CONTROL INCLUDING, BUT NOT LIMITED TO, SIGNAGE AND FLAGGERS.
8. ALL EQUIPMENT, MATERIALS, AND PERSONNEL SHALL REMAIN WITHIN THE WORK AREA BOUNDARY.
9. THE CONTRACTOR SHALL KEEP THE WORK AREAS IN NEAT CONDITION, FREE OF DEBRIS AND LITTER FOR THE DURATION OF THE PROJECT.
10. CONTRACTOR SHALL IMPLEMENT MEASURES TO CONTROL AND MINIMIZE WIND BLOWN DUST FROM THE SITE.
11. ACCESS ROUTES SHALL NOT BE CLEARED OR GRADED WITHOUT PRIOR APPROVAL FROM OPR.
12. EXCEPT WHERE APPROVED IN WRITING BY PROJECT OWNER, ALL DISTURBED AREAS OUTSIDE THE WORK AREA AND ACCESS BOUNDARY SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER AT NO ADDITIONAL COST TO THE OWNER.
13. NO PETS ONSITE, INCLUDING IN TRUCKS.

UTILITIES:

1. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR HAVING UTILITIES LOCATED PRIOR TO CONSTRUCTION ACTIVITIES.
2. THE CONTRACTOR SHALL CALL 800-322-2344 FOR UTILITY LOCATE PRIOR TO CONSTRUCTION.
3. THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE AFFECTED UTILITY SERVICE TO REPORT ANY DAMAGED OR DESTROYED UTILITIES.
4. THE CONTRACTOR SHALL PROVIDE EQUIPMENT AND LABOR TO AID THE AFFECTED UTILITY SERVICE IN REPAIRING DAMAGED OR DESTROYED UTILITIES AT NO ADDITIONAL COST.

WATER LEVELS / DATUMS		
NAME	ELEVATION (NAVD88)	SOURCE
BASE FLOOD	29.7	FEMA
OHW (Q2)	18.7	ERTG
MHHW	9.8	NOAA
MTL	7.9	NOAA
NAVD88 DATUM	0.0	N/A

CUT/FILL QUANTITIES						
SHEET	CUT AREA (ACRES)	FILL AREA (ACRES)	CUT VOLUME (CY)	FILL VOLUME (CY)	AVERAGE HAUL DISTANCE (MILES)	HAUL VOLUME (CY)
C3.0	1.71	0.81	6500	3450	0.9	3050
C3.1	0.51	0.83	1260	1260	-	-
C3.2	0.41	0.94	1020	1020	-	-
C3.4	0.41	1.49	2340	2340	-	-
C3.5	1.18	1.65	4990	4510	0.8	480
C4.0	0.24	-	890	-	0.4	890
C4.1	0.23	-	980	-	1.3	980
TOTAL	**4.70**	**5.72**	**17980**	**12580**	-	**5400**

PAIRED CUT/FILL (MPL/WHE) AREAS BALANCE AND ALL MPL AREAS WITHOUT AN ADJACENT WHE GET HAULED TO THE UHE AREA ON SHEET C3.3.

NOTICE TO EXCAVATORS:

ATTENTION: OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THE RULES BY CALLING THE CENTER.
(NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS 503-232-1987).

POTENTIAL UNDERGROUND FACILITY OWNERS

Dig Safely.

Call the Oregon One-Call Center
DIAL 811 or 1-800-332-2344

EMERGENCY TELEPHONE NUMBERS

NW NATURAL GAS	
M-F 7am-6pm	503-226-4211 Ext.4313
AFTER HOURS	503-226-4211
PGE	503-464-7777
CENTURYLINK	1-800-573-1311
CITY BUREAU OF MAINTENANCE	503-823-1700
CITY WATER	503-823-4874
VERIZON	1-800-483-1000

LEGEND AND SYMBOLS

- OHP — EXISTING POWERLINE
- TAXLOTS
- 1 — EXISTING MINOR CONTOUR 1' INTERVAL
- 5 — EXISTING MAJOR CONTOUR 5' INTERVAL
- EXISTING SITE ACCESS
- PROPOSED SITE ACCESS
- 1 — PROPOSED MINOR CONTOUR 1' INTERVAL
- 5 — PROPOSED MAJOR CONTOUR 5' INTERVAL
- ORDINARY HIGH WATER (OHW)
- FEMA 100-YEAR FLOODPLAIN BOUNDARY
- FLOODWAY BOUNDARY
- WORK AREA AND ACCESS BOUNDARY
- STRAW WATTLES
- BEAVER DAM ANALOGUE
- WOOD HABITAT STRUCTURE
- HABITAT LOG
- BASKING LOG
- MARSHPLAIN LOWERING
- WETLAND HABITAT ENHANCEMENT
- UPLAND HABITAT ENHANCEMENT
- GENERAL PLANTING
- STAGING AREA
- COFFER DAM

ABBREVIATIONS:

ACE	ANNUAL CHANCE EXCEEDANCE
APPROX	APPROXIMATE
BDA	BEAVER DAM ANALOGUE
BFE	BASE FLOOD ELEVATION
BMP	BEST MANAGEMENT PRACTICE
CHNL	CHANNEL
CL	CENTERLINE
CONC	CONCRETE
CONSTR	CONSTRUCTION
CY	CUBIC YARD
DEPT	DEPARTMENT
DS	DOWNSTREAM
EG	EXISTING GRADE/GROUND
ELEV, EL	ELEVATION
ESC	EROSION AND SEDIMENT CONTROL
EX, EXIST	EXISTING
FG	FINISHED GRADE/GROUND
FPGA	FLOODPLAIN GRADING AREA
FT	FEET
GB	GRADE BREAK
HAB	HABITAT
HIP	HABITAT IMPROVEMENT PROGRAMMATIC
IE	INVERT ELEVATION
IN	INCHES
INTL	INTERNATIONAL
LBS	POUNDS
LP	LOW POINT
LS	LIVESTAKE
MAX	MAXIMUM
MID	MIDDLE
MGMT	MANAGEMENT
MIN	MINIMUM
MPL	MARSHPLAIN LOWERING
N/A	NOT APPLICABLE
NIC	NOT IN CONTRACT
NAVD88	NORTH AMERICAN VERTICAL DATUM (1988)
NTS	NOT TO SCALE
ODFW	OREGON DEPT OF FISH & WILDLIFE
ODEQ	OREGON DEPT OF ENVIRONMENTAL QUALITY
ODOT	OREGON DEPARTMENT OF TRANSPORTATION
OHP	OVERHEAD POWER
OHW	ORDINARY HIGH WATER
OPR	OWNERS PROJECT REPRESENTATIVE
PROP	PROPOSED
ROW	RIGHT OF WAY
RR	RAILROAD
S	SLOPE
SF	SQUARE FEET
SHT	SHEET
SPEC	SPECIFICATION
ST	STREET
STA	STATION
STD	STANDARD
TEMP	TEMPORARY
TESC	TEMPORARY EROSION AND SEDIMENT CONTROL
TOB	TOP OF BANK
TOE	TOE OF SLOPE
TOP	TOP OF SLOPE
TYP	TYPICAL
UHE	UPLAND HABITAT ENHANCEMENT
US	UPSTREAM
VIF	VERIFY IN FIELD
W/	WITH
WCS	WATER CONTROL STRUCTURE
WHE	WETLAND HABITAT ENHANCEMENT
WHS	WOOD HABITAT STRUCTURE
WSE	WATER SURFACE ELEVATION
YR	YEAR

60% DESIGN
NOVEMBER 2023

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

GENERAL NOTES

REVISION NUMBER

No.	Date	Revision

Date 11/08/2023 | Designed By RCC
Drawn By DK | Checked By AJ

SCALE 0 1"

JOB NO. 20200017

SHEET NO. G1.1

2 OF 25

HIP GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS

DOCUMENTATION: TO BE POSTED ONSITE BY THE CONTRACTOR IN A LOCATION VISIBLE TO THE PUBLIC.

A) NAME(S), PHONE NUMBER(S), AND ADDRESS(ES) OF THE PERSON(S) RESPONSIBLE FOR OVERSIGHT.
B) A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES.
C) PROCEDURES TO CONTAIN AND CONTROL A SPILL OF ANY HAZARDOUS MATERIAL GENERATED, USED OR STORED ON-SITE, INCLUDING NOTIFICATION OF PROPER AUTHORITIES.
D) A STANDING ORDER TO CEASE WORK IN THE EVENT OF HIGH FLOWS EXCEPT AS NECESSARY TO MINIMIZE RESOURCE DAMAGE (ABOVE THOSE ADDRESSED IN THE DESIGN AND IMPLEMENTATION PLANS) OR EXCEEDANCE OF TAKE OR WATER QUALITY LIMITATIONS.

PROJECT DESIGN AND SITE PREPARATION

1) TIMING OF IN-WATER WORK: FORMAL RECOMMENDATIONS PUBLISHED BY STATE AGENCIES SUCH AS THE OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MFWP), OR INFORMAL RECOMMENDATIONS FROM THE APPROPRIATE STATE FISHERY BIOLOGIST IN REGARD TO THE TIMING OF IN-WATER WORK, WILL BE FOLLOWED.

1) BULL TROUT - IN BULL TROUT SPAWNING AND REARING AREAS, EGGS, ALEVIN, AND FRY ARE PRESENT EARLY YEAR ROUND. IN BULL TROUT HABITATS DESIGNATED AS FORAGING, MIGRATION, AND OVERWINTERING (FMO) HABITATS, JUVENILE AND ADULT BULL TROUT MAY BE PRESENT SEASONALLY. SOME PROJECT LOCATIONS MAY NOT HAVE DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT, OR IF THEY DO, THEY MAY DIFFER FROM THE IN-WATER WORK WINDOWS FOR SALMON AND STEELHEAD. IF THIS IS THE CASE, THE PROJECT SPONSOR WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE TO ENSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS USED TO MINIMIZE PROJECT EFFECTS.
2) LAMPREY – TO MINIMIZE DISTURBANCE TO MIGRANT ADULTS, THE PROJECT SPONSOR AND/OR THEIR CONTRACTORS WILL AVOID WORKING INSTREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY FROM MARCH 1 TO JULY 1 IN LOW- TO MID-ELEVATION REACHES (<5,000 FEET). IN HIGH-ELEVATION REACHES (>5,000 FEET), THE PROJECT SPONSOR WILL AVOID WORKING INSTREAM OR RIVER CHANNELS FROM MARCH 1 TO AUGUST 1. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE BEST MANAGEMENT PRACTICES (BMPS) FOR DEWATERING AND SALVAGE AS OUTLINED IN USFWS 20101, OR MOST RECENT GUIDANCE. SALVAGE SHOULD INCLUDE SALVAGE OF LARVAL LAMPREY FROM SEDIMENTS. (SEE SECTION "CONSERVATION MEASURES FOR SALVAGE OF NATIVE FISH, LAMPREY, AND MUSSELS").
3) A MAXIMUM OF 1 WEEK PAST THE RECOMMENDED IN-WATER WORK WINDOW SHALL BE CONSIDERED AND APPROVED BY THE EC LEAD, ANY OTHER DEVIATION FROM THE IWWW SHALL CONSIDERED AND REVIEWED BY THE SERVICES THROUGH THE VARIANCE PROCESS.

2) CONTAMINANTS: THE PROJECT SPONSOR WILL COMPLETE A SITE ASSESSMENT WITH THE FOLLOWING ELEMENTS TO IDENTIFY THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION FOR ANY ACTION THAT INVOLVES EXCAVATION OF MORE THAN 20 CUBIC YARDS OF MATERIAL:

1) A REVIEW OF AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;
2) A SITE VISIT TO INSPECT THE AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES AND THE CONDITION OF THE PROPERTY;
3) INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, AND OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND
4) A SUMMARY, STORED WITH THE PROJECT FILE THAT INCLUDES AN ASSESSMENT OF THE LIKELIHOOD THAT CONTAMINANTS ARE PRESENT AT THE SITE, BASED ON ITEMS 4(A) THROUGH 4(C).

3) SITE LAYOUT AND FLAGGING: PRIOR TO CONSTRUCTION, THE PROJECT AREA WILL BE CLEARLY FLAGGED TO IDENTIFY THE FOLLOWING:

1) SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER (OHW), SPAWNING AREAS, SPRINGS, AND WETLANDS;
2) EQUIPMENT ENTRY AND EXIT POINTS;
3) ROAD AND STREAM CROSSING ALIGNMENTS;
4) STAGING, STORAGE, AND STOCKPILE AREAS; AND
5) NO-HERBICIDE-APPLICATION AREAS AND BUFFERS.

4) TEMPORARY ACCESS ROADS AND PATHS:

1) EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER POSSIBLE, AND THE NUMBER AND LENGTH OF TEMPORARY ACCESS ROADS AND PATHS THROUGH RIPARIAN AREAS AND FLOODPLAINS WILL BE MINIMIZED TO LESSEN SOIL DISTURBANCE, SOIL COMPACTION, AND IMPACTS TO VEGETATION.
2) VEHICLE USE AND HUMAN ACTIVITIES, INCLUDING WALKING IN AREAS OCCUPIED BY TERRESTRIAL ESALISTED PECIES, WILL BE MINIMIZED.
3) TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST A LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. IF SLOPES ARE STEEPER THAN 30%, THE ROAD WILL BE DESIGNED BY A CIVIL ENGINEER WITH EXPERIENCE IN STEEP ROAD DESIGN.
4) THE REMOVAL OF RIPARIAN VEGETATION DURING CONSTRUCTION OF TEMPORARY ACCESS ROADS WILL BE MINIMIZED. WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION WILL BE CUT AT GROUND LEVEL (NOT GRUBBED).
5) AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE DECOMPACTED AND RESHAPED TO MATCH THE ORIGINAL CONTOUR; AND THE SOIL WILL BE STABILIZED AND REVEGETATED.
6) HELICOPTER FLIGHT PATTERNS WILL BE ESTABLISHED IN ADVANCE, AND LOCATED TO AVOID TERRESTRIAL ESA- LISTED SPECIES, INCLUDING THEIR OCCUPIED HABITAT AND APPROPRIATE BUFFERS, DURING SENSITIVE LIFE STAGES (I.E. NESTING AND CRITICAL BREEDING PERIODS). SEE SPECIES-SPECIFIC CONSERVATION MEASURES FOR EACH LISTED SPECIES THAT MAY OCCUR WITHIN THE PROJECT AREA FOR MORE INFORMATION.

5) TEMPORARY STREAM CROSSINGS:

1) EXISTING STREAM CROSSINGS, FORDS, OR BEDROCK WILL BE USED WHENEVER POSSIBLE.
2) IF AN EXISTING STREAM CROSSING IS NOT ACCESSIBLE, TEMPORARY CROSSINGS WILL BE INSTALLED. TREATED WOOD SHALL NOT BE USED ON TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR OVER WATER.
3) FOR PROJECTS THAT REQUIRE EQUIPMENT AND VEHICLES TO CROSS IN THE WET:
   A) THE LOCATION AND NUMBER OF ALL WET CROSSINGS MUST BE APPROVED BY BPA AND CLEARLY INDICATED ON DESIGN DRAWINGS.
   B) VEHICLES AND MACHINERY WILL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHEREVER POSSIBLE.
   C) NO STREAM CROSSINGS WILL OCCUR 300 FEET UPSTREAM OR 100-FEET DOWNSTREAM OF AN EXISTING REDD OR SPAWNING FISH.
   D) AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED, AND THE BANKS RESTORED.

6) STAGING, STORAGE, AND STOCKPILE AREAS:

1) STAGING AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) WILL BE 150 FEET OR MORE FROM ANY NATURAL WATERBODY OR WETLAND, OR ON AN ADJACENT ESTABLISHED ROAD AREA IN A LOCATION AND MANNER THAT WILL PRECLUDE EROSION INTO, OR CONTAMINATION OF, THE STREAM OR FLOODPLAIN. STAGING AREAS MAY BE CLOSER THAN 150 FEET IF THE AREA IS ABOVE (ELEVATION) THE 100-YR FLOODPLAIN AND SPILL PREVENTION MEASURES ARE APPROVED BY THE EC LEAD.
2) NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND BOULDERS, MAY BE STAGED WITHIN 150 FEET IF CLEARLY INDICATED IN PLANS. RECOMMEND REFERRING TO AREA AS "NATURAL MATERIAL STOCKPILE AREA" WITH A NOTE THAT STATES VEHICLE STORAGE, EQUIPMENT STORAGE, HAZARDOUS MATERIALS, FUELING, AND SERVICING NOT PERMITTED IN THIS AREA.
3) ANY LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION AT A SPECIFICALLY IDENTIFIED AND FLAGGED AREA. ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE REMOVED TO A LOCATION OUTSIDE OF THE 100-YEAR FLOODPLAIN FOR DISPOSAL.

7) EQUIPMENT: MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT (E.G., MINIMALLY-SIZED, LOW PRESSURE TIRES; MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES; TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS). ALL VEHICLES AND OTHER MECHANIZED EQUIPMENT WILL BE:

1) STORED, FUELED, AND MAINTAINED IN A VEHICLE STAGING AREA LOCATED 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND, OR ON AN ADJACENT, ESTABLISHED ROAD AREA;
2) REFUELED IN A VEHICLE STAGING AREA LOCATED 150 FEET OR MORE FROM A NATURAL WATERBODY OR WETLAND, OR IN AN ISOLATED HARD ZONE, SUCH AS A PAVED PARKING LOT OR ADJACENT, ESTABLISHED ROAD (THIS MEASURE APPLIES ONLY TO GAS OR DIESEL-POWERED EQUIPMENT WITH TANKS LARGER THAN 5 GALLONS);
3) BIODEGRADABLE LUBRICANTS AND FLUIDS SHALL BE USED ON EQUIPMENT OPERATING IN THE STREAM CHANNEL AND LIVE WATER.
4) INSPECTED DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION WITHIN 150 FEET OF ANY NATURAL WATER BODY OR WETLAND; AND
5) THOROUGHLY CLEANED BEFORE OPERATION BELOW ORDINARY HIGH WATER (OHW), AND AS OFTEN AS NECESSARY DURING OPERATION, TO REMAIN FREE OF GREASE.

8) EROSION CONTROL: EROSION CONTROL BEST MANAGEMENT PRACTICES (BMPS) WILL BE PREPARED AND CARRIED OUT, COMMENSURATE WITH THE SCOPE OF THE ACTION THAT MAY INCLUDE THE FOLLOWING:

1) TEMPORARY EROSION CONTROL BMPS.
   A) TEMPORARY EROSION CONTROL BMPS SHALL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE, AND SHALL BE APPROPRIATELY INSTALLED DOWNSLOPE OF PROJECT ACTIVITY WITHIN THE RIPARIAN BUFFER AREA UNTIL SITE REHABILITATION IS COMPLETE.
   B) IF THERE IS A POTENTIAL FOR ERODED SEDIMENT TO ENTER THE STREAM, SEDIMENT BARRIERS WILL BE INSTALLED AND MAINTAINED FOR THE DURATION OF PROJECT IMPLEMENTATION.
   C) TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE SEDGE MATS, FIBER WATTLES, SILT FENCES, JUTE MATTING, WOOD FIBER MULCH WITH SOIL BINDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC. BIODEGRADABLE NETTING MAY BE USED SO THAT THEY CAN DECOMPOSE ON SITE.
   D) SOIL STABILIZATION UTILIZING WOOD FIBER MULCH AND TACKIFIER (HYDRO-APPLIED) MAY BE USED TO REDUCE EROSION OF BARE SOIL IF THE MATERIALS ARE NOXIOUS-WEED-FREE AND NONTOXIC TO AQUATIC AND TERRESTRIAL ANIMALS, SOIL MICROORGANISMS, AND VEGETATION.
   E) SEDIMENT WILL BE REMOVED FROM EROSION CONTROL BMP ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE BMP.
   F) ONCE THE SITE IS STABILIZED FOLLOWING CONSTRUCTION, TEMPORARY EROSION CONTROL BMPS WILL BE REMOVED. FOR ADDITIONAL INFORMATION AND SUPPLIERS OF BIODEGRADABLE HYDRAULIC FLUIDS, MOTOR OIL, LUBRICANT, OR GREASE. SEE, ENVIRONMENTALLY ACCEPTABLE LUBRICANTS BY THE U.S. EPA (2011); E.G., MINERAL OIL, POLYGLYCOL, VEGETABLE OIL, SYNTHETIC ESTER; MOBIL® BIODEGRADABLE HYDRAULIC OILS, TOTAL® HYDRAULIC FLUID, TERRESOLVE TECHNOLOGIES LTD.® BIOBASED BIODEGRADABLE LUBRICANTS, COUGAR LUBRICATION® 2XT BIO ENGINE OIL, SERIES 4300 SYNTHETIC BIO-DEGRADABLE HYDRAULIC OIL, 8060-2 SYNTHETIC BIO-DEGRADABLE GREASE NO. 2, ETC.
2) EMERGENCY EROSION CONTROL BMPS. THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:
   A) A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND
   B) AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

9) ABATEMENT: THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES BY CONSIDERING SOIL TYPE, EQUIPMENT USAGE, PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY OTHER EROSION AND SEDIMENT CONTROL MEASURES. IN ADDITION, THE FOLLOWING CRITERIA WILL BE FOLLOWED:

1) WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.
2) DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNIN SULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF A NATURAL WATERBODY OR WETLAND AND WILL BE APPLIED SO AS TO MINIMIZE THE LIKELIHOOD THAT THEY WILL ENTER STREAMS. APPLICATIONS OF LIGNIN SULFONATE WILL BE LIMITED TO A MAXIMUM RATE OF 0.5 GALLONS PER SQUARE YARD OF ROAD SURFACE, ASSUMING A 50:50 (LIGNIN SULFONATE TO WATER) SOLUTION.
3) APPLICATION OF DUST ABATEMENT CHEMICALS WILL BE AVOIDED DURING OR JUST BEFORE WET WEATHER AND AT STREAM CROSSINGS OR OTHER AREAS THAT COULD RESULT IN UNFILTERED DELIVERY OF THE DUST ABATEMENT CHEMICALS TO A WATERBODY (TYPICALLY THESE WOULD BE AREAS WITHIN 25 FEET OF A NATURAL WATERBODY OR WETLAND; DISTANCES MAY BE GREATER WHERE VEGETATION IS SPARSE OR SLOPES ARE STEEP).
4) SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.
5) PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.

10) SPILL PREVENTION, CONTROL, AND COUNTER MEASURES: THE FOLLOWING MEASURES WILL BE USED TO PREVENT ACCIDENTAL SPILLS OF FUEL, LUBRICANTS, HYDRAULIC FLUID, OR OTHER CONTAMINANTS INTO THE RIPARIAN ZONE OR DIRECTLY INTO THE WATER:

1) A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES, WILL BE AVAILABLE ON-SITE.
2) WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE. FOR ADDITIONAL INFORMATION AND SUPPLIERS OF BIODEGRADABLE HYDRAULIC FLUIDS, MOTOR OIL, LUBRICANT, OR GREASE. SEE, ENVIRONMENTALLY ACCEPTABLE LUBRICANTS BY THE U.S. EPA (2011); E.G., MINERAL OIL, POLYGLYCOL, VEGETABLE OIL, SYNTHETIC ESTER; MOBIL® BIODEGRADABLE HYDRAULIC OILS, TOTAL® HYDRAULIC FLUID, TERRESOLVE TECHNOLOGIES LTD.® BIOBASED BIODEGRADABLE LUBRICANTS, COUGAR LUBRICATION® 2XT BIO ENGINE OIL, SERIES 4300 SYNTHETIC BIO-DEGRADABLE HYDRAULIC OIL, 8060-2 SYNTHETIC BIO-DEGRADABLE GREASE NO. 2, ETC.
3) SPILL CONTAINMENT KITS (INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL) ADEQUATE FOR THE TYPES AND QUANTITY OF HAZARDOUS MATERIALS USED AT THE SITE WILL BE AVAILABLE AT THE WORK SITE.
4) WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.
5) ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPAULIN, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO, AND DISPOSED OF, AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.
6) PUMPS USED ADJACENT TO WATER SHALL USE SPILL CONTAINMENT SYSTEMS.

11) INVASIVE SPECIES CONTROL: THE FOLLOWING MEASURES WILL BE FOLLOWED TO AVOID INTRODUCTION OF INVASIVE PLANTS AND NOXIOUS WEEDS INTO PROJECT AREAS:

1) PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWER-WASHED, ALLOWED TO DRY FULLY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.
2) WATERCRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES. WADING BOOTS WITH FELT SOLES ARE NOT TO BE USED DUE TO THEIR PROPENSITY FOR AIDING IN THE TRANSFER OF INVASIVE SPECIES UNLESS DECONTAMINATION PROCEDURES ARE USED.

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

HIP CONSERVATION NOTES 1

REVISION NUMBER

No.	Date	Revision

Date 11/08/2023 | Designed By RCC
Drawn By DK | Checked By AJ

SCALE 0 1"

JOB NO. 20200017

SHEET NO. G2.0

3 OF 25

DWG: Z:\Shared\W2r\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\G2.X - HIP NOTES.dwg USER: dkelley
DATE: Nov 08, 2023 3:56pm XREFS:X-TB-W2r-22x34

60% DESIGN
NOVEMBER 2023

WORK AREA ISOLATION

ANY WORK AREA REQUIRING EXCAVATION OR MOBILIZATION OF SEDIMENT WITHIN THE WETTED CHANNEL WILL BE ISOLATED FROM THE ACTIVE STREAM WHENEVER ESA-LISTED FISH ARE REASONABLY CERTAIN TO BE PRESENT, OR IF THE WORK AREA IS LESS THAN 300-FEET UPSTREAM FROM KNOWN ESA-LISTED FISH SPAWNING HABITATS. IF THE WORK AREA ISOLATION PRACTICES WOULD CAUSE GREATER IMPACTS THAN IT WOULD PREVENT, IS LOCATED IN DEEP OR SWIFTLY FLOWING WATER, OR IF FISH CAN BE EFFECTIVELY EXCLUDED BY NETS OR SCREENS, THEN A VARIANCE TO NOT ISOLATE THE WORK AREA MAY BE PURSUED. WORK AREA ISOLATION & FISH SALVAGE ACTIVITIES ARE CONSIDERED INCIDENTAL TO CONSTRUCTION-RELATED ACTIVITIES AND SHALL OCCUR DURING THE STATE RECOMMENDED IN-WATER WORK WINDOWS. WHEN WORK AREA ISOLATION IS REQUIRED, DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS, FISH RELEASE AREAS, A PUMP TO BE USED TO DEWATER THE ISOLATION AREA, AND, WHEN FISH ARE PRESENT, A FISH SCREEN THAT MEETS NMFS'S FISH SCREEN CRITERIA (NMFS 2011, OR MOST CURRENT). WIDER MESH SCREENS MAY BE USED AFTER ALL FISH HAVE BEEN REMOVED FROM THE ISOLATED AREA. WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES TAKE PLACE DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS TO FISH SPECIES PRESENT.

A FISH BIOLOGIST WILL DETERMINE HOW TO REMOVE ESA-LISTED FISH, WITH LEAST HARM TO THE FISH, BEFORE IN-WATER WORK BEGINS. THIS WILL INVOLVE EITHER PASSIVE MOVEMENT OF FISH OUT OF THE PROJECT REACH THROUGH SLOW DEWATERING, OR ACTIVELY REMOVING THE FISH FROM THE PROJECT REACH. SHOULD ACTIVE REMOVAL BE WARRANTED, A FISH BIOLOGIST WILL CLEAR THE AREA OF FISH BEFORE THE SITE IS DEWATERED USING ONE OR MORE OF A VARIETY OF METHODS INCLUDING SEINING, DIPPING, OR ELECTROFISHING, DEPENDING ON SPECIFIC SITE CONDITIONS. IN AREAS OCCUPIED BY LARVAL LAMPREY, TO THE EXTENT POSSIBLE, SALVAGE USING GUIDANCE SET FORTH IN USFWS 2010 OR MOST RECENT GUIDANCE.

DEPENDENT UPON SITE CONDITIONS, A FISH BIOLOGIST WILL CONDUCT OR SUPERVISE THE FOLLOWING:

1) SLOWLY REDUCE WATER FROM THE WORK AREA TO ALLOW SOME FISH TO LEAVE THE WORK AREA VOLITIONALLY;
   a) IF DEWATERED AREA CONTAINS LARGE FINE/ SANDY SEDIMENT DEPOSITS, LARVAL LAMPREY COULD BE PRESENT, AND POTENTIALLY IN LARGE NUMBERS. IF SO, CONSIDER ELECTROFISHING USING LAMPREY ELECTROFISHING SETTINGS (WHICH DO NOT AFFECT BONY FISH) PRIOR TO OR DURING DRAWDOWN. SEE SECTION FURTHER DOWN ON LAMPREY CONSERVATION MEASURES AND ELECTROFISHING GUIDELINES.

1) INSTALL BLOCK NETS;
   a) BLOCK NETS WILL BE INSTALLED AT UPSTREAM AND DOWNSTREAM LOCATIONS AND MAINTAINED IN A SECURED POSITION TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA.
   b) BLOCK NETS WILL BE SECURED TO THE STREAM CHANNEL BED AND BANKS UNTIL FISH CAPTURE AND TRANSPORT ACTIVITIES ARE COMPLETE. BLOCK NETS MAY BE LEFT IN PLACE FOR THE DURATION OF THE PROJECT TO EXCLUDE FISH.
   c) IF BLOCK NETS REMAIN IN PLACE MORE THAN ONE DAY, THE NETS WILL BE MONITORED AT LEAST DAILY TO ENSURE THEY ARE SECURED TO THE BANKS AND FREE OF ORGANIC ACCUMULATION. IF THE PROJECT IS WITHIN BULL TROUT SPAWNING AND REARING HABITAT, THE BLOCK NETS MUST BE CHECKED EVERY 4 HOURS FOR FISH IMPINGEMENT ON THE NET. LESS FREQUENT INTERVALS MUST BE APPROVED THROUGH A VARIANCE REQUEST.
   d) NETS WILL BE MONITORED HOURLY ANYTIME THERE IS INSTREAM DISTURBANCE.
3) CAPTURE FISH THROUGH SEINING, AND RELOCATE TO STREAMS;
   a) WHILE DEWATERING, ANY REMAINING FISH WILL BE COLLECTED BY HAND OR DIP NETS.
   b) SEINES WITH A MESH SIZE TO ENSURE CAPTURE OF THE RESIDING ESA-LISTED FISH WILL BE USED.
   c) MINNOW TRAPS MAY BE LEFT IN PLACE OVERNIGHT AND USED IN CONJUNCTION WITH SEINING.
4) ELECTROFISH TO CAPTURE AND RELOCATE FISH NOT CAUGHT DURING SEINING, NMFS ELECTROFISHING GUIDELINES SHALL BE USED. THIS STEP IS TO BE USED AS A LAST RESORT; AFTER ALL PASSIVE TECHNIQUES HAVE BEEN EXHAUSTED.
5) CONTINUE TO SLOWLY DEWATER THE STREAM REACH;
6) COLLECT ANY REMAINING FISH IN COLD-WATER BUCKETS AND RELOCATE TO THE STREAM;
   a) LIMIT THE TIME FISH WOULD BE IN A TRANSPORT BUCKET , AND RELEASE THEM AS QUICKLY AS POSSIBLE;
   b) THE NUMBER OF FISH WITHIN A BUCKET WILL BE LIMITED, AND FISH WILL BE OF RELATIVELY COMPARABLE SIZE TO MINIMIZE PREDATION;
   c) AERATORS FOR BUCKETS WILL BE USED, OR THE BUCKET'S WATER WILL BE FREQUENTLY CHANGED WITH COLD, CLEAR, WATER AT 15 MINUTE, OR MORE-FREQUENT, INTERVALS.
   d) BUCKETS WILL BE KEPT IN SHADED AREAS; OR IF IN EXPOSED AREAS, COVERED BY A CANOPY.
   e) DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS BUT WILL BE LEFT ON THE STREAMBANK TO AVOID MORTALITY COUNTING ERRORS.

1) NMFS'S ELECTROFISHING GUIDELINES (NMFS 20005)

1) INITIAL SITE SURVEYS AND EQUIPMENT SETTINGS
   a) IN ORDER TO AVOID CONTACT WITH SPAWNING ADULTS OR ACTIVE REDDS, RESEARCHERS MUST CONDUCT A CAREFUL VISUAL SURVEY OF THE AREA TO BE SAMPLED BEFORE BEGINNING ELECTROFISHING.
   b) PRIOR TO THE START OF SAMPLING AT A NEW LOCATION, WATER TEMPERATURE AND CONDUCTIVITY MEASUREMENTS SHALL BE TAKEN TO EVALUATE ELECTROFISHER SETTINGS AND ADJUSTMENTS.
   c) NO ELECTROFISHING SHOULD OCCUR WHEN WATER TEMPERATURES ARE ABOVE 18°C OR ARE EXPECTED TO RISE ABOVE THIS TEMPERATURE PRIOR TO CONCLUDING THE ELECTROFISHING SURVEY.
   d) WHENEVER POSSIBLE, A BLOCK NET SHOULD BE PLACED BELOW THE AREA BEING SAMPLED TO CAPTURE STUNNED FISH THAT MAY DRIFT DOWNSTREAM.
   e) EQUIPMENT MUST BE IN GOOD WORKING CONDITION AND OPERATORS SHOULD GO THROUGH THE MANUFACTURER'S PRESEASON CHECKS, ADHERE TO ALL PROVISIONS, AND RECORD MAJOR MAINTENANCE WORK IN A LOGBOOK.
   f) EACH ELECTROFISHING SESSION MUST START WITH ALL SETTINGS (VOLTAGE, PULSE WIDTH, AND PULSE RATE) SET TO THE MINIMUMS NEEDED TO CAPTURE FISH. THESE SETTINGS SHOULD BE GRADUALLY INCREASED ONLY TO THE POINT WHERE FISH ARE IMMOBILIZED AND CAPTURED, AND GENERALLY NOT ALLOWED TO EXCEED CONDUCTIVITY-BASED MAXIMA.
2) ELECTROFISHING TECHNIQUE
   a) SAMPLING SHOULD BEGIN USING STRAIGHT DC. THE POWER NEEDS TO REMAIN ON UNTIL THE FISH IS NETTED WHEN USING STRAIGHT DC. IF FISH CAPTURE IS UNSUCCESSFUL WITH INITIAL LOW VOLTAGE, GRADUALLY INCREASE VOLTAGE SETTINGS WITH STRAIGHT DC.
   b) IF FISH CAPTURE IS NOT SUCCESSFUL WITH THE USE OF STRAIGHT DC, THEN SET THE ELECTROFISHER TO LOWER VOLTAGES WITH PDC. IF FISH CAPTURE IS UNSUCCESSFUL WITH LOW VOLTAGES, INCREASE PULSE WIDTH, VOLTAGE, AND PULSE FREQUENCY (DURATION, AMPLITUDE, AND FREQUENCY).
   c) ELECTROFISHING SHOULD BE PERFORMED IN A MANNER THAT MINIMIZES HARM TO THE FISH. STREAM SEGMENTS SHOULD BE SAMPLED SYSTEMATICALLY, MOVING THE ANODE CONTINUOUSLY IN A HERRINGBONE PATTERN (WHERE FEASIBLE) THROUGH THE WATER. CARE SHOULD BE TAKEN WHEN FISHING IN AREAS WITH HIGH FISH CONCENTRATIONS, STRUCTURE WOOD, UNDERCUT BANKS) AND IN SHALLOW WATERS WHERE MOST BACKPACK ELECTROFISHING FOR JUVENILE SALMONIDS OCCURS. VOLTAGE GRADIENTS MAY BE HIGH WHEN ELECTRODES ARE IN SHALLOW WATER WHERE BOUNDARY LAYERS (WATER SURFACE AND SUBSTRATE) TEND TO INTENSIFY THE ELECTRICAL FIELD.
   d) DO NOT ELECTROFISH IN ONE LOCATION FOR AN EXTENDED PERIOD (E.G., UNDERCUT BANKS) AND REGULARLY CHECK BLOCK NETS FOR IMMOBILIZED FISH.
   e) FISH SHOULD NOT MAKE CONTACT WITH THE ANODE. THE ZONE OF POTENTIAL INJURY FOR FISH IS 0.5 M FROM THE ANODE.
   f) ELECTROFISHING CREWS SHOULD BE GENERALLY OBSERVANT OF THE CONDITION OF THE FISH AND CHANGE OR TERMINATE SAMPLING WHEN EXPERIENCING PROBLEMS WITH FISH RECOVERY TIME, BANDING, INJURY, MORTALITY, OR OTHER INDICATIONS OF FISH STRESS.
   g) NETTERS SHOULD NOT ALLOW THE FISH TO REMAIN IN THE ELECTRICAL FIELD ANY LONGER THAN NECESSARY BY REMOVING STUNNED FISH FROM THE WATER IMMEDIATELY AFTER NETTING.
3) SAMPLE PROCESSING AND RECORD KEEPING
   a) FISH SHOULD BE PROCESSED AS SOON AS POSSIBLE AFTER CAPTURE TO MINIMIZE STRESS. THIS MAY REQUIRE A LARGER CREW SIZE.
   b) ALL SAMPLING PROCEDURES MUST HAVE A PROTOCOL FOR PROTECTING HELD FISH. SAMPLERS MUST BE AWARE OF THE CONDITIONS IN THE CONTAINERS HOLDING FISH; AIR PUMPS, WATER TRANSFERS, ETC., SHOULD BE USED AS NECESSARY TO MAINTAIN SAFE CONDITIONS. ALSO, LARGE FISH SHOULD BE KEPT SEPARATE FROM SMALLER PREY-SIZED FISH TO AVOID PREDATION DURING CONTAINMENT.
   c) FISH SHOULD BE OBSERVED FOR GENERAL CONDITION AND INJURIES (E.G., INCREASED RECOVERY TIME, DARK BANDS, AND VISUALLY OBSERVABLE SPINAL INJURIES). EACH FISH SHOULD BE COMPLETELY REVIVED BEFORE RELEASING AT THE LOCATION OF CAPTURE. A PLAN FOR ACHIEVING EFFICIENT RETURN TO APPROPRIATE HABITAT SHOULD BE DEVELOPED BEFORE EACH SAMPLING SESSION. ALSO, EVERY ATTEMPT SHOULD BE MADE TO PROCESS AND RELEASE ESA-LISTED SPECIMENS FIRST.
   d) PERTINENT WATER QUALITY (E.G., CONDUCTIVITY AND TEMPERATURE) AND SAMPLING NOTES SHOCKER SETTINGS, FISH CONDITION/INJURIES/MORTALITIES) SHOULD BE RECORDED IN A LOGBOOK TO IMPROVE TECHNIQUE AND HELP TRAIN NEW OPERATORS. IT IS IMPORTANT TO NOTE THAT RECORDS OF INJURIES OR MORTALITIES PERTAIN TO THE ENTIRE ELECTROFISHING SURVEY, INCLUDING THE FISH SAMPLE WORK-UP.
   e) THE ANODE WILL NOT INTENTIONALLY CONTACT FISH.
   f) ELECTROFISHING SHOULD NOT BE CONDUCTED WHEN THE WATER CONDITIONS ARE TURBID AND VISIBILITY IS POOR. FOR EXAMPLE, WHEN THE SAMPLER CANNOT SEE THE STREAM BOTTOM IN ONE FOOT OF WATER.
   g) IF MORTALITY OR OBVIOUS INJURY (DEFINED AS DARK BANDS ON THE BODY, SPINAL DEFORMATIONS, DE-SCALING OF 25% OR MORE OF BODY, AND TORPIDITY OR INABILITY TO MAINTAIN UPRIGHT ATTITUDE AFTER SUFFICIENT RECOVERY TIME) OCCURS DURING ELECTROFISHING, OPERATIONS WILL BE IMMEDIATELY DISCONTINUED, MACHINE SETTINGS, WATER TEMPERATURE, AND CONDUCTIVITY CHECKED, AND PROCEDURES ADJUSTED OR ELECTROFISHING POSTPONED TO REDUCE MORTALITY.

2) DEWATERING: DEWATERING, WHEN NECESSARY, WILL BE CONDUCTED OVER A SUFFICIENT PERIOD OF TIME TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA AND WILL BE LIMITED TO THE SHORTEST LINEAR EXTENT PRACTICABLE.

1) DIVERSION AROUND THE CONSTRUCTION SITE MAY BE ACCOMPLISHED WITH A COFFERDAM AND A BYPASS CULVERT OR PIPE, OR A LINED, NON-ERODIBLE DIVERSION DITCH. WHERE GRAVITY FEED IS NOT POSSIBLE, A PUMP MAY BE USED, BUT MUST BE OPERATED IN SUCH A WAY AS TO AVOID REPETITIVE DEWATERING AND REWATERING OF THE SITE. IMPOUNDMENT BEHIND THE COFFERDAM MUST OCCUR SLOWLY THROUGH THE TRANSITION, WHILE CONSTANT FLOW IS DELIVERED TO THE DOWNSTREAM REACHES.
2) ALL PUMPS WILL HAVE FISH SCREENS TO AVOID JUVENILE FISH IMPINGEMENT OR ENTRAINMENT, AND WILL BE OPERATED IN ACCORDANCE WITH NMFS'S CURRENT FISH SCREEN CRITERIA (NMFS 2011, OR MOST RECENT VERSION). IF THE PUMPING RATE EXCEEDS 3 CUBIC FEET PER SECOND (CFS), A NMFS ENGINEERING REVIEW WILL BE NECESSARY. IF THE SCREEN IS IN AN ISOLATED AREA WITH NO FISH (SALMONIDS OR LARVAL LAMPREY), A LARGER MESH SCREEN MAY BE USED.
3) DISSIPATION OF FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO RIPARIAN VEGETATION AND/OR STREAM CHANNEL.
4) SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OR INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL OR TO FILTER THROUGH VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.
5) IN AREAS OCCUPIED BY LARVAL LAMPREY, TO THE EXTENT POSSIBLE, SALVAGE USING GUIDANCE DESCRIBED IN ABOVE SECTION "CONSERVATION MEASURES FOR SALVAGE OF NATIVE FISH, LAMPREY AND MUSSELS" (WHICH IS BASED ON USFWS 2010) OR MOST RECENT GUIDANCE.
6) IN AREAS OCCUPIED BY NATIVE FRESHWATER MUSSELS, TO THE EXTENT POSSIBLE, SALVAGE USING GUIDANCE DEVELOPED BY THE XERCES SOCIETY (BLEVINS ET AL. 2018, 2019).

3.1.2.4 BULL TROUT ELECTROFISHING CONSERVATION MEASURES

1) FOR SALVAGE OPERATIONS IN KNOWN BULL TROUT SPAWNING AND REARING HABITAT ELECTROFISHING SHALL ONLY OCCUR FROM MAY 1 TO JULY 31. IN FMO HABITATS, ELECTROFISHING MAY OCCUR ANY TIME OF YEAR.
2) BULL TROUT ARE VERY TEMPERATURE SENSITIVE AND GENERALLY SHOULD NOT BE ELECTROFISHED OR OTHERWISE HANDLED WHEN TEMPERATURES EXCEED 15°C IN SPAWNING AND REARING HABITATS.
3) SALVAGE ACTIVITIES SHOULD TAKE PLACE DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING
4) CONDITIONS APPROPRIATE TO MINIMIZE STRESS TO FISH SPECIES PRESENT.

3) SALVAGE OF NATIVE FISH, LAMPREY AND MUSSELS: IN ADDITION TO CONSERVATION RECOMMENDATIONS FOR SALMONIDS, ADDITIONAL EFFORTS WILL BE EMPLOYED TO SALVAGE OTHER NATIVE SPECIES. THE FOLLOWING GUIDELINES ARE DRAFT FROM THE U.S. FISH AND WILDLIFE SERVICE, WITH ASSISTANCE FROM THE XERCES SOCIETY, AND WILL BE USED AS APPROPRIATE AND TO THE EXTENT POSSIBLE.

1) CONDUCT NATIVE MUSSEL AND LAMPREY PRESENCE/ ABSENCE; APPROXIMATE NUMBERS FOR SALVAGE TO AID IN PLANNING FOR SALVAGE. PRE-SELECT SITE WHERE SALVAGED MUSSELS WILL BE RELOCATED. SUGGESTED DRAWDOWN: THIS ORDER SHOULD BE ADJUSTED FOR SITE-SPECIFIC CONDITIONS AND NUMBERS OF SPECIES AND INDIVIDUALS- FOR EXAMPLE, IF YOU ONLY HAVE A SMALL NUMBER OF MUSSELS OR VERY LIMITED LARVAL LAMPREY HABITAT, IT MAY BE MOST EFFICIENT TO SALVAGE ONLY DURING DRAWDOWN. IF DRAWDOWN OCCURS DURING COOL, WET WEATHER, AND THE AREA WILL BE REWATERED WITHIN 24-48 HOURS, MUSSELS AND LARVAL LAMPREY MAY SURVIVE IN THE SEDIMENTS, AND NOT REQUIRE SALVAGE. CONVERSELY, IF CONDITIONS ARE WARM OR HOT, LAMPREY CAN EXPIRE WITHIN A COUPLE OF HOURS. DEPENDING ON YOUR SITE AND CIRCUMSTANCES, OTHER ADJUSTMENTS MAY ALSO BE NECESSARY. A GENERALIZED ORDER PRIOR TO DRAWDOWN IS:
   a) SALVAGE FW MUSSELS BY HAND, LOCATING BY SNORKELING OR WADING. IF MUSSELS ARE NUMEROUS (OR STAFF IS LIMITED), IT MAY BE NECESSARY TO DO THIS STEP IN THE DAYS BEFORE DRAWDOWN, AS RELOCATION/PLACEMENT CAN BE TIME CONSUMING. SALVAGE LARVAL LAMPREY BY E-FISHER UNDER WATERED CONDITIONS WITH LAMPREYSPECIFIC SETTINGS.
   b) SALVAGE BONY FISH AFTER LAMPREY WITH NETS OR BY E-FISHER WITH APPROPRIATE SETTINGS.
   c) IF THERE ARE SUFFICIENT NUMBERS OF PEOPLE AND EQUIPMENT, SOME PEOPLE CAN BE DRYSHOCKING DEWATERED AREAS, WHILE OTHERS ARE REMOVING REMAINING MUSSELS, AND OTHERS ARE SALVAGING SALMON.
3) CONTINUE SALVAGE LARVAL LAMPREY AND FW MUSSELS BY HAND DURING AND AFTER DRAWDOWN, AS WATER RECEDES AND LAMPREY CONTINUE TO EMERGE FROM SEDIMENTS AND OVERLOOKED MUSSELS BECOME VISIBLE. LARVAL LAMPREY MAY EMERGE HOURS AFTER DEWATERING OCCURS.
4) TO ENCOURAGE LARVAL LAMPREY EMERGENCE, "DRY SHOCK" IN AREAS OF FINE/SANDY DEPOSITS THAT ARE LIKELY TO HAVE HIGH LARVAL LAMPREY DENSITIES.
5) HOLD ALL FISH IN BUCKETS, FINE MESH BASKETS OR TANKS WITH ADEQUATE TEMPERATURES, SPACE AND OXYGEN. RELEASE ALL FISH THROUGHOUT THE SALVAGE PROCESS IN APPROPRIATE HABITATS TO MINIMIZE STRESS, THERMAL SHOCK AND PREDATION RISK. HOLD MUSSELS IN COOLERS AS DESCRIBED BELOW AND RELOCATE MUSSELS IN A PRE-SELECTED APPROPRIATE HABITAT; PLACEMENT OF EACH INDIVIDUAL IS NEEDED TO ALLOW MUSSELS TO RE-ESTABLISH/BURROW INTO THE NEW HABITAT. ELECTROFISHING SETTINGS FOR LARVAL LAMPREY.

1) ELECTROFISHING SHOULD BE PERFORMED IN A MANNER THAT MINIMIZES HARM TO FISHES. HANDLING TECHNIQUES AS DESCRIBED IN NMFS ELECTROFISHING GUIDELINES ARE PROTECTIVE OF LAMPREY. IF THERE IS A CONFLICT BETWEEN CONSERVATION MEASURES FOR ESA-LISTED SALMONIDS AND LAMPREY/MUSSELS NOTIFY EC LEAD AND PRIORITIZE PROTECTIONS TOWARDS THE ESA-LISTED FISH.
2) GENERALLY THREE TYPES OF ELECTROFISHERS ARE SUITABLE FOR LARVAL LAMPREY SAMPLING9:
   a) ABP-2 "WISCONSIN" ELECTROFISHER (ETS ELECTROFISHING, VERONA, WI)
   b) SMITH-ROOT LR-24 MODEL ELECTROFISHER WITH LAMPREY SETTINGS;
   c) SMITH ROOT APEX BACKPACK ELECTROFISHER WITH LAMPREY SETTINGS.
3) ELECTROFISHERS USED FOR LARVAL LAMPREY SAMPLING SHOULD BE SET WITH TWO WAVE FORMS, A LOWER FREQUENCY "TICKLE" WAVE FORM TO COAX LARVAL LAMPREYS OUT OF THE SUBSTRATE AND A HIGHER FREQUENCY "STUN" WAVE FORM TO IMMOBILIZE LARVAL LAMPREYS FOR NETTING.
4) EFFECTIVE SAMPLING INVOLVES THIS 2-STAGE METHOD (TABLE 2):
   a) FIRST STAGE: USE 125V DIRECT CURRENT WITH A 25 PERCENT DUTY CYCLE APPLIED AT A SLOW RATE OF 3 PULSES PER SECOND, TO INDUCE LARVAL LAMPREYS TO EMERGE FROM THE SEDIMENT. AT LOW WATER TEMPERATURE (<10C˚), VOLTAGE MAY NEED TO BE RAISED (150- 200V) TO MAINTAIN ITS EFFECTIVENESS (GRADUALLY INCREASE VOLTAGE TO FIND THE APPROPRIATE SETTING TO AVOID THE RISK OF ELECTRONARCOSIS).
   b) USE A PATTERN OF 3 SLOW PULSES FOLLOWED BY A SKIPPED PULSE (BURSTED PULSE) HELPS LARVAL LAMPREYS TO EMERGE.
   c) SECOND STAGE: IMMEDIATELY AFTER LARVAL LAMPREYS EMERGE, USE A FAST PULSE SETTING OF 30 PULSES PER SECOND TO IMMOBILIZE AND NET THEM. IT IS NOT NECESSARY TO STUN LAMPREY FOR NETTING FOR EXPERIENCED NETTERS.
5) AVOID EXPOSING LARVAL LAMPREYS TO EXTENDED PERIODS OF ELECTROFISHING AS IT HAS ALSO BEEN LINKED TO ELECTRONARCOSIS. RECOVERY FROM ELECTRONARCOSIS TAKES ABOUT 15 MINUTES.
6) USE DIP NETS TO CAPTURE LARVAL LAMPREYS WHERE THEY ARE READILY VISIBLE. WHERE NOT VISIBLE, SEINES MAY BE EFFECTIVE. USING FINE MESH NETS TO "SWEEP" THE WATER ("BLIND-NETTING") MAY INCREASE THE NUMBER OF SMALL LARVAE COLLECTED.
7) WITHIN EACH REACH, ELECTROFISHING SHOULD BE CONDUCTED IN A DOWNSTREAM TO UPSTREAM DIRECTION (FOR THE PURPOSE OF REDUCING TURBIDITY/MAINTAINING VISIBILITY) WITH ONE PERSON OPERATING THE ELECTROFISHER AND AT LEAST ONE PERSON NETTING LARVAL LAMPREYS. EACH REACH SHOULD BE THOROUGHLY AND SLOWLY SAMPLED (60-90 SEC/M), WITH MORE EFFORT DIRECTED AT SUITABLE LAMPREY REARING HABITAT AND LESS EFFORT IN AREAS WITH HARD SUBSTRATES OR HIGH WATER VELOCITY.
8) USING THE 2-STAGE METHOD DESCRIBED ABOVE, THE ELECTROFISHER SHOULD MAINLY BE OPERATED IN THE LOWER FREQUENCY OUTPUT MODE TO IRRITATE LARVAL LAMPREYS OUT OF THE SUBSTRATE. WHEN NECESSARY, THE HIGHER FREQUENCY MODE SHOULD BE ACTIVATED FOR CAPTURING EMERGENT LARVAL LAMPREYS.
9) MULTIPLE ELECTROFISHING PASSES SHOULD BE MADE TO ENSURE A MORE COMPLETE REMOVAL OF LARVAL LAMPREYS. A FIFTEEN MINUTE BREAK BETWEEN PASSES SHOULD BE TAKEN TO REDUCE THE CHANCE OF ELECTRONARCOSIS. SOME RESEARCH INDICATED ON AVERAGE, ONLY 30% LAMPREY EMERGE PER PASS, THUS THE NEED FOR MULTIPLE PASSES.
10) POST-DRAWDOWN: LARVAL LAMPREY MAY CONTINUE TO EMERGE FROM SEDIMENTS AFTER DRAWDOWN. THE FOLLOWING "DRY- SHOCKING" GUIDELINES CAN BE USED TO ENCOURAGE LARVAE TO EMERGE FROM THE SEDIMENTS SO THEY CAN BE SALVAGED.
   a) DURING AND AFTER DEWATERING, DEWATERED AREAS WHERE LAMPREY MAY BE BURROWED SHOULD BE SHOCKED, AKA "DRY-SHOCKING." DRY SHOCK IN DEPOSITIONAL AREAS OF FINE AND SANDY SEDIMENT FOR LARVAL LAMPREY. JUVENILES (EYED MIGRANTS) AND ADULTS ARE SOMETIMES FOUND BURIED IN ROCKIER AREAS, AND THOSE AREAS SHOULD ALSO BE SHOCKED IF OTHER THESE LIFE STAGES MAY BE PRESENT.
   b) DRY-SHOCK A SQUARE METER AT A TIME. PLACE THE ANODES ABOUT 1 METER APART AND TICKLE-PULSE FOR 60 TO 90 SECONDS. REMOVE EMERGED LAMPREY ONCE THE SHOCKING HAS STOPPED. MOVE TO NEXT SQUARE METER AND CONTINUE. ADJUST TO LOCAL CONDITIONS IN SOME INSTANCES, 60 SECONDS OF SHOCKING WILL BE SUFFICIENT; IN OTHER AREAS 90 SECONDS IS NEEDED. IN COLD TEMPERATURES, IT CAN BE BENEFICIAL TO RAISE THE VOLTAGE TO INCREASE EFFICIENCY. A GENERAL GUIDELINE IS AT TEMPERATURES LESS THAN 100C, THE VOLTAGE CAN BE INCREASED TO 150-175 V. IF EMERGENCE IS REALLY SLOW (OR ON THE LAST SALVAGE PASS PRIOR TO COMPLETE DEWATERING), THE VOLTAGE CAN BE INCREASED TO 200 V INITIALLY, AND UP TO 400 V IF LOWER VOLTAGE IS NOT EFFECTIVE (DRY SHOCKING ONLY).

4) FISH SALVAGE NOTICE: MONITORING AND RECORDING OF FISH PRESENCE, HANDLING, AND MORTALITY MUST OCCUR FOR THE DURATION OF THE ISOLATION, SALVAGE, ELECTROFISHING, DEWATERING, AND DEWATERING OPERATIONS. ONCE OPERATIONS ARE COMPLETED, A SALVAGE REPORT WILL DOCUMENT PROCEDURES USED, ANY FISH INJURIES OR DEATHS (INCLUDING NUMBERS OF FISH AFFECTED), AND CAUSES OF ANY DEATHS.

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership

LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

HIP CONSERVATION NOTES 2

REVISION NUMBER

No.	Date	Revision

Date	Designed By
11/08/2023	RCC
Drawn By	Checked By
DK	AJ

SCALE 0 1"

JOB NO. 20200017

SHEET NO. G2.1

4 OF 25

DWG: Z:\Shared\W2\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\G2.X - HIP NOTES.dwg USER: dkelley
DATE: Nov 08, 2023 3:56pm XREFS:X-TB-W2r-22x34

60% DESIGN
NOVEMBER 2023

4) FISH PASSAGE: FISH PASSAGE WILL BE PROVIDED FOR ANY ADULT OR JUVENILE FISH LIKELY TO BE PRESENT IN THE PROJECT AREA DURING CONSTRUCTION, UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION, OR THE STREAM IS NATURALLY IMPASSABLE AT THE TIME OF CONSTRUCTION. IF THE PROVISION OF TEMPORARY FISH PASSAGE DURING CONSTRUCTION WILL INCREASE NEGATIVE EFFECTS ON ESA-LISTED SPECIES OR THEIR HABITAT, A VARIANCE CAN BE REQUESTED FROM THE NMFS BRANCH CHIEF AND THE USFWS FIELD OFFICE SUPERVISOR. PERTINENT INFORMATION, SUCH AS THE SPECIES AFFECTED, LENGTH OF STREAM REACH AFFECTED, PROPOSED TIME FOR THE PASSAGE BARRIER, AND ALTERNATIVES CONSIDERED WILL BE INCLUDED IN THE VARIANCE REQUEST.

5) CONSTRUCTION AND DISCHARGE WATER:

1) SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS, BUT ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.
2) DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.
3) ALL CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED USING THE BEST AVAILABLE TECHNOLOGY SUITABLE FOR SITE CONDITIONS.
4) TREATMENTS TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS AND OTHER POLLUTANTS LIKELY TO BE PRESENT WILL BE PROVIDED.

6) MINIMIZE TIME AND EXTENT OF DISTURBANCE: EARTHWORK (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING AND COMPACTING) IN WHICH MECHANIZED EQUIPMENT IS USED IN STREAM CHANNELS, RIPARIAN AREAS, AND WETLANDS WILL BE COMPLETED AS QUICKLY AS POSSIBLE. MECHANIZED EQUIPMENT WILL BE USED IN STREAMS ONLY WHEN PROJECT SPECIALISTS BELIEVE THAT SUCH ACTIONS ARE THE ONLY REASONABLE ALTERNATIVE FOR IMPLEMENTATION, OR WOULD RESULT IN LESS SEDIMENT IN THE STREAM CHANNEL OR DAMAGE (SHORT- OR LONG-TERM) TO THE OVERALL AQUATIC AND RIPARIAN ECOSYSTEM RELATIVE TO OTHER ALTERNATIVES. TO THE EXTENT FEASIBLE, MECHANIZED EQUIPMENT WILL WORK FROM THE TOP OF THE BANK, UNLESS WORK FROM ANOTHER LOCATION WOULD RESULT IN LESS HABITAT DISTURBANCE.

7) CESSATION OF WORK: PROJECT OPERATIONS WILL CEASE UNDER THE FOLLOWING CONDITIONS:

1) HIGH FLOW CONDITIONS THAT MAY RESULT IN INUNDATION OF THE PROJECT AREA, EXCEPT FOR EFFORTS TO AVOID OR MINIMIZE RESOURCE DAMAGE
2) WHEN ALLOWABLE WATER QUALITY IMPACTS, AS DEFINED BY THE STATE CWA SECTION 401 WATER QUALITY CERTIFICATION OR HIP TURBIDITY MONITORING PROTOCOL, HAVE BEEN EXCEEDED

8) SITE RESTORATION: WHEN CONSTRUCTION IS COMPLETE:

1) ALL STREAMBANKS, SOILS, AND VEGETATION WILL BE CLEANED UP AND RESTORED AS NECESSARY USING STOCKPILED LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL.
2) ALL PROJECT-RELATED WASTE WILL BE REMOVED.
3) ALL TEMPORARY ACCESS ROADS, CROSSINGS, AND STAGING AREAS WILL BE DECOMPACTED AND RECONTOURED. WHEN NECESSARY FOR REVEGETATION AND INFILTRATION OF WATER, COMPACTED AREAS OF SOIL WILL BE LOOSENED.
4) ALL DISTURBED AREAS WILL BE REHABILITATED IN A MANNER THAT RESULTS IN SIMILAR OR IMPROVED CONDITIONS RELATIVE TO PRE-PROJECT CONDITIONS. THIS WILL BE ACHIEVED THROUGH REDISTRIBUTION OF STOCKPILED MATERIALS, SEEDING, AND/OR PLANTING WITH LOCAL NATIVE SEED MIXES OR PLANTS.

9) REVEGETATION: LONG-TERM SOIL STABILIZATION OF DISTURBED SITES WILL BE ACCOMPLISHED WITH REESTABLISHMENT OF NATIVE VEGETATION USING THE FOLLOWING CRITERIA:

1) PLANTING AND SEEDING WILL OCCUR PRIOR TO OR AT THE BEGINNING OF THE FIRST GROWING SEASON AFTER CONSTRUCTION.
2) PLANT MATERIALS WILL BE COORDINATED WITH METRO PROJECT MANAGER. THE ORIGINAL SOURCE FOR MATERIAL WILL BE COLLECTED BELOW 1000 FEET IN ELEVATION AND WITHIN THE WILLAMETTE VALLEY ECOREGION OR THE PUGET LOWLAND ECOREGION (AS FOUND HERE: HTTPS://WWW.EPA.GOV/ECO-RESEARCH/LEVEL-III-AND-IV-ECOREGIONS-CONTINENTAL-UNITED-STATES) BELOW A LATITUDE OF 47 DEGREES. VEGETATION, SUCH AS WILLOW, SEDGE AND RUSH MATS, WILL BE SALVAGED FROM DISTURBED OR ABANDONED FLOODPLAINS, STREAM CHANNELS, OR WETLANDS, AND REPLANTED AT THE SITE IN APPROPRIATE LOCATIONS.
3) INVASIVE SPECIES WILL NOT BE USED.
4) SHORT-TERM STABILIZATION MEASURES MAY INCLUDE THE USE OF NON-NATIVE STERILE SEED MIX (WHEN NATIVE SEEDS ARE NOT AVAILABLE), WEED-FREE CERTIFIED STRAW, JUTE MATTING, AND OTHER SIMILAR TECHNIQUES.
5) SURFACE FERTILIZER WILL NOT BE APPLIED WITHIN 50 FEET OF ANY STREAM CHANNEL, WATERBODY, OR WETLAND.
6) FENCING WILL BE INSTALLED AS NECESSARY TO PREVENT ACCESS TO REVEGETATED SITES BY LIVESTOCK OR UNAUTHORIZED PERSONS.
7) RE-ESTABLISHMENT OF VEGETATION IN DISTURBED AREAS WILL ACHIEVE AT LEAST 70% OF PRE-PROJECT CONDITIONS WITHIN 3 YEARS.
8) INVASIVE PLANTS WILL BE REMOVED OR CONTROLLED UNTIL NATIVE PLANT SPECIES ARE WELL ESTABLISHED (TYPICALLY 3 YEARS POST-CONSTRUCTION).

10) SITE ACCESS: THE PROJECT SPONSOR WILL RETAIN THE RIGHT OF REASONABLE ACCESS TO THE SITE IN ORDER TO MONITOR THE SUCCESS OF THE PROJECT OVER ITS LIFE.

11) IMPLEMENTATION MONITORING: PROJECT SPONSOR STAFF OR THEIR DESIGNATED REPRESENTATIVE WILL PROVIDE IMPLEMENTATION MONITORING BY FILLING OUT THE PROJECT COMPLETION FORM (PCF) TO ENSURE COMPLIANCE WITH THE APPLICABLE BIOP, DEMONSTRATING THAT:

1) GENERAL CONSERVATION MEASURES ARE ADEQUATELY FOLLOWED.
2) EFFECTS TO LISTED SPECIES ARE NOT GREATER THAN PREDICTED AND INCIDENTAL TAKE LIMITATIONS ARE NOT EXCEEDED.
3) TURBIDITY MONITORING IS BEING CONDUCTED IN ACCORDANCE WITH THE HIP TURBIDITY MONITORING PROTOCOL (SECTION 3.3, PG. 44) AND RECORDED IN THE PCF.

12) CWA SECTION 401 WATER QUALITY CERTIFICATION: THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL COMPLETE AND RECORD WATER QUALITY OBSERVATIONS TO ENSURE THAT IN-WATER WORK IS NOT DEGRADING WATER QUALITY. DURING CONSTRUCTION, CWA SECTION 401 WATER QUALITY CERTIFICATION PROVISIONS PROVIDED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY, WASHINGTON DEPARTMENT OF ECOLOGY, OR IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY WILL BE FOLLOWED.

13) STAGED REWATERING PLAN: WHEN APPROPRIATE, THE PROJECT SPONSOR SHALL IMPLEMENT A STAGED REWATERING PLAN FOR PROJECTS THAT INVOLVE INTRODUCING STREAMFLOW INTO RECENTLY EXCAVATED CHANNELS UNDER THE 2A) IMPROVE SECONDARY CHANNEL AND WETLAND HABITAT ACTIVITY CATEGORY OR 2F) CHANNEL RECONSTRUCTION CATEGORIES. THIS PLAN MAY BE ALTERED ACCORDING TO SITE SPECIFIC CONDITIONS WITH COORDINATION AND FEEDBACK FROM BPA AND THE SERVICES.

1) PRE-WASH THE NEWLY-EXCAVATED CHANNEL BEFORE REWATERING10. TURBID WASH WATER WILL BE DETAINED AND PUMPED TO THE FLOODPLAIN OR INTO A REACH WITH SEDIMENT CAPTURE DEVICES, RATHER THAN DISCHARGING INTO FISH-BEARING WATERS.
2) PREPARE NEW CHANNEL FOR WATER BY INSTALLING SEINE NETS AT THE UPSTREAM END TO PREVENT FISH FROM MOVING DOWNSTREAM INTO THE NEW CHANNEL UNTIL 2/3 OF TOTAL STREAMFLOW IS AVAILABLE IN THAT CHANNEL. STARTING IN THE EARLY MORNING, INTRODUCE 1/3 OF THE FLOW INTO THE NEW CHANNEL OVER A PERIOD OF 1-2 HOURS.
3) WHEN REINTRODUCING STREAMFLOW INTO A DEWATERED STREAM REACH, MONITOR FOR TURBIDITY:
   A) A SAMPLE MUST BE TAKEN TO ESTABLISH BACKGROUND TURBIDITY LEVELS PRIOR TO ANTICIPATED TURBIDITY PULSES. TAKE THE SAMPLE AT AN UNDISTURBED AREA APPROXIMATELY 100 FEET UPSTREAM FROM THE NEWLY EXCAVATED CHANNEL.
   B) TAKE A SECOND SAMPLE OR OBSERVATION, IMMEDIATELY DOWNSTREAM OF THE NEWLY EXCAVATED CHANNEL, APPROXIMATELY:
   C) 50 FEET DOWNSTREAM FOR STREAMS THAT ARE LESS THAN 30 FEET WIDE;
   D) 100 FEET DOWNSTREAM FOR STREAMS BETWEEN 30 AND 100 FEET WIDE;
   E) 200 FEET DOWNSTREAM FOR STREAMS GREATER THAN 100 FEET WIDE; AND
   F) 300 FEET FROM THE DISCHARGE POINT OR NONPOINT SOURCE FOR LOCATIONS SUBJECT TO TIDAL OR COASTAL SCOUR.
   G) A SAMPLE MUST THEN BE TAKEN EVERY 2 HOURS DURING REWATERING AND BE COMPARED AGAINST THE BACKGROUND MEASUREMENT.
   H) AN EXCEEDANCE OCCURS WHENEVER BOTH OF THE FOLLOWING CONDITIONS ARE EXCEEDED:
   I) DOWNSTREAM TURBIDITY EXCEEDS 40 NTU (FIGURE 1).
   J) DOWNSTREAM TURBIDITY EXCEEDS 10% ABOVE BACKGROUND.
   K) IN AN EXCEEDANCE OCCURS FOR TWO CONSECUTIVE READINGS (4 HOURS), STOP WORK IMMEDIATELY AND TAKE MEASURES TO REDUCE TURBIDITY BEFORE CONTINUING TO REINTRODUCE STREAMFLOW.
4) PREPARE TO INTRODUCE THE SECOND 1/3 OF THE FLOW (UP TO A TOTAL OF 2/3) TO THE NEW CHANNEL BY INSTALLING SEINE NETS AT THE UPSTREAM END OF THE OLD CHANNEL IN ORDER TO PREVENT FISH, LARVAL LAMPREY AND FRESHWATER MUSSELS FROM MOVING INTO A PARTIALLY-DEWATERED CHANNEL. INTRODUCE THE SECOND 1/3 OF THE FLOW OVER THE NEXT 1-2 HOURS. SALVAGE FISH FROM THE OLD 10 THE CONTRACTOR MAY FIND IT USEFUL TO HAVE PREWASHED GRAVEL BAGS AVAILABLE ONSITE TO CONTROL THE FLOW OF WATER. CHANNEL AT THIS TIME, SO THAT THE OLD CHANNEL IS FISH-FREE BEFORE DROPPING BELOW 1/3 OF THE FLOW. NOTE: THE FISH WILL BE TEMPORARILY BLOCKED FROM MOVING DOWNSTREAM INTO EITHER CHANNEL UNTIL 2/3 OF THE FLOW HAS BEEN TRANSITIONED TO THE NEW CHANNEL. THIS BLOCKAGE TO DOWNSTREAM FISH PASSAGE IS EXPECTED TO PERSIST FOR ROUGHLY 12 TO 14 HOURS, BUT FISH WILL STILL BE ABLE TO VOLITIONALLY MOVE OUT OF THE CHANNEL IN THE DOWNSTREAM DIRECTION. PERFORM MONITORING AS IN #3 ABOVE.
5) AFTER THE SECOND 1/3 OF FLOW IS INTRODUCED OVER 2 HOURS, AND TURBIDITY IS WITHIN 10% OF THE BACKGROUND LEVEL, REMOVE SEINE NETS FROM THE NEW CHANNEL, AND ALLOW FISH TO MOVE DOWNSTREAM BACK INTO THE CHANNEL. INTRODUCE THE FINAL 1/3 OF FLOW. ONCE 100% OF THE FLOW IS IN THE NEW CHANNEL, INSTALL PLUG TO BLOCK FLOW INTO THE OLD CHANNEL AND REMOVE SEINE NETS FROM THE OLD CHANNEL. ADDITIONAL EFFORTS TO SALVAGE LARVAL LAMPREY EMERGING FROM FINE SEDIMENT DEPOSITS SHOULD BE CONDUCTED AFTER THE FLOW IS GONE AND POSSIBLY FOR A FEW HOURS AFTER FLOW IS GONE, AS THE LARVAE WILL CONTINUE TO EMERGE.

14) HIP TURBIDITY MONITORING PROTOCOL: THE PROJECT SPONSOR SHALL COMPLETE AND RECORD THE FOLLOWING WATER QUALITY OBSERVATIONS ON THE HIP 4 PROJECT COMPLETION FORM (PCF). IF THE GEOMORPHOLOGY OF THE PROJECT AREA (E.G., SILTY OR CLAYLIKE MATERIALS) OR THE NATURE OF THE ACTION (E.G., LARGE AMOUNTS OF BARE EARTH EXPOSURE) SHALL PRECLUDE THE SUCCESSFUL COMPLIANCE WITH THESE TRIGGERS, NOTIFY YOUR EC LEAD & THE SERVICES IN ADVANCE OF THE LIKELIHOOD OF AN EXCEEDANCE AND SEEK ADDITIONAL RECOMMENDATIONS.

1) TAKE A BACKGROUND TURBIDITY MEASUREMENT APPROXIMATELY 100 FEET UPSTREAM FROM THE PROJECT AREA USING A RECENTLY-CALIBRATED TURBIDIMETER. RECORD THE OBSERVATION, LOCATION, AND TIME OF THE BACKGROUND MEASUREMENT BEFORE MONITORING AT THE DOWNSTREAM POINT, KNOWN AS THE MEASUREMENT COMPLIANCE POINT. IF THE BACKGROUND TURBIDITY IS LESS THAN 20 NTU, THEN USE VISUAL OBSERVATIONS (FIGURE 1).
2) TAKE A SECOND MEASUREMENT OR OBSERVATION AT THE MEASUREMENT COMPLIANCE POINT, IMMEDIATELY DOWNSTREAM OF THE DISTURBANCE AREA, APPROXIMATELY:
   A) 50 FEET DOWNSTREAM FOR STREAMS THAT ARE LESS THAN 30 FEET WIDE;
   B) 100 FEET DOWNSTREAM FOR STREAMS BETWEEN 30 AND 100 FEET WIDE;
   C) 200 FEET DOWNSTREAM FOR STREAMS GREATER THAN 100 FEET WIDE; AND
   D) 300 FEET FROM THE DISCHARGE POINT OR NONPOINT SOURCE FOR LOCATIONS SUBJECT TO TIDAL OR COASTAL SCOUR.
   E) RECORD THE DOWNSTREAM OBSERVATION, LOCATION, AND TIME.
3) TURBIDITY SHALL BE MEASURED (STEPS 1-2) EVERY 2 HOURS 11WHILE WORK IS BEING IMPLEMENTED. THE MONITORING INTERVAL OF 4 HOURS HAS BEEN PROPOSED BUT NOT APPROVED.
4) AN EXCEEDANCE OCCURS WHENEVER BOTH OF THE FOLLOWING CONDITIONS ARE EXCEEDED:
   A) DOWNSTREAM TURBIDITY EXCEEDS 40 NTU,
   B) DOWNSTREAM TURBIDITY EXCEEDS 10% ABOVE BACKGROUND FIGURE 1 SUGGESTED VISUAL OBSERVATIONAL DIFFERENCES IN TURBIDITY NOTE: FOR ANY STREAM WITH A BACKGROUND TURBIDITY OF 20 NTU OR LESS, IF YOU CANNOT SEE THE BOTTOM IN 2 FEET OF WATER AT EACH 2 HOUR INTERVAL, THEN TURBIDITY HAS LIKELY SURPASSED 40 NTUS AND YOU MUST ADJUST YOUR PROCEDURES. THIS WOULD ALLOW WORK TO CONTINUE WITH A TURBIDITY OF UNDER ABOUT 30-40 NTU. TURBIDITY OVER 40 NTU SHOULD BE AVOIDED.

1) IF AN EXCEEDANCE OCCURS THEN ADJUSTMENTS OR CORRECTIVE MEASURES MUST BE TAKEN IN ORDER TO REDUCE TURBIDITY. THE NMFS STAFF BIOLOGISTS OF THE AREA CAN PROVIDE TECHNICAL ASSISTANCE.
2) IF EXCEEDANCES OCCUR FOR MORE THAN TWO CONSECUTIVE MONITORING INTERVALS (AFTER 4HOURS), THE ACTIVITY MUST STOP UNTIL THE TURBIDITY LEVEL RETURNS TO BACKGROUND, AND THE EC LEAD MUST BE NOTIFIED AFTER THE PROJECT IS CONCLUDED. THE EC LEAD SHALL DOCUMENT THE REASONS FOR THE EXCEEDANCES AND THE CORRECTIVE MEASURES TAKEN. THIS IS VERY IMPORTANT AS BPA IS REQUIRED TO REPORT TO THE SERVICES UPON ALL EXCEEDANCES

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

HIP CONSERVATION NOTES 3

REVISION NUMBER

No.	Date	Revision

Date: 11/08/2023
Designed By: RCC
Drawn By: DK
Checked By: AJ

SCALE 0 1"

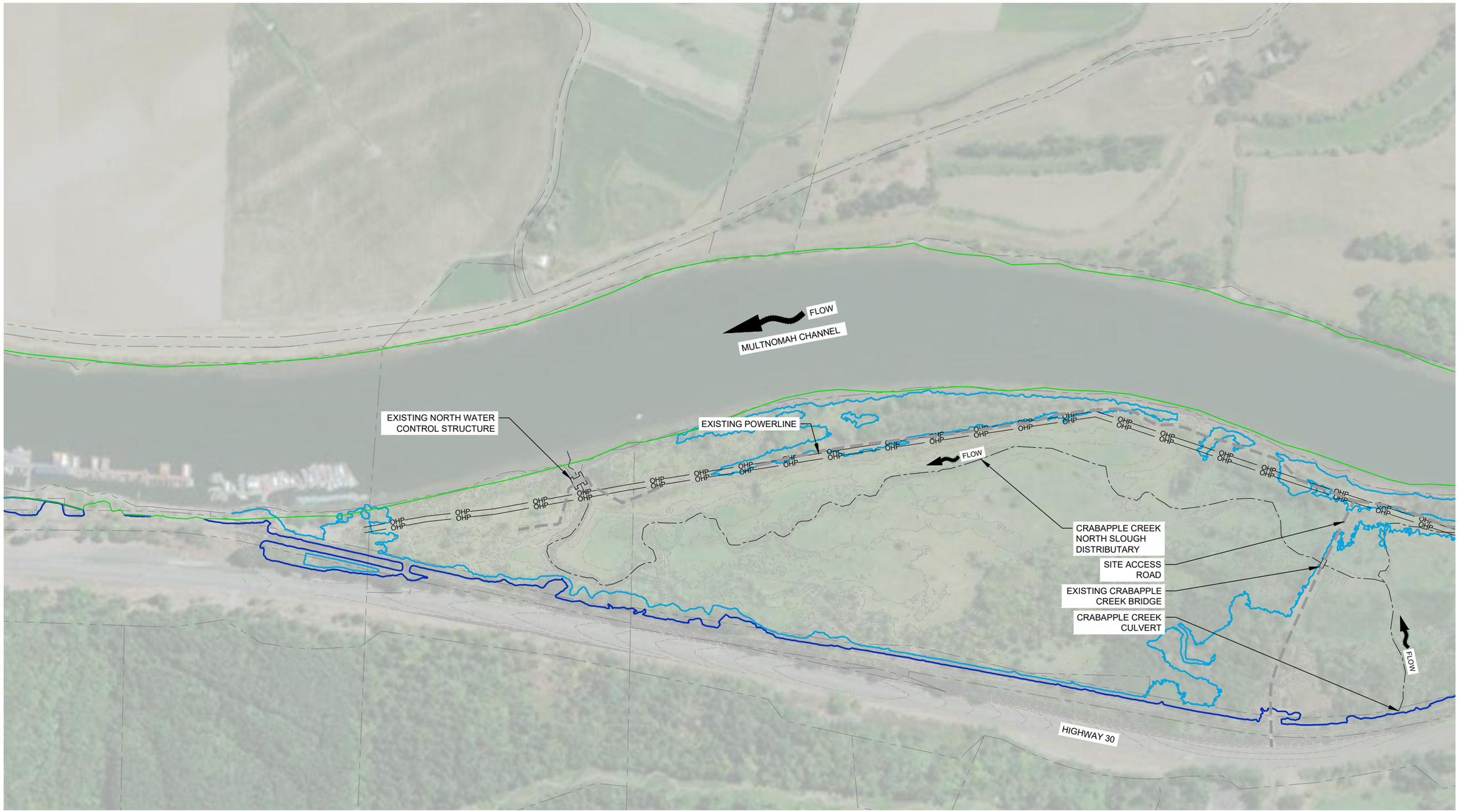
JOB NO. 20200017

SHEET NO. G2.2

5 OF 25

DWG: Z:\Shared\W2\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\G2.X - HIP NOTES.dwg USER: dkelley
DATE: Nov 08, 2023 3:56pm XREFS:X-TB-W2r-22x34

60% DESIGN
NOVEMBER 2023



PLAN: EXISTING CONDITIONS - NORTH WETLAND

SCALE: 1"=250'

NOTES:

1. EXISTING CONDITIONS CONTOURS FROM 2019 METRO OLC LIDAR.
2. EXISTING POWER LINES AND ACCESS ROAD LOCATIONS ARE APPROXIMATE & SHOWN FOR REFERENCE ONLY

SCALE

250 0 125 250 500

SCALE FEET

LEGEND:

- EXISTING MINOR CONTOUR 1' INTERVAL
- EXISTING MAJOR CONTOUR 5' INTERVAL
- OHW (2-YEAR FLOOD)
- FEMA 100-YEAR FLOODPLAIN BOUNDARY
- FLOODWAY BOUNDARY
- EXISTING SITE ACCESS
- OHP — EXISTING POWERLINES
- TAXLOTS

DWG: Z:\Shared\W2r\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C1.0 EXISTING OVERVIEW.dwg USER: dkelley
DATE: Nov 08, 2023 3:56pm XREFS:X-TB-W2r-22x34 X-LEGEND X-IMAGE X-EG X-TAXLOTS X-MAP X-DESIGN_Seeding

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

EXISTING CONDITIONS PLAN - NORTH

REVISION NUMBER

No.	Date	Revision

Date 11/08/2023	Designed By RCC
Drawn By DK	Checked By AJ

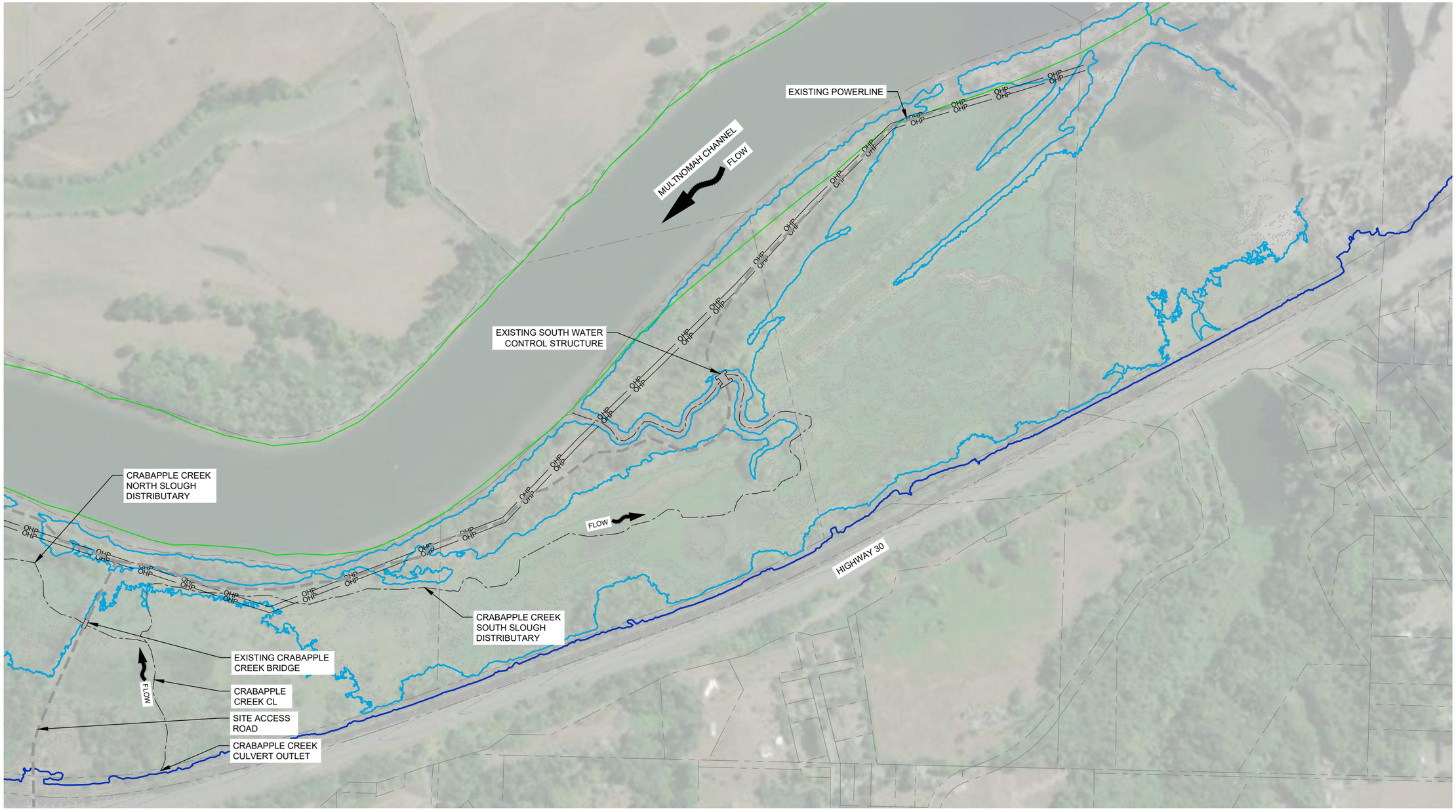
SCALE 0 1"

JOB NO. 20200017

SHEET NO. C1.0

6 OF 25

60% DESIGN
NOVEMBER 2023



PLAN: EXISTING CONDITIONS - SOUTH WETLAND

SCALE: 1"=250'

NOTES:

1. EXISTING CONDITIONS CONTOURS FROM 2019 METRO OLC LIDAR.
2. EXISTING POWER LINES AND ACCESS ROAD LOCATIONS ARE APPROXIMATE & SHOWN FOR REFERENCE ONLY

SCALE
250 0 125 250 500
SCALE FEET

LEGEND:

- EXISTING MINOR CONTOUR 1' INTERVAL
- EXISTING MAJOR CONTOUR 5' INTERVAL
- OHW (2-YEAR FLOOD)
- FEMA 100-YEAR FLOODPLAIN BOUNDARY
- FLOODWAY BOUNDARY
- EXISTING SITE ACCESS
- OHP — EXISTING POWERLINES
- TAXLOTS

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

EXISTING CONDITIONS PLAN - SOUTH

REVISION NUMBER

No.	Date	Revision

Date	Designed By
11/08/2023	RCC
Drawn By	**Checked By**
DK	AJ

SCALE 0 1"

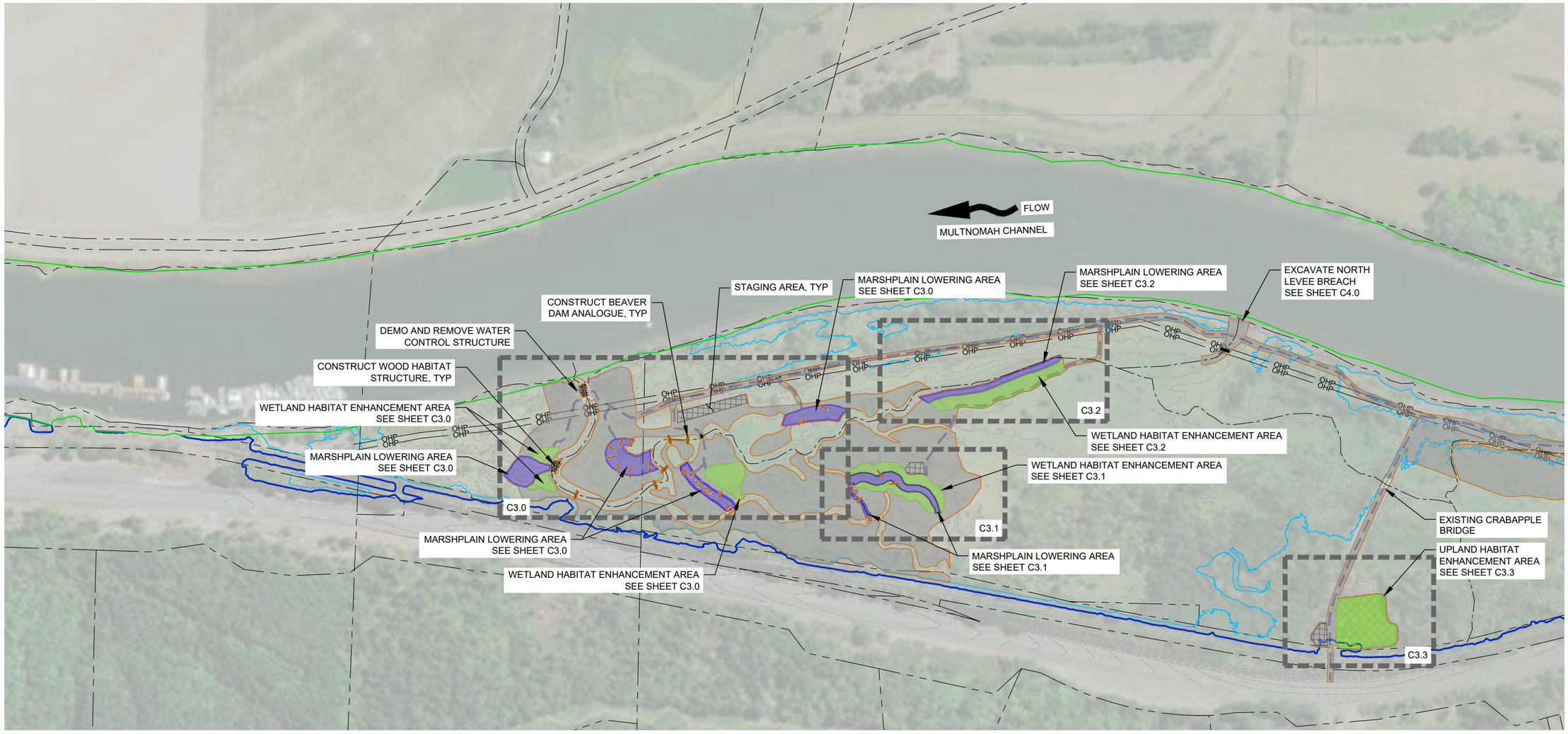
JOB NO. 20200017

SHEET NO. C1.1

7 OF 25

DWG: Z:\Shared\W2x\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C1.0 EXISTING OVERVIEW.dwg USER: dkelley
DATE: Nov 08, 2023 3:56pm XREFS:X-TB-W2r-22x34 X-LEGEND X-IMAGE X-EG X-TAXLOTS X-MAP X-DESIGN_Seeding

60% DESIGN
NOVEMBER 2023



PLAN: NORTH WETLAND ENHANCEMENT CONSTRUCTION OVERVIEW

SCALE: 1"=250'

SCALE
250 0 125 250 500
SCALE FEET

N

NOTES:

1. CONTRACTOR SHALL COORDINATE WITH METRO FOR SITE ACCESS.
2. FLAG AREAS TO BE CLEARED AND GRUBBED. OPR SHALL REVIEW AND APPROVE MARKED AREAS BEFORE CLEARING. NATIVE PLANT MATERIALS CLEARED AND GRUBBED SHALL BE STOCKPILED AND USED FOR BDA CONSTRUCTION.
3. CONSTRUCT WOOD FEATURES AT THE LOCATIONS AND ELEVATIONS SHOWN HERE AND ON SHEETS C3.0 - C3.5.
4. CONSTRUCT LEVEE BREACH EXCAVATION AS SHOWN HERE AND ON SHEET C4.0.
5. ALL NON-NATIVE EXCAVATED MATERIAL BE DISPOSED OF OFFSITE IN A LEGAL MANNER.
6. FINISHED SURFACE SHALL VARY NATURALLY WITHIN ± 0.5 FT OF THE DESIGN ELEVATION.
7. STAGING AREAS BELOW ORDINARY HIGH WATER FOR TEMPORARY STOCKPILE MATERIAL ONLY. OVERNIGHT STORAGE OF EQUIPMENT AND REFUELING SHALL USE THE UPLAND STAGING AREA ON SHEET C3.3.
8. SEED AND PLANT WORK AREAS PER SCHEDULES ON SHEET L1.0.

LEGEND:

- EXISTING MINOR CONTOUR 1' INTERVAL
- EXISTING MAJOR CONTOUR 5' INTERVAL
- OHW (2-YEAR FLOOD)
- FEMA 100-YEAR FLOODPLAIN BOUNDARY
- FLOODWAY BOUNDARY
- SITE ACCESS
- WORK AREA AND ACCESS BOUNDARY
- OHP — EXISTING POWERLINES
- TAXLOTS
- BEAVER DAM ANALOGUE
- WOOD HABITAT STRUCTURE
- HABITAT LOG
- BASKING LOG
- MARSHPLAIN LOWERING (MPL)
- WETLAND HABITAT ENHANCEMENT (WHE)
- UPLAND HABITAT ENHANCEMENT (UHE)
- GENERAL PLANTING
- STAGING AREA

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

ENHANCEMENT CONSTRUCTION OVERVIEW PLAN - NORTH

REVISION NUMBER

No.	Date	Revision

Date	Designed By
11/08/2023	RCC
Drawn By	Checked By
DK	AJ

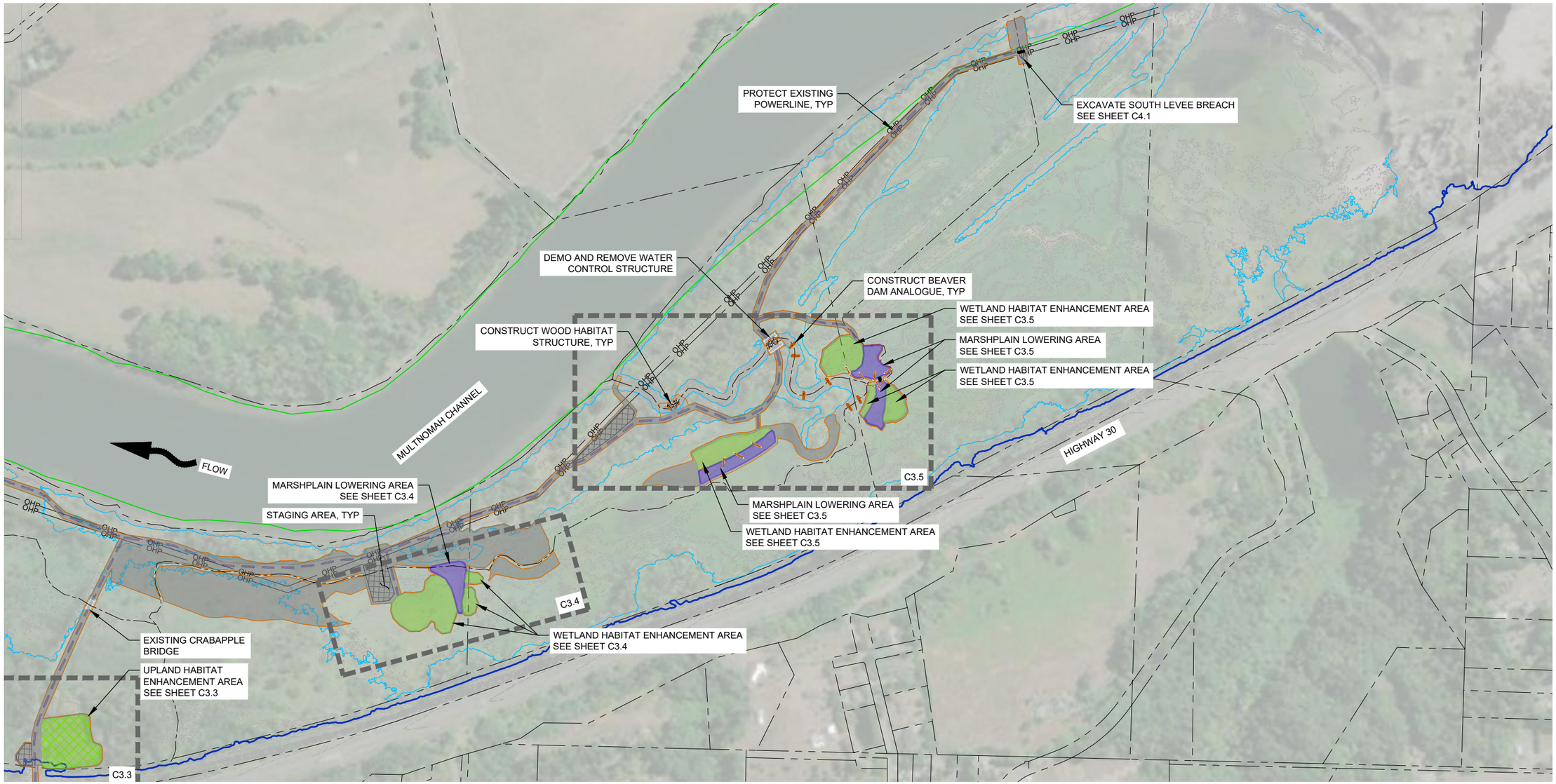
SCALE
0 1"

JOB NO.
20200017

SHEET NO.
C2.0
8 OF 25

DWG: Z:\Shared\W2r\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C1.0 PROPOSED OVERVIEW.dwg USER: dkelley
DATE: Nov 08, 2023 4:22pm XREFS:X-TB-W2r-22x34 X-MAP X-BDA X-DESIGN X-IMAGE X-TAXLOTS X-EG X-PLANTING X-LEGEND X-DESIGN_Seeding

60% DESIGN
NOVEMBER 2023



PLAN: SOUTH WETLAND ENHANCEMENT CONSTRUCTION OVERVIEW

SCALE: 1"=250'

SCALE
250 0 125 250 500
SCALE FEET

NOTES:

1. CONTRACTOR SHALL COORDINATE WITH METRO FOR SITE ACCESS.
2. FLAG AREAS TO BE CLEARED AND GRUBBED. OPR SHALL REVIEW AND APPROVE MARKED AREAS BEFORE CLEARING. NATIVE PLANT MATERIALS CLEARED AND GRUBBED SHALL BE STOCKPILED AND USED FOR BDA CONSTRUCTION.
3. CONSTRUCT WOOD FEATURES AT THE LOCATIONS AND ELEVATIONS SHOWN HERE AND ON SHEETS C3.0 - C3.5.
4. CONSTRUCT LEVEE BREACH EXCAVATION AS SHOWN HERE AND ON SHEET C4.1.
5. ALL NON-NATIVE EXCAVATED MATERIAL BE DISPOSED OF OFFSITE IN A LEGAL MANNER.
6. FINISHED SURFACE SHALL VARY NATURALLY WITHIN ± 0.5 FT OF THE DESIGN ELEVATION.
7. STAGING AREAS BELOW ORDINARY HIGH WATER FOR TEMPORARY MATERIAL STOCKPILE ONLY. OVERNIGHT STORAGE OF EQUIPMENT AND REFUELING SHALL USE THE UPLAND STAGING AREA ON SHEET C3.3.
8. SEED AND PLANT WORK AREAS PER SCHEDULES ON SHEET L1.0.

LEGEND:

- EXISTING MINOR CONTOUR 1' INTERVAL
- EXISTING MAJOR CONTOUR 5' INTERVAL
- OHW (2-YEAR FLOOD)
- FEMA 100-YEAR FLOODPLAIN BOUNDARY
- FLOODWAY BOUNDARY
- SITE ACCESS
- WORK AREA AND ACCESS BOUNDARY
- OHP — EXISTING POWERLINES
- TAXLOTS
- BEAVER DAM ANALOGUE
- WOOD HABITAT STRUCTURE
- HABITAT LOG
- BASKING LOG
- MARSHPLAIN LOWERING (MPL)
- WETLAND HABITAT ENHANCEMENT (WHE)
- UPLAND HABITAT ENHANCEMENT (UHE)
- GENERAL PLANTING
- STAGING AREA

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

ENHANCEMENT CONSTRUCTION OVERVIEW PLAN - SOUTH

REVISION NUMBER

No.	Date	Revision

Date: 11/08/2023 | Designed By: RCC
Drawn By: DK | Checked By: AJ

SCALE 0 1"

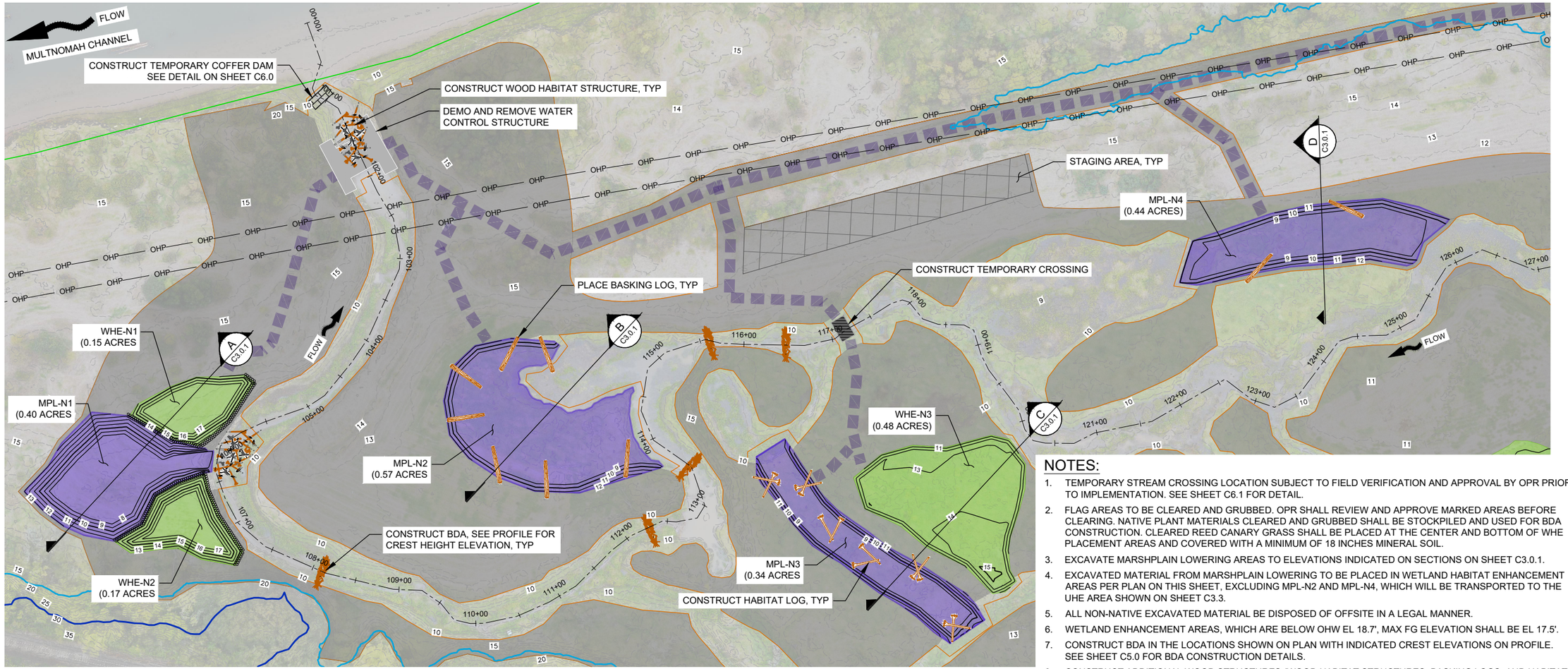
JOB NO. 20200017

SHEET NO. C2.1

9 OF 25

DWG: Z:\Shared\W2r\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C1.0 PROPOSED OVERVIEW.dwg USER: dkelley
DATE: Nov 08, 2023 3:58pm XREFS:X-TB-W2r-22x34 X-MAP X-BDA X-DESIGN X-IMAGE X-TAXLOTS X-EG X-PLANTING X-LEGEND X-DESIGN_Seeding

60% DESIGN
NOVEMBER 2023



NORTH SLOUGH PLAN

SCALE: 1"=60'

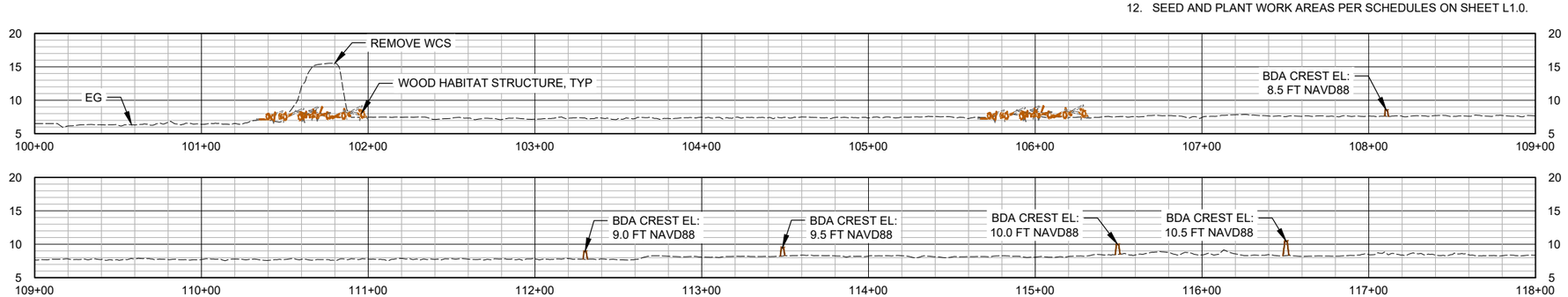
SCALE
60 0 30 60 120
SCALE FEET

LEGEND:

- STRAW WATTLES
- WORK AREA AND ACCESS BOUNDARY
- MARSHPLAIN LOWERING (MPL)
- WETLAND HABITAT ENHANCEMENT (WHE)
- GENERAL PLANTING

NOTES:

1. TEMPORARY STREAM CROSSING LOCATION SUBJECT TO FIELD VERIFICATION AND APPROVAL BY OPR PRIOR TO IMPLEMENTATION. SEE SHEET C6.1 FOR DETAIL.
2. FLAG AREAS TO BE CLEARED AND GRUBBED. OPR SHALL REVIEW AND APPROVE MARKED AREAS BEFORE CLEARING. NATIVE PLANT MATERIALS CLEARED AND GRUBBED SHALL BE STOCKPILED AND USED FOR BDA CONSTRUCTION. CLEARED REED CANARY GRASS SHALL BE PLACED AT THE CENTER AND BOTTOM OF WHE PLACEMENT AREAS AND COVERED WITH A MINIMUM OF 18 INCHES MINERAL SOIL.
3. EXCAVATE MARSHPLAIN LOWERING AREAS TO ELEVATIONS INDICATED ON SECTIONS ON SHEET C3.0.1.
4. EXCAVATED MATERIAL FROM MARSHPLAIN LOWERING TO BE PLACED IN WETLAND HABITAT ENHANCEMENT AREAS PER PLAN ON THIS SHEET, EXCLUDING MPL-N2 AND MPL-N4, WHICH WILL BE TRANSPORTED TO THE UHE AREA SHOWN ON SHEET C3.3.
5. ALL NON-NATIVE EXCAVATED MATERIAL BE DISPOSED OF OFFSITE IN A LEGAL MANNER.
6. WETLAND ENHANCEMENT AREAS, WHICH ARE BELOW OHW EL 18.7', MAX FG ELEVATION SHALL BE EL 17.5'.
7. CONSTRUCT BDA IN THE LOCATIONS SHOWN ON PLAN WITH INDICATED CREST ELEVATIONS ON PROFILE. SEE SHEET C5.0 FOR BDA CONSTRUCTION DETAILS.
8. CONSTRUCT ADDITIONAL WOOD STRUCTURES (WOOD HABITAT STRUCTURES, BASKING LOGS, AND HABITAT LOGS) PER PLAN. SEE SHEET C5.1 AND C5.2 FOR DETAILS.
9. DOWNED LOGS ENCOUNTERED DURING EXCAVATION TO BE SALVAGED, STOCKPILED AND PLACED ON OR EMBEDDED IN THE FINISHED GRADE MARSHPLAIN ACCORDING TO THE SPECIFICATIONS.
10. FINISHED SURFACE SHALL VARY NATURALLY WITHIN ± 0.5 FT OF THE DESIGN ELEVATION.
11. STAGING AREAS BELOW ORDINARY HIGH WATER FOR TEMPORARY MATERIAL ONLY. OVERNIGHT STORAGE OF EQUIPMENT AND REFUELING SHALL USE THE UPLAND STAGING AREA ON SHEET C3.3.
12. SEED AND PLANT WORK AREAS PER SCHEDULES ON SHEET L1.0.



NORTH SLOUGH PROFILE

SCALE: 1"=40'
VERTICAL SCALE: 1"=15'

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

NORTH SLOUGH GRADING PLAN & PROFILE

REVISION NUMBER

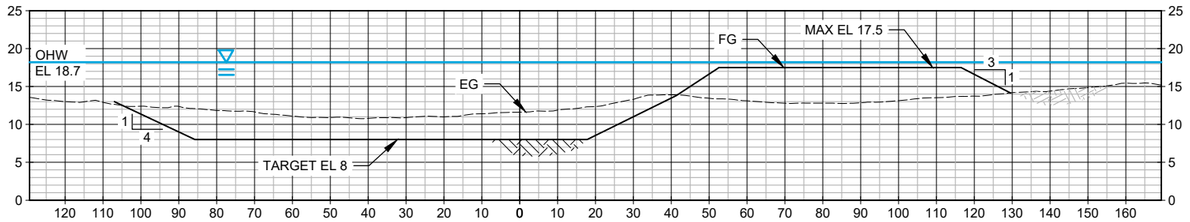
No.	Date	Revision

Date 11/08/2023 | Designed By RCC
Drawn By DK | Checked By AJ
SCALE 0 1"

JOB NO. 20200017

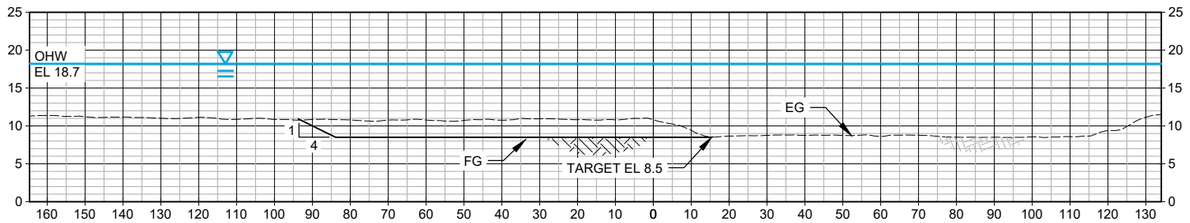
SHEET NO. C3.0
10 OF 25

DWG: Z:\Shared\W2r\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2.0 PROPOSED CONDITIONS BDA PLACEMENT PROFILE.dwg USER: dkelley
DATE: Nov 08, 2023 3:58pm XREFS:X-TB-W2r-22x34 X-LEGEND X-IMAGE X-BDA X-EG X-DESIGN X-MAP X-PLANTING X-DESIGN_Seeding



A - SECTION: MPL-N1 & WHE-N1

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1

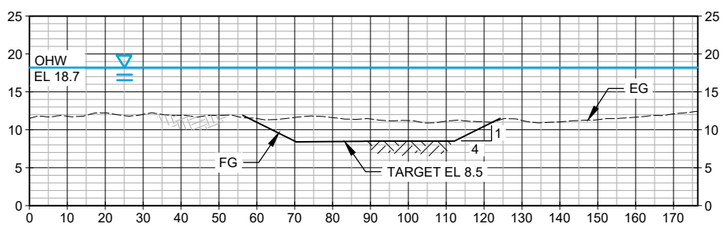


B - SECTION: MPL-N2

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1

C - SECTION: MPL-N3 & WHE-N3

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1



D - SECTION: MPL-N4

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1

NOTES:

1. FLAG AREAS TO BE CLEARED AND GRUBBED. OPR SHALL REVIEW AND APPROVE MARKED AREAS BEFORE CLEARING. NATIVE PLANT MATERIALS CLEARED AND GRUBBED SHALL BE STOCKPILED AND USED FOR BDA CONSTRUCTION. CLEARED REED CANARY GRASS SHALL BE PLACED AT THE CENTER AND BOTTOM OF WHE PLACEMENT AREAS AND COVERED WITH A MINIMUM OF 18 INCHES MINERAL SOIL.
2. CONSTRUCT MARSHPLAIN LOWERING AND WETLAND HABITAT ENHANCEMENT TO THE ELEVATIONS AND GRADES SHOWN ON SECTIONS HERE, EXCLUDING MPL-N2 AND MPL-N4, WHICH WILL BE TRANSPORTED TO THE UHE AREA SHOWN ON SHEET C3.3.
3. SCARIFY THE EXISTING GRADE SURFACE PRIOR TO PLACING FILL TO PROMOTE GROUNDWATER EXCHANGE THROUGH THE FILL AREA. SEE SURFACE ROUGHENING DETAIL ON SHEET C6.0.
4. WETLAND HABITAT ENHANCEMENT FILL HEIGHT NOT TO EXCEED ELEVATION 17.5.
5. FINISHED SURFACE SHALL VARY NATURALLY WITHIN ± 0.5 FT OF THE DESIGN ELEVATION.
6. DOWNED LOGS ENCOUNTERED DURING EXCAVATION TO BE SALVAGED, STOCKPILED AND PLACED ON OR EMBEDDED IN THE FINISHED GRADE MARSHPLAIN ACCORDING TO THE SPECIFICATIONS.

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

NORTH SLOUGH SECTIONS

REVISION NUMBER

No.	Date	Revision

Date: 11/08/2023 | Designed By: RCC
Drawn By: DK | Checked By: AJ

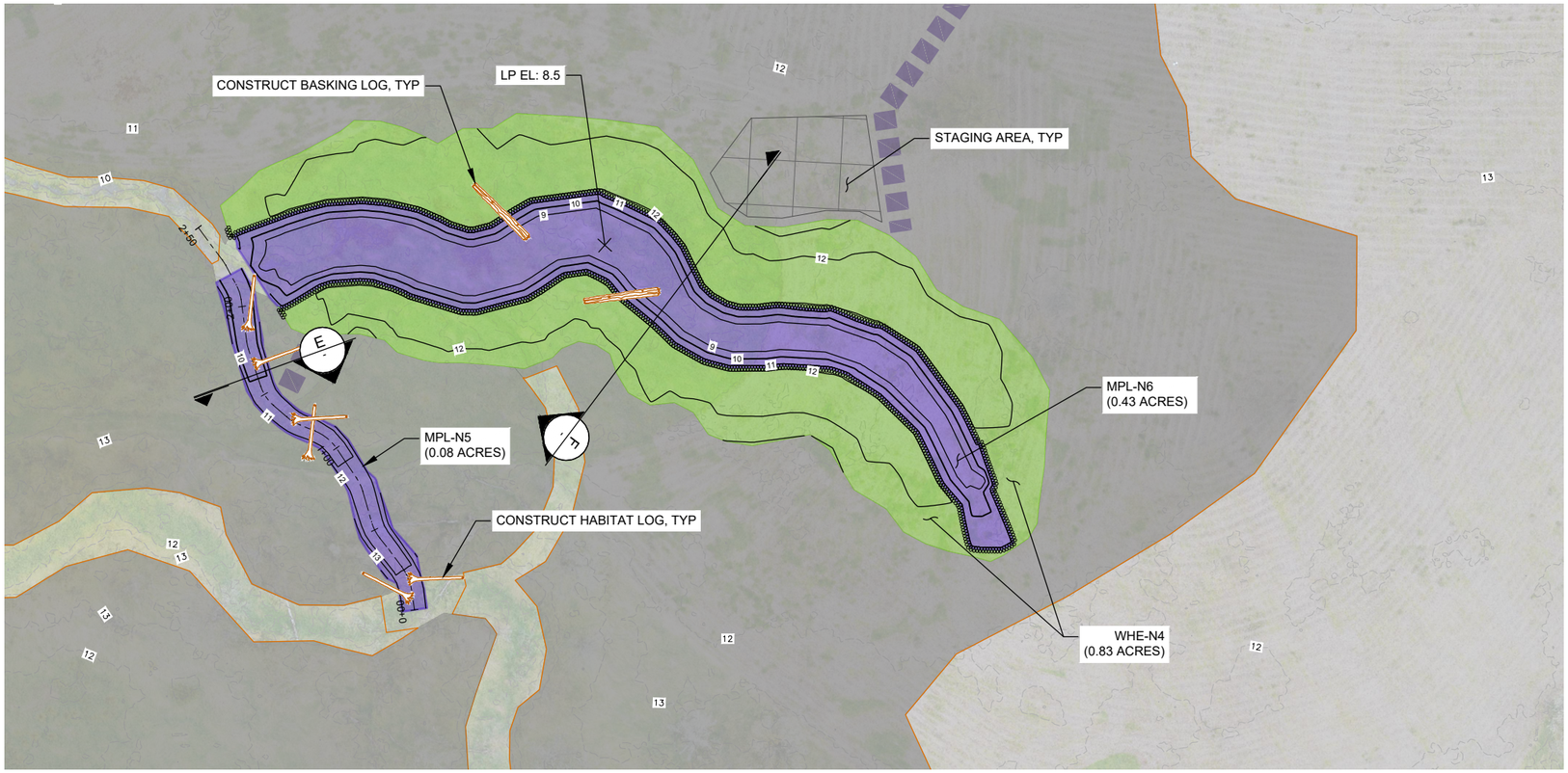
SCALE 0 1"

JOB NO. 20200017

SHEET NO. C3.0.1

11 OF 25

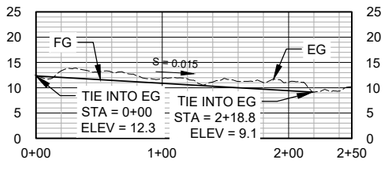
60% DESIGN
NOVEMBER 2023



SWALE EXCAVATION PLAN

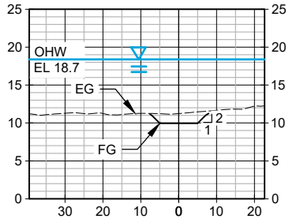
SCALE: 1"=40'

SCALE
40 0 20 40 80
SCALE FEET



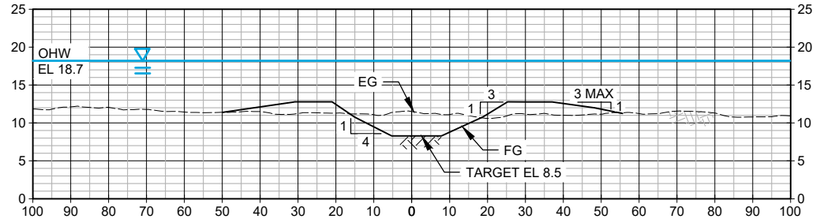
PROFILE: MPL-N5

SCALE: 1"=60'
VERTICAL SCALE: 1"=15'



E SECTION: MPL-N5

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1



F SECTION: MPL-N6 & WHE-N4

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1

NOTES:

1. TEMPORARY STREAM CROSSING LOCATION SUBJECT TO FIELD VERIFICATION AND APPROVAL BY OPR PRIOR TO IMPLEMENTATION. SEE SHEET C6.1 FOR DETAIL.
2. FLAG AREAS TO BE CLEARED AND GRUBBED. OPR SHALL REVIEW AND APPROVE MARKED AREAS BEFORE CLEARING. NATIVE PLANT MATERIALS CLEARED AND GRUBBED SHALL BE STOCKPILED AND USED FOR BDA CONSTRUCTION. CLEARED REED CANARY GRASS SHALL BE PLACED AT THE CENTER AND BOTTOM OF WHE PLACEMENT AREAS AND COVERED WITH A MINIMUM OF 18 INCHES MINERAL SOIL.
3. EXCAVATE MARSHPLAIN LOWERING AREAS TO ELEVATIONS INDICATED IN SECTIONS.
4. EXCAVATED MATERIAL FROM MARSHPLAIN LOWERING TO BE PLACED IN WETLAND HABITAT ENHANCEMENT AREAS PER PLAN AND SECTIONS ON THIS SHEET.
5. SCARIFY THE EXISTING GRADE SURFACE PRIOR TO PLACING FILL TO PROMOTE GROUNDWATER EXCHANGE THROUGH THE FILL AREA. SEE SURFACE ROUGHENING DETAIL ON SHEET C6.0.
6. ALL NON-NATIVE EXCAVATED MATERIAL BE DISPOSED OF OFFSITE IN A LEGAL MANNER.
7. WETLAND ENHANCEMENT AREAS, WHICH ARE BELOW OHW EL 18.2', MAX FG ELEVATION SHALL BE EL 17.5'.
8. CONSTRUCT BASKING LOGS AND HABITAT LOGS PER PLAN. SEE SHEET C5.1 AND C5.2 FOR DETAILS.
9. DOWNED LOGS ENCOUNTERED DURING EXCAVATION TO BE SALVAGED, STOCKPILED AND PLACED ON OR EMBEDDED IN THE FINISHED GRADE MARSH PLAIN ACCORDING TO THE SPECIFICATIONS.
10. FINISHED SURFACE SHALL VARY NATURALLY WITHIN ± 0.5 FT OF THE DESIGN ELEVATION.
11. STAGING AREAS BELOW ORDINARY HIGH WATER FOR TEMPORARY MATERIAL ONLY. OVERNIGHT STORAGE OF EQUIPMENT AND REFUELING SHALL USE THE UPLAND STAGING AREA ON SHEET C3.3.
12. SEED AND PLANT WORK AREAS PER SCHEDULES ON SHEET L1.0.

LEGEND:

- STRAW WATTLES
- WORK AREA AND ACCESS BOUNDARY
- MARSHPLAIN LOWERING (MPL)
- WETLAND HABITAT ENHANCEMENT (WHE)
- GENERAL PLANTING

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

SWALE GRADING PLAN & SECTION

REVISION NUMBER

No.	Date	Revision

Date 11/08/2023	Designed By RCC
Drawn By DK	Checked By AJ

SCALE 0 1"

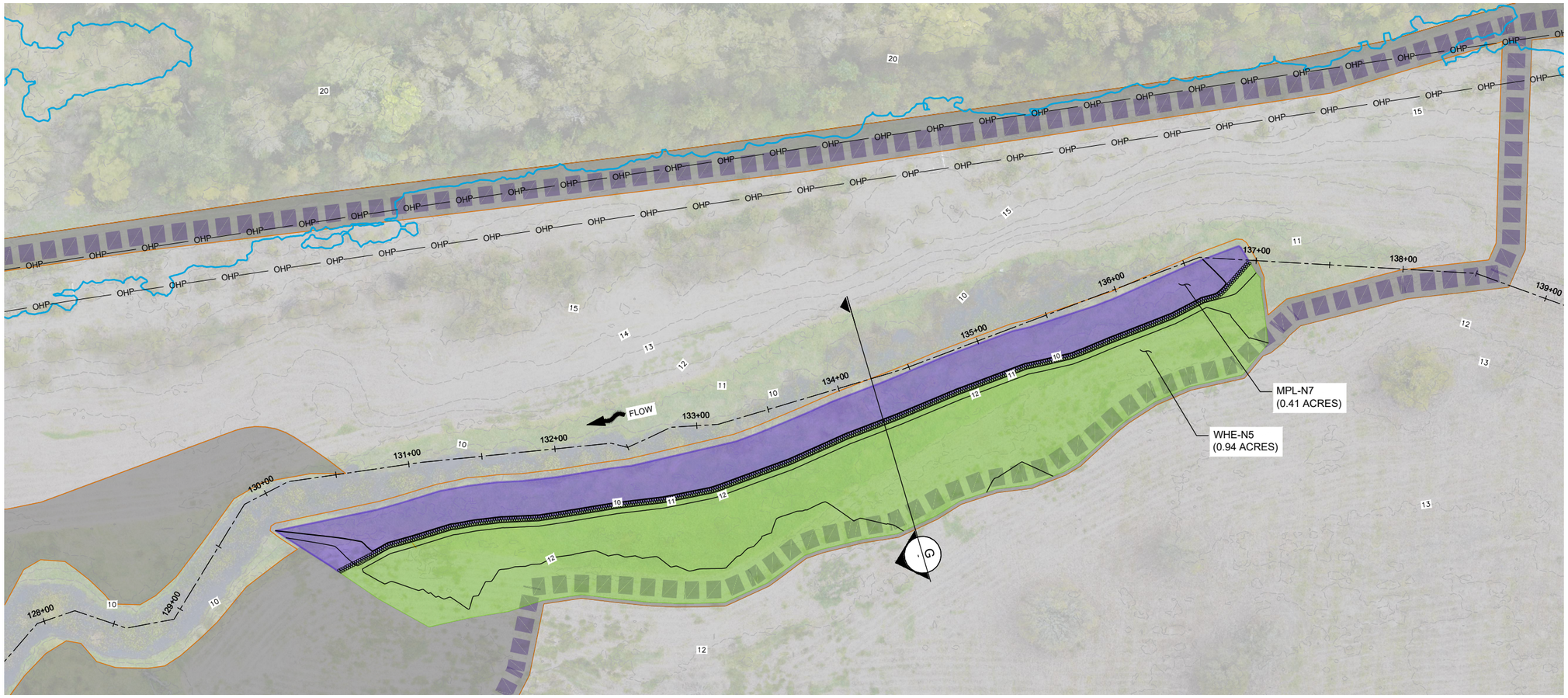
JOB NO. 20200017

SHEET NO. C3.1

12 OF 25

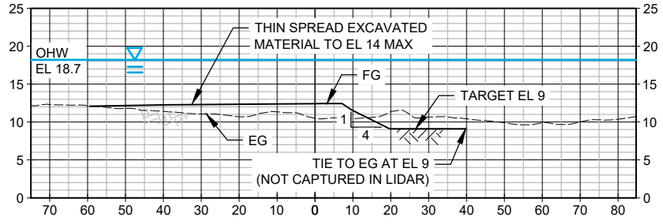
DWG: Z:\SharedW2\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2 0 PROPOSED CONDITIONS BDA PLACEMENT PROFILE.dwg USER: dkelley
DATE: Nov 08, 2023 4:01pm XREFS:X-TB-W2r-22x34 X-LEGEND X-IMAGE X-BDA X-EG X-DESIGN X-MAP X-PLANTING X-DESIGN_Seeding

60% DESIGN
NOVEMBER 2023



CENTRAL MPL PLAN

SCALE: 1"=40'



G
SECTION: MPL-N7 & WHE-N5

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1

LEGEND:

- STRAW WATTLES
- WORK AREA AND ACCESS BOUNDARY
- MARSHPLAIN LOWERING (MPL)
- WETLAND HABITAT ENHANCEMENT (WHE)
- GENERAL PLANTING

SCALE
40 0 20 40 80
SCALE FEET

NOTES:

1. FLAG AREAS TO BE CLEARED AND GRUBBED. OPR SHALL REVIEW AND APPROVE MARKED AREAS BEFORE CLEARING. NATIVE PLANT MATERIALS CLEARED AND GRUBBED SHALL BE STOCKPILED AND USED FOR BDA CONSTRUCTION. CLEARED REED CANARY GRASS SHALL BE PLACED AT THE CENTER AND BOTTOM OF WHE PLACEMENT AREAS AND COVERED WITH A MINIMUM OF 18 INCHES MINERAL SOIL.
2. EXCAVATE MARSHPLAIN LOWERING AREAS TO ELEVATIONS INDICATED IN SECTION.
3. EXCAVATED MATERIAL FROM MARSHPLAIN LOWERING TO BE PLACED IN WETLAND HABITAT ENHANCEMENT AREAS PER PLAN AND SECTIONS ON THIS SHEET.
4. SCARIFY THE EXISTING GRADE SURFACE PRIOR TO PLACING FILL TO PROMOTE GROUNDWATER EXCHANGE THROUGH THE FILL AREA. SEE SURFACE ROUGHENING DETAIL ON SHEET C6.0.
5. ALL NON-NATIVE EXCAVATED MATERIAL BE DISPOSED OF OFFSITE IN A LEGAL MANNER.
6. WETLAND ENHANCEMENT AREAS, WHICH ARE BELOW OHW EL 18.2', MAX FG ELEVATION SHALL BE EL 17.5'.
7. DOWNED LOGS ENCOUNTERED DURING EXCAVATION TO BE SALVAGED, STOCKPILED AND PLACED ON OR EMBEDDED IN THE FINISHED GRADE MARSH PLAIN ACCORDING TO THE SPECIFICATIONS.
8. FINISHED SURFACE SHALL VARY NATURALLY WITHIN ± 0.5 FT OF THE DESIGN ELEVATION.
9. STAGING AREAS BELOW ORDINARY HIGH WATER FOR TEMPORARY MATERIAL ONLY. OVERNIGHT STORAGE OF EQUIPMENT AND REFUELING SHALL USE THE UPLAND STAGING AREA ON SHEET C3.3.
10. SEED AND PLANT WORK AREAS PER SCHEDULES ON SHEET L1.0.

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

CENTRAL MPL GRADING PLAN & SECTION

REVISION NUMBER

No.	Date	Revision

Date 11/08/2023 | Designed By RCC
Drawn By DK | Checked By AJ

SCALE 0 1"

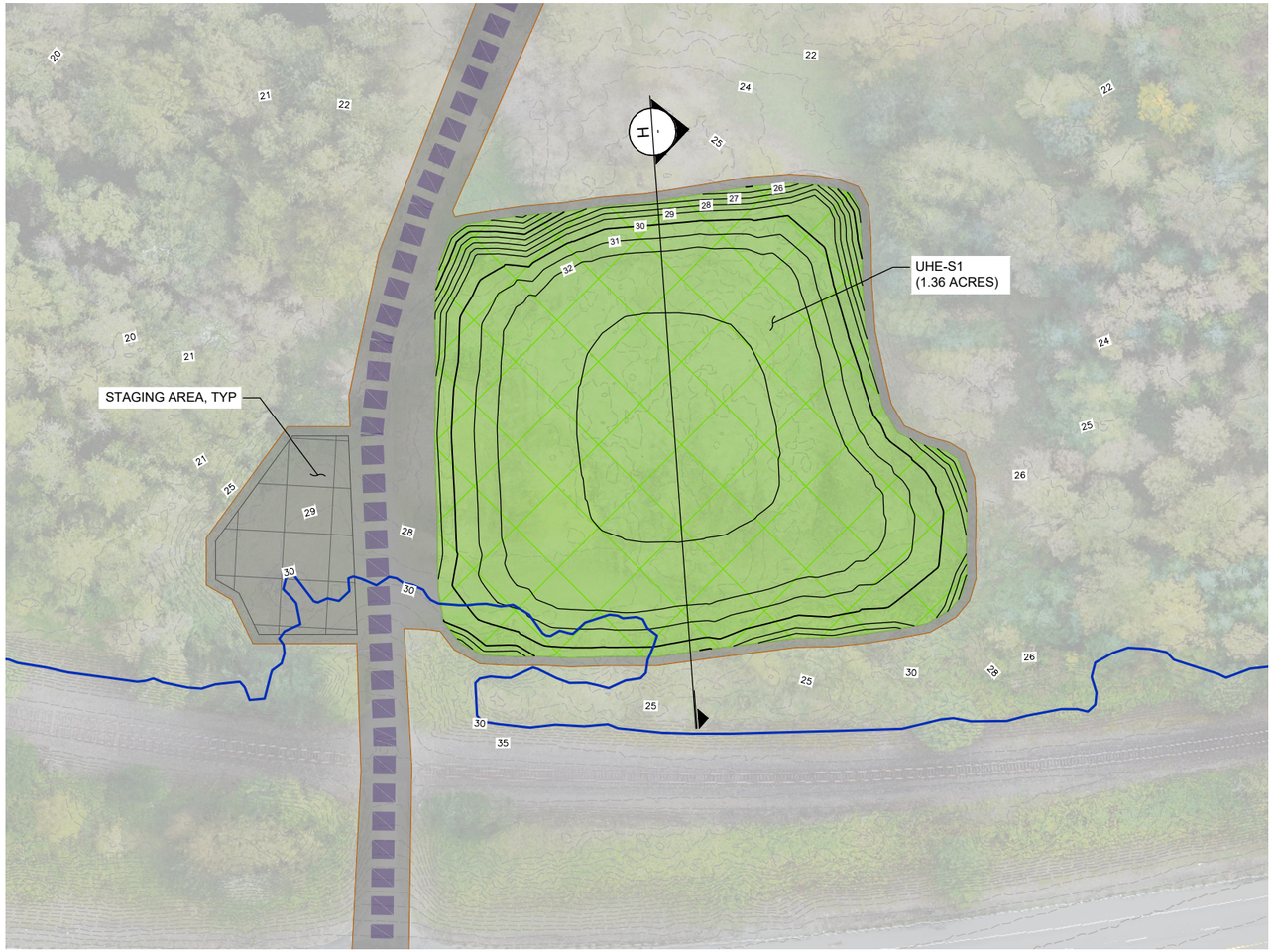
JOB NO. 20200017

SHEET NO. C3.2

13 OF 25

DWG: Z:\Shared\W2r\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2.0 PROPOSED CONDITIONS BDA PLACEMENT PROFILE.dwg USER: dkelley
DATE: Nov 08, 2023 4:02pm XREFS:X-TB-W2r-22x34 X-LEGEND X-IMAGE X-BDA X-EG X-DESIGN X-MAP X-PLANTING X-DESIGN_Seeding

60% DESIGN
NOVEMBER 2023



LEGEND:

- STRAW WATTLES
- WORK AREA AND ACCESS BOUNDARY
- GENERAL PLANTING
- UPLAND HABITAT ENHANCEMENT (UHE)

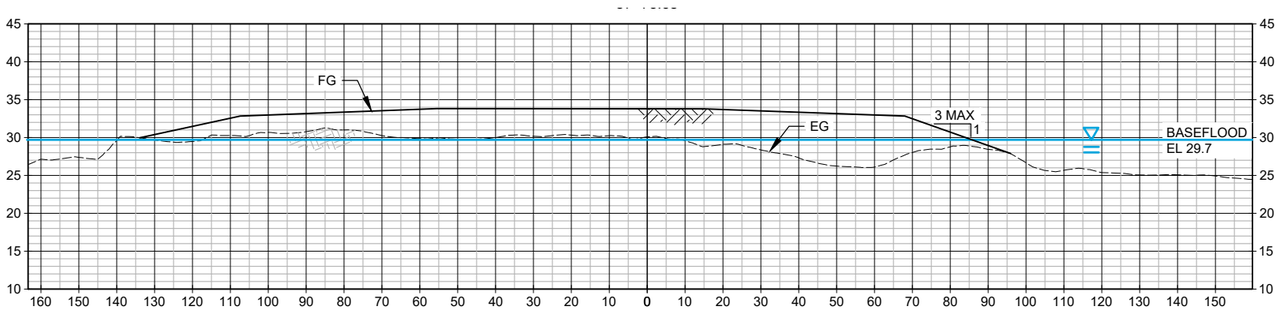
NOTES:

1. FLAG AREAS TO BE CLEARED AND GRUBBED. OPR SHALL REVIEW AND APPROVE MARKED AREAS BEFORE CLEARING. NATIVE PLANT MATERIALS CLEARED AND GRUBBED SHALL BE STOCKPILED AND USED FOR BDA CONSTRUCTION.
2. SCARIFY THE EXISTING GRADE SURFACE PRIOR TO PLACING FILL TO PROMOTE GROUNDWATER EXCHANGE THROUGH THE FILL AREA. SEE SURFACE ROUGHENING DETAIL ON SHEET C6.0.
3. UPLAND ENHANCEMENT AREAS, WHICH ARE ABOVE OHW EL 18.2', HAVE NO MAXIMUM ELEVATION.
4. FINISHED SURFACE SHALL VARY NATURALLY WITHIN ± 0.5 FT OF THE DESIGN ELEVATION.
5. STAGING AREAS BELOW ORDINARY HIGH WATER FOR TEMPORARY MATERIAL ONLY. OVERNIGHT STORAGE OF EQUIPMENT AND REFUELING SHALL USE THE UPLAND STAGING AREA ON THIS SHEET.
6. SEED AND PLANT WORK AREAS PER SCHEDULES ON SHEET L1.0.
7. EXCAVATE, HAUL AND LEGALLY DISPOSE OF CONCRETE PAD.

UPLAND GRADING PLAN

SCALE: 1"=40'

SCALE
40 0 20 40 80
SCALE FEET



H SECTION: UHE-S1

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

UPLAND GRADING PLAN & SECTION

REVISION NUMBER

No.	Date	Revision

Date 11/08/2023 | Designed By RCC
Drawn By DK | Checked By AJ

SCALE 0 1"

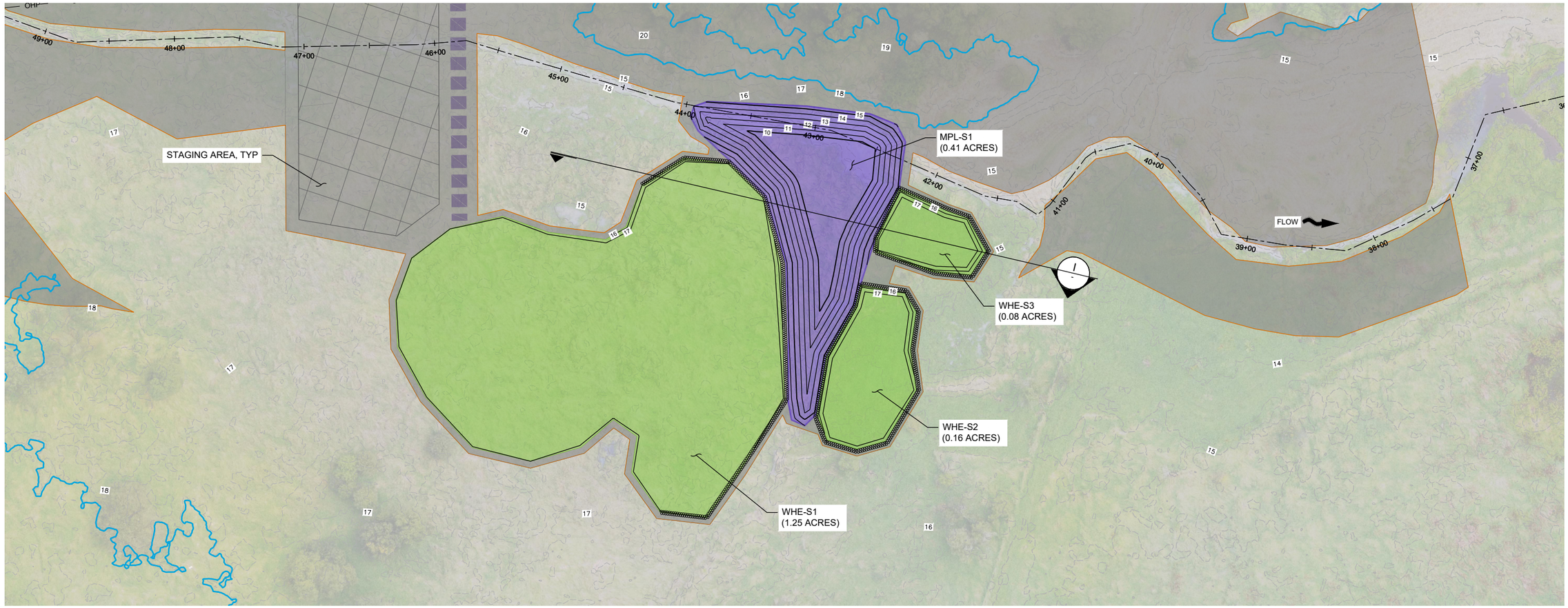
JOB NO. 20200017

SHEET NO. C3.3

14 OF 25

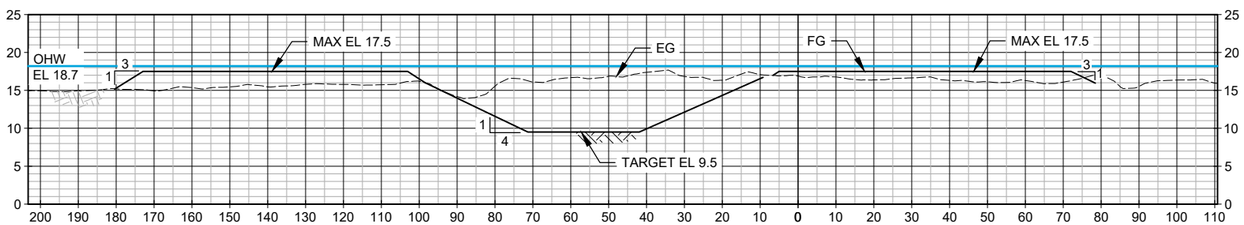
DWG: Z:\Shared\W2r\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2.0 PROPOSED CONDITIONS BDA PLACEMENT PROFILE.dwg USER: dkelley
DATE: Nov 08, 2023 4:03pm XREFS:X-TB-W2r-22x34 X-LEGEND X-IMAGE X-BDA X-EG X-DESIGN X-MAP X-PLANTING X-DESIGN_Seeding

60% DESIGN
NOVEMBER 2023



SOUTH WETLAND GRADING PLAN

SCALE: 1"=40'



I
I'

SECTION: WHE-S1, MPL-S1 & WHE-S3

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1

SCALE
40 0 20 40 80
SCALE FEET

NOTES:

1. FLAG AREAS TO BE CLEARED AND GRUBBED. OPR SHALL REVIEW AND APPROVE MARKED AREAS BEFORE CLEARING. NATIVE PLANT MATERIALS CLEARED AND GRUBBED SHALL BE STOCKPILED AND USED FOR BDA CONSTRUCTION. CLEARED REED CANARY GRASS SHALL BE PLACED AT THE CENTER AND BOTTOM OF WHE PLACEMENT AREAS AND COVERED WITH A MINIMUM OF 18 INCHES MINERAL SOIL.
2. EXCAVATE MARSHPLAIN LOWERING AREAS TO ELEVATIONS INDICATED IN SECTION.
3. EXCAVATED MATERIAL FROM MARSHPLAIN LOWERING TO BE PLACED IN WETLAND HABITAT ENHANCEMENT AREAS PER PLAN AND SECTION ON THIS SHEET.
4. SCARIFY THE EXISTING GRADE SURFACE PRIOR TO PLACING FILL TO PROMOTE GROUNDWATER EXCHANGE THROUGH THE FILL AREA. SEE SURFACE ROUGHENING DETAIL ON SHEET C6.0.
5. WETLAND ENHANCEMENT AREAS, WHICH ARE BELOW OHW EL 18.2', MAX FG ELEVATION SHALL BE EL 17.5'.
6. DOWNED LOGS ENCOUNTERED DURING EXCAVATION TO BE SALVAGED, STOCKPILED AND PLACED ON OR EMBEDDED IN THE FINISHED GRADE MARSHPLAIN ACCORDING TO THE SPECIFICATIONS.
7. FINISHED SURFACE SHALL VARY NATURALLY WITHIN ± 0.5 FT OF THE DESIGN ELEVATION.
8. STAGING AREAS BELOW ORDINARY HIGH WATER FOR TEMPORARY MATERIAL ONLY. OVERNIGHT STORAGE OF EQUIPMENT AND REFUELING SHALL USE THE UPLAND STAGING AREA ON SHEET C3.3.
9. SEED AND PLANT WORK AREAS PER SCHEDULES ON SHEET L1.0.

LEGEND:

- STRAW WATTLES
- WORK AREA AND ACCESS BOUNDARY
- MARSHPLAIN LOWERING (MPL)
- WETLAND HABITAT ENHANCEMENT (WHE)
- GENERAL PLANTING

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

SOUTH WETLAND GRADING PLAN & SECTION

REVISION NUMBER

No.	Date	Revision

Date: 11/08/2023 | Designed By: RCC
Drawn By: DK | Checked By: AJ

SCALE
0 1"

JOB NO. 20200017

SHEET NO. C3.4

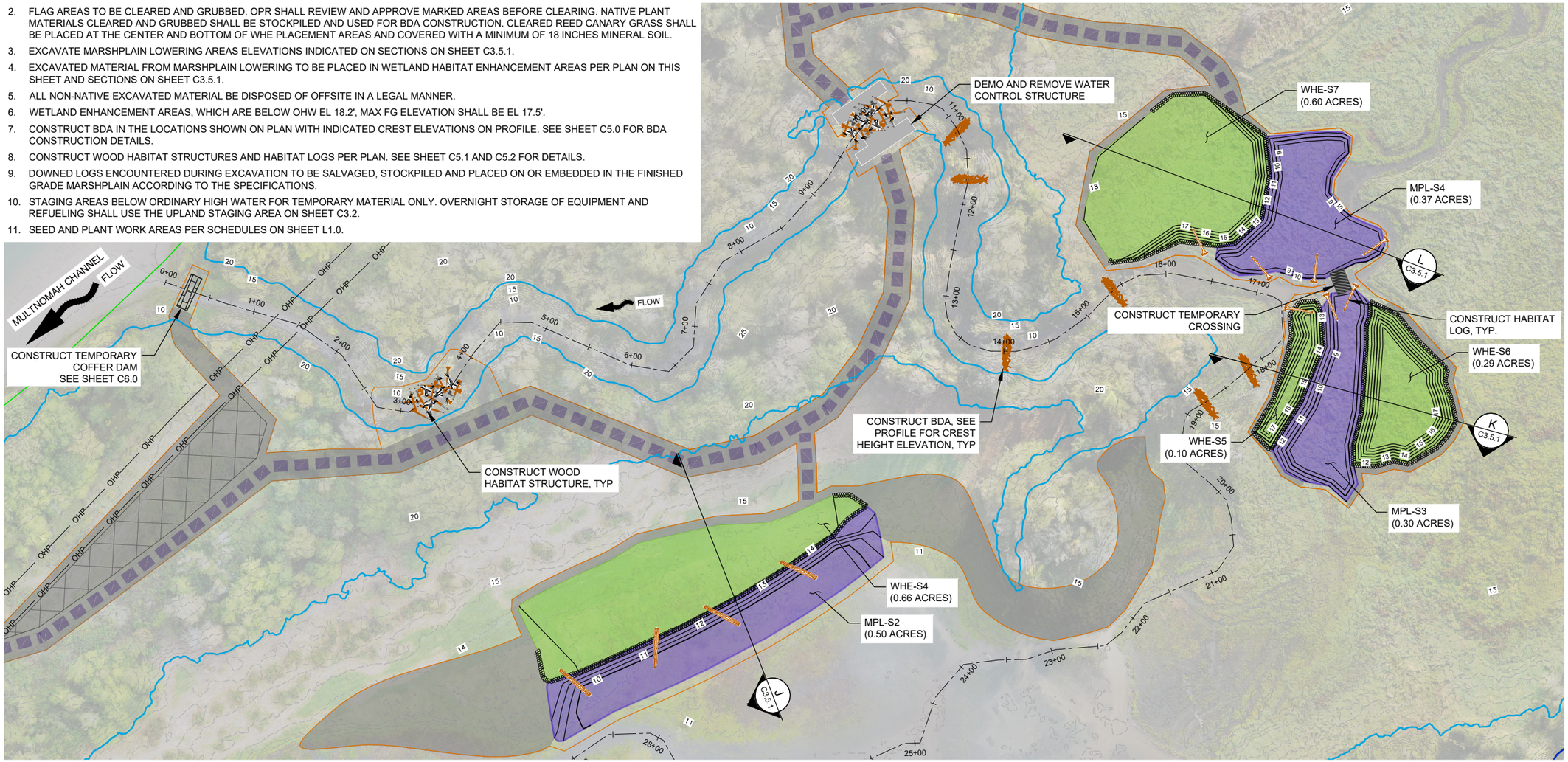
15 OF 25

DWG: Z:\Shared\W2r\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2.0 PROPOSED CONDITIONS BDA PLACEMENT PROFILE.dwg USER: dkelley
DATE: Nov 08, 2023 4:04pm XREFS:X-TB-W2r-22x34 X-LEGEND X-IMAGE X-BDA X-EG X-DESIGN X-MAP X-PLANTING X-DESIGN_Seeding

60% DESIGN
NOVEMBER 2023

NOTES:

1. TEMPORARY STREAM CROSSING LOCATION SUBJECT TO FIELD VERIFICATION AND APPROVAL BY OPR PRIOR TO IMPLEMENTATION. SEE SHEET C6.1 FOR DETAIL.
2. FLAG AREAS TO BE CLEARED AND GRUBBED. OPR SHALL REVIEW AND APPROVE MARKED AREAS BEFORE CLEARING. NATIVE PLANT MATERIALS CLEARED AND GRUBBED SHALL BE STOCKPILED AND USED FOR BDA CONSTRUCTION. CLEARED REED CANARY GRASS SHALL BE PLACED AT THE CENTER AND BOTTOM OF WHE PLACEMENT AREAS AND COVERED WITH A MINIMUM OF 18 INCHES MINERAL SOIL.
3. EXCAVATE MARSHPLAIN LOWERING AREAS ELEVATIONS INDICATED ON SECTIONS ON SHEET C3.5.1.
4. EXCAVATED MATERIAL FROM MARSHPLAIN LOWERING TO BE PLACED IN WETLAND HABITAT ENHANCEMENT AREAS PER PLAN ON THIS SHEET AND SECTIONS ON SHEET C3.5.1.
5. ALL NON-NATIVE EXCAVATED MATERIAL BE DISPOSED OF OFFSITE IN A LEGAL MANNER.
6. WETLAND ENHANCEMENT AREAS, WHICH ARE BELOW OHW EL 18.2', MAX FG ELEVATION SHALL BE EL 17.5'.
7. CONSTRUCT BDA IN THE LOCATIONS SHOWN ON PLAN WITH INDICATED CREST ELEVATIONS ON PROFILE. SEE SHEET C5.0 FOR BDA CONSTRUCTION DETAILS.
8. CONSTRUCT WOOD HABITAT STRUCTURES AND HABITAT LOGS PER PLAN. SEE SHEET C5.1 AND C5.2 FOR DETAILS.
9. DOWNED LOGS ENCOUNTERED DURING EXCAVATION TO BE SALVAGED, STOCKPILED AND PLACED ON OR EMBEDDED IN THE FINISHED GRADE MARSHPLAIN ACCORDING TO THE SPECIFICATIONS.
10. STAGING AREAS BELOW ORDINARY HIGH WATER FOR TEMPORARY MATERIAL ONLY. OVERNIGHT STORAGE OF EQUIPMENT AND REFUELING SHALL USE THE UPLAND STAGING AREA ON SHEET C3.2.
11. SEED AND PLANT WORK AREAS PER SCHEDULES ON SHEET L1.0.

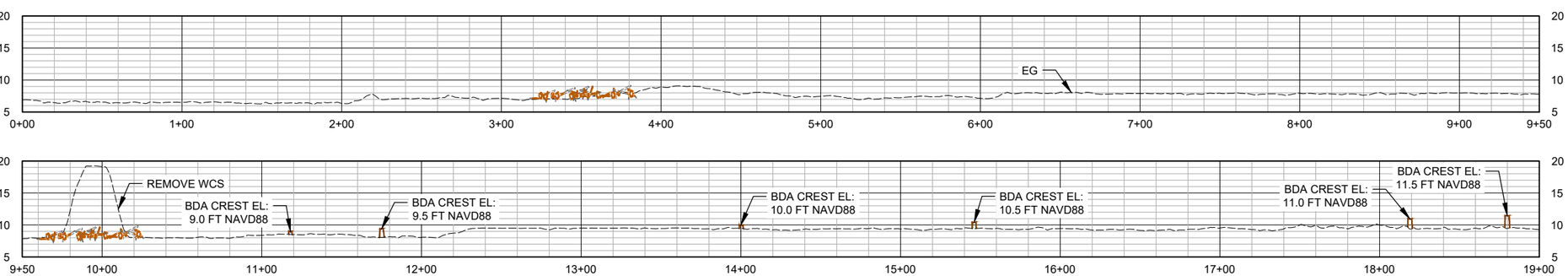


SOUTH SLOUGH PLAN

SCALE: 1"=60'

SOUTH SLOUGH PROFILE

SCALE: 1"=40'
VERTICAL SCALE: 1"=15'



SCALE
60 0 30 60 120
SCALE FEET

LEGEND:

- STRAW WATTLES
- WORK AREA AND ACCESS BOUNDARY
- MARSHPLAIN LOWERING (MPL)
- WETLAND HABITAT ENHANCEMENT (WHE)
- GENERAL PLANTING

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

SOUTH SLOUGH GRADING PLAN & PROFILE

REVISION NUMBER

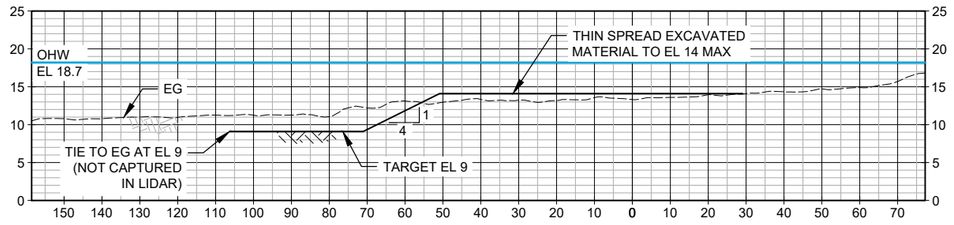
No.	Date	Revision

Date 11/08/2023 | Designed By RCC
Drawn By DK | Checked By AJ
SCALE 0 1"

JOB NO. 20200017

SHEET NO. C3.5
16 OF 25

DWG: Z:\Shared\Wr2\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2.0 PROPOSED CONDITIONS BDA PLACEMENT PROFILE.dwg USER: dkelley
DATE: Nov 08, 2023 4:05pm XREFS:X-TB-Wr2r-22x34 X-LEGEND X-IMAGE X-BDA X-EG X-DESIGN X-MAP X-PLANTING X-DESIGN_Seeding

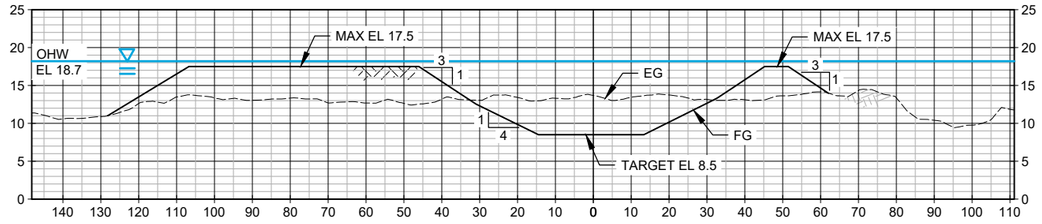


J
-
SECTION: MPL-S2 & WHE-S4

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1

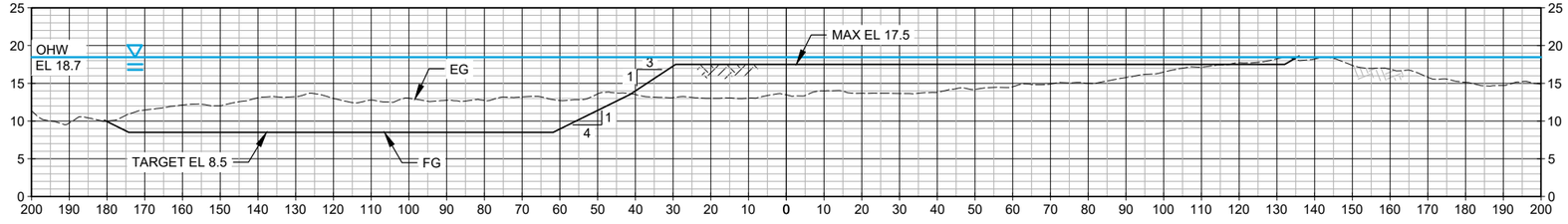
NOTES:

1. FLAG AREAS TO BE CLEARED AND GRUBBED. OPR SHALL REVIEW AND APPROVE MARKED AREAS BEFORE CLEARING. NATIVE PLANT MATERIALS CLEARED AND GRUBBED SHALL BE STOCKPILED AND USED FOR BDA CONSTRUCTION. CLEARED REED CANARY GRASS SHALL BE PLACED AT THE CENTER AND BOTTOM OF WHE PLACEMENT AREAS AND COVERED WITH A MINIMUM OF 18 INCHES MINERAL SOIL.
2. CONSTRUCT MARSHPLAIN LOWERING AND WETLAND HABITAT ENHANCEMENT TO THE ELEVATIONS AND GRADES SHOWN ON SECTIONS HERE.
3. SCARIFY THE EXISTING GRADE SURFACE PRIOR TO PLACING FILL TO PROMOTE GROUNDWATER EXCHANGE THROUGH THE FILL AREA. SEE SURFACE ROUGHENING DETAIL ON SHEET C6.0.
4. WETLAND HABITAT ENHANCEMENT FILL HEIGHT NOT TO EXCEED ELEVATION 17.5.
5. FINISHED SURFACE SHALL VARY NATURALLY WITHIN ± 0.5 FT OF THE DESIGN ELEVATION.
6. DOWNED LOGS ENCOUNTERED DURING EXCAVATION TO BE SALVAGED, STOCKPILED AND PLACED ON OR EMBEDDED IN THE FINISHED GRADE MARSHPLAIN ACCORDING TO THE SPECIFICATIONS.



K
-
SECTION: WHE-S5, MPL-S3 & WHE-S6

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1



L
-
SECTION: WHE-S7 & MPL-S4

SCALE: HORIZONTAL 1" = 20'
VERTICAL EXAGGERATION 2:1

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

SOUTH SLOUGH SECTIONS

REVISION NUMBER

No.	Date	Revision

Date	Designed By
11/08/2023	RCC
Drawn By	Checked By
DK	AJ

SCALE 0 1"

JOB NO. 20200017

SHEET NO. C3.5.1

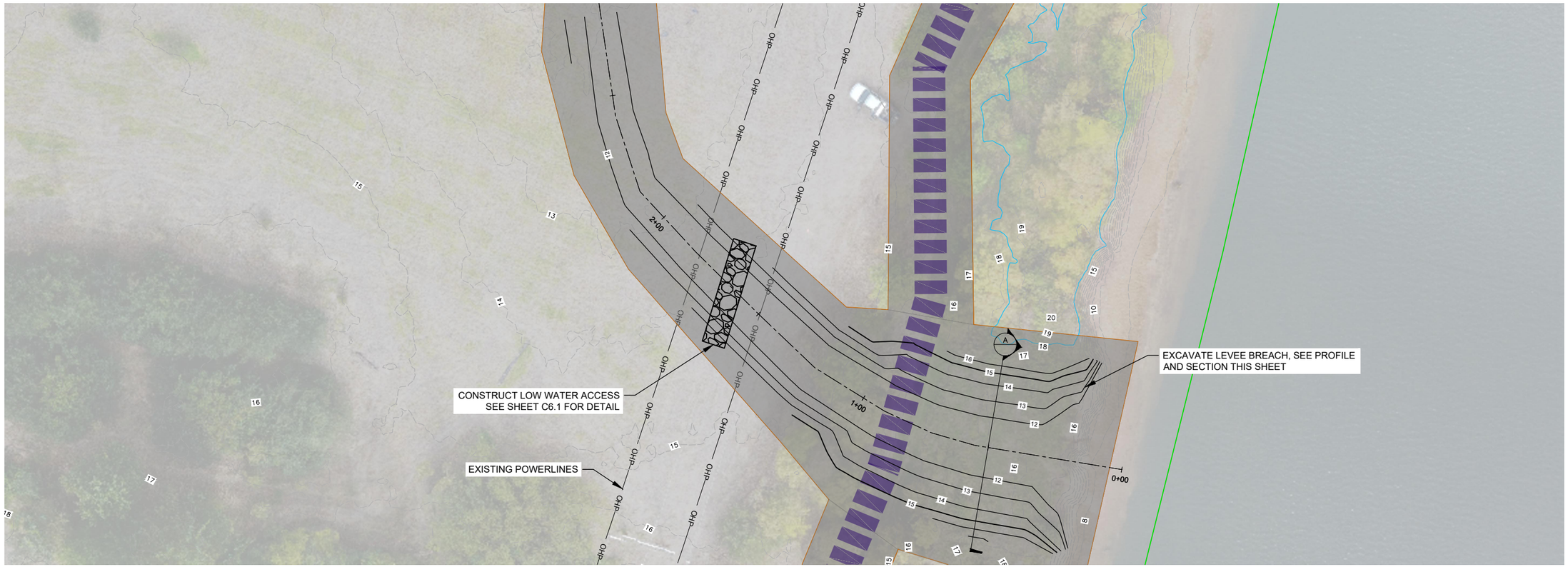
17 OF 25

DWG: Z:\Shared\W2\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2 0 PROPOSED CONDITIONS BDA PLACEMENT PROFILE.dwg USER: dkelley
DATE: Nov 08, 2023 4:06pm XREFS:X-TB-W2r-22x34 X-LEGEND X-IMAGE X-BDA X-EG X-DESIGN X-MAP X-PLANTING X-DESIGN_Seeding

60% DESIGN
NOVEMBER 2023

NOTES:

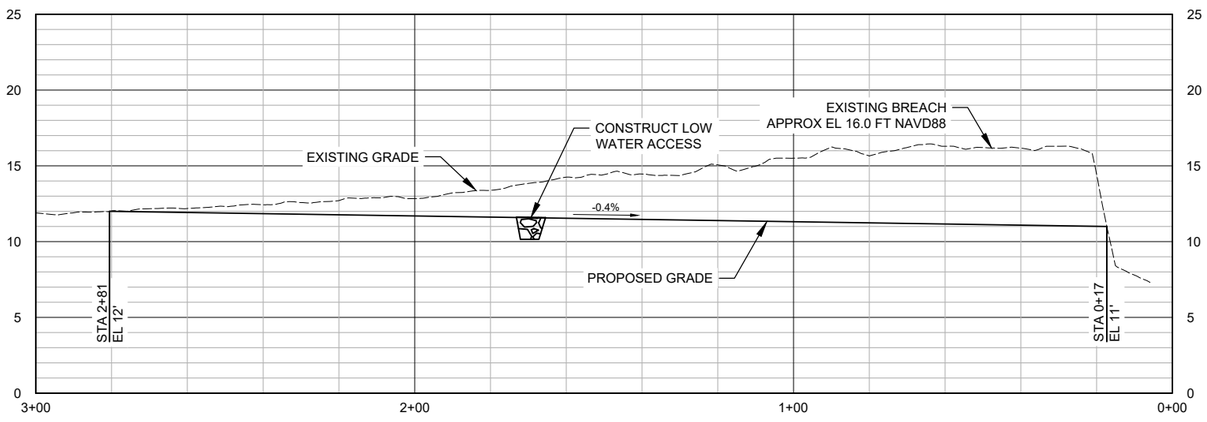
1. EXCAVATE TO GRADES SHOWN.
2. HAUL EXCAVATED MATERIAL TO DESIGNATED DISPOSAL LOCATION ON SITE.
3. SEED BARE SOIL WITH NATIVE EROSION CONTROL GRASS SEED.
4. DOWNED LOGS ENCOUNTERED DURING EXCAVATION TO BE SALVAGED, STOCKPILED AND PLACED ON OR EMBEDDED IN THE FINISHED GRADE ACCORDING TO THE SPECIFICATIONS.



PLAN: NORTH LEVEE BREACH

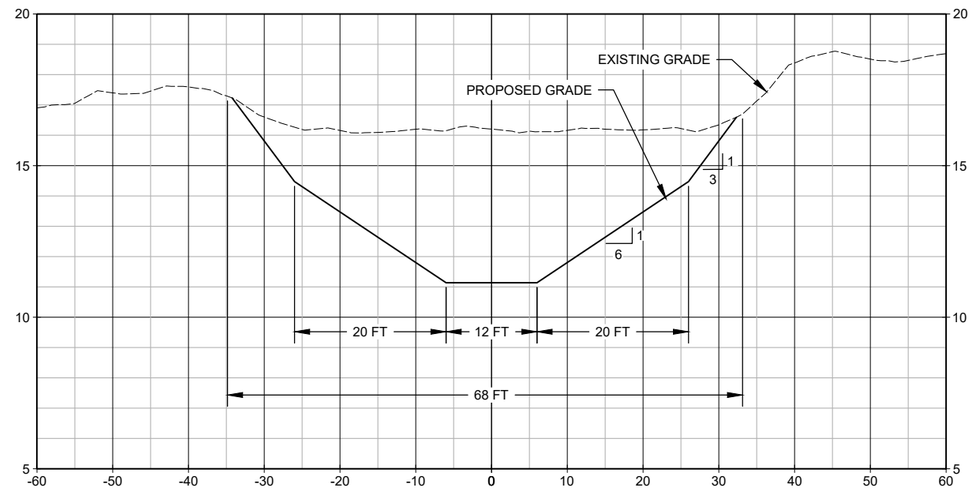
SCALE: 1"=20'

SCALE
20 0 10 20 40
SCALE FEET



PROFILE: NORTH LEVEE BREACH

SCALE: 1"=20'
VERTICAL SCALE: 1"=5'



SECTION A: NORTH LEVEE BREACH

SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

N

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

NORTH LEVEE BREACH PLAN & ELEVATIONS

REVISION NUMBER

No.	Date	Revision

Date	Designed By
11/08/2023	RCC
Drawn By	Checked By
DK	AJ

SCALE
0 1"

JOB NO.
20200017

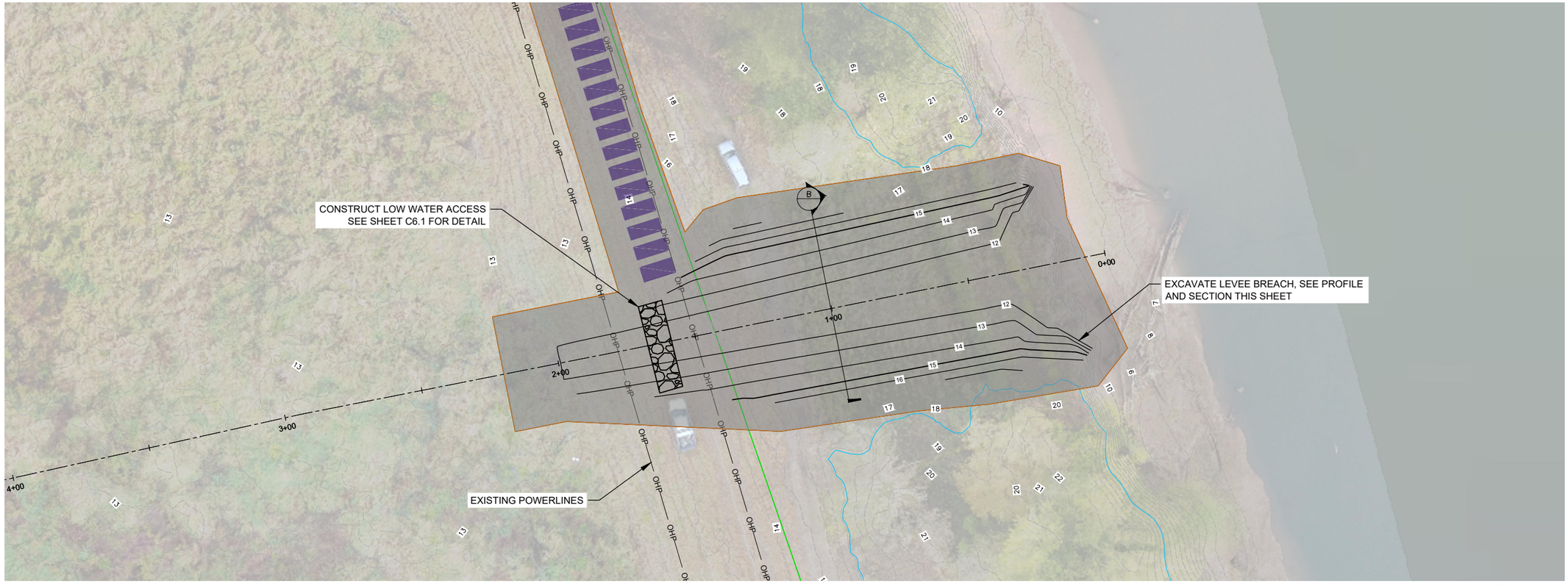
SHEET NO.
C4.0
18 OF 25

DWG: Z:\Shared\W2r\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2.1 PROPOSED CONDITIONS WORK PLAN & PROFILE.dwg USER: dkelley
DATE: Nov 08, 2023 4:08pm XREFS:X-TB-W2r-22x34 X-LEGEND X-MAP X-DESIGN X-IMAGE X-PLANTING X-DESIGN_Seeding

NOTES:

1. EXCAVATE TO GRADES SHOWN.
2. HAUL EXCAVATED MATERIAL TO DESIGNATED DISPOSAL LOCATION ON SITE.
3. SEED BARE SOIL WITH NATIVE EROSION CONTROL GRASS SEED.
4. DOWNED LOGS ENCOUNTERED DURING EXCAVATION TO BE SALVAGED, STOCKPILED AND PLACED ON OR EMBEDDED IN THE FINISHED GRADE ACCORDING TO THE SPECIFICATIONS.

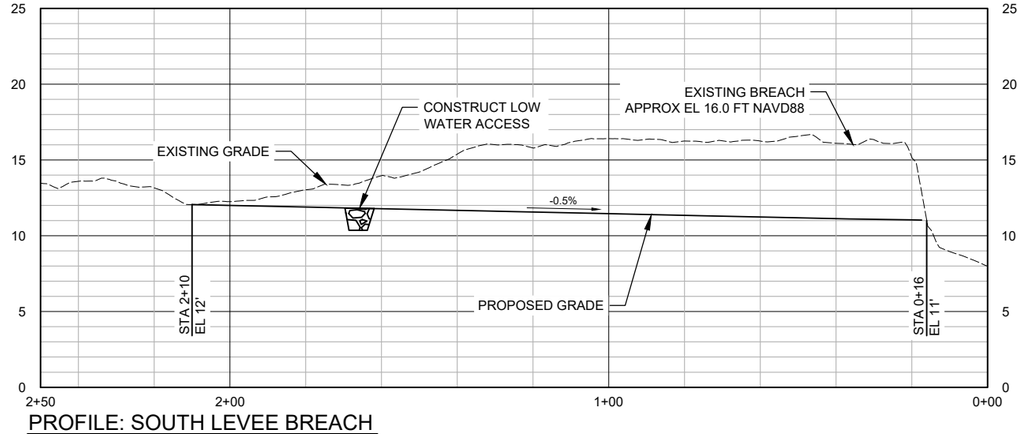
60% DESIGN
NOVEMBER 2023



SCALE
20 0 10 20 40
SCALE FEET

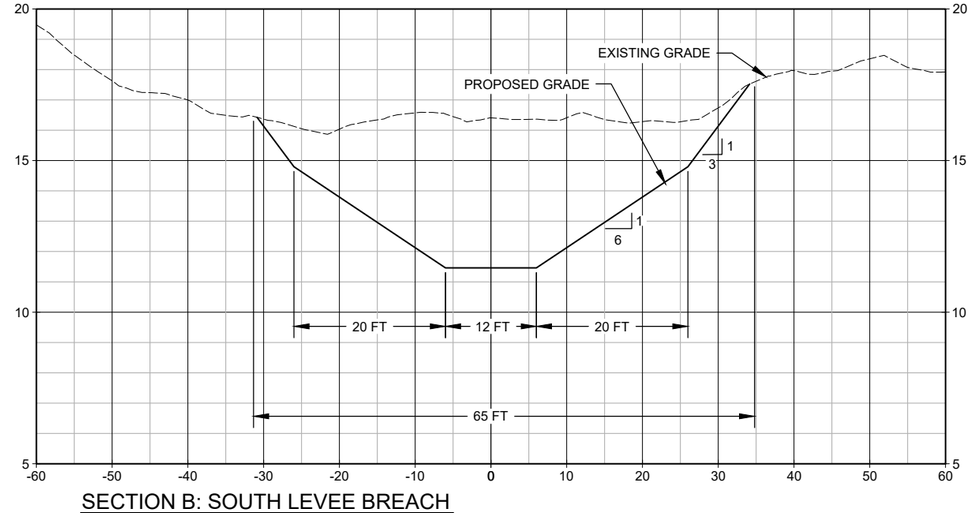
PLAN: SOUTH LEVEE BREACH

SCALE: 1"=20'



PROFILE: SOUTH LEVEE BREACH

SCALE: 1"=20'
VERTICAL SCALE: 1"=5'



SECTION B: SOUTH LEVEE BREACH

SCALE: 1"=10'
VERTICAL SCALE: 1"=5'

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

SOUTH LEVEE BREACH PLAN & ELEVATIONS

REVISION NUMBER

No.	Date	Revision

Date: 11/08/2023 | Designed By: RCC
Drawn By: DK | Checked By: AJ

SCALE 0 1"

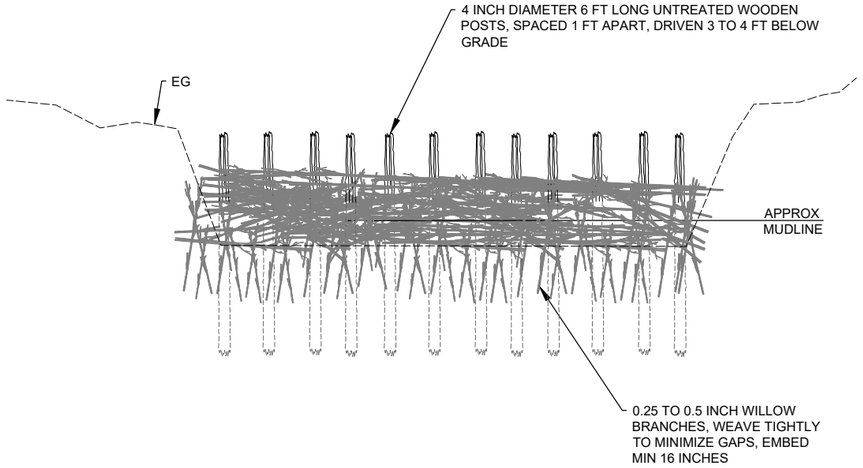
JOB NO. 20200017

SHEET NO. C4.1

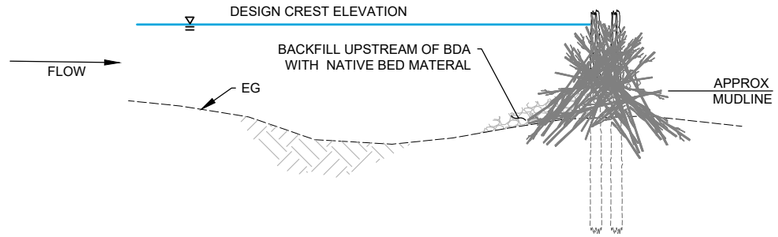
19 OF 25

DWG: Z:\Shared\W2x\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2.1 PROPOSED CONDITIONS WORK PLAN & PROFILE.dwg USER: dkelley
DATE: Nov 08, 2023 4:09pm XREFS:X-TB-W2r-22x34 X-LEGEND X-MAP X-DESIGN X-IMAGE X-PLANTING X-DESIGN_Seeding

60% DESIGN
NOVEMBER 2023



SECTION
NTS



PROFILE
NTS

BDA STRUCTURE COMPONENTS			
MATERIAL	DIAMETER (IN)	LENGTH (FT)	QUANTITY PER 12 FEET OF STRUCTURE LENGTH
WILLOW BRANCH	1 TO 2	5	500
UNTREATED WOODEN POSTS	4	6	12

NOTES:

1. COORDINATE WITH ENGINEER ON SITE TO CONSTRUCT FIRST BDA TO ENSURE PROPER LOCATION, CONSTRUCTION METHODS, INTENT, AND FINAL INSTALLED CONDITION.
2. BEAVER DAM ANALOGUES SHALL BE PACKED WITH MUD AND NATIVE ORGANIC MATERIAL TO SEAL HOLES IN THE BOTTOM 6 INCHES OF THE STRUCTURE. IF AVAILABLE. PLACE A LAYER OF CONIFER BRANCHES AT THE BOTTOM OF THE CHANNEL PRIOR TO DRIVING POSTS AND WEAVING/EMBEDDING WILLOW BRANCHES.
3. UNTREATED WOOD POSTS SHALL BE EMBEDDED A MINIMUM OF 4'. POSTS SHALL BE STAGGERED +/-3 INCHES FROM A LINE PERPENDICULAR TO FLOW. THE STRUCTURE SHALL HAVE A UNIFORM CREST HEIGHT AT THE ELEVATION INDICATED ON SHEETS C3.0 AND C3.5.
4. WILLOW BRANCHES SHALL BE HAND DRIVEN INTO CHANNEL BOTTOM AND BANKS TO A MINIMUM EMBEDMENT OF 16" AT A 4" SPACING, THEY SHALL BE DRIVEN IN AT VARIABLE ANGLES AND WOVEN INTO THE STRUCTURE WITH ADDITIONAL WILLOW BRANCHES.

1 - BEAVER DAM ANALOGUE DETAIL
NTS

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

HABITAT DETAILS 1

REVISION NUMBER

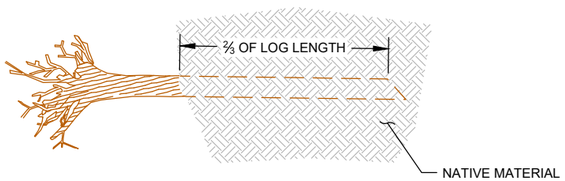
No.	Date	Revision

Date: 11/08/2023
Designed By: RCC
Drawn By: DK
Checked By: AJ
SCALE: 0 1"
JOB NO. 20200017
SHEET NO. C5.0
20 OF 25

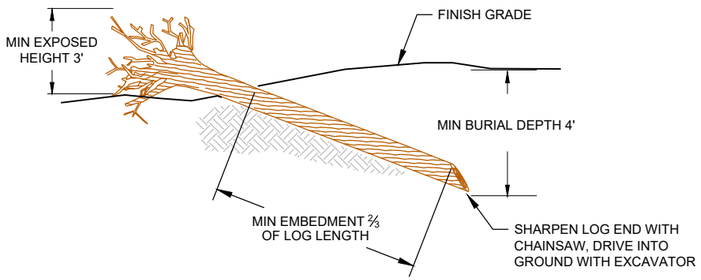
DWG: Z:\SharedW2\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2X-HABITAT DETAILS.dwg USER: dkelley
DATE: Nov 08, 2023 4:11pm XREFS:X-TB-W2r-22x34

60% DESIGN
NOVEMBER 2023

REMOVE ORGANIC MATERIAL FROM GROUND SURFACE BEFORE EMBEDMENT. EMBED APPROX ⅔ LOG LENGTH INTO FIRM GROUND.

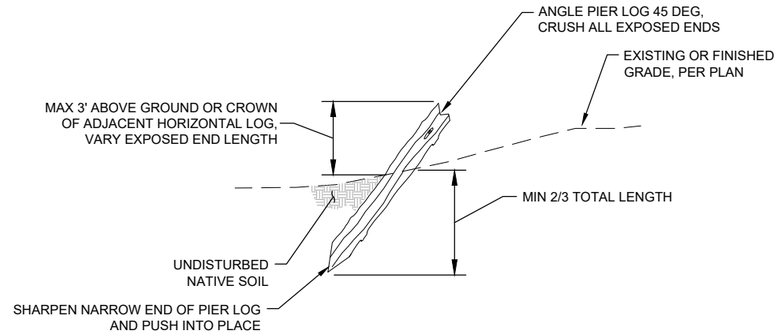


PLAN



SECTION

1 - HABITAT LOG
SCALE: NTS

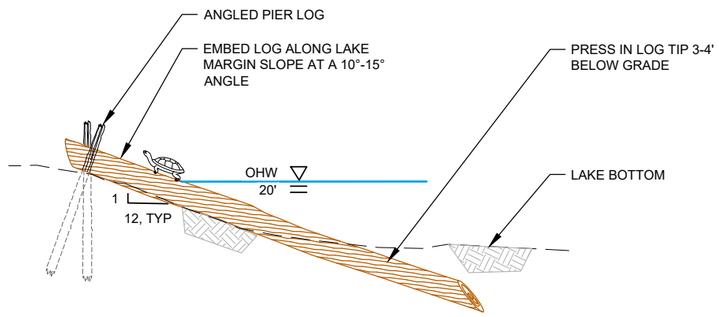


2 - PIER LOG
SCALE: NTS

KEYED HABITAT LOG STRUCTURE MATERIALS		
MATERIAL	MIN DIAMETER (IN)	MIN LENGTH (FT)
SALVAGE LOG	8	15

LOG INSTALLATION NOTES:

1. CONTRACTOR TO COORDINATE LOG PLACEMENT WITH ENGINEER PRIOR TO CONSTRUCTION. ENGINEER SHALL APPROVE PLACEMENT BEFORE COMPLETION.
2. ALL LOGS SHALL BE DRIVEN INTO THE GROUND WITHOUT EXCAVATION. SHARPEN ENDS OF LOGS WITH A CHAINSAW AND DRIVE SHARPENED END INTO THE GROUND AT THE ANGLES AND BURIAL DEPTHS SHOWN IN DETAILS.
3. IF DRIVING TO REQUIRED DEPTHS IS NOT POSSIBLE, LOGS SHALL BE INSTALLED BY EXCAVATING A TRENCH, PLACING THE LOG, BACKFILLING, AND MACHINE COMPACTING BACKFILL PER SPECIFICATIONS.SELECT NATIVE BACKFILL SHALL BE PLACED IN 12" LIFTS AND COMPACTED TO FIRM CONDITION.
4. EMBED HABITAT LOGS A MINIMUM OF ⅔ THE TOTAL LENGTH OF THE LOG.
5. ALL PIER LOGS TO BE ANGLED WITHIN 30°-45° OF VERTICAL. VARY ANGLE OF PIER LOGS TO LOOK NATURAL.
6. EMBED ROOTWAD AS NEEDED TO ACHIEVE REQUIRED BURIAL DEPTH AND ALLOW FOR FULL CONTACT BETWEEN THE BOTTOM OF THE LOG AND THE FINISHED GRADE. BACKFILL AROUND ROOTWAD WITH SELECT NATIVE BACKFILL..
7. SEE SPECIFICATIONS FOR TREE SPECIES. HABITAT LOG DIAMETER MEASURED AT BREAST HEIGHT (DBH) AND LENGTH AS SHOWN ON PLANS (SHT C6.8).
8. CRUSH ALL EXPOSED SAW-CUT PIER PIECES AFTER DRIVING.
9. VARY THE ORIENTATION OF THE LOGS IN EACH OF THE STRUCTURES AS DIRECTED BY THE ENGINEER.
10. HABITAT LOGS MAY BE EMBEDDED IN CLUSTERS AS DIRECTED BY CAR.



3 - BASKING LOG
SCALE: NTS

BASKING LOG			
MATERIAL	MIN DIAMETER (IN)	MIN LENGTH (FT)	QUANTITY PER STRUCTURE
VARIABLE SIZE LOG WITHOUT ROOTWAD	10-20	20	1
PIER LOG	8-12	5	2

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

HABITAT DETAILS 2

REVISION NUMBER

No.	Date	Revision

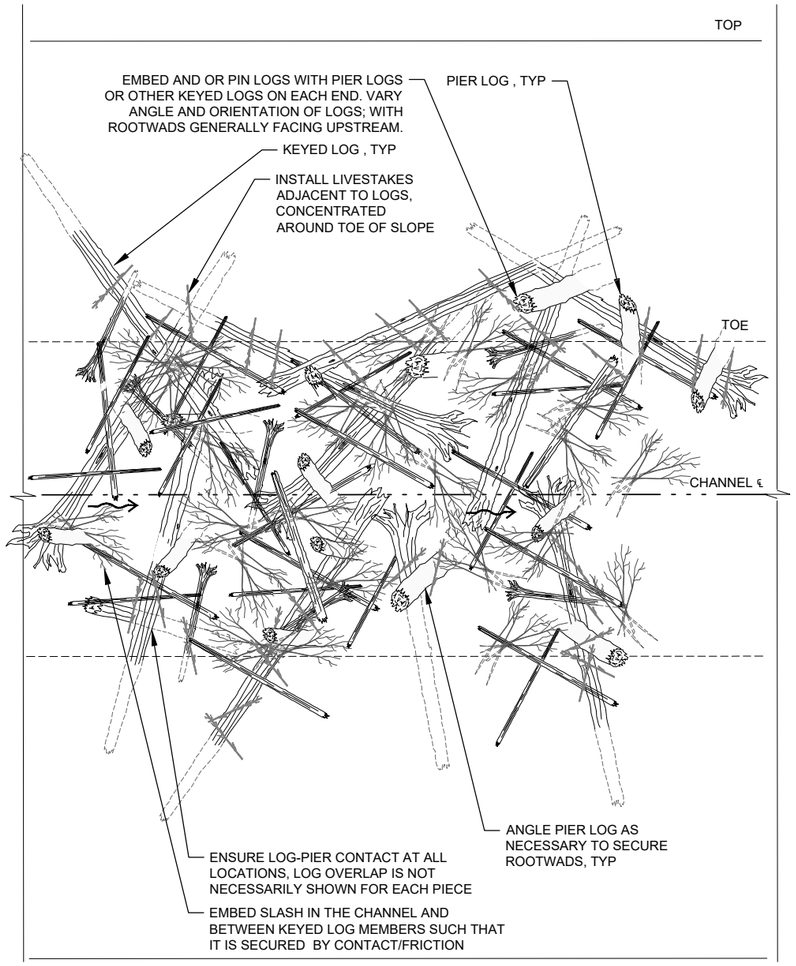
Date: 11/08/2023 | Designed By: RCC
Drawn By: DK | Checked By: AJ
SCALE: 0 1"

JOB NO. 20200017

SHEET NO. C5.1

21 OF 25

DWG: Z:\Shared\W2r\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2X-HABITAT DETAILS.dwg USER: dkelley
DATE: Nov 08, 2023 4:11pm XREFS:X-TB-W2r-22x34



1 / - WOOD HABITAT STRUCTURE
NTS

WHS TYPE 1 - WOOD HABITAT STRUCTURE MATERIALS			
MATERIAL	MIN DIAMETER (IN)	MIN LENGTH (FT)	QUANTITY PER STRUCTURE
LARGE LOG WITH ROOTWAD	18	30	5
SMALL LOG WITH ROOTWAD	10	15	9
LARGE LOG WITHOUT ROOTWAD	18	30	4
SMALL LOG WITHOUT ROOTWAD	8	20	15
PIER LOG	8-12	20	14
LIVESTAKES	0.5	3	290
SLASH	4	15	50 CY

NOTES:

1. COORDINATE WITH ENGINEER ON SITE TO CONSTRUCT WHS TO ENSURE PROPER LOCATION, CONSTRUCTION METHODS, INTENT, AND FINAL INSTALLED CONDITION.
2. PLACE SALVAGED LOGS AND SLASH FROM ACCESS DEVELOPMENT IN THE SLOUGH AT VARIABLE ANGLES AND PARTIALLY SEAT BY PUSHING INTO THE GROUND WITH EXCAVATOR BUCKET.
3. DO NOT PLACE ANY LOGS COMPLETELY SPANNING THE CHANNEL BOTTOM AT GRADE. SPANNING LOGS MAY BE PLACED, BUT ONLY IF THE BOTTOM OF ONE END IS A MINIMUM OF SIX INCHES ABOVE THE CHANNEL BOTTOM.
4. PIER LOGS SHALL BE EMBEDDED 2/3 OF LOG MINIMUM.
5. EMBED PIER LOGS INTERWOVEN BETWEEN THE CONSTRUCTED MEMBERS AS SHOWN BY SHARPENING ONE END WITH A CHAINSAW AND DRIVING THEM IN TO THE SOIL. ENSURE LOG TO LOG CONTACT FOR ALL LOG MEMBERS. DRIVE ADDITIONAL SLASH INTO HOLES IN THE STRUCTURE AND INTO THE SOIL UPSTREAM AND DOWNSTREAM OF THE STRUCTURE AS SHOWN AND AS DIRECTED BY THE ENGINEER.
6. FOR EACH KEYED LOG, PLACE 1 TO 2 BUCKETS OF SLASH UNDER THE ABOVE GRADE END OF THE LOG PRIOR TO LOG PLACEMENT AND BACKFILL.
7. ANY LARGE LOG WITHOUT ROOTWAD NOT KEYED 2/3 OR MORE OF IT'S LENGTH TO AN AVERAGE DEPTH OF 3 FEET SHALL BE SECURED IN PLACE BY A MINIMUM OF THREE OTHER LOGS CONSTRAINING ITS LATERAL AND VERTICAL MOVEMENT IN ANY DIRECTION NEAR BOTH ENDS. SECURING MEMBERS MAY BE PIER LOGS OR OTHER LOG MEMBERS THAT ARE KEYED 2/3 OR MORE OF THEIR LENGTH TO AN AVERAGE DEPTH OF 3 FT. LOGS KEYED ⅔ OF THE TOTAL LENGTH SHALL BE PLACED SUCH THAT ANOTHER LOG MEMBER OR PIER IS IN CONTACT WITH ITS DOWNSTREAM SIDE TO PREVENT ROTATING.
8. VARY THE ORIENTATION OF THE LOGS IN EACH OF THE STRUCTURES AS DIRECTED BY THE ENGINEER.

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

HABITAT DETAILS 3

REVISION NUMBER

No.	Date	Revision

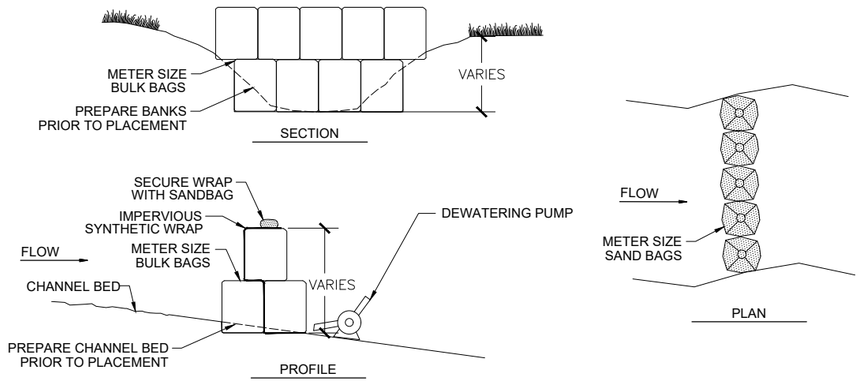
Date 11/08/2023 | Designed By RCC
Drawn By DK | Checked By AJ
SCALE 0 1"

JOB NO. 20200017

SHEET NO. C5.2

22 OF 25

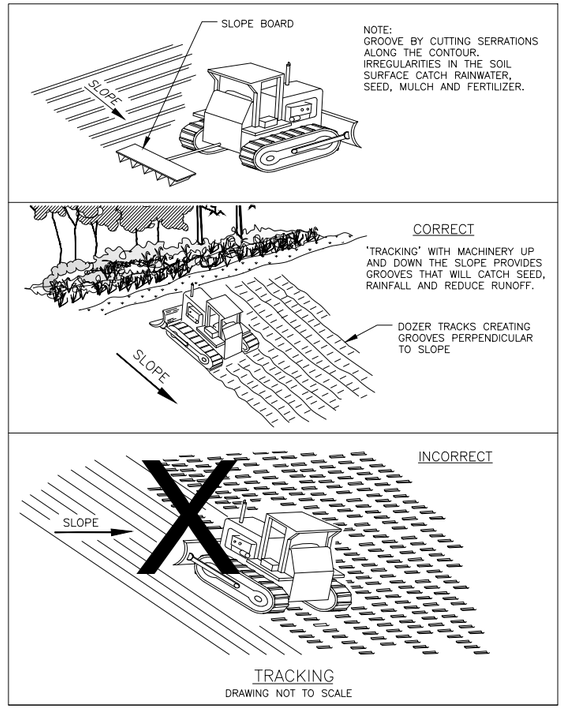
DWG: Z:\SharedW2\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C2X-HABITAT DETAILS.dwg USER: dkelley
DATE: Nov 08, 2023 4:12pm XREFS:X-TB-W2r-22x34



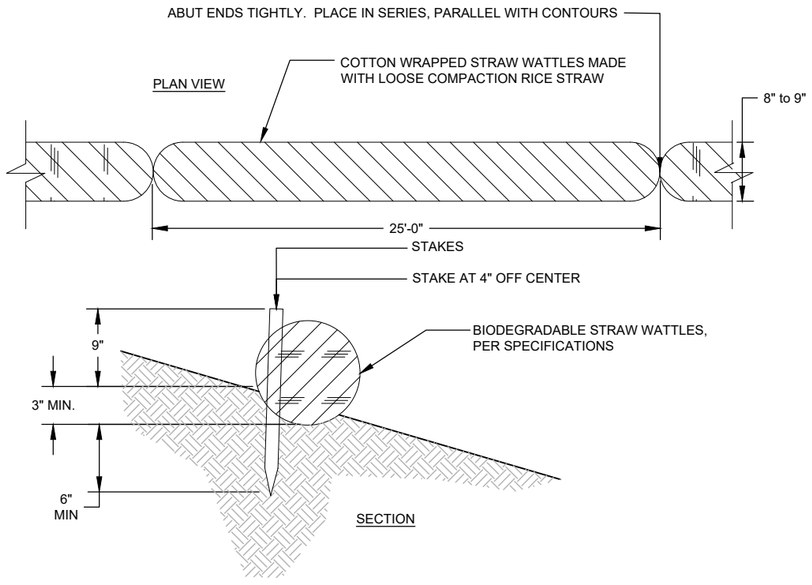
NOTE:

1. CONSTRUCTION CREWS SHALL INSTALL BULK BAG COFFER DAMS AS SHOWN ON PLAN TO ISOLATE THE EXCAVATION AREAS.
2. IN ADDITION TO BULK BAGS, USE AN IMPERVIOUS SYNTHETIC LINER TO REDUCE PERMEABILITY OF BLUK BAG COFFER DAM.
3. HEIGHT OF THE BULK BAG COFFER DAMS SHALL BE HIGH ENOUGH TO PREVENT BYPASS FLOWS FROM ENTERING THE ISOLATED WORK AREA. DAM HEIGHTS AND MATERIALS SHALL BE INCLUDED IN THE CONTRACTOR'S WORK CONTAINMENT AND DEWATERING PLAN.

1 / - TEMPORARY BULK BAG COFFER DAM
NTS



2 / - SURFACE ROUGHENING
NTS



3 / - STRAW WATTLES
NTS

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

TESC DETAILS 1

REVISION NUMBER

No.	Date	Revision

Date	Designed By
11/08/2023	RCC
Drawn By	Checked By
DK	AJ

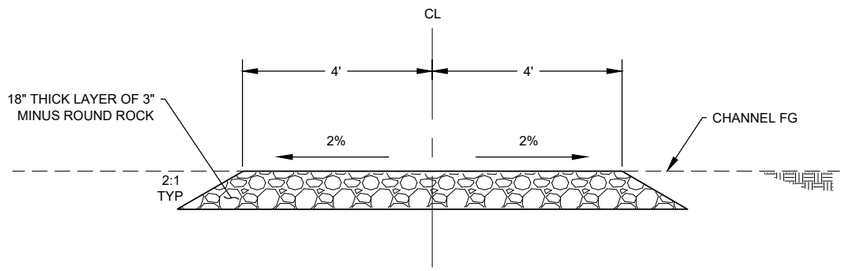
SCALE 0 1"

JOB NO. 20200017

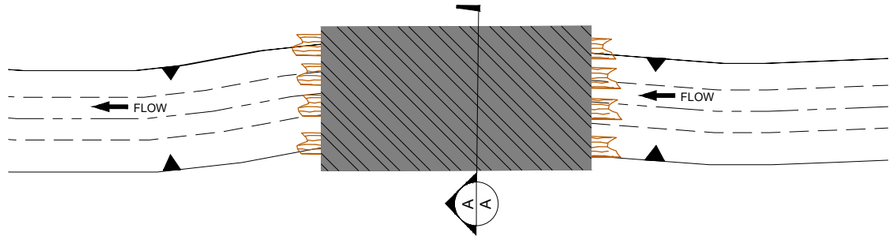
SHEET NO. C6.0

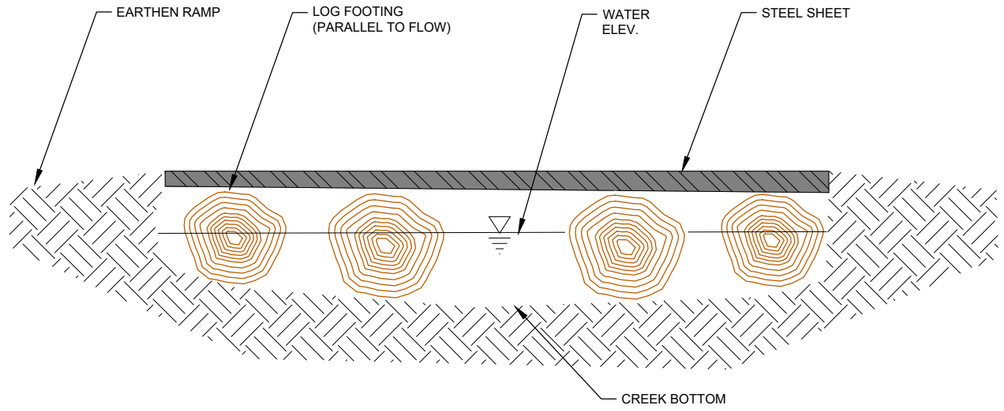
23 OF 25

DWG: Z:\Shared\W2\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C3X-ESC DETAILS.dwg USER: dkelley
DATE: Nov 08, 2023 4:12pm XREFS:X-TB-W2r-22x34



1 - LOW WATER ACCESS TYPICAL SECTION
NTS





2 - TEMPORARY STREAM CROSSING
NTS

NOTES FOR TEMPORARY STREAM CROSSING:

1. CONTRACTOR SHALL COORDINATE WITH OPR PRIOR TO ANY IN-WATER WORK OR STREAM CROSSING ACTIVITY.
2. CONTRACTOR TO DESIGN TEMPORARY CROSSING. TEMPORARY CROSSING SHOWN IS AN EXAMPLE CONCEPT.
3. TEMPORARY CROSSING SHALL ALLOW FOR FLOWS BELOW STEEL SHEET TO PROVIDE PASSAGE.
4. TEMPORARY CROSSING SHALL BE LOCATED SUCH THAT ONLY ONE SPAN IS USED TO ELIMINATE IMPACTS TO SUBSTRATE OF CHANNEL.
5. END OF THE TEMPORARY CROSSING SHALL BEAR ON BANKS IN A MANNER THAT PREVENTS SLOUGHING OR COLLAPSE OF SIDE CHANNEL BANKS.
6. CONCRETE ECOLOGY BLOCKS OR WOOD ABUTMENTS MAY BE USED TO SUPPORT ENDS OF TEMPORARY CROSSING AS NEEDED.
7. TEMPORARY CROSSING MAY BE CONSTRUCTED FROM LOGS, OR APPROVED EQUAL, AND DECKED WITH STEEL SHEET, WOOD LAGGING OR APPROVED EQUAL.

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

TESC DETAILS 2

REVISION NUMBER

No.	Date	Revision

Date	Designed By
11/08/2023	RCC
Drawn By	Checked By
DK	AJ

SCALE 0 1"

JOB NO. 20200017

SHEET NO. C6.1

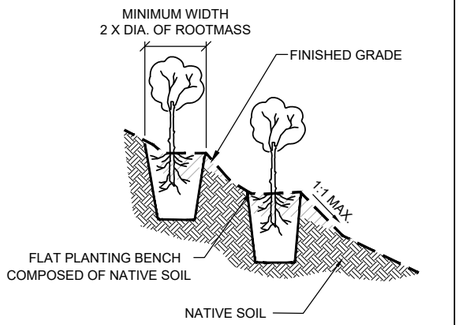
24 OF 25

DWG: Z:\Shared\W2\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\C3X-ESC DETAILS.dwg USER: dkelley
DATE: Nov 08, 2023 4:12pm XREFS:X-TB-W2r-22x34

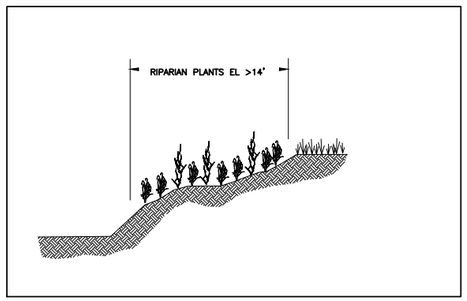
60% DESIGN
NOVEMBER 2023

PLANT AND SEEDING NOTES

1. SEED AND PLANT AREAS PER PLAN SHEETS C2.0 TO C4.1 AND THE ELEVATION RANGES ON THIS SHEET. SEEDING AND PLANTING SCHEDULES ARE COLOR CODED TO MATCH GRADING AREA AND GENERAL PLANTING AREA HATCHES.
2. SEED MARSHPLAIN LOWERING AREAS AS SHOWN ON THE PLANS WITH MARSHPLAIN SEED MIX FROM TABLE 1 ON THIS SHEET.
3. PLANT THE MARSHPLAIN PLUGS IN CLUSTERS AS DIRECTED IN THE FIELD BY OPR.
4. SEED WETLAND AREAS BELOW ELEVATION 18.7 FEET NAVD88 AS SHOWN ON THE PLANS WITH WETLAND SEED MIX FROM TABLE 2 ON THIS SHEET.
5. SEED UPLAND HABITAT ENHANCEMENT AREAS ABOVE ELEVATION 18.7 NAVD88 WITH UPLAND SEED MIX FROM TABLE 2 ON THIS SHEET.



1 - PLANTING



2 - TYPICAL PLANTING SECTION

TABLE 1: MARSHPLAIN SEED MIX

AREA: 4.2 ACRE

COMMON NAME	BOTANICAL NAME	LBS PLS/ACRE
SHORTAWN FOXTAIL	*ALOPECURUS AEQUALIS*	1.00
SLOUGH GRASS	*BECKMANNIA SYZIGACHNE*	3.00
CREEPING SPIKERUSH	*ELEOCHARIS PALUSTRIS*	0.15
SLOUGH SEDGE	*CAREX OBNUPTA*	0.25
AWLFRUIT SEDGE	*CAREX STIPATA*	0.25
COMMON RUSH	*JUNCUS EFFUSUS*	0.1
RICE CUTGRASS	*LEERSIA ORYZOIDES*	2.00
DENSE SPIKE PRIMROSE	*EPILOBIUM DENSIFLORUM*	1.00
WAPATO	*SAGITTARIA LATIFOLIA*	1.00

TABLE 2: WETLAND SEED MIX

AREA: 47.3 AC, ELEVATION RANGE: <18.7 FT NAVD88

COMMON NAME	BOTANICAL NAME	LBS PLS/ACRES
SPIKE BENTGRASS	*AGROSTIS EXARATA*	0.25
MEADOW BARLEY	*HORDEUM BRACHYANTHERUM*	7.00
TUFTED HAIRGRASS	*DESCHAMPSIA CESPITOSA*	1.00
SLOUGH GRASS	*BECKMANNIA SYZIGACHNE*	1.25
PUGET SOUND GUMWEED	*GRINDELIA INTEGRIFOLIA*	1.00
CLUSTERED TARWEED	*MADIA GLOMERATA*	1.00
LARGE-LEAF LUPINE	*LUPINOUS POLYPHYLLUS*	1.00

TABLE 3: UPLAND SEED MIX

AREA: 1.4 AC, ELEVATION RANGE: >18.7 FT NAVD88

COMMON NAME	BOTANICAL NAME	LBS PLS/ACRE
BLUE WILDRYE***	*ELYMUS GLAUCUS*	5.00
CALIFORNIA BROME***	BROMUS CARINATUS	7.00
SHOWY TARWEED	*MADIA ELEGANS*	1.50
YARROW	*ACHILLEA MILLEFOLIUM*	0.125
WOOL OR/OR SUNSHINE	*ERIOPHYLLUM LANATUM*	0.25
RIVERBANK LUPINE	*LUPINUS RIVULARIS*	0.50
CINGUEFOIL	*POTENTILLA GRACILIS*	0.25
SELFHEAL; HEAL-ALL	*PRUNELLA VULGARIS VAR. LANCELOATA*	2.00
WESTERN BUTTERCUP	*RANUNCULUS OCCIDENTALIS*	2.00
MEADOW CHECKERMALLOW	*SIDALCEA CAMPESTRIS*	3.00
CALIFORNIA OATGRASS	*DANTHONIA CALIFORNICA*	4.00
ROMER'S FESCUE	*FESTUCA ROEMERI*	2.00

TABLE 4: MARSHPLAIN PLANTING SCHEDULE

AREA: 4.2 ACRE

COMMON NAME	BOTANICAL NAME	CONDITION	SPACING (FT ON-CENTER)	TOTAL PER SPECIES
NORTHERN WATER PLANTAIN	*ALISMA TRIVIALE*	PLUGS	3	430
COMMON SNEEZEWEED	*HELENIUM AUTUMNALE*	PLUGS	3	430
SLENDERBEAK SEDGE	*CAREX ATHROSTACHYA*	PLUGS	3	430
THICK-HEAD SEDGE	*CAREX PACHYSTACHYA*	PLUGS	3	430

TABLE 5: WETLAND PLANTING SCHEDULE

AREA: 47.3 AC, ELEVATION RANGE: <18.7 FT NAVD88

COMMON NAME	BOTANICAL NAME	CONDITION	SPACING (FT ON-CENTER)	TOTAL PER SPECIES
RED-OSIER DOGWOOD	*CORNUS STOLONIFERA*	1 GAL/BARE ROOT	4	12300
DOUGLAS HAWTHORNE	*CRATAEGUS DOUGLASII*	1 GAL/BARE ROOT	4	14200
OREGON ASH	*FRAXINUS LATIFOLIA*	BARE ROOT	4	14200
OREGON ASH	*FRAXINUS LATIFOLIA*	1 GAL	4	4800
BLACK TWINBERRY	*LONICERA INVOLUCRATA*	BARE ROOT	4	14200
PACIFIC NINEBARK	*PHYSOCARPOS CAPITATUS*	BARE ROOT	4	14200
SWAMP/CLUSTERED ROSE	*ROSA PISOCARPA*	BARE ROOT	4	14200
PACIFIC WILLOW	*SALIX LASSIANDRA*	LIVESTAKES	4	37900
SITKA WILLOW	*SALIX SITCHENSIS*	LIVESTAKES	4	37900
HOOKER'S/PIPER'S WILLOW	*SALIX HOOKERIANA*	LIVESTAKES	4	37900
DOUGLAS SPIREA	*SPIREA DOUGLASII*	BARE ROOT	4	19000

TABLE 6: UPLAND PLANTING SCHEDULE

AREA: 1.4 AC, ELEVATION RANGE: >18.7 FT NAVD88

COMMON NAME	BOTANICAL NAME	CONDITION	SPACING (FT ON-CENTER)	TOTAL PER SPECIES
SCOULER WILLOW	*SALIX SCOULERIANA*	BAREROOT	8	100
OSOBERRY/INDIAN-PLUM	*OEMLERIA CERASIFORMIS*	BAREROOT	8	100
TALL OREGON-GRAPE	*MAHONIA AQUIFOLIUM*	BAREROOT	8	200
WESTERN CHOKECHERRY	*PRUNUS VIRGINIANA VAR.DEMISSA*	BAREROOT	8	200
OREGON WHITE OAK	*QUERCUS GARRYANA*	BAREROOT	8	200
RED FLOWERING CURRANT	*RIBES SANGUINEUM*	BAREROOT	8	200
BLUE ELDERBERRY	*SAMBUCUS CAERULEA*	BAREROOT	8	200
OCEANSPRAY	*HOLODISCUS DISCOLOR*	BAREROOT	8	200
SASKATOON SERVICEBERRY	*AMERLANCHIER ALNIFOLIA*	BAREROOT	8	200
BLACK HAWTHORN	*CRATAEGUS DOUGLASII*	BAREROOT	8	200
CASCARA	RAMNUS PURSHIANA	BAREROOT	8	200
MOCKORANGE	PHILADELPHUS LEWISII	BAREROOT	8	200
NOOTKA ROSE OR BALDHIP	*ROSA NUTKANA* OR *R. GYMNOCARPA*	BAREROOT	8	200
SNOWBERRY	SYMPHORICARPOS ALBA	BAREROOT	8	200

NOT FOR CONSTRUCTION

WOLF WATER RESOURCES, INC.
1001 SE WATER AVE, SUITE #180
PORTLAND, OR 97214
503.207.6688

Lower Columbia Estuary Partnership
LOWER COLUMBIA ESTUARY PARTNERSHIP
400 NE 11TH AVE
PORTLAND, OR 97232
503.226.1565

LOWER COLUMBIA ESTUARY PARTNERSHIP

MULTNOMAH CHANNEL MARSH NATURAL AREA

MULTNOMAH COUNTY, OR

PLANTING DETAILS

REVISION NUMBER

No.	Date	Revision

Date: 11/08/2023 | Designed By: RCC
Drawn By: DK | Checked By: AJ

SCALE: 0 1"

JOB NO. 20200017

SHEET NO. L1.0

25 OF 25

DWG: Z:\Shared\W2r\CAD\20200017-Mult Channel Natural Area (Estuary Partnership)\DWG\SHEETS\L1.1 - PLANTING DETAILS.dwg USER: dkelley
DATE: Nov 08, 2023 4:12pm XREFS:X-TB-W2r-22x34