Joint Permit Application

This is a joint application, and must be sent to all agencies (Corps, DSL, and DEQ). Alternative forms of permit applications may be acceptable; contact the Corps and DSL for more information.

RECEIVED
AUG 29 2023
DEPARTMENT OF STATE LANDS
Date Stamp

U.S. Army Corps of Engineers Portland District		Oregon Department of State Lands		Oregon Department of Environmental Quality
Action ID Number	NWP-2020-393	Number	63077 RF	

(1) TYPE OF PERMIT(S) IF KNOWN (check all that apply)

Corps: ☒ Individual ☐ Nationwide No.: _______ ☐ Regional General Permit _______ ☐ Other (specify): ______

DSL: ☒ Individual ☐ GP Trans ☐ GP Min Wet ☐ GP Maint Dredge ☐ GP Ocean Energy ☐ No Permit ☐ Waiver

(2) APPLICANT AND LANDOWNER CONTACT INFORMATION

	Applicant	Property Owner (if different)	Authorized Agent (if applicable) ☑ Consultant ☐ Contractor
Name (Required)	Christopher Efird	See Attachment 1 for list of Property Owners	Laurie Parry
Business Name	NEXT Renewable Fuels Oregon, LLC		Stewardship Solutions, Inc.
Mailing Address 1	11767 Katy Freeway, Suite 705		3370 10th Street, Suite C
Mailing Address 2			
City, State, Zip	Houston, TX 77079		Baker City, OR 97814
Business Phone	(281) 884-3680		(541) 519-4891
Cell Phone	(206) 300-9342		(541) 519-4891
Fax			
Email	chris@nextrenewables.com		laurie@stewardshipsolutionsinc.com

(3) PROJECT INFORMATION

A. Provide the project location.

Project Name	Latitude & Longitude*
NEXT Renewable Fuels Oregon	46.166605, -123.161324 (Facility Site) 46.152259, -123.172541 (Mitigation Site)

Project Address / Location	City (nearest)	County
Located in the Port Westward Industrial Park between Kallunki and Hermo Road	Clatskanie, OR	Columbia County

Township	Range	Section	Quarter / Quarter	Tax Lot
Blue Represents the Construction Site Tax Lots 8N	4W	16	SE/SE, SW/SE	200
8N	4W	21	SW/NE	600,700
8N	4W	22	SW/NE, SE/NE, NE/NE	100,200, 300, 400, 500, , 700,1100
8N	4W	23	SE/NW, NE/SW	700,
Green Represents the Mitigation Site Tax Lots	4W	27	NW/NW, NE/NW, NW/NE, NE/NE, SW/NW, SWNE,	100, 200, 400, 1600

8N			NW/SW, NE/SW, SW/SW	
8N	4W	28	SW/SE, SE/SE, NE/SE, SE/NE	300,1400
8N	4W	33	NW/NE, NE/NE	100
8N	4W	34	NW/NW, NE/NW, SW/NW, NW/SW	300

Brief Directions to the Site:
From Hwy 30 at Clatskanie, head Northeast on N Nehalem Street, slight right onto 5th Street, turn left onto Quincey Mayger Road, turn right onto Kallunki Road.

B. What types of waterbodies or wetlands are present in your project area? (Check all that apply.)

☐ River / Stream ☑ Non-Tidal Wetland ☐ Lake / Reservoir / Pond

☐ Estuary or Tidal Wetland ☑ Other ☐ Pacific Ocean

Waterbody or Wetland Name*	River Mile	6th Field HUC Name	6th Field HUC (12 digits)
Farmed Wetland & associate drainage/irrigation ditches	N/A	Lower Beaver Creek	170800030207

* In decimal format (e.g., 44.9399, -123.0283)
** If there is no official name for the wetland or waterbody, create a unique name (such as "Wetland 1" or "Tributary A").

C. Indicate the project category. (Check all that apply.)

☐ Commercial Development	☑ Industrial Development	☐ Residential Development
☐ Institutional Development	☐ Agricultural	☐ Recreational
☐ Transportation	☐ Restoration	☐ Bridge
☐ Dredging	☐ Utility lines	☐ Survey or Sampling
☐ In- or Over-Water Structure	☐ Maintenance	☐ Other:

(4) PROJECT DESCRIPTION

A. Summarize the overall project including work in areas both in and outside of waters or wetlands.
NEXT Renewable Fuels Oregon, LLC (NEXT) proposes to build a renewable fuels facility (Facility) to supply renewable fuels to West Coast markets. The Facility will be located at Port Westward, near Clatskanie, Columbia County, Oregon. Construction of the Facility will impact jurisdictional wetlands and impact waterways, requiring mitigation. The project will require an Individual 404 Permit from US Army Corps of Engineers, a Removal/Fill permit from the Oregon Department of State Lands, and an Individual 401 Certification from the Oregon Department of Environmental Quality. Table 1 shows a list of Figures, Appendices, and Attachments that are included in this permit application and are intended to aid the reader in the review process.

Table 1: List of Documents

Document Type	Identification	Document Name
Figures	Figure 1	Location and Vicinity Maps
	Figure 2A, 2B	Aerial Photograph
	Figure 3A, 3B, 3C, 3D, 3E,	Tax Lot Maps
	Figure 4A, 4B, 4C, 4D, 4E	Site Photographs
	Figure 5	Zoning Map
	Figure 6	Floodplain Map
	Figure 7A, 7B, 7C, 7D, 7E, 7F	Site Layout, Site Elevations (South, North, East & West) & Aerial Photo Site Rendering
	Figure 8A, 8B, 8C	Staging and Access
	Figure 9	Existing Wetlands
	Figure 10A, 10B	Wetland Impact Areas
	Figure 11	Existing Waterways

	Figure 12	Waterway Impact Areas
	Figure 13	Stormwater Ponds
	Figure 14	Stormwater Management Plan Site Layout
	Figure 15	Wetland Mitigation Area
	Figure 16	Wetland Mitigation Area Plan
	Figure 17	Wetland Mitigation Areas Conceptual Site Cross Section
	Figure 18	All Northwest Alternative Sites
	Figure 19	All Port Westward Alternative Sites
Attachments	Attachment A	Property Owners
	Attachment B	Wetland and Waterway Impact Calculations
	Attachment C	NEXT Renewable Fuels Exhibits and Plan Sheets
	Attachment D	Removal/Fill Table
Appendices	Appendix A	Project Design Basis for NEXT Renewable Fuels Oregon
	Appendix B	Wetland Delineation Concurrence (Construction Site) #WD2020-0663
	Appendix C	Wetland Delineation Concurrence (Mitigation Site) #WD2021-0501
	Appendix D	Compensatory Wetland Mitigation Plan for NEXT Renewable Fuels Oregon
	Appendix E	Post-Construction Stormwater Management Plan NEXT Renewable Fuels Oregon
	Appendix F	NEXT Renewable Fuels Oregon Restoration Plan for Temporary Impacts to Wetlands
	Appendix G	Alternatives Analysis for NEXT Renewable Fuels Oregon
	Appendix H	Phase One Cultural Resources Survey of the NEXT Renewable Fuels Oregon Project Area, Columbia County, Oregon (removed for DSL & DEQ)
	Appendix I	NEXT Renewable Fuels Oregon – Wastewater-Stormwater Design Basis

The Facility site is located at the Port of Columbia County (Port), Oregon, within the Port's existing Port Westward Industrial Park. The Facility will be located on land zoned *Resource Industrial Planned Development (RIPD)*. Construction of the Facility will impact jurisdictional wetlands and waterways and will require mitigation. The proposed mitigation site is located to the south, approximately 0.25 miles south of the Facility, and is zoned *Primary Agriculture*.

The Facility will utilize the UOP Ecofining^{TM} Green Diesel technology and will be capable of producing 50,000 barrels per day (bbl/d) of renewable diesel and other renewable products. The process will produce renewable fuels, mainly renewable diesel, and sustainable aviation fuel, from a range of sustainable feedstocks such as various vegetable oils, used cooking oil, animal tallow, and inedible corn oil. The renewable diesel produced in the Ecofining^{TM} process is a drop-in fuel which can directly replace up to 100 percent of petroleum-based diesels.

The project relies on waterborne transportation. Feedstocks will primarily be received via barge and oceangoing vessels to Port Westward and delivered to the proposed facility by a terminalling provider though a pipeline. Once onsite feedstock will be refined utilizing the Ecofining^{TM} process. The finished refined product will then be transported through a pipeline to the terminalling provider where it will be shipped to West Coast customers via waterborne vessels.

The Facility and ancillary components include:

- new main access road
- new rail spur and rail spur access road
- four new pipelines to terminus with terminalling provider's existing permitted facility
- ten large product and feedstock tanks (125,000 to 225,000 barrels each)
- eleven smaller feedstock and process tanks (10,000 to 50,000 barrels each)
- pre-treatment plant
- hydrogen facility
- Ecofining™ units
- storm and process water system
- office/administration buildings/laboratory
- site landscaping and fencing
- wetland mitigation site

For complete details on the Facility and the operation process see the "Project Design Basis for NEXT Renewable Fuels Oregon, LLC" in Appendix A.

See Figures 1 through 7 for Location and Vicinity Maps, Aerial Photograph, Tax Lot Maps, Site Photographs, Zoning Maps, floodplain map, and Site Layout.

The project will include the following major work components:

- implement erosion and sediment control measures
- construct staging and laydown areas
- stripping and grading
- construct main access road
- construct stormwater ponds and facilities
- construct product pipelines and maintenance road
- construct facility – ten large and eleven small tanks (feedstock, processed and finished pre-treatment plant, hydrogen facility, Ecofining™ units, office/administration buildings
- construct storm and process water system
- construct rail spur and rail access road
- site restoration
- site landscaping and fencing
- construct wetland mitigation site
- demobilization
- removal of erosion and sediment control measures

The site is located within the Beaver Drainage District (BDD). The BDD is entirely contained within a series of levees. Most of the project site is currently agriculture pastureland which has historically been utilized for cattle grazing. There are mint fields to the north and west and a tree farm to the south. Most of the site is covered by herbaceous vegetation and receives water from precipitation and groundwater. Surface and subsurface hydrology has been altered by agricultural practices, including ditching and drainage, as well as the construction of the levees, roads, railroads, and industrial facilities. Despite agriculture disruptions wetlands and waterways still persist within the project area. A Wetland Delineation (DSL# WD2020-0663) was performed by Anderson Perry & Associates, Inc., in 2019, 2020, and 2021 (See Appendix B, "Wetland Delineation Concurrence NEXT Renewable Fuels Oregon WD32020-0663"). There are multiple drainage ditches and two low-quality wetlands encompassing approximately 109.9 ac. of the 122.5-ac. impact site (See *Figure 9 Existing Wetlands* and *Figure 11, Existing Waterways*).

Wetland Impacts. The proposed project will include fill and removal in wetlands and waterways, creating a loss of function and values of Waters of the United States. The Applicant proposes to mitigate this loss by enhancing wetlands and waterways at a location south of the construction site and within the same drainage district and HUC code. The proposed mitigation site is show on *Figure 15, Wetland Mitigation Area*. Details of the proposed Compensatory Wetland Mitigation (CWM) Plan are in Appendix D, "*Compensatory Wetland Mitigation Plan for NEXT Renewable Fuels Oregon*."

Stormwater/Wastewater. Stormwater: Construction of the Facility and ancillary components will result in the creation of approximately 72.6 ac. of new impervious surfaces. Stormwater runoff from the Main Plant including the building roofs, roadways, parking, and staging areas within the plant will be collected through catch basins and routed to the on-site wastewater treatment facility for treatment and discharged to the Port's outfall to the Columbia River. Runoff from equipment pads will be collected separately and piped to an on-site wastewater treatment plant to remove any pollutants. Once treated, the stormwater and wastewater will be comingled and pumped through a final multimedia filtration prior to entering the existing Port Westward wastewater treatment facility (WWT) for eventual discharge at the Port's permitted outfall to the Columbia River. The treated wastewater discharges will be covered under the Port's National Pollutant Discharge Elimination System Wastewater Discharge Permit (NPDES Permit, DEQ File No.111746). Runoff from remaining impervious surfaces within the Main Plant footprint and runoff from the Main Plant Rail Spur Area will be routed to an on-site treatment system.

Runoff from the main access road, rail access road, and rail spur will be collected into a series of catch basins and conveyed via gravity piping into stormwater ponds. Run off from the pipeline and pipeline maintenance road will sheet flow into a stormwater pond. The ponds provide detention to meet the County's flow-control requirements, as well as treatment via sedimentation and biofiltration. Pond outlets have been equipped with a downturned elbow to trap floatables, including oil sheen, in the ponds. The pond outlets are routed to manholes that will discharge to one of the existing waterways or McLean Slough. The manholes may be used to sample stormwater consistent with a future National Pollutant Discharge Elimination System (NPDES) Industrial Stormwater Discharge Permit No. 1200-Z (1200-Z Permit) that will be issued to cover the industrial stormwater discharges from the site. The Post-Construction Stormwater Management Plan is in Appendix E, "*Post-Construction Stormwater Management Plan NEXT Renewable Fuels Oregon*". Temporary Erosion Controls measures are shown on *Exhibit C3.0 – Pipeline/Maintenance Rd ESCP 1, Exhibit C3.1 – Pipeline/Maintenance ESCP II, Exhibit C3.2 – West Rail Spur ESCP I, Exhibit C3.3 – Main Plant ESCP and Exhibit C3.4 – East Rail Spur ESCP.* The applicant will obtain a 1200-C Construction Stormwater Permit from DEQ prior to construction.

Wastewater: Wastewater within the facility will be managed via the Port of Columbia County's wastewater system (NPDES Permit #1111746). The Facility's wastewater system is designed to process wastewater which is produced from processing 51,0000 BPD of vegetable oil and animal fats to produce Renewable Diesel. Wastewater will be collected and treated based on various stream contaminants. Once treated, the wastewater and stormwater will be comingled and processed through the Tertiary Filters before being sent through a heat exchanger for cooling. The comingled water will then be pumped through a final multimedia filtration prior to entering the existing Port Westward wastewater collection system for eventual discharge at the Port's permitted outfall to the Columbia River. The effluent qualities will be required to comply with the Ports NPDES permit for wastewater discharge. To ensure compliance with the NPDES permit, the NEXT WWT effluent design specifications are more stringent than required by those outlined in the Port's existing NPDES permit. For further detail see Appendix I, Next Renewable Fuels, Wastewater-Stormwater Design Basis.

B. Describe work within waters and wetlands.

Overview

The NEXT Renewable Fuels Oregon project site is approximately 122.5 ac. Of the 122.5 ac., approximately 109.9 ac. are low-quality jurisdictional wetlands and 1.82 acres of drainage/irrigation ditches. The following calculations are conservatively based on conceptional designs and will be confirmed as the detailed project engineering is completed.

Construction of the project will permanently impact 104.3 acres of wetlands (Wetlands 1,and 2) by permanently removing approximately 163,172 cubic yards (Cy) of material and placing approximately 661,167 Cy of material within the wetland boundaries. Approximately 32.03 ac. of wetlands will be temporarily impacted by the removal of approximately 48,000 Cy of temporary excavation and placement of approximately 182,415 Cy of temporary fill (See *Figure 9, Existing Wetlands, Figure 10A and 10B, Wetland Impact Areas, Figure 11, Existing Waterways* and *Figure 12, Waterway Impact Areas*).

Additionally, the project will permanently impact 0.87 ac. of drainage/irrigation ditches from the permanent removal of approximately 1,443 Cy of material and the placement of approximately 3,645 Cy of permanent fill below the ordinary high water (OHW) of the ditches from construction activities. Table 2: Total Wetland and Waterway Impacts outlines the proposed impacts to jurisdictional wetlands and waterways in the project area. More complete details of wetland and waterway impacts are summarized in *Attachment B – Wetland and Water Impact Calculations*.

Table 2: Total Wetland/ Waterway Impacts

Wetland	Acres		Fill/Removal (Cubic Yards)		Fill/Removal (Cubic Yards)	
	Permanent Impact	Temporary Impact	Permanent		Temporary	
			Fill	Removal	Fill	Removal
#1	104.30	4.51	657,317	159,372	7,325	4,440
#2	0.003	.04	3,850	3,800	90	60
Mitigation Site Wetland 1	0.00	27.00	0.00	0.00	175,000	43,500
Total	104.30	31.51	661,167	163,172	182,415	48,000

Waterways	Square Feet		Fill/Removal (Cubic Yards)		Fill/Removal (Cubic Yards)	
	Permanent Impact	Temporary Impact	Permanent		Temporary	
			Fill	Removal	Fill	Removal
A	308	0	29	12	0	0
B	769	0	72	29	0	0
C	166	0	16	7	0	0
D	2500	0	325	100	0	0
E	34,292	0	3,177	1,280	0	0
F	271	0	26	15	0	0
Total	38,305	0	3,645	1,443	0	0

Impacts will occur within Wetlands 1, 2, and Mitigation Site Wetland 1 and Waterways A through F. All wetland and waterway impact from construction of the Facility are shown on Figures 10A, 10B, and 12. Wetland and Waterway impacts are the result of the following work elements:

- **Protection of Sensitive Areas**. Prior to any construction activities wetlands, ditches, sensitive habitats and their buffers, and cultural resource sites located in or near the project site will be identified and marked. These markers will be maintained appropriately for the duration of construction. No permanent impacts to wetlands or waterways will result from protection measures.

- **Erosion Control**. Appropriate temporary erosion and sediment control (TESC) measures will be installed in all work areas prior to the initiation of ground-disturbing construction activities. Silt fencing will be placed at appropriate locations throughout the life of the project and after, or until the ground has stabilized. Wetlands 1 through 3 and Mitigation Site Wetland 1 continue off the project site; providing TESC measures will protect these wetlands and waterways downslope. TESC measure will also be installed around Wetlands 5 and 6 for protection from construction activities. Additional TESC measures include inlet protection, slope protection and matting, wheel washes, and rocked construction entrances to prevent tracking off-site. Stockpiled materials will be covered and protected. Work will be governed by a State of Oregon DEQ 1200-C Construction Stormwater General Permit. As construction continues, the erosion control measures will be updated and maintained per approved permit documents to limit pollutant discharge. Temporary sediment and erosion control measures will create approximately 20 Cy of temporary fill in Wetland 1, approximately 5 Cy of temporary fill in Wetland 2, and approximately 5 Cy of temporary fill in Wetland Mitigation Site Wetland 1. (*Exhibits C3.0 through C3.4, Erosion and Sediment Control Plan (ESCP), and Exhibit C3.5 through C3.7 for Erosion Control Details*.

- **Access and Staging**. Prior to construction of the access and staging areas, the appropriate sediment controls will be installed.

  <u>Access:</u> Access to the construction site, prior to construction of the main access road, will be via the gravel secondary access road west of Kallunki Road. The existing gravel road will be rocked and graded to accommodate truck traffic and heavy equipment. Improvements to the road will have no impacts to wetlands or waterways. Once the main access road is constructed, access for construction activities will be from the main access road via Hermo Road. In all phases, off-site access will be controlled to specified locations that are subject to erosion control measures.

  <u>Staging:</u> Staging will occur in multiple locations:

    Staging Area 1- Power line corridor: The powerline corridor setback will be utilized as a staging area during construction and will be restored to previous conditions, in accordance with the *“NEXT Renewable Fuels Oregon Restoration Plan for Temporary Impacts to Wetlands”*, once construction is completed. The area adjacent to the power line is 1,300 ft. long by 100 ft. wide and is within the boundary of Wetland 1 (*See Figure 8A, Staging and Access*). Prior to construction this area will be stripped and graded with the topsoil segregated for restoration. Cut and fill volumes are included below.

    Staging Area 3 - Bradbury Slough Dock, Haul Road, and Equipment Staging Area: Some construction and facility equipment will be transported to the site via barge and unloaded at the existing concrete dock located near the mouth of Bradbury Slough. Equipment will be unloaded onto heavy haul trucks at the dock. The trucks will travel south along Kallunki Road to the site or to the south laydown area in Staging Area 3, located between Kallunki Road and the railroad tracks (*See Figure 8A, Staging and Access*). Fill may be placed along the road where necessary; no fill is anticipated in Wetland 6 which is adjacent to Kallunki Road. There are no wetlands in the staging area.

    A geotechnical study of the road will be performed prior to construction to determine the weight capacity of the road. Trucks will not exceed the maximum weight capacity or the limits allowable for the road under Oregon Department of Transportation Truck Weight Limits.

    Staging Area 4 – Rock Stockpile Area: Rock will be temporally stockpiled south of the construction site in Staging Area 4 (See Figure 8B – Staging and Access). This staging area is adjacent to the proposed mitigation site and within the boundary of Mitigation Site - Wetland 1. Approximately 27 acres will be utilized for temporary stockpiling and the concrete batch plant. All impacts are temporary and will be restored to previous conditions, as outlined in the *“NEXT Renewable Fuels Oregon Restoration Plan for Temporary Impacts to Wetlands”,* once construction is completed.

- **Stripping and Grading.** Approximately 12 inches of brush, overburden, and soil will be removed from the main access road, pipeline route, rail spur, and facility site, where needed, lowering the site approximately 1.0 ft. below existing grade. Stripping and grading will be phased to the maximum extent practicable to prevent exposed inactive areas from becoming a source of erosion. Non-useable materials will be removed from the site and disposed of at an upland location (location to be determined). Materials will be tested randomly for contamination prior to removal from the site. Tested materials will be disposed of at an upland site. Reuse of materials on-site will be facilitated to the maximum extent practical. Materials will be temporarily stockpiled for use in landscape areas and berms. Stripping will result in the permanent removal of approximately 155,372 Cy of material from Wetland 1 and 1,105 Cy of material from Waterway E, and temporary removal of 4,440 Cy of material from the following components:

Table 3: Wetland/Waterway Removal Quantities from Site Stripping

Wetland/ Waterway	Construction Area	Removal	
		Permanent	Temporary
Wetland 1	Facility Footprint (including rail)	136,192 Cy	1,640 Cy
	Access Road	4,345 Cy	0
	Ponds 1,2,3,4	2,280 Cy	0
	Rail Spur East & West	7,400 Cy	0
	Pipeline Access Road & Rail Access Roads	3,285 Cy	905 Cy
	Pipe Rack	0	1,895 Cy
	Tree Buffer	1,870 Cy	0
Waterway E	Facility Footprint	1,105 Cy	0

The next step will be to fill, rough grade, and establish the final grade of the main access road, the pipeline route, the rail spur, rail access road, and the facility site. The overall final grade will be approximately 3 ft. above the existing grade. Fill material will consist of clean soil and aggregate (specified for use by the geotechnical engineer) that will be imported from a local source determined by the contractor. Prior to final grading, and in coordination with in-place erosion control measures, the below-ground utilities and stormwater system will be installed. Fill and final grading will result in permanent fill from the placement of approximately 397,880 Cy of material in Wetland 1 and 4,505 Cy of material in Waterway E and temporary fill of 7,325 Cy of material in Wetland 1 from the following construction components:

Table 4: Wetland/Waterway Fill Quantities from Grading

Wetland/ Waterway	Construction Area	Fill	
		Permanent	Temporary
Wetland 1	Facility Footprint (including rail)	314,505 Cy	1,715 Cy
	Access Road	17,380Cy	0 Cy
	Ponds 1,2, & 4	5,295 Cy	0
	Rail Spur East & West	40,090 Cy	0
	Pipeline Maintenance Road & Rail Access Road	13,130 Cy	1,355 Cy
	Pipe Rack	0	4,255 Cy
	Rail Spur & Rail Spur Access Road	11,530 Cy	0
Waterway E	Facility Footprint	2,753 Cy	0

- **Main Access Road Construction**. Once on-site grading is completed, the main access road will be built prior to the construction of the facility to allow access to the construction site. The main access road will begin at Hermo Road and will tie into the facility on the west side near the proposed administration building. The access road will be approximately 3,815 ft. long by 30 ft. wide, covering 2.69 ac. Aggregate will be imported to construct the road base. Construction of the access road will result in approximately 2.69 ac. of permanent impacts to Wetland 1. Approximately 17,380 Cy of permanent fill will be placed in Wetland 1 to construct the final road base. Cross sections of the road construction are shown on Exhibits C2.0, C2.1 and C2.2.

The main access road will cross Waterway D, which will require the installation of a 36-inch culvert at the crossing to allow for the continued conveyance of irrigation and drainage water. The culvert was sized based on current flow. Installation of the culvert will require permanent removal of 20 Cy of material for the placement of the culvert. Approximately 63 Cy of permanent fill from the placement of the culvert and back fill material will occur in Waterway D. A typical cross section of the waterway is shown on *Plan Sheet 5, Culvert Installation Cross Section*.

The main access road and facility roads will be paved with asphalt after the construction of the facility and ancillary components are completed. Paving will occur after construction to allow the road to settle and to prevent damage to the asphalt. The secondary access road will remain in place to be used as emergency access.

- **Facility Construction.**

Foundations: Additional impacts to Wetland 1 will result from the construction of the facility components, including the foundations for the tanks, pre-treatment plant, hydrogen facility, Ecofining™ units, pipe racks, and office/administration building. Large and small foundations will be constructed, resulting in the permanent removal of approximately 3,075 Cy of material, permanent fill of approximately 139,267 Cy of material, and displacement of 118,855 Cy of material in Wetland 1. Material will be removed to an approved upland site. Fill materials will include concrete, steel piles, aggregate, and topsoil. Typical cross sections showing existing and proposed elevations of Wetland 1 from the construction of the foundations are shown on Plan *Sheet 2, Wetland Fill Cross Section East and West, North and South*.

Foundations will be constructed to support each component of the facility. The size of the foundations will vary by type of equipment. Only foundations that go below stripping grade were included as additional cut and fill volumes. A typical foundation, (45 foundations) at 300 sf. volume placed approximately 4.5 ft. below the stripping grade, was used to approximate the cut and fill volume for large equipment foundations that go below stripping grade. Approximately 25 tanks foundations will be constructed consisting of concrete caps set on concrete piles. The concrete piles will be constructed using the ground improvement method described below. Concrete piles are being purposed due to the soil type.

Piles: Approximately 15,200, 16-inch steels piles that are 90 ft. long (each) will be installed, resulting in the permanent fill of 4,522 Cy. Steel piles will be driven utilizing a vibratory hammer to minimize noise impacts. Work will be performed between the hours of 7:00 AM and 6:00 PM. A typical cross section of the pile foundations is shown on *Plan Sheet 3, Pile Foundation Schematics.*

Ground Improvement: Wet soil mixing known as the Deep Mixing Method will be utilized to construct the concrete piles. The process employs a drill that advances a mixing tool as binder slurry is pumped through the connecting drill steel, mixing the soil to the target depth. Additional mixing of the soil is completed as the tool is withdrawn to the surface. This process constructs individual soilcrete columns, rows of overlapping columns or 100% mass stabilization, to provide designed strength and stiffness. Ground improvement will displace approximately 114,333 Cy of material in Wetland 1. A typical cross section of the pile foundations is shown on *Plan Sheet 3, Pile Foundation Schematics.*

Tanks and Refining Equipment: Once the foundations are completed construction of the tanks and refining equipment will commence. Construction of the majority of the facility components will occur offsite and be shipped to the site as modules that will be assembled on site. Once the tanks are set, secondary containment will be constructed in areas shown on *Plan Sheet 1, Site Layout*. Secondary containment designed to industry specifications will consist of 6-foot dirt berms with 12-inch impervious liners.

Buildings, Offices, and Warehouses. Buildings, offices, and warehouses will be built onsite utilizing typical construction methods.

Road and Gravel Area. All roads will be paved with asphalt, there will be concrete around the building, all other areas will be treated with gravel.

- **Rail Spur and Rail Access Road Construction.** Construction of the rail components will be completed concurrently with the facility construction. The rail spur and tracks will run east and west from the existing Portland & Western's rail line through the new facility along the new access road to Hermo Road. In the exhibits and for the impact calculations the rail has been identified as the west rail spur, east rail spur, and main plant rail spur. The overall rail spur will be approximately 8,900 ft. long. The corridor for the rail and rail access road through the west portion of the project will be 60 feet wide (50 feet of rail and 10 feet of rail access road). The rail corridor through the east portion of the project will be 24 feet wide with no access road. Through the facility the rail will be 84 feet wide, and the rail access road will be 10 feet wide. See details on *Exhibit C2.0 West Rail Spur Plan Section I, Exhibit C2.1 West Rail Spur Plan and Section II, Exhibit C2.2 West Rail Spur Plan and Section III, Exhibit C2.5 Main Plant Rail Spur and Section I, Exhibit C2.6 Main Plant Rail Spur Plan and Section II, and Exhibit C2.7 East Rail Spur Plan and Section.*

  Construction of the east rail spur, west rail spur, and rail spur access road will permanently impact 6.62 ac. of Wetland 1. Impacts to Wetland 1 from the main plant rail spur are included in the main plant impact calculations. Approximately 0.044 acres of Waterway D and Waterway F will be permanently impacted from placement of culverts under the rail spur and rail access for the continued conveyance of irrigation and drainage water. *See details on Figure 12, Waterway Impact Area* and *Exhibit C2.2 West Rail Spur Plan and Section III and Exhibit C2.7 East Rail Spur Plan and Section.*

- **Pipeline Alignment and Pipeline Access Road.** Construction of the pipeline alignment and pipeline access road will be performed concurrently with the facility construction. The above-ground pipeline will be approximately 6,445 ft. long with various widths between 10 ft. and 35 ft. (See *Plan Sheet 6, Pipeline Alignment Plan*). A portion of the pipeline will be built inside the facility as described in the narrative above. Outside of the facility the pipeline will run parallel with the new access road for approximately 1,315 ft. The pipeline will then turn and travel northwest for 2,520 ft., crossing over an irrigation ditch and under Hermo Road for 110 ft. before turning east. The pipeline will then run east and west along Hermo Road for 325 ft. before it turns north again, traveling approximately 2,175 ft. to the existing pipeline confluence with the terminalling partner.

  The pipeline will be aboveground and sit on pipe rack stanchion spaced appropriately along the pipeline route. The pipe rack stanchions' foundations will be concrete piers set on pilings. The footprint of each pipe rack stanchion will be approximately 300 sf., and the pilings will be placed 20 ft. deep. There will be approximately 215 pipe rack stanchions, requiring 430 pilings.

  A pipeline access road will be constructed along the portion of the pipeline that travels north and south from the new main access road to Hermo Road, as shown on Plan Sheets 6. The access road will be approximately 2,390 ft. long and 10 ft. wide and include culverted crossings of the existing ditches. Grading of the access road and fill and removal volumes are discussed under "Stripping and Grading" (*See Exhibit C2.3 Pipeline Maintenance Road Plan and Section for Pipeline Maintenance Road Typical Cross Section*).

  Installation of the pipeline will require two road crossing. Road crossings will be constructed by running the pipeline through culverts that are set on grade with a berm over the culvert to allow for continued traffic flow. See *Plan Sheet 4, Hermo Road Piperack Crossing* for existing and proposed elevation and construction details.

  Construction of the pipeline rack stanchions, and pipeline access road will impact Wetlands 1 and 2 and Waterways A, B, and C. Impacts to wetlands will be from the construction of the pipe rack stanchions, installation of culverts, and the access road. Impacts to wetlands and waterways from the construction of the pipeline and access road are as follows:

Table 5: Pipeline & Access Road Wetland/Waterway Removal/Fill Quantities

Wetland	Acres	Pipe Rack Stanchion		Access Road	
		Removal	Fill	Removal	Fill
Wetland 1	0.72	925 Cy	1,315 Cy	940 Cy	1,405 Cy
Wetland 2	0.04	3,800 Cy	3,850 Cy	0	0
Totals	0.76	4,725 Cy	5,165 Cy	940 Cy	1,405 Cy

Waterways	Acres	Permanent	
		Removal	Fill
Waterway A	0.007	12 Cy	29 Cy
Waterway B	0.017	29 Cy	72 Cy
Waterway C	0.004	7 Cy	16 Cy
Waterway D	0.009	15 Cy	59 Cy
Totals	0.037	63 Cy	176 Cy

- **Stormwater Treatment**. Runoff water quality treatment and flow (stormwater quantity) control will be provided via detention and settling/biofiltration ponds. The ponds will be vegetated to provide sedimentation and biofiltration. Pond outlets will be equipped with downturned elbows to trap oil sheen and other floatables in the ponds. Absorbent socks or booms will be used to remove sheen, if any, from the water surface in the pond. Construction of the ponds and components of the stormwater system will be completed concurrently with the facility construction (*See Figure13, Stormwater Ponds and Figure 14, Stormwater Management Plan Site Layout*). A total of 4 ponds will be constructed. Ponds 1 and 2 will run parallel along the west rail spur between the access road and the west rail spur. Ponds 1 will be 23 feet wide extending east from Hermo Road for approximately 2,684 feet and will collect runoff from the paved access road, gravel laydown area, and rail areas west of the Main Plant into a series of catch basins that gravity flow to Pond 1. Runoff from the Main Plant Rail Spur will sheet flow to a series of catch basins and will be conveyed via gravity flow to Pond 2 that extends from the Main Plant westward for approximately 1,064 feet. Stormwater from Ponds 1 and 2 will discharge to MH-DP002, located within the earth berm between Ponds 1 and 2 before discharging to McLean Slough.

  Runoff from the rail area southeast of the Main Plant (East Rail Spur) will sheet flow to a catch basin and will then be conveyed via gravity flow to Pond 4 located on the south side of the east rail spur adjacent to the existing Waterway F. Runoff from the pipe rack and pipeline maintenance roadway will sheet flow into Pond 3 that will run parallel to the maintenance road and will then be conveyed via gravity flow to MH-DP002, located upstream of Discharge Point 002 before discharging to Waterway D and McLean Slough. Construction of the ponds will permanently impact approximately 2.45 acres of Wetland 1 by permanently removing 2,280 Cy of material in the grading process and placing 5,295 Cy of material to create the ponds. For additional details see Exhibits C2.0 through C2.9.

- **Landscaping.** In general, areas on-site not subject to equipment or facility use will be planted with a native upland seed mix, while certain areas along the perimeter of the site and subject to view from right-of-way will receive native groundcover, shrubs, and trees. Within the site, the landscape areas within vehicular parking areas and adjacent to enclosed buildings will also receive a mix of trees, shrubs, and groundcover to meet the code requirements of the local jurisdiction. All plantings will occur in new fill and above the existing elevation of wetlands.

- **Restoration, Revegetation, and Hydroseeding.** Any disturbed areas otherwise not subject to the civil and landscape construction documents will be graded to facilitate effective drainage and replanted with a native vegetation mix. Temporary impacts to wetland areas will be restored in accordance with the "*NEXT Renewable Fuels Oregon Restoration Plan for Temporary Impacts to Wetlands" (Appendix F).*

Demobilization. Once all elements of construction are completed, the contractor will remove all construction equipment and waste materials. Temporary sediment and erosion controls will be removed once the site has been stabilized. Removal of the temporary sediment and erosion control measures will result in the removal of the 30 Cy of temporary fill.

C. Construction Methods. Describe how the removal and/or fill activities will be accomplished to minimize impacts to waters and wetlands.

Construction Equipment: Construction equipment for site development activities is specific to the contractor performing the work but will most likely include bulldozers, scrapers, excavators/backhoes, dump trucks, graders, cranes, compactors, trencher, pavers, vibratory hammer, and small hand equipment.

General construction activities are as follows:

- Implement perimeter erosion and sediment control measures protect waterways and wetland that extend of the site, and to minimize impacts to water quality.
- Construct staging and laydown areas using BMPs .
- Complete stripping and grading.
- Install underground storm and process water systems.
- Install underground utilities.
- Construct main access road.
- Construct Facility:
    - Install erosion control measures. Maintain, expand, and remove as required.
    - Install temporary construction facilities.
    - Roughly grade and install underground utilities and storm drainage facilities.
    - Apply topsoil to areas that do not receive other surfacing, install erosion control mats at designated areas, and seed. This will be completed in each area as practicable and will not be done at one time.
    - Install piles and large and small equipment foundations.
    - Install unit concrete topping slabs and backfill.
    - Install tanks and tank containment berms.
    - Install storm and process water systems.
    - Install pipeline stanchions and pipeline.
    - Install pre-treatment plant.
    - Install hydrogen facility.
    - Install Ecofining™ units.
    - Construct office/administration buildings/laboratory.
- Construct above-ground pipeline and pipeline access road.
- Construct rail spur and rail spur access road.
- Complete site restoration.
- Landscape site and install fencing.
- Construct wetland mitigation site.
- Demobilize.
- Remove erosion and sediment control measures.

Construction Methods:

Typical construction methods will be utilized for the stripping, grading, road construction, installation of the underground utilities, stormwater, and processed water systems. The steels piles for the foundations will be driven with a vibratory hammer to minimize noise impacts to wildlife and surrounding areas. Construction of the concrete piles will utilize a ground improvement method known as Deep Mixing Method. A drill advances a mixing tool as binder slurry is pumped through the connecting drill steel, mixing the soil to the target depth. Additional mixing of the soil is completed as the tool is withdrawn to the surface. This process constructs individual soilcrete columns, rows of overlapping columns or 100% mass stabilization, all with a designed strength and stiffness.

Minimization Measure During Construction:

The following general BMPs will be implemented during construction to minimize impact to waters and wetlands:

- Construction limits will be clearly defined with stakes prior to the beginning of ground-disturbing activities. The project engineer or construction representative will meet with the contractor to ensure all parties understand the locations of project construction limits and measures that will be taken to protect them. No disturbance will occur beyond these limits. Erosion and sediment control measure as outline in the 1200-C Permit will be implemented to minimize and control pollution and erosion from stormwater.

- Construction will occur between the hours of 7:00 AM and 6:00 PM.
- All construction equipment will be maintained and in good working order to minimize the risk of fuel and fluid leaks or spills.
- A spill containment plan will be developed, and all necessary materials will be on-site prior to, and during, construction.
- If a leak or spill should occur, work will cease near any waterbody or wetland until the source of the leak is identified and corrected and the contaminants have been removed.
- All base temporary erosion and sediment control measures (i.e., inlet protection, perimeter sediment control, gravel construction entrances, etc.) must be in place, functional, and approved in an initial inspection prior to commencement of construction activities. Temporary erosion and sediment control measures will be maintained throughout construction.
- All clearing and excavation will be accomplished in ways that minimize soil disturbance, compaction, and impacts to vegetation whenever possible.
- Refueling activities will be conducted within designated refueling areas away from waterbody or wetland areas. For track-mounted equipment, and other equipment whose limited mobility makes it impractical to move for refueling, precautions will be taken to minimize the risk of fuel reaching the project's regulated work area. Spill prevention measures and fuel containment systems designed to completely contain a potential spill will be implemented, as well as other pollution control devices and measures (such as diapering, parking on absorbent material, etc.) adequate to provide containment of hazardous materials.
- Temporary stabilization measures will be employed on slopes, inactive areas, and areas subject to wind erosion.
- Construction BMPs will be implemented to control dust and limit impacts to air quality, including:
    - Cover loads and ensure adequate freeboard to prevent soil particles from blowing away during transport.
    - Wet down fill material and dust on site, whenever practicable.
    - Remove excess dirt, dust, and debris from roadway.
    - Revegetate disturbed soil as soon as practicable.
- Measures to minimize noise impacts will be implemented during construction, including:
    - Turn off equipment when not in use for more than 30 minutes.
    - Utilize a vibratory hammer to install steel piles.
    - Use only well-maintained and properly functioning equipment and vehicles.
- BMPs for stormwater runoff controls will be implemented, including:
    - Install temporary sediment control devices such as filter fabric fences or sediment traps.
    - Sediment barriers shall be installed immediately following establishment of earthwork activities prone to erosion.
    - Exposed soils and soil stockpiles will be temporarily stabilized at the end of shifts and before holidays and weekends, if needed. Stockpiles shall be placed in a stable location and configuration and covered with plastic sheeting during "wet weather."
    - Temporary stabilization with a covering of blown straw and a tackifier, loose straw, or an adequate covering of compost mulch will be provided for portions of the site where construction activities will cease for 14 days or more.
    - Minimize soil disturbance and reseed disturbed areas as soon as practicable.
- BMPs for culvert installation to maintain water quality will be implemented, including:

- Wetland areas and waterways will be designated for protection with silt fencing.
- Refueling activities will be conducted within designated refueling areas away from waterbody or wetland areas.
- All vehicles and equipment operated within 150 ft. of any waterbody will be inspected daily for fluid leaks before leaving the vehicle staging area. Any leaks detected will be repaired before the vehicle resumes operation. When not in use, vehicles will be stored in the designated staging area, which will be located outside all wetlands and waterways, and their buffers.
- Vegetation removal will be minimized to the greatest extent possible, and erosion control blankets will be used to assist in the rapid revegetation of sites disturbed by culvert replacements or temporary impacts.

(4) PROJECT DESCRIPTION (continued)

D. Describe source of fill material and disposal locations if known.

Fill materials. Fill materials will include reuse of on-site soils, imported clean soils, culvert pipe, rebar-reinforced concrete, foundation aggregate, pilings, and other structural material for construction of the facility and ancillary components. Materials will be sourced from local suppliers as determined by the contractor.

Disposal. Excess materials removed from the project area will be disposed of at an upland location determined by the contractor and approved by the local jurisdiction. The design team does not anticipate contaminated soils, but if found they would be transported off-site to an approved facility.

E. Construction timeline.

What is the estimated project start date? April 2024

What is the estimated project completion date? December 2025

Is any of the work underway or already complete? ☐ **Yes** ☑ **No**
If yes, please describe.

F. Removal Volumes and Dimensions (if more than 7 impact sites, include a summary table as an attachment)

Wetland / Waterbody Name *	**Removal Dimensions**					**Time Removal is to remain****	**Material*****
	Length (ft.)	**Width (ft.)**	**Depth (ft.)**	**Area (sq.ft. or ac.)**	**Volume (c.y.)**		
See Attachment D, Removal/Fill Table							

G. Total Removal Volumes and Dimensions

Total Removal to Wetlands and Other Waters	Length (ft.)	Area (sq. ft or ac.)	Volume (c.y.)
Total Removal to Wetlands			
Total Removal Below Ordinary High Water			
Total Removal Below Highest Measured Tide			
Total Removal Below High Tide Line			
Total Removal Below Mean High Water Tidal Elevation			

H. Fill Volumes and Dimensions (if more than 7 impact sites, include a summary table as an attachment)

Wetland / Waterbody Name*	Fill Dimensions					Time Fill is to remain**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq. ft. or ac.)	Volume (c.y.)		

(4) PROJECT DESCRIPTION (CONTINUED)

I. Total Fill Volumes and Dimensions

Total Fill to Wetlands and Other Waters	Length (ft.)	Area (sq. ft or ac.)	Volume (c.y.)
Total Fill to Wetlands			
Total Fill Below Ordinary High Water			
Total Fill Below Highest Measured Tide			
Total Fill Below High Tide Line			
Total Fill Below Mean High Water Tidal Elevation			

*If there is no official name for the wetland or waterbody, create a unique name (such as “Wetland 1” or “Tributary A”).
**Indicate whether the proposed area of removal or fill is permanent or, if you are proposing temporary impacts, specify the days, months or years the fill or removal is to remain.
*** Example: soil, gravel, wood, concrete, pilings, rock etc.

(5) PROJECT PURPOSE AND NEED

Provide a statement of the purpose and need for the overall project.

Project Purpose

The purpose of the NEXT Renewable Fuels Oregon Project is to construct and operate a renewable fuels facility to provide renewable fuels to West Coast markets that are mandated under the renewable fuel's standards and state low-carbon mandates.

Project Need

This project is needed to provide a reliable source of renewable fuels to West Coast markets that are mandated by the Renewable Fuel Standard (RFS) program or other state mandates that require carbon fuels reductions. With the implementation of the Renewable Fuel Standard program, other state mandates, and regional coalitions, the demand for and consumption of renewable fuels on the West Coast has seen unprecedented increases since 2018. Although nearly every gallon of renewable diesel produced in the U.S. is sent to supply California, demand is still not being met by U.S. production. The current supply does not consider the demand from other West Coast locations, nor does it allow for the expansion of renewable diesel use in other areas of the U.S. The demand for renewable diesel will continue to increase with the adoption of additional low-carbon fuel policies. The construction of a renewable diesel facility in the Pacific Northwest will establish an environmentally responsible means of providing and supplying a reliable source of renewable fuels to West Coast markets that have mandated carbon fuels reductions.

A full description of the project need is included in the "Alternatives Analysis for the NEXT Renewable Fuels Oregon Project" (See Appendix G).

(6) DESCRIPTION OF RESOURCES IN PROJECT AREA

A. Describe the existing physical, chemical, and biological characteristics of each wetland or waterbody. Reference the wetland and waters delineation report if one is available. Include the list of items provided in the instructions.

Project Area

The project area is defined as the project site including the staging and operating areas for the facility, access driveways, the proposed rail spur to connect with the existing port spur, the pipeline from the facility to the confluence with the existing terminalling partner's existing pipeline easement, the haul road, and unloading dock. The following is a general description of the project area's existing environmental baseline conditions based on database research, site visits, descriptions of previous actions within the project area affecting the baseline conditions, and a description of habitat features that would be affected by the proposed project.

The project area is generally flat agricultural and industrial land bounded by the Columbia River to the north, Bradbury Slough to the east, Hermo Road and agricultural land to the west, and Quincy-Mayger Road and forested hillsides to the south. The soils in the sloping areas are generally derived from weathering igneous basalt and marine sandstone and siltstone. The flatter agricultural areas are limited to pasture and low intensity uses. Portions of the undeveloped areas within the project area are Class II and Class V agricultural soils and are currently used as pasture.

The project site includes a mosaic of habitats, including westside riparian wetlands, agriculture/pastureland, and low-density urban development. Open-water habitat occurs in the form of drainage/irrigation ditches, which are low gradient and flat bottomed, and contain a silt-dominated substrate.

Vegetation

The vegetation within the project area generally consists of forbs and grasses. Dominant species include velvetgrass *(Holcus lanatus),* rough bentgrass *(Agrostis exarata),* horsetail *(Equisetum arvense),* and reed canarygrass *(Phalaris arundinacea).* A portion of the project is adjacent to mint farming activities and planted *Populus* species tree farms. Reed canarygrass and dense thickets of Himalayan blackberry *(Rubus discolor)* are present along and within the project site.

Habitat

Agricultural and pasture habitat covers approximately 75-percent of the proposed project area. This habitat often dominates the landscape in flat or gently rolling terrain, on well-developed soils, broad river valleys, and areas with access to abundant irrigation water. Unlike other habitat types, agricultural habitat is often characterized by regular landscape patterns (squares, rectangles, and circles) and straight borders because of ownership boundaries and multiple crops within a region. Edges can be abrupt along the habitat borders within agricultural habitat and with adjacent habitats.

Jurisdictional Resource

A wetland delineation of the site was conducted by Anderson Perry & Associates, Inc., in 2019, 2020, and 2021 which identified six wetlands totaling 141.04 ac. in two study areas, (Study Area A and B) and approximately 10,095 linear ft. 1.82 ac.) of drainage/irrigation ditches in Study Area A (See Appendix B, "*Wetland Delineation Concurrence NEXT Renewable Fuels Oregon WD#2020-0663*").

It is anticipated that the wetlands will be jurisdictional under the US Army Corps of Engineers (USACE) and the Department of State Lands (DSL) guidelines. At the time of submitted, DLS has not finalized the review of the Delineation Report. For this application it is assumed that the drainage/irrigation ditches are jurisdictional. The resources are described below. Table 6 shows the acreage and type of wetlands that were delineated in the study areas, and Table 7 shows the area of the waterways within the study areas.

Wetlands

Wetland 1 – Wetland 1 is in Study Area A and is classified as palustrine emergent (PEM) and palustrine scrub-shrub (PSS) with an HGM classification of Flats. The wetland is not entirely contained within the study area, as it extends out of the study area to the north, east, and west. Wetland 1 is the most extensive wetland in the study area, covering the eastern and southern parts of the site. It primarily consists of pasture, mint fields, and a portion of an existing poplar tree farm. Three areas of upland are present within the pasture that forms the main part of the study area and Wetland 1, which appears to be fill material likely from the construction of other industrial plants in the vicinity. These areas are slightly raised above the elevation of the surrounding wetland, with flat surfaces, and may possibly have been used as storage platforms for hay or other materials.

Vegetation observed in this wetland included sedges, rushes, various native and introduced grasses, and smaller amounts of forbs. There are extensive Himalayan blackberry thickets in some areas, and a stand of poplar saplings in the northwest corner of the main part of the study area. This wetland appears to be supported by precipitation, irrigation water, surface runoff, and groundwater.

Wetland 2 – Wetland 2 is in Study Area A and is classified as PEM with an HGM classification of Flats. The wetland is not entirely contained within the study area, as it extends to the west and north. Wetland 2 is located in the central portion of the new pipeline corridor, north of Hermo Road.

Vegetation observed in this wetland included reed canarygrass, Himalayan blackberry, and smaller amounts of grasses and forbs. It appears to be supported by precipitation, irrigation water, surface runoff, and groundwater.

Wetland 3 – Wetland 3 is in Study Area A and is classified as PEM with an HGM classification of Flats. The wetland is not entirely contained within the study area, as it extends to the east. It is also located along the pipeline corridor, in a depression between the access road and the PGE facility.

Vegetation observed in this wetland included reed canarygrass, Himalayan blackberry, sedges, rushes, various native and introduced grasses, and smaller amounts of forbs. The wetland appears to be supported by precipitation, irrigation water, surface runoff, and groundwater.

Wetland 4 – Wetland 4 is in Study Area A and is classified as PEM and Palustrine Forested (PFO) with an HGM classification of Flats. The wetland is not entirely contained within the study area, as it extends to the north. This wetland is located along the pipeline corridor adjacent to the Columbia River.

Vegetation observed in this wetland included alder, cottonwood, willow, reed canarygrass, Himalayan blackberry, sedges, rushes, various native and introduced grasses, and smaller amounts of forbs. The wetland appears to be supported by precipitation, surface runoff, and groundwater.

Wetland 5 – Wetland 5 is in Study Area B, bordered by the fill slopes of the small barge dock and Kallunki Road. This area is not depicted as wetlands on the NWI Map. Based on site observations, this wetland is classified as PEM. The wetland is entirely contained within the study area.

Vegetation observed in this wetland included reed canarygrass, Himalayan blackberry, sedges, rushes, various native and introduced grasses, and smaller amounts of forbs. The wetland appears to be supported by precipitation and surface runoff.

Wetland 6 – Wetland 6 is in Study Area B, bordered by the fill slopes of Kallunki Road, an electrical substation, and access roads. This area is depicted as wetland on the NWI Map. Based on site observations, this wetland is classified as PEM. The wetland is entirely contained within the study area.

Vegetation observed in this wetland included reed canarygrass, Himalayan blackberry, sedges, rushes, various native and introduced grasses, and smaller amounts of forbs. The wetland appears to be supported by precipitation and surface runoff.

Table 6: Jurisdictional Wetlands

Study Area	Wetland	HGM Class[1]	Cowardin Class[2]	USACE Category and Basis	Sample Plot No.	Acres in Study Area
A	1	Flats	PEM/PSS	Cat. 7 - Adjacent to Columbia River	1 through 22[3], 24, 28 through 39, 43, 44, 48 through 54	136.78
	2	Flats	PEM	Cat. 7 - Adjacent to Columbia River	40, 45	1.02
	3	Flats	PEM	Cat. 7 - Adjacent to Columbia River	25, 26, 41, 42	1.98
	4	Flats	PEM/PFO	Cat. 7 - Adjacent to Columbia River	27	0.31
B	5	Flats	PEM	Cat. 7 - Adjacent to Columbia River	46	0.07
	6	Flats	PEM	Cat. 7 - Adjacent to Columbia River	47	0.88
					Total	**141.04**

Waterways

Numerous non-wetland waterways were identified in the project area; all are unnamed irrigation ditches except for McLean Slough, that convey irrigation water or drain the agricultural fields in the area. The Oregon Steam Functional Assessment Method (SFAM) was not used to evaluate these ditches as the ditches are not wadable. Since these ditches are all part of the same interconnected drainage network, they were not individually named in the WDR; however, the location of each is shown in Appendix B, "*Wetland Delineation Concurrence NEXT Renewable Fuels Oregon WD#2020-0663*", Figures 6A through 6W, and have been identified as Waterways A through G and McLean Slough on *Figure 11, Existing Waterways* for ease of reference in this application.

These ditches drain south via McLean Slough and Beaver Slough for approximately six miles before the water is then pumped into the Clatskanie River, which ultimately flows to the Columbia River; however, there is no free and open connection to a fish-bearing waterway. A total of 10,095 linear ft. (1.82 ac.) of ditches are within the study area. The Columbia River is located outside of the project area The impact area of each waterway is listed on Table 7 and corresponds with Figure 11.

Table 7: Drainage/Irrigation Ditches

DRAINAGE/IRRIGATIONDITCHES	
Waterway	**Area (Square Feet)**
Waterway A	846
Waterway B	901
Waterway C	595
Waterway D	4,226
Waterway E	26,617
Waterway F	26,262
Waterway G	18,150
McLean Slough	1,746
Total Area	**79,343**

Functional Assessment

The Oregon Rapid Wetland Assessment Protocol (ORWAP) version 3.2 was used to evaluate the wetlands in the study area. The ORWAP spreadsheets generate scores intended to reflect a wetland's ability to support a variety of specific *functions*, and then evaluate the *value* of each function to ecosystem and societal needs. The scores and ratings for specific functions and values are shown in Tables ((1)) and ((2)) below, while the grouped functions and values are shown in Table ((3)) below. The spreadsheets for the ORWAP assessment can be found in Appendix B.

Table 8 (1–3): Functional Assessment

Table ((1))

Specific Function or Value	Function Score	Function Rating	Rating Break Proximity	Values Score	Values Rating	Rating Break Proximity
Water Storage & Delay (WS)	3.18	Lower		0.00	Lower	
Sediment Retention & Stabilization	3.37	Lower	LM	9.05	Higher	
Phosphorus Retention (PR)	5.30	Moderate		8.17	Higher	
Nitrate Removal & Retention (NR)	3.10	Lower		10.00	Higher	
Anadromous Fish Habitat (FA)	0.00	Lower		0.00	Lower	
Resident Fish Habitat	0.00	Lower		0.00	Lower	
Amphibian & Reptile Habitat (AM)	7.76	Higher		3.61	Lower	

Waterbird Nesting Habitat (WBN)	7.13	Higher	MH	10.00	Higher	
Waterbird Feeding Habitat (WBF)	9.23	Higher		10.00	Higher	
Aquatic Invertebrate Habitat (INV)	1.79	Lower		2.60	Lower	
Songbird, Raptor, Mammal Habitat (SBM)	5.18	Moderate		10.00	Higher	
Water Cooling (WC)	2.31	Lower	LM	10.00	Higher	
Native Plant Diversity (PD)	6.37	Moderate	MH	2.18	Lower	
Pollinator Habitat (POL)	7.60	Higher	MH	3.92	Moderate	
Organic Nutrient Export (OE)	5.90	Moderate				
Carbon Sequestration (CS)	5.16	Moderate				
Public Use & Recognition (PU)				3.48	Lower	LM

Table ((2))

Other Attributes	Score	Rating	Rating Break
Wetland	2.84	Moderate	
Wetland Ecological	5.02	Moderate	
Wetland Stressors	6.34	Higher	MH

Table ((3))

Groups	Selected Functions	Function Rating	Rating Break Proximity	Values Rating	Rating Break Proximity
Hydrologic Function	Water Storage & Delay	Lower		Lower	
Water quality Support (SR, PR, or NR)	Phosphorus Retention	Moderate		Higher	
Fish Habitat (FA or FR)	Anadromous Fish	Lower		Lower	

Aquatic Habitat (AM, WBF, or WBN)	Waterbird Nesting Habitat (WBN)	Higher	MH	Higher	
Ecosystem Support (WC, INV, PD, POL, SBM, or OE)	Songbird, Raptor, Mammal Habitat (SBM)	Higher	MH	Moderate	

As indicated in Table ((3)), the impacted wetlands received a Lower rating for the Hydrologic Function and Fish Habitat group functions and values, while the remaining groups (Water Quality, Aquatic Habitat, and Ecosystem Support) have Moderate and High function and value ratings. This indicates that while the water storage and delay (Hydrologic Function) and Fish Habitat functions and values of the wetlands may have somewhat diminished importance to the area, other functions and values of the wetlands play a valuable role in the landscape.

Species and Habitat

Within the project area the drainage/irrigation ditches may contain resident fish species that are tolerant of poor water quality such as suckers (*Catostomus* sp.), carp (*Cyprinus carpio),* and sculpins (*Cottus* sp.). The ditches also may contain suitable habitat for amphibian species such as northwestern salamanders (*Ambystoma gracile*), bullfrogs (*Rana catesbeiana*), and roughskin newts (*Taricha granulosa).* The associated riparian vegetation and upland locations may contain suitable habitat for songbirds such as song sparrow (*Melospiza melodia*) and Brewer's blackbird (*Euphagus cyanocephalus*), as well as deer and small mammals such as deer mice (*Peromyscus maniculatus*) and voles (*Microtus* sp.).

Endangered Species Act–Listed Species

A biologist completed a site visit of the action area in the fall of 2020, and a biological evaluation for this project will be completed in the winter of 2021 in consultation with USACE and will be provided as a supplement to this JPA. ESA-listed species within the project area are as follows:

Columbian White-Tailed Deer

The only listed species within the project area is the Columbian white-tailed deer. Columbian white-tailed deer have been documented within the action area. The level of disturbance from project activities to the deer will depend on construction timing, proximity of the deer to construction activities, and the duration of construction. Deer are most active at dawn and dusk, and construction will primarily occur during daylight hours. Construction will occur within the generalized area, so deer should easily be able to avoid construction activities by moving to a different area. Given the size and openness of the action area, this temporary displacement should not significantly affect foraging or movement. In addition, because of ongoing industrial activity in the Port Westward area, including large truck traffic within the proposed project area, effects from construction activities may not rise significantly above ambient levels.

Fish Species

While listed salmonids are present within the Lower Columbia River near adjacent to the project area, these species are not present within the action area. Federally listed fish species do not occur within the drainage district ditches in the project area, and the project is approximately six miles through the ditch system from salmonid habitat shown on the StreamNet internet site. The topography of the site and ditches are flat, minimal, or reversed, and generally, the flow direction is to the south; however, it is often indiscernible. The ditches are below sea level, with an average slope between the project site and the pump station of less than 0.0002 ft./ft. in a distance of about eight miles. In the dry months (roughly June through September) the ditch surface elevations and volumes are driven by flows introduced at the upstream irrigation gate and drawn down and regulated by the downstream pump station. During the dry months, flashboard dams in the system are used to artificially raise water surface elevations. The pump station floats have a summertime setting of 8.5 ft. below sea level, and a wintertime setting of 6.5 ft. below sea level. Any water surface above these elevations triggers the three pumps to turn on at the pump station. Each pump has a pumping capacity of 40,000 gallons per minute (gpm) for a total of 120,000 gpm or 267 cubic ft. per second (cfs).

Plant Species

Nelson's Checker-Mallow, Bradshaw's Desert-Parsley, and Willamette Daisy

There have been no plant surveys at the project site or mitigation site; however, it is unlikely that these species native to wet prairies are present within the areas of ground disturbance. Areas of the project site are either mowed for hay or have a dense cover of non-native blackberries on ditch banks, and the mitigation site has a dense stand of mature cottonwoods. Suitable habitat for these species includes full sun with few disturbances from mowing or grazing, and they cannot compete with typical pasture grasses and herbaceous plants such as those at the project site.

Kincaid's Lupine

There have been no plant surveys at the project site or mitigation site; however, it is unlikely that Kincaid's lupine is present within these areas of ground disturbance. Areas of the project site are either mowed for hay or have a dense cover of non-native blackberries on ditch banks, and the mitigation site has a dense stand of mature cottonwoods. These are not suitable habitats for Kincaid's lupine, which requires full sun and few disturbances from mowing or grazing. Additionally, open areas at the project site contain typical pasture grasses and herbaceous plants so that Kincaid's lupine cannot compete with them.

Oregon Biodiversity Information Center Report

According to the Oregon Biodiversity Information Center Report dated September 8, 2020, and lists obtained from US Fish and Wildlife Services (USFWS) and National Marine Fisheries Services (NMFS), the following species may occur in the project vicinity and/or within Columbia County, but are not likely to occur in the project area:

Table 9: ESA-List Species in Columbia County

Species	ESU/DPS	Federal Status[1]	Habitat within Action Area
Steelhead (*Oncorhynchus mykiss*)	Upper Columbia River DPS	T	No
	Middle Columbia River DPS	T	
	Lower Columbia River DPS	T	
	Upper Willamette River DPS	T	
	Snake River Basin DPS	T	
Chinook salmon (*Oncorhynchus tshawytscha*)	Upper Columbia River spring-run ESU	E	No
	Lower Columbia River ESU	T	
	Snake River fall-run ESU	T	
	Snake River spring/summer-run ESU	T	
	Upper Willamette River ESU	T	
Chum salmon (*Oncorhynchus keta*)	Columbia River ESU	T	No
Coho salmon (*Oncorhynchus kisutch*)	Lower Columbia River ESU	T	No
Sockeye salmon (*Oncorhynchus nerka*)	Snake River ESU	E	No
Bull trout (*Salvelinus confluentus*)	Columbia River DPS	T	No

Green sturgeon (*Acipenser medirostris*)	Southern DPS	T	No
Eulachon (*Thaleichthys pacificus*)	Southern DPS	T	No
Columbian white-tailed deer (*Odocoileus leucurus*)	N/A	T	Yes
Marbled murrelet (*Brachyramphus marmoratus*)	N/A	T	No
Northern spotted owl (*Strix occidentalis caurina*)	N/A	T	No
Streaked horned lark (*Eremophila alpestris strigata*)	N/A	T	Possibly
Yellow-billed cuckoo (*Coccyzus americanus*)	N/A	T	No
Bradshaw's desert-parsley (*Lomatium bradshawii*)	N/A	E (Proposed for delisting)	Possibly
Kincaid's lupine (*Lupinus sulphureus ssp. kincaidii*)	N/A	T	No
Nelson's checker-mallow (*Sidalcea nelsoniana*)	N/A	T	Possibly
Willamette daisy (*Erigeron decumbens*)	N/A	E	Possibly

[1] T = Threatened, E = Endangered
DPS = distinct population segment
ESU = evolutionarily significant unit
N/A = Not Applicable

100-Year Floodplain

The project site is wholly within the Beaver Drainage District and outside of the 100-year Floodplain. See *Figure 6, Floodplain Map*.

Hydraulic Characteristics

The project area receives water from precipitation and groundwater. Surface and subsurface hydrology in the project area has been altered by agricultural practices, including ditching, as well as the construction of the dike, roads, railroads, and industrial facilities.

The hydraulics are primarily driven by the Beaver Drainage/Irrigation District's pump station between Beaver Slough and Beaver Dredge Cut and the inlet gate at John Slough with relatively minor influences from groundwater infiltration and drainage from Tank Creek. When water is in the ditches, the hydraulics are driven by the Beaver Drainage District pump station, and water levels and volumes in the ditches are driven by floats at the pump station.

Cultural Resource/Section 106

Archaeological Services, LLC (ASCC) has completed a cultural resources survey of the NEXT Renewable Fuels Oregon project area over a period of time between November 2020 and June 2022, the intent being to inform the federal review process under Section 106 of the National Historic Preservation Act (NHPA). ASCC surveyed a roughly 1,008-acre area of potential effects (APE) located on the south side of the Lower

Columbia River in northern Columbia County, Oregon, incorporating portions of sections 15, 16, 21, 22, 23, 27, 28, 33, and 34 of Township 8 North, Range 4 West, Willamette Meridian. Roughly 1,008-acre area of potential effects (APE) located on the south side of the Lower Columbia River in northern Columbia County, Oregon, incorporating portions of sections 15, 16, 21, 22, 23, 27, 28, 33, and 34 of Township 8 North, Range 4 West, Willamette Meridian.

In total, the ~1,008-acre project area contains or overlaps seven archaeological sites, four above-ground historic properties associated with the 1942 Beaver Ammunition Storage Point Depot (BASP), the Bradbury Slough Levee, and several ditches associated with the early period of the Beaver Drainage District. Of these resources, one precontact archaeological site (35CO16), four above-ground historic BASP properties, and several historic earthworks of the Beaver Drainage District are recommended as eligible for listing on the National Register of Historic Places (NRHP).

Based on the current project design, it appears that the project may have an adverse effect on historic properties. Specifically, the wetland mitigation efforts will impact seven early-1900s ditches which are assessed as contributing elements to the Beaver Drainage District, and eligible for listing on the NRHP under Criterion A. The project should otherwise have no effect on any other NRHP-eligible historic properties, either directly or indirectly.

Section 408

Section 408 is authorized in Section 14 of the Rivers and Harbors Appropriation Act of 1899. Section 408 provides that the Secretary of the Army may, on recommendation of the Chief of Engineers, grant permission for the alteration of a public work so long as the alteration is not injurious to the public interest and will not impair the usefulness of the work. The project site is contained within the Beaver Drainage District, which is surrounded by the drainage dike that is considered a public work project. The dike is currently used as the access road for the Port Westward Industrial site. Use of the road will be consistent with current and past activities. The US Army Corps of Engineers determined the proposed new construction or use as a haul road will not alter the levee system. The proposed project is not adjacent to or in navigable waters and will have no impact to navigation. Therefore, the proposed project will not alter, occupy, or use a USACE federally authorized project and therefore does not require permission from the USACE under Section 408. (USACE Letter Dated 4-7-2022)

B. Describe the existing navigation, fishing and recreational use of the waterbody or wetland.

There are no navigable waterways in the project area. The area is not used for fishing or recreation, as much of the area is farmed or industrial. Additionally, public access to the Port Westward Industrial Park is limited for security reasons.

(7) PROJECT SPECIFIC CRITERIA AND ALTERNATIVES ANALYSIS

Describe project-specific criteria necessary to achieve the project purpose. Describe alternative sites and project designs that were considered to avoid or minimize impacts to the waterbody or wetland.*

Project-Specific Criteria

The purpose of the Next Renewable Fuels Oregon Project is to construct and operate a renewable fuels facility to provide renewable fuels to West Coast markets that are mandated under the Renewable Fuel Standard and state low-carbon mandates. The preferred alternative must meet the following project-specific criteria and have the least environmental impacts.

- Construct and operate a renewable fuels facility of size to achieve economies of scale
- Supply renewable diesel to West Coast Markets
- Be able to offload feedstock transported by vessel

An assessment of the project alternatives was carried out utilizing the US Army Corp of Engineers Alternative Analysis Framework to fulfill the requirements of the National Environmental Policy Act. Under NEPA and the Clean Water Act Section 404 (b)(1) Guidelines, the Corps is required to evaluate alternatives to a proposed project. The complete analysis is in Appendix G, "Alternatives Analysis for the NEXT Renewable Fuels Oregon Project".

In summary, the Applicant was first able to determine a general geographical location utilizing the project purpose, which includes a geographical location, practicable cost, and logistical availability and access to land.

- Geographical Area – The facility must be located on the West Coast to serve West Coast Markets and receive international feedstock.
- Practicable Cost – The Applicant has determined that an economically viable renewable diesel facility must have a throughput capacity of 50,000 bbl/d of renewable diesel.
- Logistical Availability and Access to Land – To achieve throughput capacity of contracted feedstocks from international markets, the facility must have access to (or space to build) a dock capable of simultaneously loading and unloading international vessels with a 39.5-ft. draft. A configuration with two berths, capable of accepting and unloading international vessels, is needed to provide the necessary throughput capacity. The site must also be accessible by manifest rail for the economic transport of production products (primarily bleaching earth) to and from the facility.
- Availability and Access to Land – In order to build a facility of this capacity, all potentially viable sites must have access and availability of a minimum of 105 ac. of buildable land to accommodate the facility footprint.

* Not required by the Corps for a complete application but is necessary for individual permits before a permit decision can be rendered.

Based on the above criteria the applicant determined that sites with navigable water access in Oregon and Washington were not only practicable but also provide an economic and environmental advantage over other ports on the West Coast.

The Applicant evaluated 24 sites in the Pacific Northwest (*See Figure 18, Vicinity Map Pacific Northwest Sites*). A two-tier framework was developed to screen potential sites. Utilizing a broad criterion for Tier I screening, the applicant was able to eliminate 23 of the 24 sites based on the following criteria:

- Availability of suitable acreage – 105 contiguous ac.
- Access to navigable waters
- Access to or ability to construct a dock with two berths
- Access to manifest rail service

Only Port Westward in Columbia County, Oregon, met the selection criteria listed above. The Applicant identified seven potential sites at Port Westward to be evaluated in the second-tier analysis (*See Figure 19, All Port Westward Alternative Sites*). Second-tier criteria were developed utilizing the guideline of cost, existing technology, and logistics as outlined in the US Army Corp of Engineers Alternative Analysis Framework. Second-tier criteria are listed below:

- cost
  - ability to accommodate operations up to 50,000 bbl/d of renewable diesel
  - access to land that is zone for industrial development
  - ability to accommodate international shipping vessels for import of feedstocks
- existing technology
  - access to existing natural gas pipelines
  - access to existing power line
  - access to existing railways
  - access to existing wastewater disposal
  - access to existing water supply system
- logistics
  - suitable acreage and configuration
  - access to two berths for off-loading and on-loading
  - access to a deep-water port accommodating drafts of 39.5 ft.
  - access to 42 MW of electricity
  - access to 38,00 Mmbtu/day of natural gas
  - access to 1300 gallons/minute of freshwater
  - access to light rail capacity
  - land approval/land accessibility/zoning

Through initial screening and evaluation of the seven sites located at Port Westward, the Applicant eliminated sites 5, 6 and 7 due to the landowner approval and land accessibility criteria. The Applicant was not able to gain landowner approval and/or the estimated timeline for rezoning the property deemed them infeasible, thus leaving four sites to be evaluated under the second-tier criteria.

Of the four sites evaluated in the second-tier screening utilizing the developed project criteria, only one met the overall project criteria used to determine if a site had the ability to achieve the defined project purpose and was therefore a practicable alternative. Only the POCC parcel/Teevin property met all project criteria and was deemed a practicable alternative. As required by the USACE Alternative Analysis, the Applicant has included a no-action alternative in the analysis. The following alternatives were carried through the environmental analysis:

- Alternative 1: POCC parcel/Teevin property (preferred alternative)
- Alternative 2: No action

- Alternative 1 - POCC parcel/Teevin property (preferred alternative) – Under this alternative the NEXT Renewable Fuels Facility would be built in the Pacific Northwest, utilizing suitable acreage that is available and is zoned for industrial use. Additionally, the preferred site has access to existing technology including utilities, pipelines, two berths, and manifest rail, reducing the environmental impacts of constructing new infrastructure. The preferred site is cost-effective, as it has access to a terminalling partner who will utilize an existing deep-water dock with two berths to import feedstocks and export renewable fuel.

  - Project-Specific Criteria: This is the preferred alternative because it meets all project-specific criteria. By utilizing the preferred site, a renewable fuels facility would be built. This alternative has access to navigable waters and would allow the Applicant to receive feedstock via vessel and supply renewable diesel to West Coast Markets, with the least environmental impacts of the sites evaluated.

- No-Build Alternative – Under the no-build alternative, the NEXT Renewable Fuels Oregon Project would not be constructed, and the project purpose and need would not be satisfied.

Project-Specific Criteria: This alternative is not considered a feasible alternative because it does not meet any of the project-specific criteria. Under this alternative a renewable fuels facility would not be built, and the applicant could not supply renewable diesel to West Coast markets.

(8) ADDITIONAL INFORMATION

Are there state or federally listed species on the project site?	☒ **Yes**	☐ **No**	☐ **Unknown**
Is the project site within designated or proposed critical habitat?	☐ **Yes**	☒ **No**	☐ **Unknown**
Is the project site within a national Wild and Scenic River ?	☐ **Yes**	☒ **No**	☐ **Unknown**
Is the project site within a State Scenic Waterway?	☐ **Yes**	☒ **No**	☐ **Unknown**
Is the project site within the 100-year floodplain?	☐ **Yes**	☒ **No**	☐ **Unknown**
If yes to any above, explain in Block 6 and describe measures to minimize adverse effects to those resources in Block 7.			
Is the project site within the Territorial Sea Plan (TSP) Area?	☐ **Yes**	☒ **No**	☐ **Unknown**
If yes, attach TSP review as a separate document for DSL.			
Is the project site within a designated Marine Reserve?	☐ **Yes**	☒ **No**	☐ **Unknown**
If yes, certain additional DSL restrictions will apply.			
Will the overall project involve ground disturbance of one acre or more?	☒ **Yes**	☐ **No**	☐ **Unknown**
If yes, you may need a 1200-C permit from the Oregon Department of Environmental Quality (DEQ).			
Is the fill or dredged material a carrier of contaminants from on-site or off-site spills?	☐ **Yes**	☒ **No**	☐ **Unknown**
Has the fill or dredged material been physically and/or chemically tested?	☒ **Yes**	☐ **No**	☐ **Unknown**
If yes, explain in Block 6 and provide references to any physical/chemical testing report(s).			
Has a cultural resource (archaeological and/or built environment) survey been performed on the project area?	☒ **Yes**	☐ **No**	☐ **Unknown**
Do you have any additional archaeological or built environment documentation, or correspondence from tribes or the State Historic Preservation Office?	☒ **Yes**	☐ **No**	☐ **Unknown**
If yes, provide a copy of the survey and/or documentation of correspondence with this application to the Corps only. Do not describe any resources in this document. Do not provide the survey or documentation to DSL.			

Is the project part of a DEQ Cleanup Site? No☒ Yes☐ Permit number ____________

DEQ contact._________________________

Will the project result in new impervious surfaces or the redevelopment of existing surfaces? Yes ☒ No ☐

If yes, the applicant must submit a post-construction stormwater management plan as part of this application to DEQ's 401 WQC program for review and approval, see https://www.oregon.gov/deq/FilterDocs/401wqcertPostCon.pdf

Identify any other federal agency that is funding, authorizing or implementing the project.

Agency Name	Contact Name	Phone Number	Most Recent Date of Contact
US Army Corps of Engineers	Joseph Brock	(503)808-4377	6/22/2021

List other certificates or approvals/denials required or received from other federal, state or local agencies for work described in this application.

Agency	Certificate / approval / denial description	Date Applied
Oregon Department of Environmental Quality (DEQ)	Air Containment Discharge Permit	In process
DEQ	401 Certification	1/15/2021
DEQ	1200-Z Industrial Stormwater Permit	TBD following 90% Design
DEQ	1200-C Stormwater Construction Permit	1200-C Stormwater Construction Permit
Oregon Department of Energy	Energy Facility Siting Council Exemption	10/31/2020, resubmitted 2/26/2021
Oregon Department of State Lands (DSL)	Removal/Fill Permit	1/15/2021
DSL	Wetland Delineation Concurrence (Project Area)	11/16/2020
DSL	Wetland Delineation Concurrence (Mitigation Site)	1/08/2021
Columbia County	Land Use Permit	1/20/21, resubmitted 7/13/21, Approved 2/23/22
Columbia County	Conditional Use Permit	1/20/21, resubmitted 7/13/21, Approved 2/23/22
Columbia County	Building Permit	TBD following final design

Other DSL and/or Corps Actions Associated with this Site (Check all that apply.)

☐ Work proposed on or over lands owned by or leased from the Corps (may require authorization pursuant to 33 USC 408). These could include the federal navigation channel, structures, levees, real estate, dikes, dams, and other Corps projects.

☐ State owned waterway	DSL Waterway Lease #:	
☐ Other Corps or DSL Permits	Corps #	DSL # 63077
☐ Violation for Unauthorized Activity	Corps #	DSL #
☑ Wetland and Waters Delineation	Corps #	DSL # WD2020-0663, WD2021-0501

Submit the entire delineation report to the Corps; submit only the concurrence letter (if complete) and approved maps to DSL. If not previously submitted to DSL, send under a separate cover letter

(9) IMPACTS, RESTORATION/REHABILITATION, AND COMPENSATORY MITIGATION

A. Describe unavoidable environmental impacts that are likely to result from the proposed project. Include permanent, temporary, direct, and indirect impacts.

Permanent and temporary impacts from the proposed project will include impacts to wetlands and waterways, an increase in imperious surface area, and localized increase in sediment and pollutant runoff associated with construction activities. Native and non-native vegetation, wetland habitat, and drainage ditches will be impacted during the proposed project activities. Specific impacts are listed below.

Wetlands

Permanent Impacts. Construction of the NEXT Renewable Fuels Project will permanently remove 104.30 ac. of low-functioning wetlands in Wetlands 1 and 2. The size and configuration of the facility and ancillary components were designed to minimize impacts to wetlands by reducing the overall footprint, maximizing the use of uplands within the footprint, and locating necessary components in low-quality, highly disturbed wetlands. All wetland impacts will be mitigated through permittee-responsible compensatory wetland mitigation 0.25 miles south of the impact site. The enhancement of 484.44 ac. of wetlands, the implementation of erosion control measures, and other conservation measures (BMP) are expected to minimize the project's short- and long-term effects.

Temporary Impacts. Construction of the facility will temporarily impact 4.5 ac. of Wetland 1, 0.04 acres of Wetland 2, and 27.0 ac. of Mitigation Site Wetland 1. Temporary impacts to wetland areas will be restored in accordance with the "*NEXT Renewable Fuels Oregon Restoration Plan for Temporary Impacts to Wetlands"* (See Appendix F). No adverse effects are anticipated from the temporary wetland impact.

Waterways:

Permanent Impacts. Construction of the facility will permanently fill 0.79 ac. of Waterway E. Any drainage associated with Waterway E will be collected into the facility's stormwater system. Impacts to Waterways A though D are from the placement of a culvert under the pipeline access road, the main access road, and the rail spur to allow for the continued conveyance of irrigation and drainage water maintain flow. Permanent impacts will be mitigated by the construction of new waterways in the compensatory wetland mitigation site.

Temporary Impacts. No long-term adverse effects are anticipated from the disturbance to waterways as the drainage/irrigation ditches will continue to convey water. Short-term impacts include temporary soil and vegetation disturbance and the potential for construction debris to enter the waterway. BMPs will be implemented to minimize the sediment and pollutants entering the waterways during construction.

Upland:

Construction of the facility will permanently impact 8.53 ac. of upland within the project area. Long-term impacts include loss of forage. Erosion control measures will be implemented during construction to minimize sediment release during construction.

B. For temporary removal or fill or disturbance of vegetation in waterbodies, wetlands or riparian (i.e., streamside) areas, discuss how the site will be restored after construction to include the timeline for restoration.

Following construction completion, all temporarily disturbed work areas will be restored to pre-construction conditions. All construction debris and any temporary site modifications will be removed from the construction area and properly disposed of in an approved location. Any temporarily disturbed areas with pre-construction vegetation will be reseeded with a native seed mix. Seeding will be completed by a qualified contractor during the proper season to provide optimum chances for success. Once planting is complete, the area will be maintained by the Applicant.

Maintenance/monitoring will include a general assessment of site regrowth when the Applicant conducts general maintenance operations. The native seeding mix used for post-construction restoration is presented in Table 10 below.

Table 10: Native Seed Mix

Species	Wetland Indicator Status	Percent Mix Desired
Meadow barley (*Hordeum brachyantherum*)	FACW	10
Western mannagrass (*Glyceria occidentalis*)	OBL	15
Tufted hairgrass (*Deschampsia cespitosa*)	FACW	15
American sloughgrass (*Beckmannia syzigachne*)	OBL	15
Spike bentgrass (*Agrostis exarata*)	FACW	15
Annual hairgrass (*Deschampsia danthonioides*)	FACW	15
Baltic rush (*Juncus balticus*)	FACW	15

Temporary impacts to wetland areas will be restored in accordance with the "*NEXT Renewable Fuels Oregon Restoration Plan for Temporary Impacts to Wetlands"* (Appendix F).

Compensatory Mitigation

C. Proposed mitigation approach. Check all that apply:

- ☑ Permittee-responsible Onsite Mitigation
- ☐ Permittee-responsible Offsite mitigation
- ☐ Mitigation Bank or In-Lieu Fee Program
- ☐ Payment to Provide (not approved for use with Corps permits)

D. Provide a brief description of proposed mitigation approach and the rationale for choosing that approach. If you believe mitigation should not be required, explain why.

Construction of the NEXT Renewable Fuels Project will permanently remove 104.30 ac. of low-functioning Wetlands and will require mitigation by both USACE and DSL. The Applicant considered multiple mitigation options, including different sites, the In-Lieu Fee Program, and mitigation banking. Mitigation banking was not an option as there are no mitigation banks located within the approved watershed area, and the in-lieu fee program would not satisfy the USACE requirement. The Applicant considered different locations within the watershed but ultimately determined that mitigation near the site would be the most effective approach with the highest potential for long-term success.

The proposed mitigation site is located approximately 0.25 miles south of the impact area. The proposed site is approximately 590 ac. and is owned by Oregon Port AG Investors, LLC and leased to NEXT Renewable Fuels Oregon, LLC. A wetland delineation was conducted by Anderson Perry & Associates, Inc., in April and May 2021. Two wetlands consisting of 580 ac. were mapped at the mitigation site (See Appendix C, "Wetland Mitigation Concurrence NEXT Renewable Fuels Oregon Compensatory Wetland Mitigation Site WD#2021-0501"). The Applicant plans to reestablish native Columbia River bottomland emergent wetlands with a shrub and native–dominated groundcover by restoring degraded wetlands on the proposed mitigation site.

Using the Draft Compensatory Mitigation Eligibility and Accounting Determination Form developed by the Oregon Department of State Lands, it was determined that 3.9 ac. of mitigation will be required per acre of impact (3.9:1 ratio). This form is provided in Appendix D of Appendix C with the Oregon Rapid Wetland Assessment Protocol (ORWAP) data sheets.

The new renewable fuels facility will require permanent fill in two wetlands, with an area of permanent wetland impact of 104.3 ac. (requiring a minimum of 406.77 ac. of mitigation using the 3.9:1 ratio). To mitigate for this impact, 468.78 ac. of wetland will be enhanced at the proposed mitigation site.

In terms of mitigation credits, the 468.78 acres of restoration mitigation represents 120.20 acres of mitigation credit, which exceeds the minimum required under the 3.9:1 mitigation ratio, as shown on Table 11 below.

Table 11: Wetland Mitigation Summary

	Impact Site			Proposed CWM Site					
Wetland ID	Cowardin	HGM[1]	Acres	Mitigation Method	Cowardin	HGM	Acres	Mitigation Ratio	Mitigation Credits Gained
1	PEM/PSS	Flats	104.30						
2	PEM	Flats	0.003						
CWM				Enhance	PEM	Flats	228.32	3.9:1	58.54
CWM				Enhance	PSS	Flats	177.99	3.9:1	45.64
CWM				Enhance	PFO	Flats	62.47	3.9:1	16.02
Total			**104.30**				**468.78**		**120.20**

The objective of this Compensatory Wetland Mitigation (CWM) Plan is to offset permanent impacts to wetland from construction of the project by restoring the hydrology and vegetation of the mitigation site, which will in turn improve wetland functions. This will be accomplished by the following activities:

- Strategically fill approximately 26,800 linear ft. of the site's existing drainage ditches to provide diversified habitat and not impact the drainage district.
- Utilize one growing season of mechanical (plowing/discing/grading) and chemical (herbicide) controls to reduce the presence and potential reestablishment of invasive plant species prior to reestablishing native vegetation.
- Create small, dendritic channels patterned after those typically found in Lower Columbia backwater sloughs.
- Create shallow pools. This will provide an opportunity to diversify emergent vegetation and provide potential reproductive habitat for amphibians and other aquatic wildlife.
- Create overall surface roughness (enhanced microtopography). Surface microtopography will be incorporated throughout the site to diversify surface hydrology and resultant vegetation. Microtopography will consist of machinery-induced undulations from site preparation tillage and will result in generally six-inch height/depth variations.
- Create upland buffer zones along public access paths between wetlands.
- Revegetate with native species of appropriate genetic stock to establish a mix of native forbs, grasses, sedges, rushes, and woody species compatible with lower Columbia River bottomland emergent and shrub habitat.
- Utilize adaptive management throughout the project to react quickly and effectively to unforeseen events.
- Incorporate five years of annual vegetation monitoring.

The functions and values of the impacted wetlands and the CWM site (pre- and post-construction) were evaluated using ORWAP. Construction of the Project will remove all functions of the impacted wetlands. These losses will be offset by the creation of the CWM site, which is anticipated to have functions and values similar to or better than the majority of the impacted wetlands.

Since the proposed mitigation area includes existing wetlands a comparison of the pre-construction and post-construction function and value ratings of this area was completed. For complete details of this comparison and the overall mitigation plan, see Appendix D, “Compensatory Wetland Mitigation Plan for NEXT Renewable Fuels Oregon”.

Mitigation Bank / In-Lieu Fee Information:
Name of mitigation bank or in-lieu fee project:
Type and amount of credits to be purchased:

If you are proposing permittee-responsible mitigation, have you prepared a compensatory mitigation plan?
☑ Yes. Submit the plan with this application and complete the remainder of this section.
☐ No. A mitigation plan will need to be submitted (for DSL, this plan is required for a complete

Mitigation Location Information (Fill out only if permittee-responsible mitigation is proposed)

Mitigation Site Name/Legal Description	Mitigation Site Address	Tax Lot #
Located south of the Port Westward Industrial Park between Kallunki and Hermo Road		Sec 27 – 100, 200, 400, 1600 Sec 28 – 300, 1400 Sec 33 - 100 Sec 34 – 300,
County	City	Latitude & Longitude (in DD.DDDD format)
Columbia	Clatskanie	46.145628, -123.175794

Township	Range	Section	Quarter/Quarter
8N	4W	27 28 33 34	NE, NE, NE/NW, NW/NW, SW/NW,SE/NW & SW/SW, SE/SE, SE/NE, NE/NE NW/NW

(10) ADJACENT PROPERTY OWNERS FOR PROJECT AND MITIGATION SITE		
☐ **Pre-printed mailing labels of adjacent property owners attached separately (if more than 30).**	**Project Site Adjacent Property Owners**	**Mitigation Site Adjacent Property Owners**
Contact Name Address 1 Address 2 City, ST ZIP Code	Reino & Thelma Lehto 79680 Quincy Mayger Road Clatskanie, OR 97016	
Contact Name Address 1 Address 2 City, ST ZIP Code	Port of Columbia County Portland General Electric, Leaseholder 121 SW Salmon Street, #1WTC0510 Portland, OR 97231	
Contact Name Address 1 Address 2 City, ST ZIP Code	Felipe & Bobby De La Cruz 80393 Kallunki Road Clatskanie, OR 97016	
Contact Name Address 1 Address 2 City, ST ZIP Code	George & Karen Poysky P.O. Box 158 Clatskanie, OR 97016	
Contact Name Address 1 Address 2 City, ST ZIP Code	Valorie R. White 80773 Kallunki Road Clatskanie, OR 97016	
Contact Name Address 1 Address 2 City, ST ZIP Code		Port of Columbia County P.O. Box 190 Columbia City, OR 97018
Contact Name Address 1 Address 2 City, ST ZIP Code		Timothy M. Keranen 80183 Kallunki Road Clatskanie, OR 97016
Contact Name Address 1 Address 2 City, ST ZIP Code		Gary & Constance Leinonen 79859 Kola Road Clatskanie, OR 97016
Contact Name Address 1 Address 2 City, ST ZIP Code		Lower Columbia River Tree Farm, LLC 1500 SW First Street, #1150 Portland, OR 97231

Contact Name **Address 1** **Address 2** **City, ST ZIP Code**		Karin Irish 6565 Hazeltine National Dr#10 Orlando, FL 32822
Contact Name **Address 1** **Address 2** **City, ST ZIP Code**		Ken E. Kern P.O. Box 825 Clatskanie, OR 97016
Contact Name **Address 1** **Address 2** **City, ST ZIP Code**		Michael P. Seely 18865 Hermo Road, Clatskanie, OR 97016

Property Owners Adjacent to Impact Site

Parcel Number	Taxlot Number	Owners	Address
1	300	NEXT Renewable Fuels Oregon LLC	11767 Katy Freeway STE 705 Houston, TX 77079
2	200	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
3	100	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
4	1100	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
5	600	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
6	500	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
7	400	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
8	100	Valorie White	80773 Kallunki Rd Clatskanie, OR 97016
9	104	Michael Seely	18865 Hermo Rd Clatskanie, OR 97016
10	700	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
11	800	Felipe & Bobby De La Cruz	80393 Kallunki Rd Clatskanie, OR 97016
12	800	Reino & Thelma Lehto	79680 Quincy Mayger Rd Clatskanie, OR 97016
13	600	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
14	900	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
15	1000	Ken Kern	PO Box 825 Clatskanie, OR 97016
16	1100	Karen Irish	6565 Hazeltine National Dr #10 Orlando, FL 32822
17	700	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
18	900	Gary & Constance Leinonen	79859 Kola Rd Clatskanie, OR 97016
19	500	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
20	800	Timothy Keranen	80183 Kallunki Rd Clatskanie, OR 97016
21	400	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
22	600	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231

Property Owners Adjacent to Impact Site

Parcel Number	Taxlot Number	Owners	Address
23	501	George & Karen Poysky	PO Box 158 Clatskanie, OR 97016
24	500	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
25	100	Michael Seely	18865 Hermo Rd Clatskanie, OR 97016
26	101	Warren Seely	18865 Hermo Rd Clatskanie, OR 97016
27	400	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
28	200	Harbor Master Beef LLC	19039 Beaver Dike Rd Clatskanie, OR 97016
29	200	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
30	300	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
31	200	Lawrence & Wanda Derby	81036 Erickson Dike Clatskanie, OR 97016
32	100	George & Karen Poysky	PO Box 158 Clatskanie, OR 97016
33	700	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
34	700	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
35	200	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
36	500	E. Boswell, et. Al	20047 S Fischers Mill Rd Oregon City, OR 97045
37	300	Portland General Electric	121 SW Salmon St Portland, OR 97231
38	400	Cascade Kelly Holdings LLC	81200 Kallunki Rd Clatskanie, OR 97016
39	600	Portland General Electric	121 SW Salmon St Portland, OR 97231
40	500	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231

Property Owners Adjacent to Mitigation Site

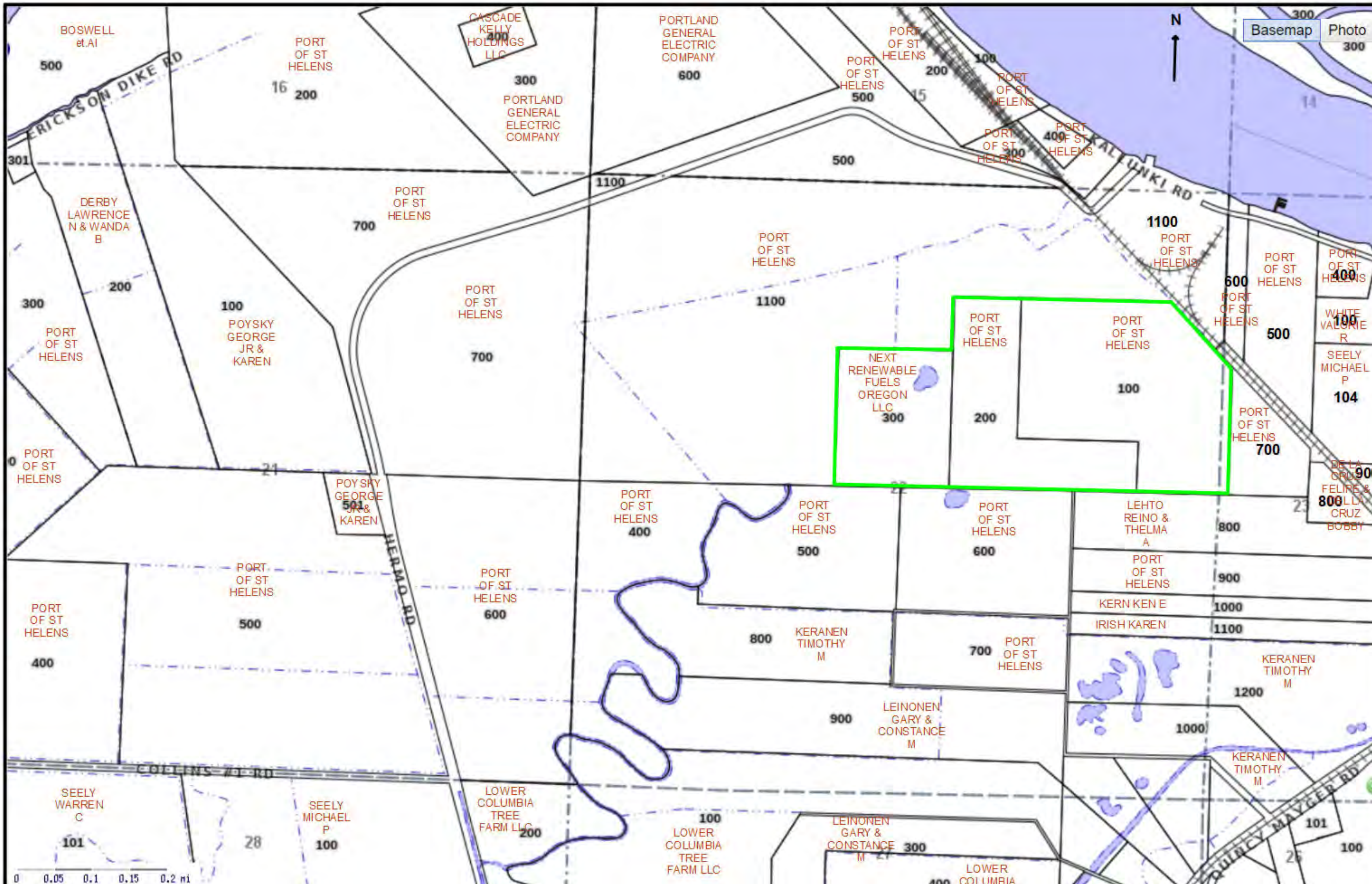
Parcel Number	Taxlot Number	Owners	Address
1	100	Lower Columbia Tree Farm LLC	1500 SW First Ave 1150 Portland, OR 97231
2	300	Lower Columbia Tree Farm LLC	1500 SW First Ave 1150 Portland, OR 97231
3	400	Lower Columbia Tree Farm LLC	1500 SW First Ave 1150 Portland, OR 97231
4	200	Lower Columbia Tree Farm LLC	1500 SW First Ave 1150 Portland, OR 97231
5	1600	Lower Columbia Tree Farm LLC	1500 SW First Ave 1150 Portland, OR 97231
6	300	Lower Columbia Tree Farm LLC	1500 SW First Ave 1150 Portland, OR 97231
7	100	Lower Columbia Tree Farm LLC	1500 SW First Ave 1150 Portland, OR 97231
8	1400	Lower Columbia Tree Farm LLC	1500 SW First Ave 1150 Portland, OR 97231
9	300	Lower Columbia Tree Farm LLC	1500 SW First Ave 1150 Portland, OR 97231
10	500	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
11	600	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
12	400	Port of St. Helens	121 SW Salmon St #1WTC0510 Portland, OR 97231
13	800	Timothy Keranen	80183 Kallunki Rd Clatskanie, OR 97016
14	900	Gary & Constance Leinonen	79859 Kola Rd Clatskanie, OR 97016
15	200	Gary & Constance Leinonen	79859 Kola Rd Clatskanie, OR 97016
16	400	Denise Stram-Youngblood	79847 Kola Rd Clatskanie, OR 97016
17	500	Debra Smiley	79711 Kola Rd Clatskanie, OR 97016
18	600	Nathan & Dorina Bond	79671 Kola Rd Clatskanie, OR 97016
19	700	Beaver Drainage Improvement Company	PO Box 201 Clatskanie, OR 97016
20	500	Brian Cicerchi	9181 NW Sharp Rd Prineville, OR 97754
21	600	Brian Cicerchi	9181 NW Sharp Rd Prineville, OR 97754

Property Owners Adjacent to Mitigation Site

Parcel Number	Taxlot Number	Owners	Address
22	1100	Warren Seely	18865 Hermo Rd Clatskanie, OR 97016
23	1200	Warren Seely	18865 Hermo Rd Clatskanie, OR 97016
24	1500	Trung Huynh & Wendy Schmidt	19396 Hermo Rd Clatskanie, OR 97016
25	1400	Trung Huynh & Wendy Schmidt	19396 Hermo Rd Clatskanie, OR 97016
26	100	Curtis Ollila	19459 Beaver Dike Rd Clatskanie, OR 97016
27	200	Horness Wayne & Lois Trust	19381 Beaver Dike Rd Clatskanie, OR 97016
28	200	Horness Wayne & Lois Trust	19381 Beaver Dike Rd Clatskanie, OR 97016
29	400	Ross Barkhurst & Christine Living	151 N Nemah Rd W South Bend, WA 98586
30	400	Ross Barkhurst & Christine Living	151 N Nemah Rd W South Bend, WA 98586
31	300	Lower Columbia Tree Farm LLC	1500 SW First Ave 1150 Portland, OR 97231
32	100	Randy Anderson	19157 Kallio Rd Clatskanie, OR 97016
33	600	Columbia County	230 Strand Street St. Helens, OR 97051
34	200	Warren Seely	18865 Hermo Rd Clatskanie, OR 97016
35	201	Warren Seely	18865 Hermo Rd Clatskanie, OR 97016
36	300	Hazze LLC	78802 Rantala Rd Clatskanie, OR 97016
37	901	Michael Seely	18865 Hermo Rd Clatskanie, OR 97016
38	1000	Michael Seely	18865 Hermo Rd Clatskanie, OR 97016
39	1100	Dan & Lynn Green	79426 Collins Rd Clatskanie, OR 97016
40	1300	Tyler Brame	76885 Maple Ln Clatskanie, OR 97016
41	1200	Tyler Brame	76885 Maple Ln Clatskanie, OR 97016
42	400	Dan & Lynn Green	79426 Collins Rd Clatskanie, OR 97016
43	200	Harbor Master Beef LLC	19039 Beaver Dike Rd Clatskanie, OR 97016

Property Owners Adjacent to Mitigation Site

Parcel Number	Taxlot Number	Owners	Address
44	300	Lower Columbia Tree Farm LLC	1500 SW First Ave 1150 Portland, OR 97231
45	100	Michael Seely	18865 Hermo Rd Clatskanie, OR 97016
46	300	Gary & Constance Leinonen	79859 Kola Rd Clatskanie, OR 97016



LEGEND

IMPACT SITE

NOTE 1: HARBOR MASTER BEEF LLC (TAXLOT 200) IS WEST OF WARREN SEELY IN SECTION 28

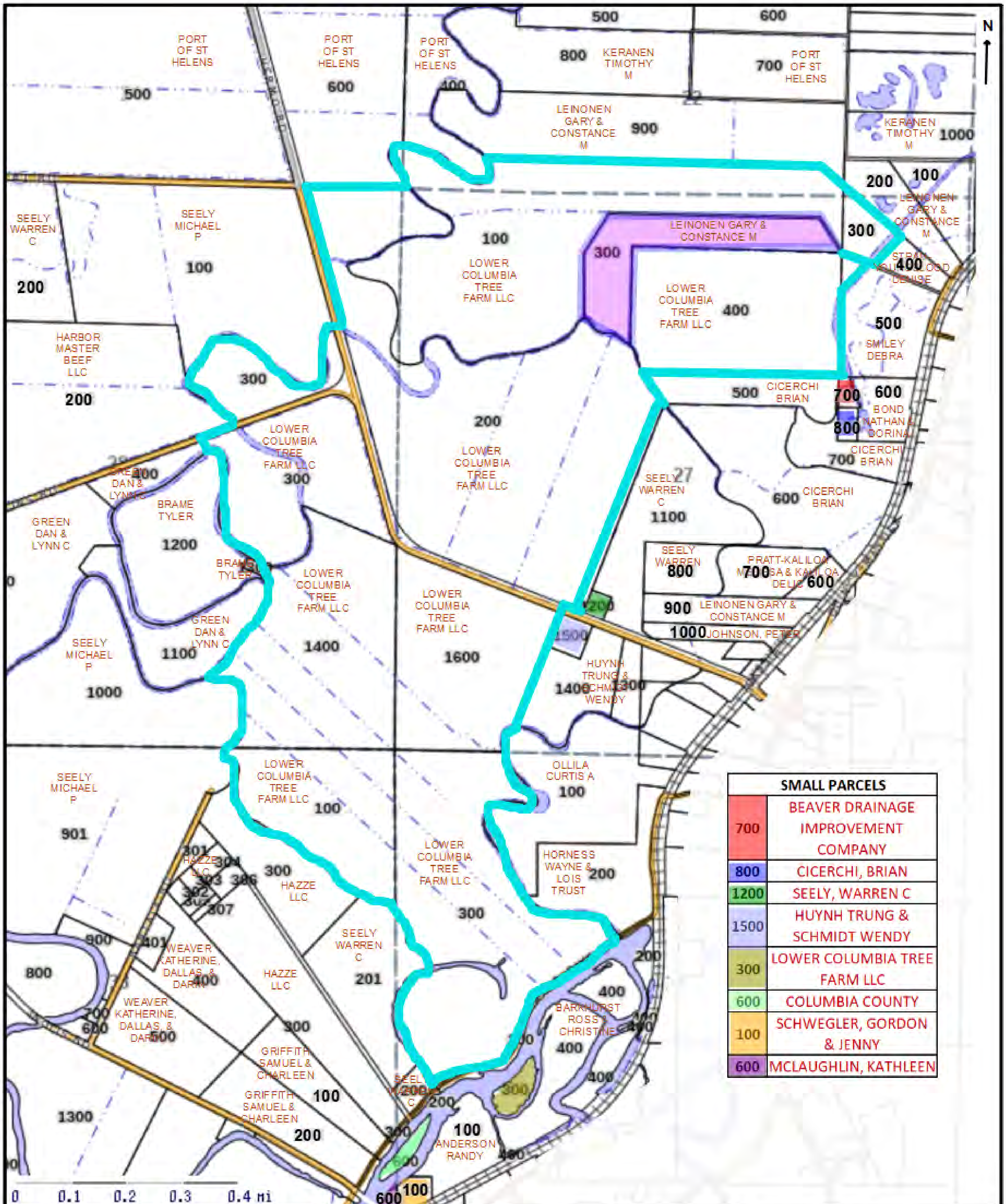
NEXT Renewable Fuels, Inc.

Stewardship Solutions

NEXT RENEWABLE FUELS OREGON, LLC

PORT WESTWARD, OR

PROPERTY OWNERS ADJACENT TO IMPACT SITE



LEGEND

MITIGATION SITE

NEXT Renewable Fuels, Inc.

Stewardship Solutions

NEXT RENEWABLE FUELS OREGON, LLC

PORT WESTWARD, OR

PROPERTY OWNERS ADJACENT TO MITIGATION SITE

(11) CITY/COUNTY PLANNING DEPARTMENT LAND USE AFFIDAVIT (TO BE COMPLETED BY LOCAL PLANNING OFFICIAL)

I have reviewed the project described in this application and have determined that:

- ☐ This project is not regulated by the comprehensive plan and land use regulations
- ☐ This project is consistent with the comprehensive plan and land use regulations
- ☒ This project is consistent with the comprehensive plan and land use regulations with the following:
  - ☒ Conditional Use Approval
  - ☒ Development Permit
  - ☐ Other Permit (explain in comment section below)
- ☐ This project is not currently consistent with the comprehensive plan and land use regulations. To be consistent requires:
  - ☐ Plan Amendment
  - ☐ Zone Change
  - ☐ Other Approval or Review (explain in comment section below)

An application or variance request has ☒ has not ☐ been filed for the approvals required above.

Local planning official name (print)	Title	City / County
ROBERT WHEELDON	Planning Manager	Columbia County

Signature	Date
Robert Wheeldon	01 / 05 / 2022

Comments:
Use requires conditional use permit under CCZO 683.1 and site design review under CCZO 1550.
Permits under review pending 01/19/2022 land use hearing.

(12) COASTAL ZONE CERTIFICATION

~~If the proposed activity described in your permit application is within the Oregon Coastal Zone, the following certification is required before your application can be processed. The signed statement will be forwarded to the Oregon Department of Land Conservation and Development (DLCD) for its concurrence or objection. For additional information on the Oregon Coastal Zone Management Program and consistency reviews of federally permitted projects, contact DLCD at 635 Capitol Street NE, Suite 150, Salem, Oregon 97301 or call 503-373-0050 or click here.~~

~~CERTIFICATION STATEMENT~~
~~I certify that, to the best of my knowledge and belief, the proposed activity described in this application complies with the approved Oregon Coastal Zone Management Program and will be completed in a manner consistent with the program.~~

Print /Type Applicant Name	Title
Applicant Signature	Date

(13) SIGNATURES

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities. By signing this application I consent to allow Corps or DSL staff to enter into the above-described property to inspect the project location and to determine compliance with an authorization, if granted. I hereby authorize the person identified in the authorized agent block below to act in my behalf as my agent in the processing of this application and to furnish supplemental information in support of this permit application. I understand that the granting of other permits by local, county, state or federal agencies does not release me from the requirement of obtaining the permits requested before commencing the project. I understand that payment of the required state processing fee does not guarantee permit issuance.

To be considered complete, the fee must accompany the application to DSL. The fee is not required for submittal of an application to the Corps.

Fee Amount Enclosed	$1,325.00

Applicant Signature (required) must match the name in Block 2	
Print Name Christopher Efird	Title Executive Chairman
Signature	Date

Authorized Agent Signature	
Print Name Laurie Parry	Title Stewardship Solutions, Inc – Consultant
Signature	Date

Landowner Signature(s)*	
Landowner of the Project Site (if different from applicant)	
Print Name Felipe De La Cruz & Boby De La Cruz	Title Owners
Signature Felipe H. De LA Cruz Bobby De LA Cruz	Date 1/7/2021
Landowner of the Mitigation Site (if different from applicant)	
Print Name	Title
Signature	Date
Department of State Lands, Property Manager (to be completed by DSL)	
If the project is located on state-owned submerged and submersible lands, DSL staff will obtain a signature from the Land Management Division of DSL. A signature by DSL for activities proposed on state-owned submerged/submersible lands only grants the applicant consent to apply for a removal-fill permit. A signature for activities on state-owned submerged and submersible lands grants no other authority, express or implied and a separate proprietary authorization may be required.	
Print Name	Title
Signature	Date

* Not required by the Corps.

(13) SIGNATURES

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities. By signing this application I consent to allow Corps or DSL staff to enter into the above-described property to inspect the project location and to determine compliance with an authorization, if granted. I hereby authorize the person identified in the authorized agent block below to act in my behalf as my agent in the processing of this application and to furnish supplemental information in support of this permit application. I understand that the granting of other permits by local, county, state or federal agencies does not release me from the requirement of obtaining the permits requested before commencing the project. I understand that payment of the required state processing fee does not guarantee permit issuance.

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Fee Amount Enclosed	$1,325.00
Applicant Signature (required) must match the name in Block 2	
Print Name Christopher Efird	Title Executive Chairman
Signature	Date
Authorized Agent Signature	
Print Name Laurie Parry	Title Stewardship Solutions, Inc – Consultant
Signature Laurie Parry	Date 1/10/2021

Landowner Signature(s)*	
Landowner of the Project Site (if different from applicant)	
Print Name Christopher Efird	Title Owner, NEXT Renewable FuelsOregon
Signature	Date
Landowner of the Mitigation Site (if different from applicant)	
Print Name	Title
Signature	Date
Department of State Lands, Property Manager (to be completed by DSL)	
If the project is located on state-owned submerged and submersible lands, DSL staff will obtain a signature from the Land Management Division of DSL. A signature by DSL for activities proposed on state-owned submerged/submersible lands only grants the applicant consent to apply for a removal-fill permit. A signature for activities on state-owned submerged and submersible lands grants no other authority, express or implied and a separate proprietary authorization may be required.	
Print Name	Title
Signature	Date

* Not required by the Corps.

(13) SIGNATURES

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To be considered complete, the fee must accompany the application to DSL. The fee is not required for submittal of an application to the Corps.

Fee Amount Enclosed	$1,325.00

Applicant Signature (required) must match the name in Block 2

Print Name Christopher Efird	Title Executive Chairman
Signature	Date

Authorized Agent Signature

Print Name Laurie Parry	Title Stewardship Solutions, Inc – Consultant
Signature	Date

Landowner Signature(s)*

Landowner of the Project Site (if different from applicant)

Print Name Douglas Hayes	Title Executive Director
Signature	Date

Landowner of the Mitigation Site (if different from applicant)

Print Name Douglas Hayes , Port of Columbia County	Title Executive Director
Signature	Date

Department of State Lands, Property Manager (to be completed by DSL)

If the project is located on state-owned submerged and submersible lands, DSL staff will obtain a signature from the Land Management Division of DSL. A signature by DSL for activities proposed on state-owned submerged/submersible lands only grants the applicant consent to apply for a removal-fill permit. A signature for activities on state-owned submerged and submersible lands grants no other authority, express or implied and a separate proprietary authorization may be required.

Print Name	Title
Signature	Date

* Not required by the Corps.

(13) SIGNATURES

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities. By signing this application I consent to allow Corps or DSL staff to enter into the above-described property to inspect the project location and to determine compliance with an authorization, if granted. I hereby authorize the person identified in the authorized agent block below to act in my behalf as my agent in the processing of this application and to furnish supplemental information in support of this permit application. I understand that the granting of other permits by local, county, state or federal agencies does not release me from the requirement of obtaining the permits requested before commencing the project. I understand that payment of the required state processing fee does not guarantee permit issuance.

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Fee Amount Enclosed	$1,325.00

Applicant Signature (required) must match the name in Block 2

Print Name Christopher Efird	Title Executive Chairman
Signature	Date

Authorized Agent Signature

Print Name Laurie Parry	Title Stewardship Solutions, Inc. – Consultant
Signature	Date

Landowner Signature(s)*

Landowner of the Project Site (if different from applicant)

Print Name	Title
Signature	Date

Landowner of the Mitigation Site (if different from applicant)

Print Name Robert Russell	Title Manager, Oregon Port AG Investors, LLC
Signature Rbt Russell	Date 2/7/2022

Department of State Lands, Property Manager (to be completed by DSL)

If the project is located on state-owned submerged and submersible lands, DSL staff will obtain a signature from the Land Management Division of DSL. A signature by DSL for activities proposed on state-owned submerged/submersible lands only grants the applicant consent to apply for a removal-fill permit. A signature for activities on state-owned submerged and submersible lands grants no other authority, express or implied and a separate proprietary authorization may be required.

Print Name	Title
Signature	Date

* Not required by the Corps.

INCUMBENCY CERTIFICATE

NEXT Renewable Fuels Oregon, LLC (entity name as recorded with the Secretary of State, Oregon)

I, **Christopher Efird** (name of registered agent or authorized representative), do hereby certify that:

1. I am the duly elected and acting **Executive Chairman** (position) of NEXT Renewable Fuels, Inc. the sole and managing member of **NEXT Renewable Fuels Oregon, LLC** (entity name as recorded with the Secretary of State, Oregon), a **Foreign Limited Liability Company** (entity type) organized and existing in good standing under the laws of the State of Oregon (the "Entity"); and

2. I have the authority to submit, on behalf of the Entity, this application for a permit to conduct removal-fill within waters of the state (as evidenced by my signature on the application) and to commit the Entity to comply with all resulting permit conditions, including any mitigation obligations, resulting from the issuance of the permit.

______________________________, this 8th day of January, 2021
Signature of Registered Agent or Authorized Representative

NEXT RENEWABLE FUELS, INC.
(the "Company")

UNANIMOUS WRITTEN CONSENT OF THE BOARD OF DIRECTORS

Pursuant to Section 141(f) of the Delaware General Corporation Law (the "DGCL") and Section 2.8 of the Company's Bylaws in effect on the date hereof (the "Bylaws"), the undersigned, being all of the members of the Board of Directors of the Company (the "Board"), hereby consent to the following actions with the same force and effect as if the following recitals and resolutions were adopted and approved at a duly called and held meeting of the Board.

Change in President

WHEREAS, the Board desires to appoint Eugene W. Cotten to serve as the President of the Company (the "New President Appointment"); and

WHEREAS, Christopher Efird, the current President of the Company, has resigned from such position effective immediately prior to the New President Appointment (the "Former President Resignation");

NOW, THEREFORE, BE IT RESOLVED that (i) the Former President Resignation is hereby accepted and (ii) effective as January 5, 2021, Eugene W. Cotton, is hereby appointed to serve as the President of the Company until his successor in office is duly appointed or until his earlier death, resignation or removal.

RESOLVED FURTHER that, after giving effect to the foregoing actions, the executive management of the Company as of January 5, 2021 is as follows:

- Board of Directors: Christopher Efird and Robert Russell.
- Officers: Christopher Efird is the Executive Chairman and Secretary. Eugene W. Cotten is the President. David Kane is the Chief Financial Officer.

****

IN WITNESS WHEREOF, the undersigned hereby execute and deliver this Consent on the dates indicated below but with the actions taken hereby to be effective as of the dates specified herein.

MEMBERS OF THE BOARD:

Christopher Efird

Date: January 4, 2021

Robert Russell

Date: 1-4-21

(14) ATTACHMENTS

☒ Drawings

- ☒ Location map with roads identified
- ☒ U.S.G.S topographic map
- ☒ Tax lot map
- ☒ Site plan(s)
- ☒ Plan view and cross section drawing(s)
- ☒ Recent aerial photo
- ☒ Project photos
- ☒ Erosion and Pollution Control Plan(s), if applicable
- ☐ DSL / Corps Wetland Concurrence letter and map, if approved and applicable

☐ Pre-printed labels for adjacent property owners (Required if more than 30)

☒ Incumbency Certificate if applicant is a partnership or corporation

☒ Restoration plan or rehabilitation plan for temporary impacts

☒ Mitigation plan

☒ Wetland functional assessments, if applicable

- ☒ Cover Page
- ☒ Score Sheets
- ☒ ORWAP OR, F, T, & S forms
- ☒ ORWAP Reports
- ☒ Assessment Maps
- ☒ ORWAP Reports: Soils, Topo, Assessment area, Contributing area

☐ Stream Functional Assessments, if applicable

- ☐ Cover Page
- ☐ Score Sheets
- ☐ SFAM PA, PAA, & EAA forms
- ☐ SFAM Report
- ☐ Assessment Maps
  - ☐ Aerial Photo Site Map and Topo Site Map (Both maps should document the PA, PAA, & EAA)

8 Compensatory Mitigation (CM) Eligibility & Accounting Worksheet

- ☐ Matching Quickguide sheet(s)
- ☒ CM Eligibility & Accounting sheet

☒ Alternatives analysis

☐ Biological assessment (if requested by the Corps project manager during pre-application coordination)

☒ Stormwater management plan (may be required by the Corps or DEQ)

☐ Other

- ☐ Please describe:

For U.S. Army Corps of Engineers send application to:

USACE Portland District
ATTN: CENWP-ODG-P
PO Box 2946
Portland, OR 97208-2946
Phone: 503-808-4373
portlandpermits@usace.army.mil

Counties:
Baker, Benton, Clackamas, Clatsop, Columbia, Gilliam, Grant, Hood River, Jefferson, Lincoln, Linn, Malheur, Marion, Morrow, Multnomah, Polk, Sherman, Tillamook, Umatilla, Union, Wallowa, Wasco, Washington, Wheeler, Yamhill

U.S. Army Corps of Engineers
ATTN: CENWP-ODG-E
211 E. 7th AVE, Suite 105
Eugene, OR 97401-2722
Phone: 541-465-6868
portlandpermits@usace.army.mil

Counties:
Coos, Crook, Curry, Deschutes, Douglas, Jackson, Josephine, Harney, Klamath, Lake, Lane

For Department of State Lands send application to:

West of the Cascades:
Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
Phone: 503-986-5200

East of the Cascades:
Department of State Lands
951 SW Simpson Ave, Suite 104
Bend, Oregon 97702
Phone: 541-388-6112

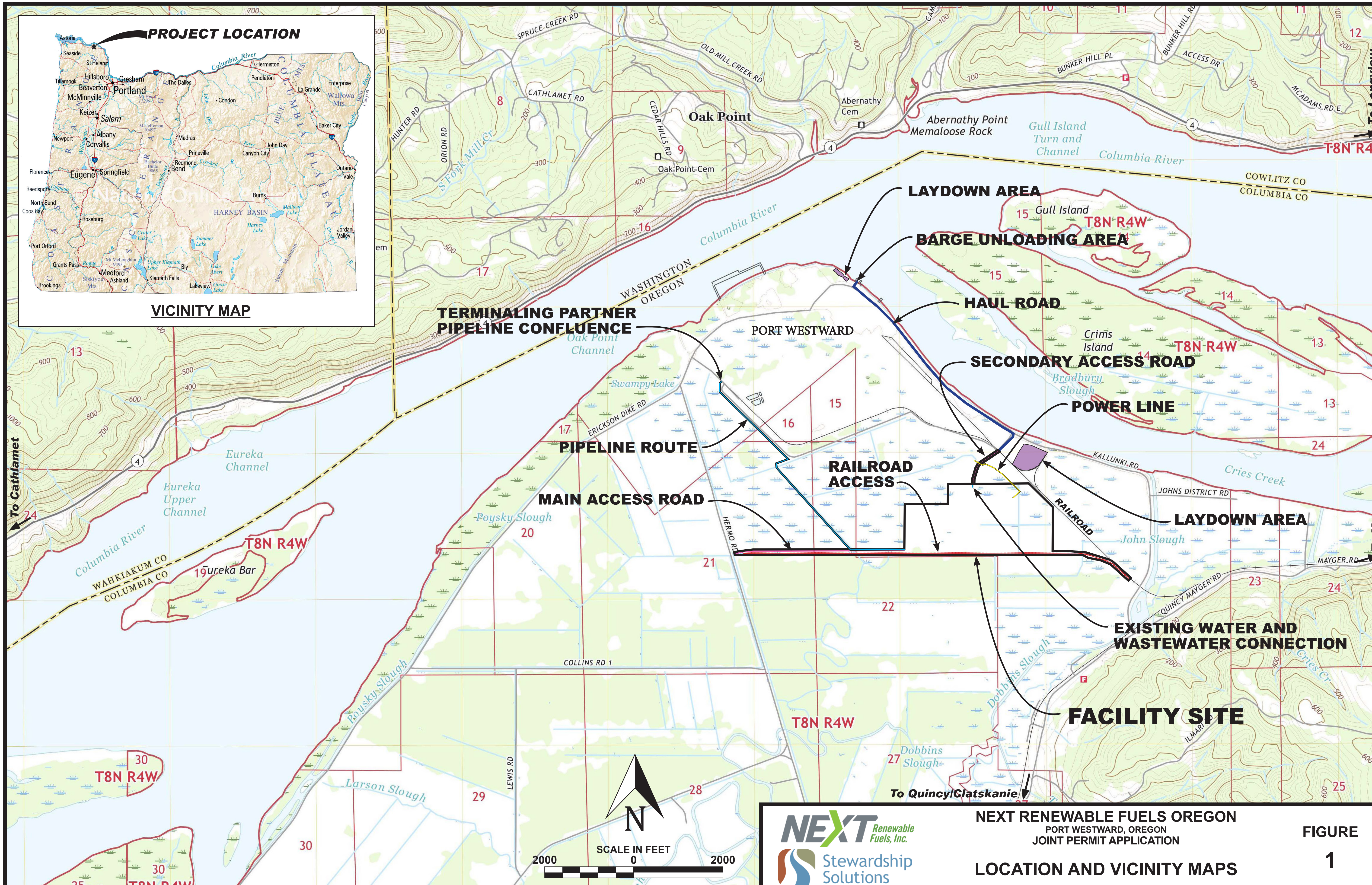
For Department of Environmental Quality e-mail application to:

ATTN: DEQ 401 Certification Program
Water Quality
700 NE Multnomah St, Suite 600
Portland, OR 97232
401applications@deq.state.or.us

FIGURES

JPA Figures 1-19

Next Renewable Fuels, Oregon, LLC.
Joint Permit Application
January 2021, Revise February 2023



NEXT Renewable Fuels, Inc.

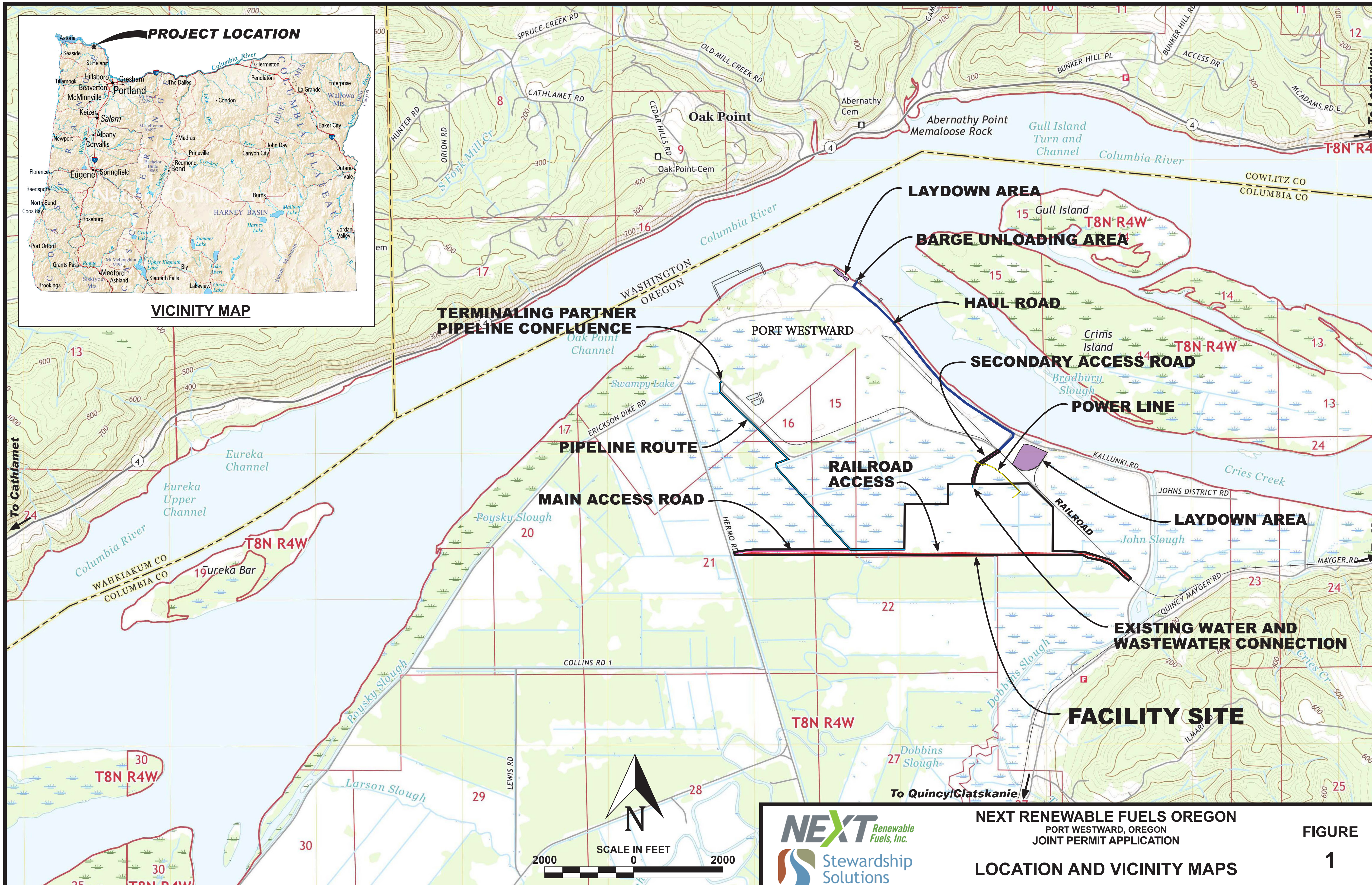
Stewardship Solutions

NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

LOCATION AND VICINITY MAPS

FIGURE 1

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023



NEXT Renewable Fuels, Inc.

Stewardship Solutions

NEXT RENEWABLE FUELS OREGON

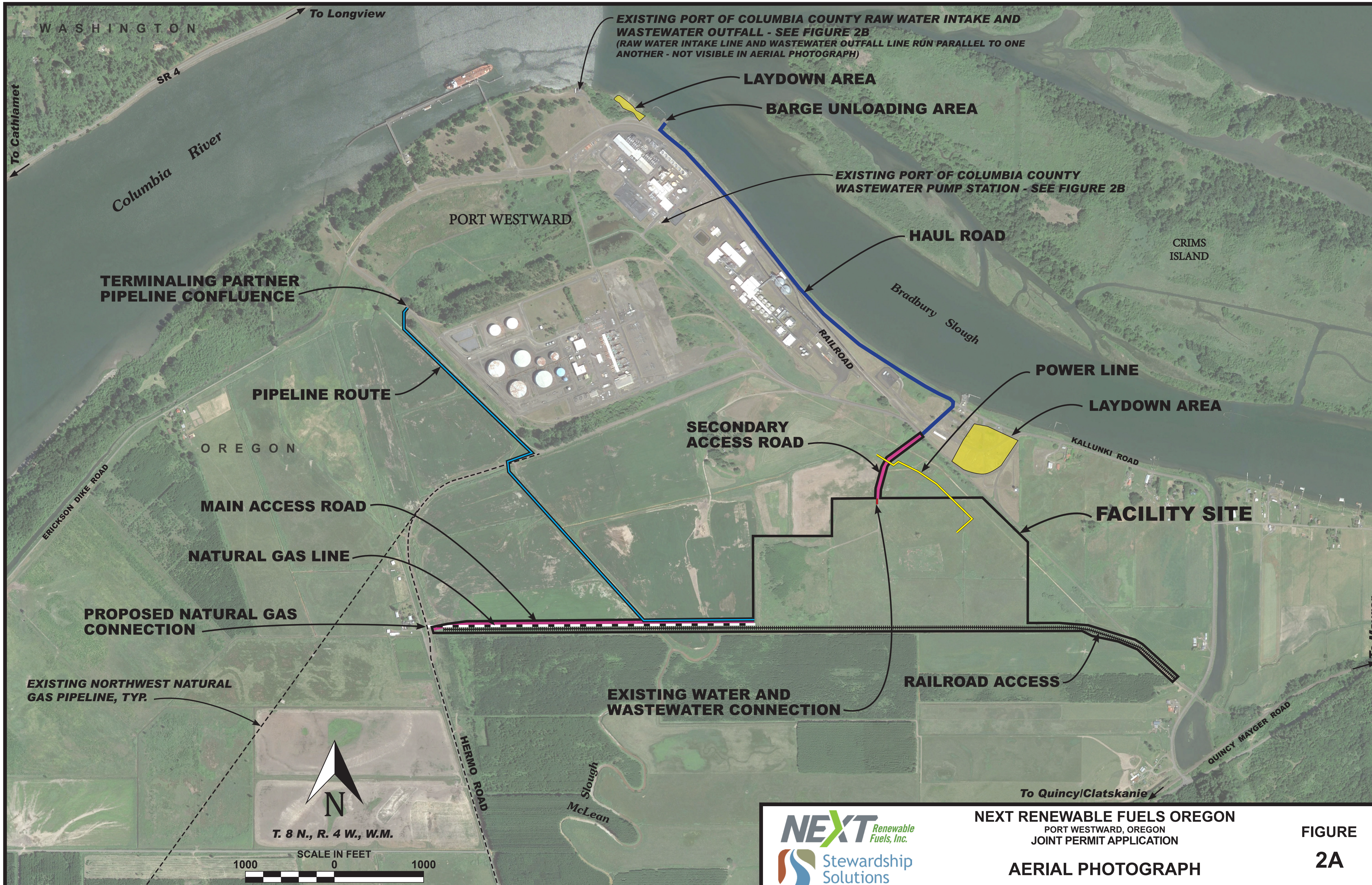
PORT WESTWARD, OREGON

JOINT PERMIT APPLICATION

LOCATION AND VICINITY MAPS

FIGURE 1

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023



NEXT Renewable Fuels, Inc.

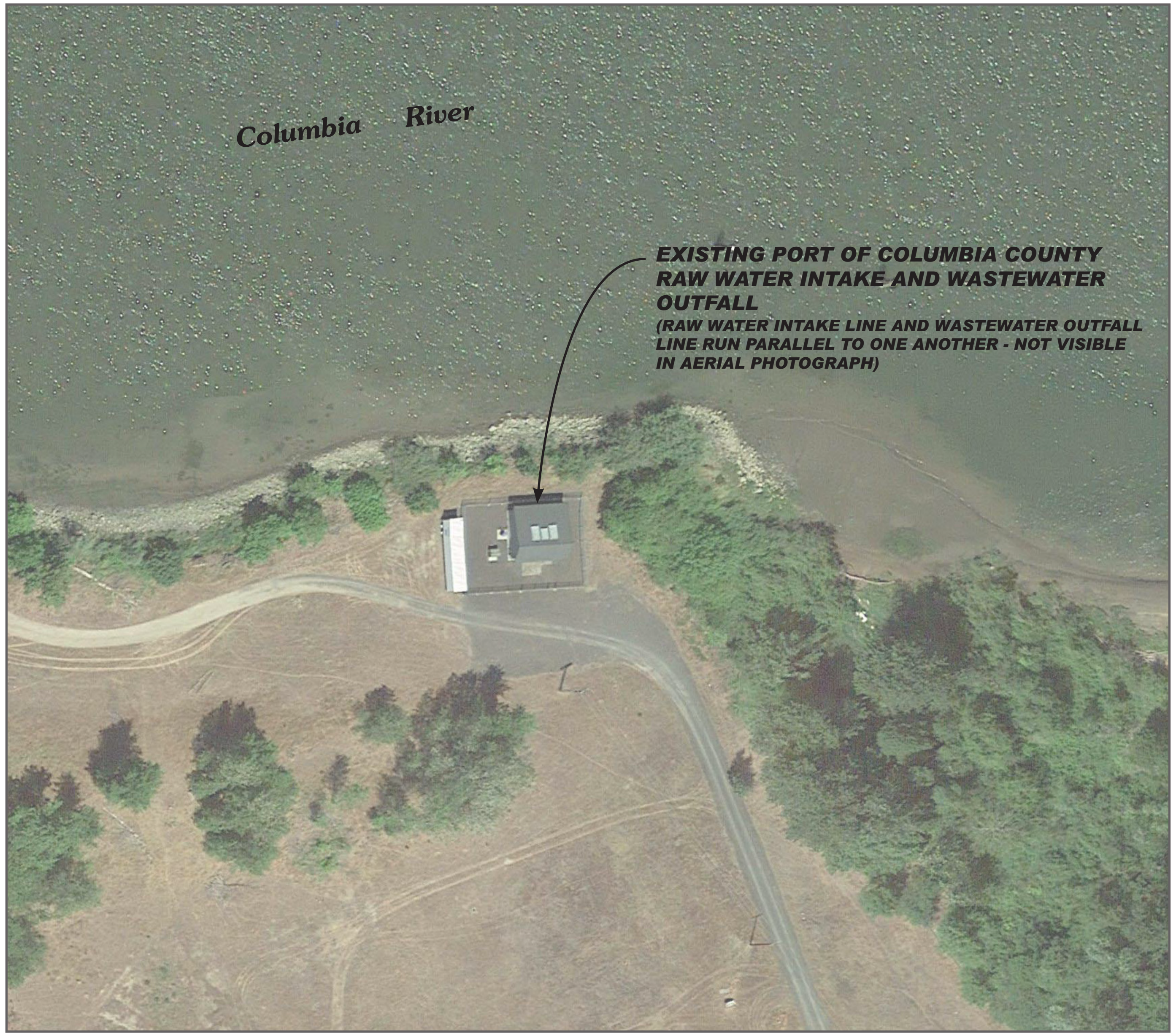
Stewardship Solutions

NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

AERIAL PHOTOGRAPH

FIGURE 2A

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023



N

T. 8 N., R. 4 W., W.M.

SCALE IN FEET
100 0 100

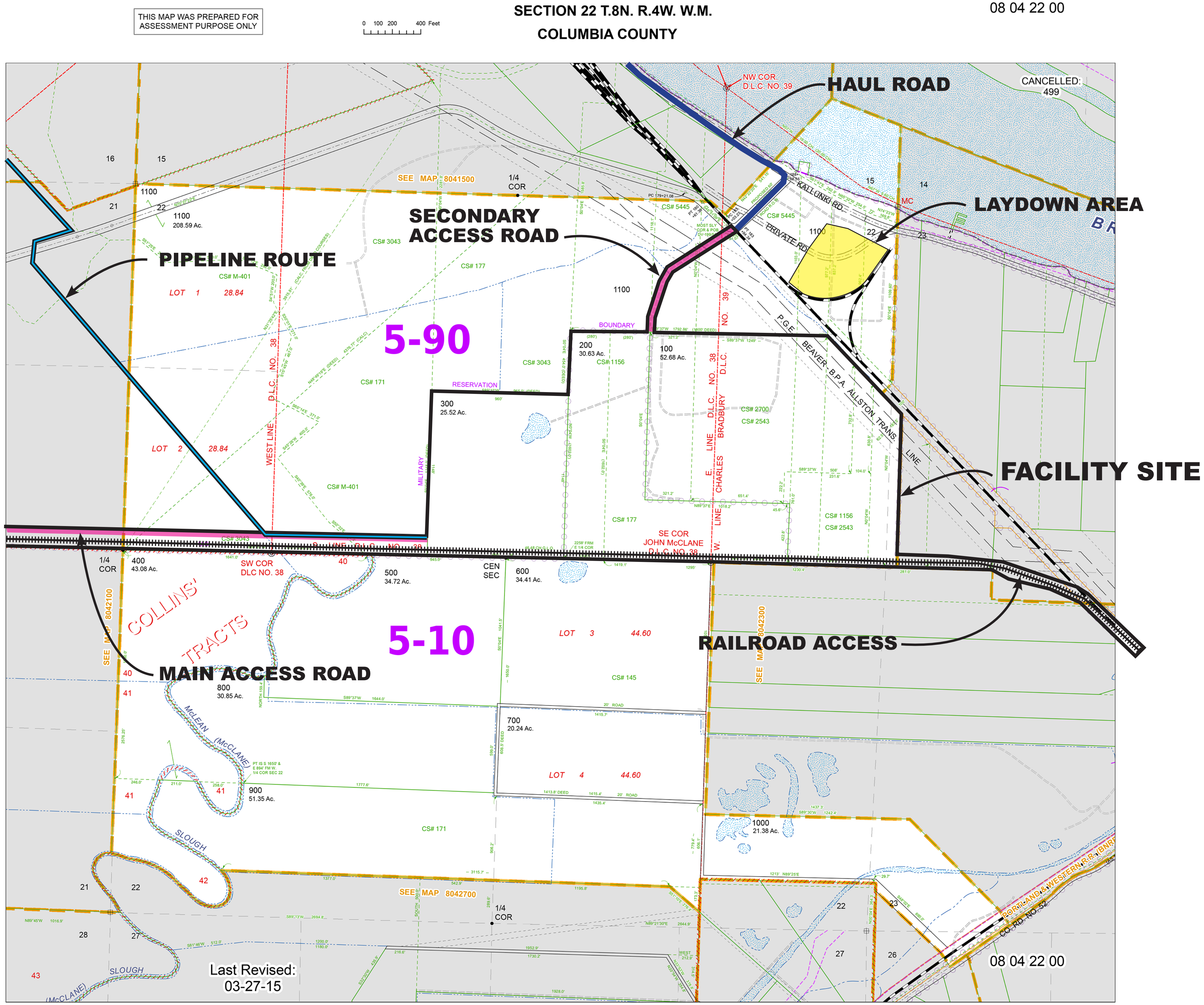
NEXT Renewable Fuels, Inc.
Stewardship Solutions

NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

AERIAL PHOTOGRAPH

FIGURE
2B

NEXT-PortWestwardJPA-Rev2 Dec. 9, 2022



NOTE:
SEE AERIAL PHOTOGRAPH FIGURE 2 FOR SCHEMATIC UTILITY LOCATIONS FOR FACILITY SITE.

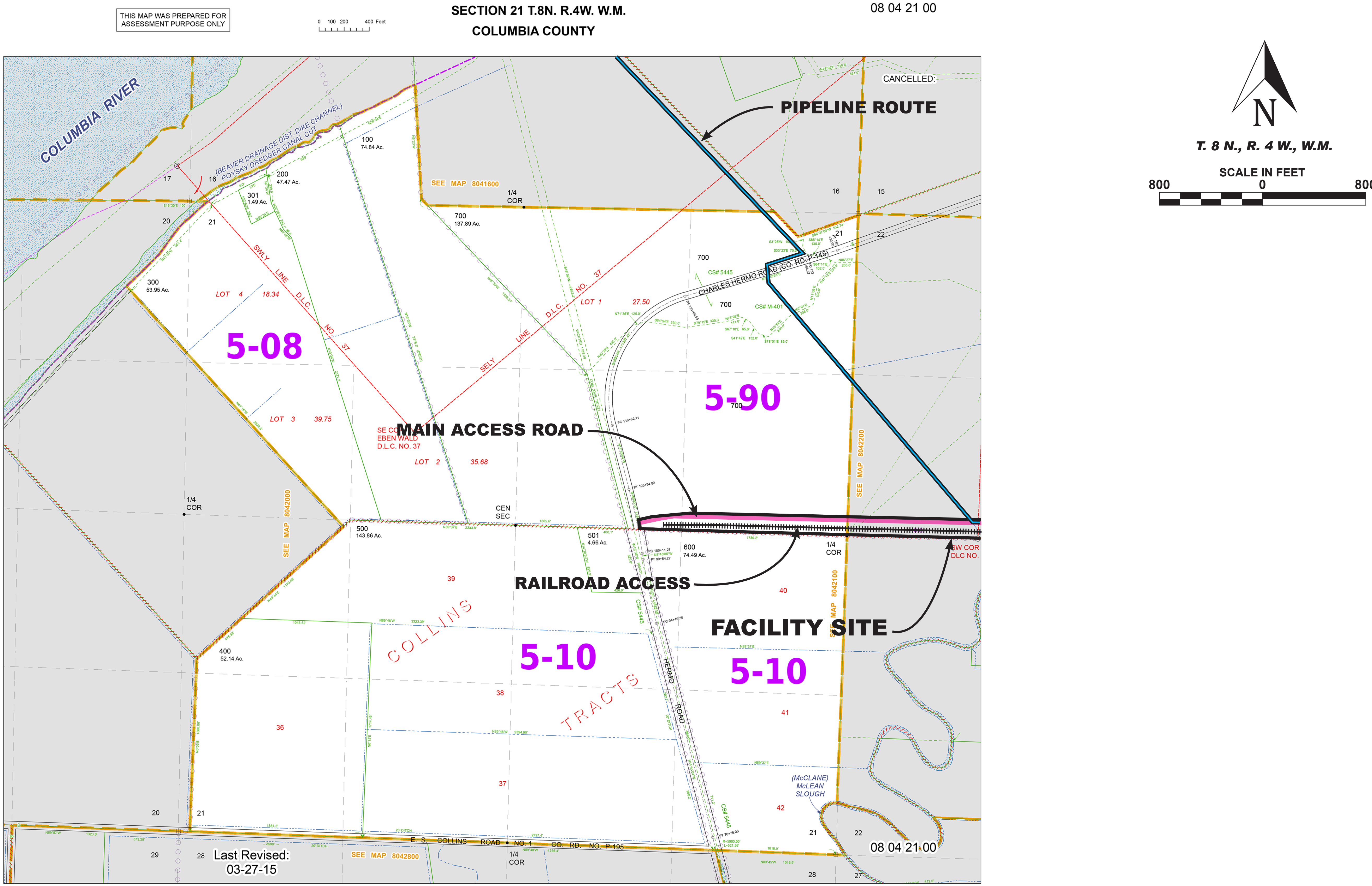
NEXT Renewable Fuels, Inc.
Stewardship Solutions

NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

TAX LOT MAP 1 - 080422

FIGURE 3A

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023



NOTE:
SEE AERIAL PHOTOGRAPH FIGURE 2 FOR SCHEMATIC UTILITY LOCATIONS FOR FACILITY SITE.

NEXT Renewable Fuels, Inc.
Stewardship Solutions

NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

TAX LOT MAP 2 - 080421

FIGURE
3B

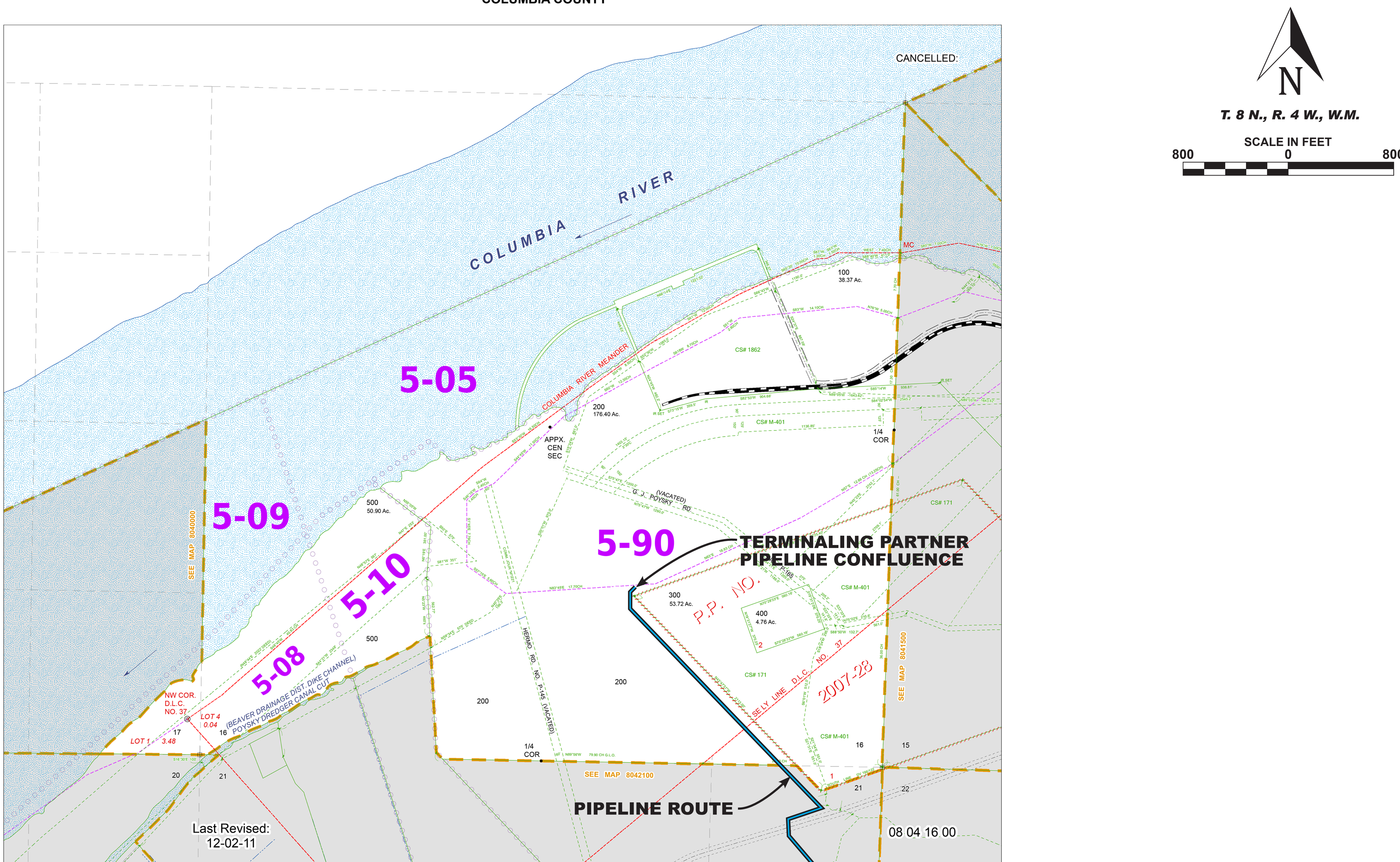
NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023

THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSE ONLY

SECTION 16 T.8N. R.4W. W.M.

COLUMBIA COUNTY

08 04 16 00



NOTE:
SEE AERIAL PHOTOGRAPH FIGURE 2 FOR SCHEMATIC UTILITY LOCATIONS FOR FACILITY SITE.

NEXT Renewable Fuels, Inc.

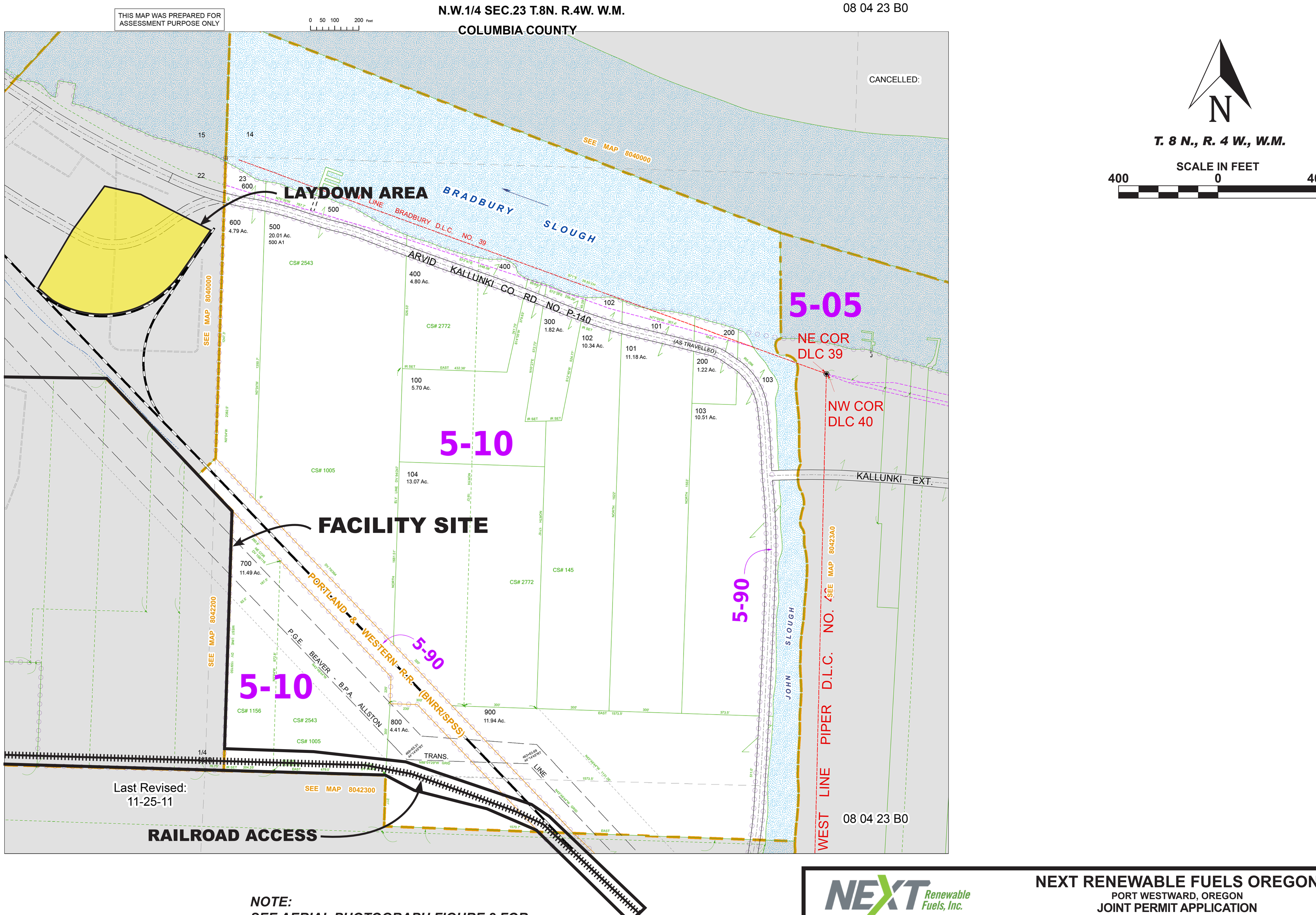
Stewardship Solutions

NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

TAX LOT MAP 3 - 080416

FIGURE
3C

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023



NOTE:
SEE AERIAL PHOTOGRAPH FIGURE 2 FOR SCHEMATIC UTILITY LOCATIONS FOR FACILITY SITE.

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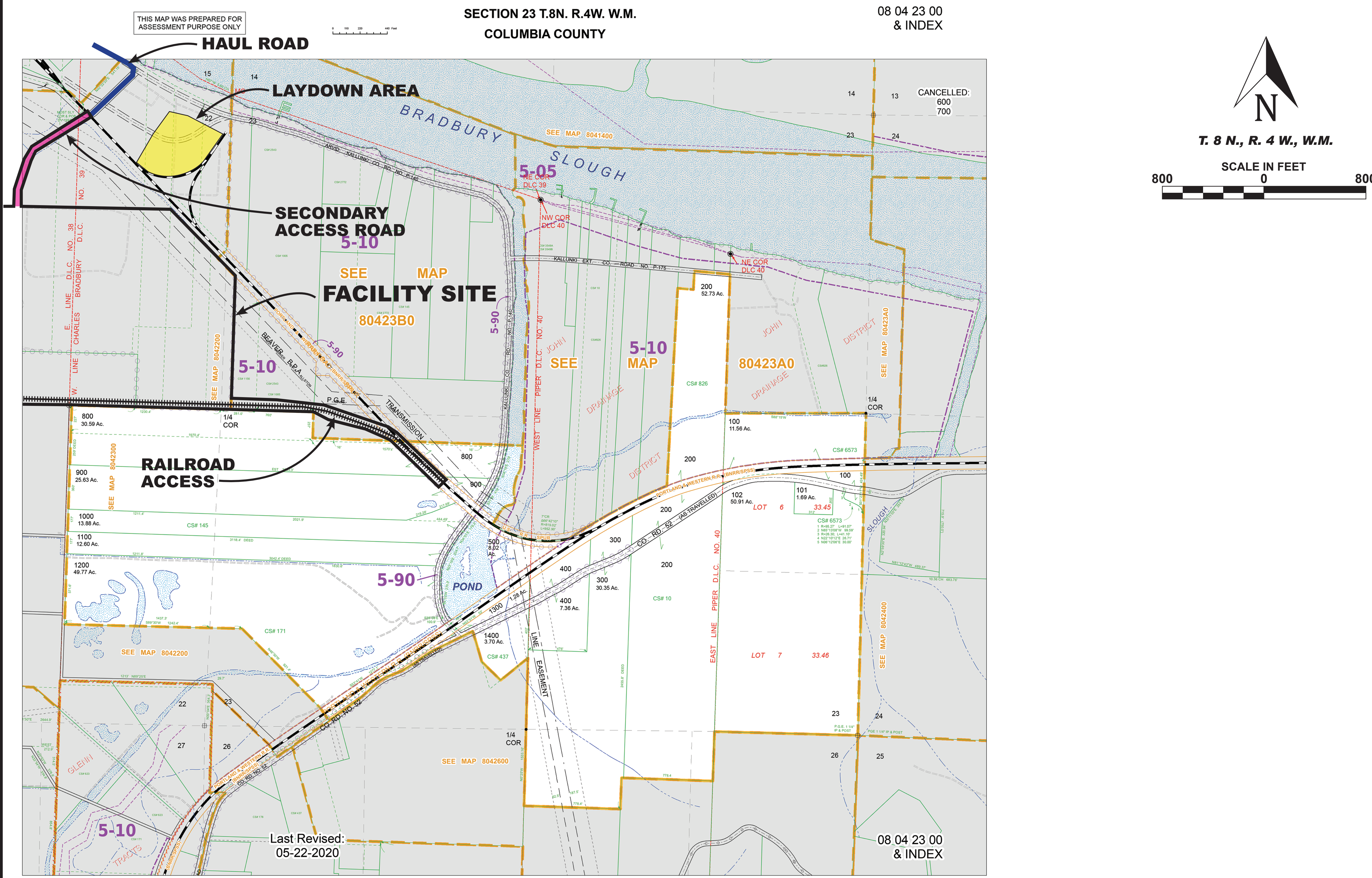
TAX LOT MAP 4 - 080423B

FIGURE
3D

NEXT-PortWestwardJPA-Rev2 Feb. 21, 2023



NOTE:
SEE AERIAL PHOTOGRAPH FIGURE 2 FOR SCHEMATIC UTILITY LOCATIONS FOR FACILITY SITE.

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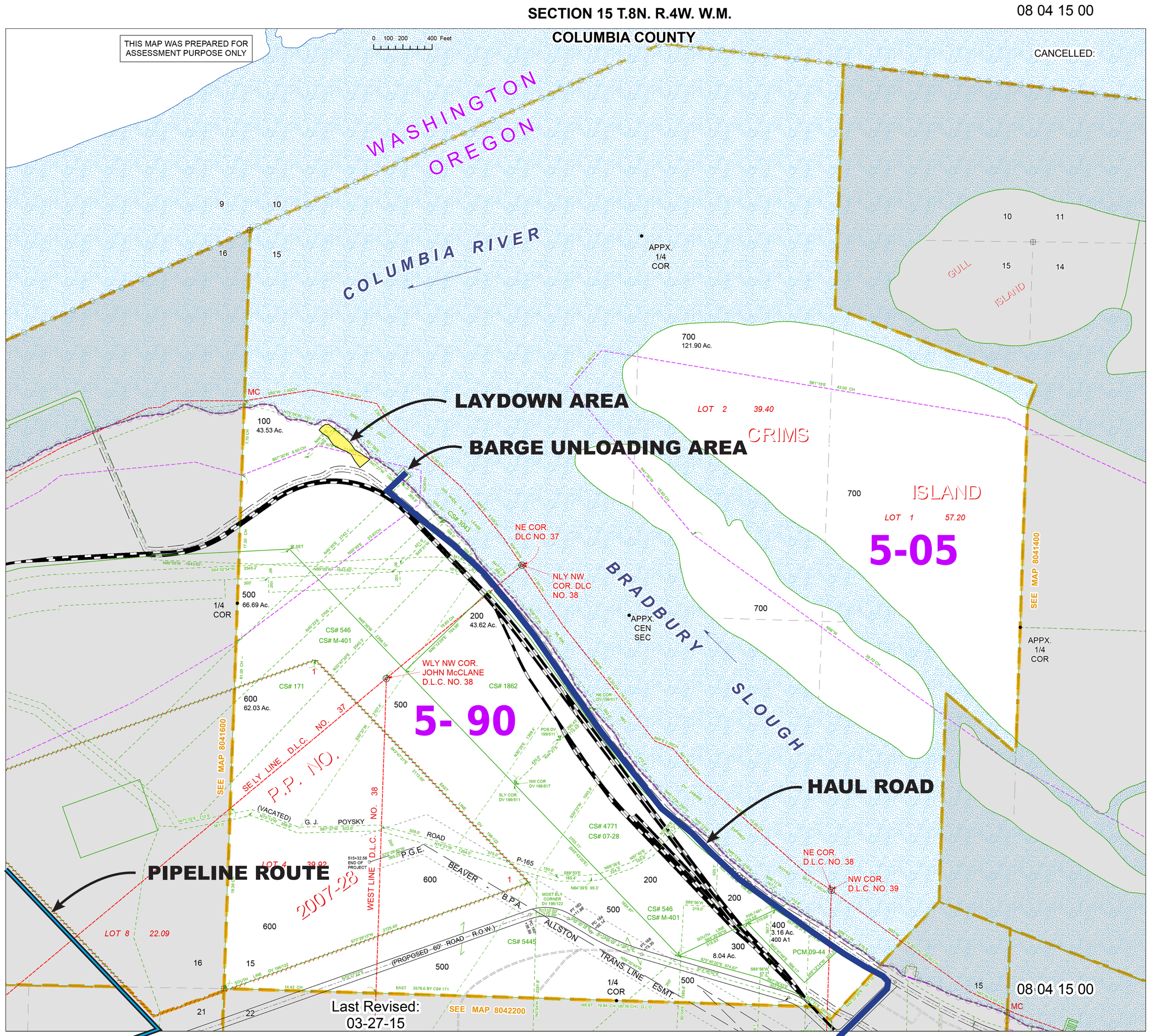
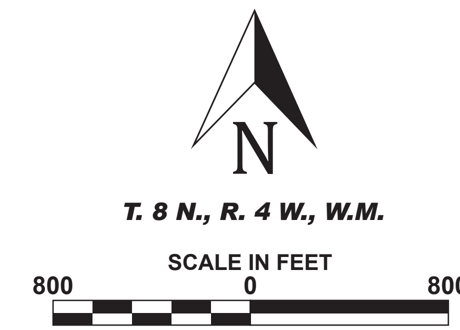
TAX LOT MAP 5 - 080423

FIGURE
3E

NEXT-PortWestwardJPA-Rev2 Feb. 21, 2023





NOTE:
SEE AERIAL PHOTOGRAPH FIGURE 2 FOR SCHEMATIC UTILITY LOCATIONS FOR FACILITY SITE.

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TAX LOT MAP 6 - 080415

FIGURE 3F

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023

PHOTOGRAPH 1 - Overview photo of Port Westward.

PHOTOGRAPH 2 - Looking west from the secondary access road.

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PORT WESTWARD, OREGON

JOINT PERMIT APPLICATION

SITE PHOTOGRAPHS 1

FIGURE

4A

NEXT-PortWestwardJPA-Rev2 Dec. 9, 2022

PHOTOGRAPH 3 - Looking east at the power line corridor.

PHOTOGRAPH 4 - Looking north at Columbia Pacific Bio Refinery.

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SITE PHOTOGRAPHS 2

FIGURE 4B

PHOTOGRAPH 5 - Looking south from the secondary access road.

PHOTOGRAPH 6 - Existing water/wastewater connection.

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PORT WESTWARD, OREGON

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SITE PHOTOGRAPHS 3

FIGURE

4C

PHOTOGRAPH 7 - Staging Area 3 - North Staging Area, looking from south to north from the unloading dock to the Columbia River. Photo taken by Sue Brady, AP biologist.

PHOTOGRAPH 8 - Staging Area 3 - Unloading Dock on Bradbury Slough, looking from Kallunki Road to the northeast towards Bradbury Slough. Photo taken by Sue Brady, AP biologist.

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SITE PHOTOGRAPHS 4

FIGURE 4D

NEXT-PortWestwardJPA-Rev2 Dec. 9, 2022

PHOTOGRAPH 9 - Staging Area 3 - Haul Road, Kallunki Road looking north to south. Photo taken by Sue Brady, AP biologist.

PHOTOGRAPH 10 - Staging Area 3 - South Laydown Area, looking from the southeast to the northwest. Photo taken by Sue Brady, AP biologist.

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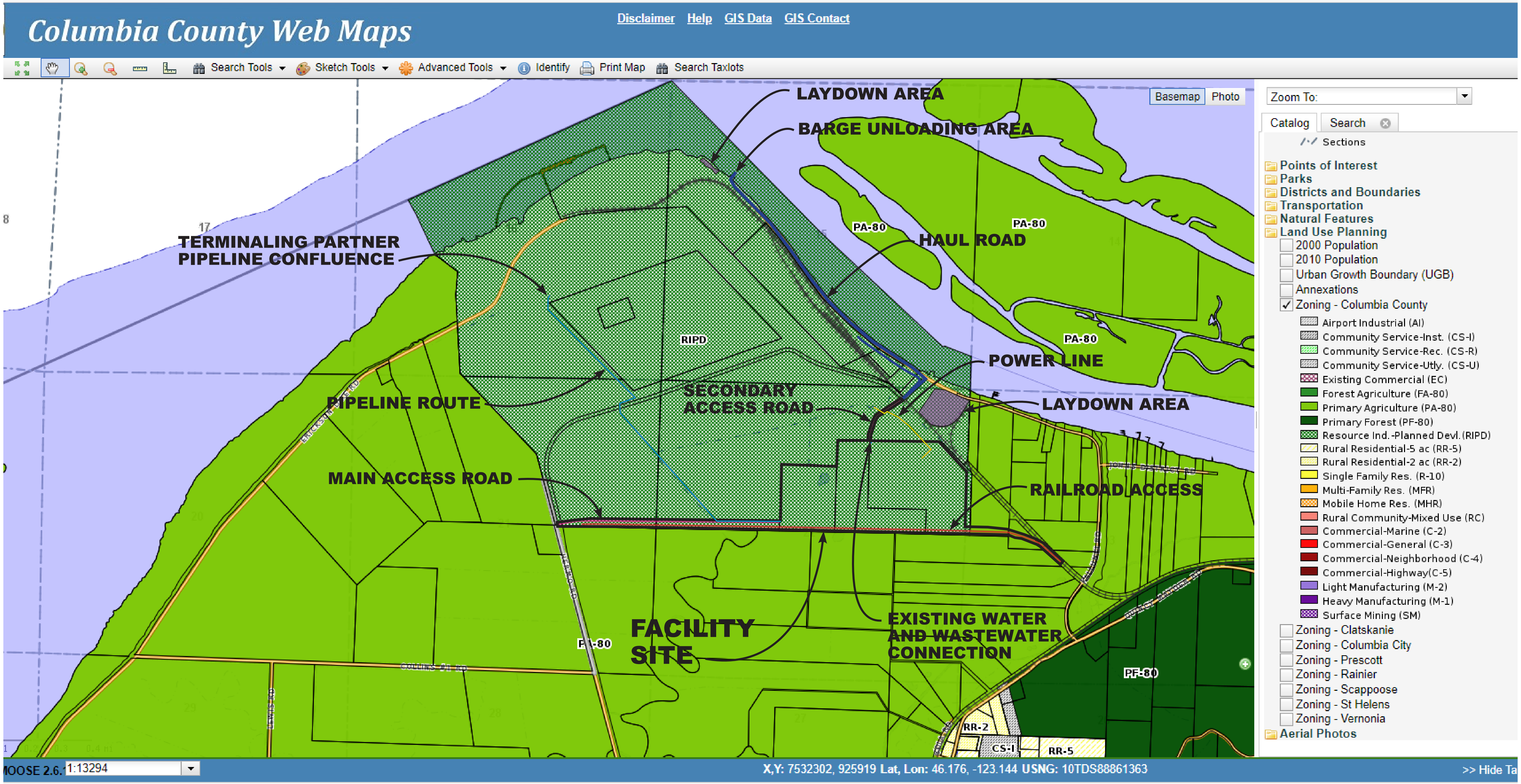
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

SITE PHOTOGRAPHS 5

FIGURE
4E



N

T. 8 N., R. 4 W., W.M.
N.T.S.

MAP OBTAINED FROM:
https://www.columbiacountyor.gov/gis-mapping

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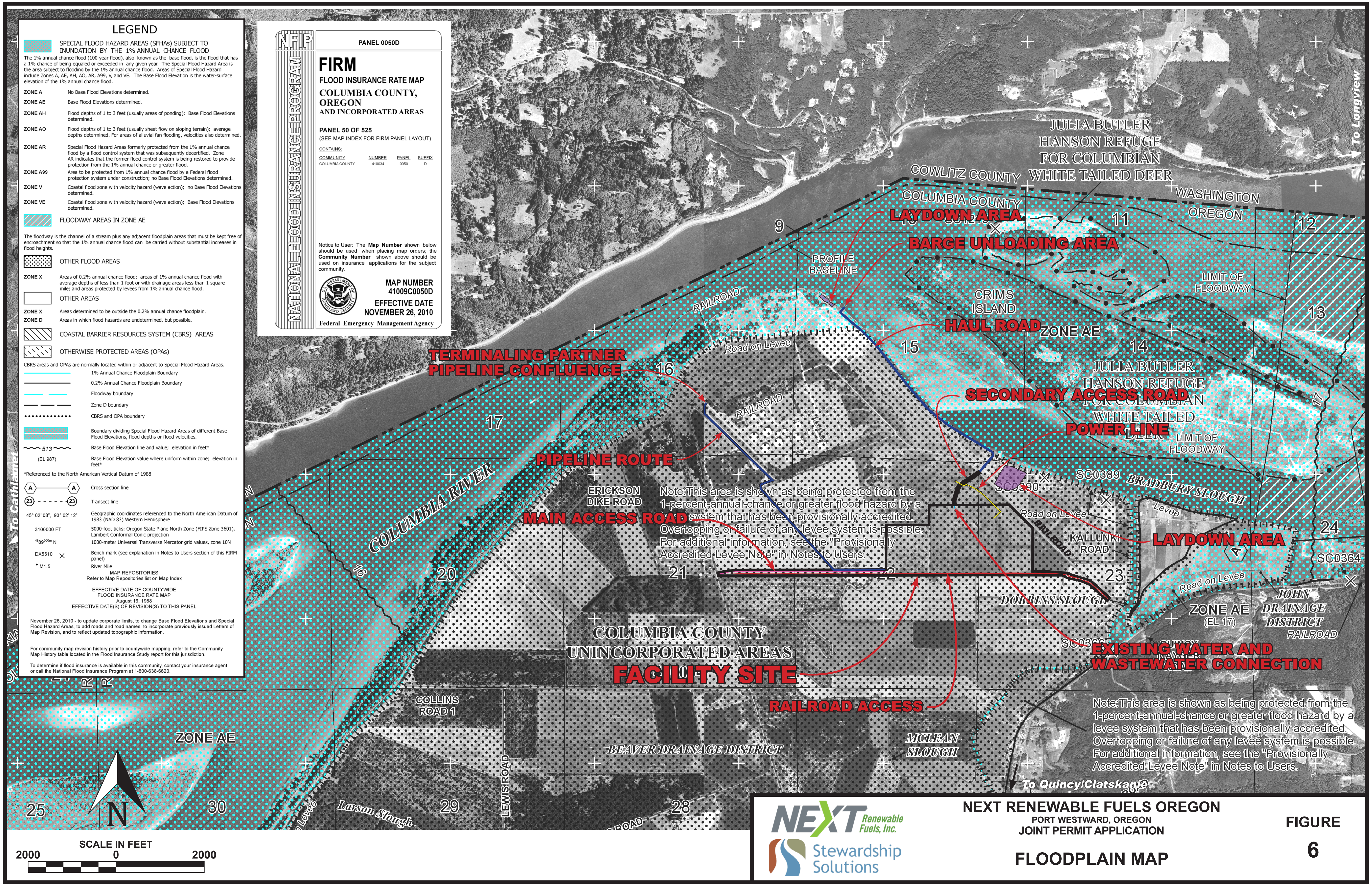
ZONING MAP

FIGURE 5

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023



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PORT WESTWARD, OREGON
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FLOODPLAIN MAP

FIGURE 6

BUILDING AREA SUMMARY:

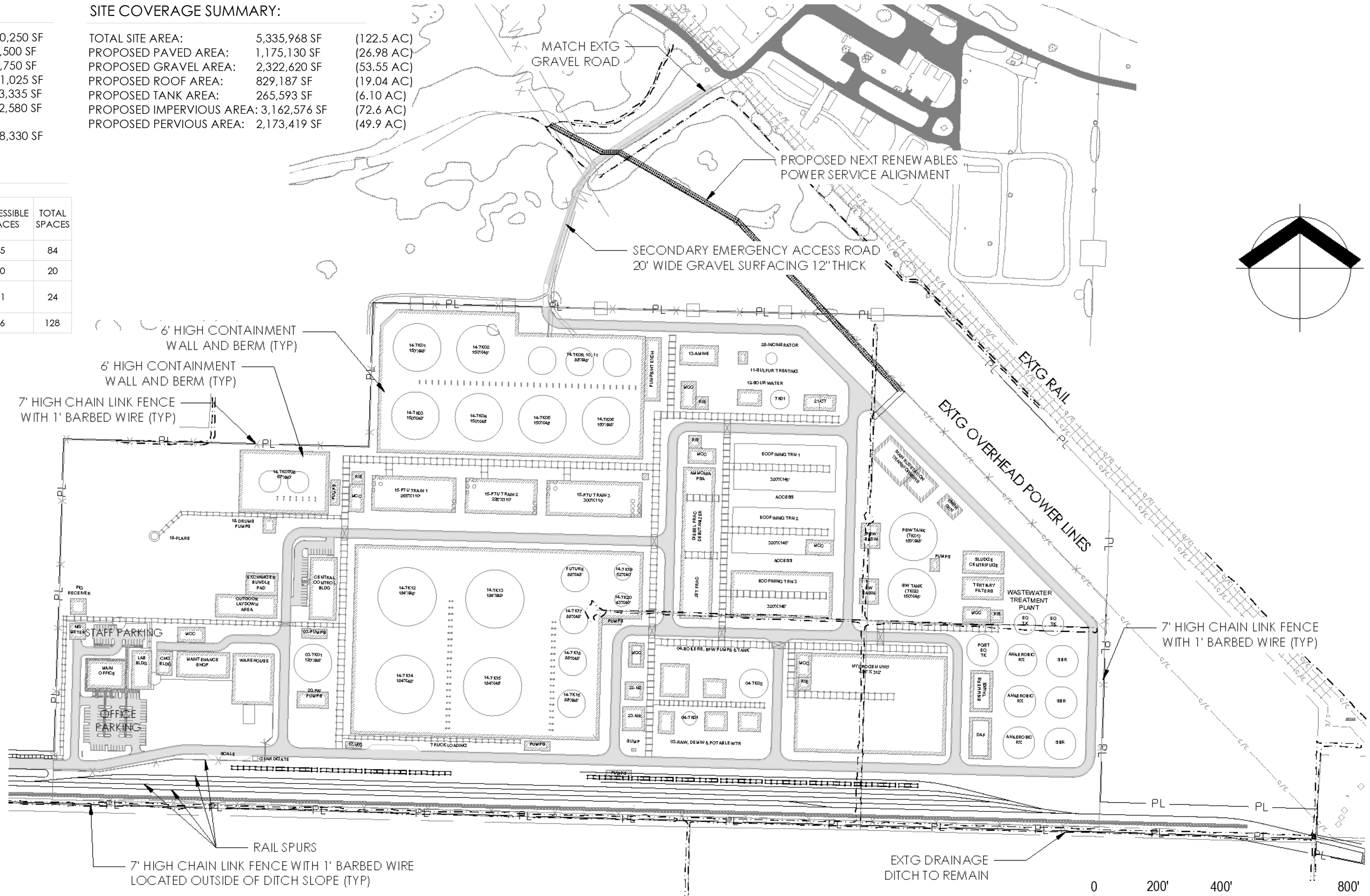
MAIN OFFICE:	20,250 SF
LAB:	7,500 SF
CHANGE BUILDING:	3,750 SF
WAREHOUSE:	21,025 SF
MAINTENANCE:	13,335 SF
CENTRAL CONTROL:	12,580 SF
TOTAL BUILDING FLOOR AREA:	78,330 SF

SITE COVERAGE SUMMARY:

TOTAL SITE AREA:	5,335,968 SF	(122.5 AC)
PROPOSED PAVED AREA:	1,175,130 SF	(26.98 AC)
PROPOSED GRAVEL AREA:	2,322,620 SF	(53.55 AC)
PROPOSED ROOF AREA:	829,187 SF	(19.04 AC)
PROPOSED TANK AREA:	265,593 SF	(6.10 AC)
PROPOSED IMPERVIOUS AREA:	3,162,576 SF	(72.6 AC)
PROPOSED PERVIOUS AREA:	2,173,419 SF	(49.9 AC)

PARKING SUMMARY:

	STANDARD SPACES	ACCESSIBLE SPACES	TOTAL SPACES
OFFICE PARKING	79	5	84
STAFF PARKING	20	0	20
CONTROL BLDG PARKING	23	1	24
TOTAL PARKING	122	6	128



NOTE:
ACCESS ROADS, RAILROAD ACCESS, UTILITIES, ETC. NOT SHOWN ON THIS FIGURE FOR CLARITY. SEE AERIAL PHOTOGRAPH, FIGURE 2, FOR SCHEMATIC LOCATIONS.

SITE PLAN PROVIDED BY MAUL FOSTER ALONGI

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PORT WESTWARD, OREGON
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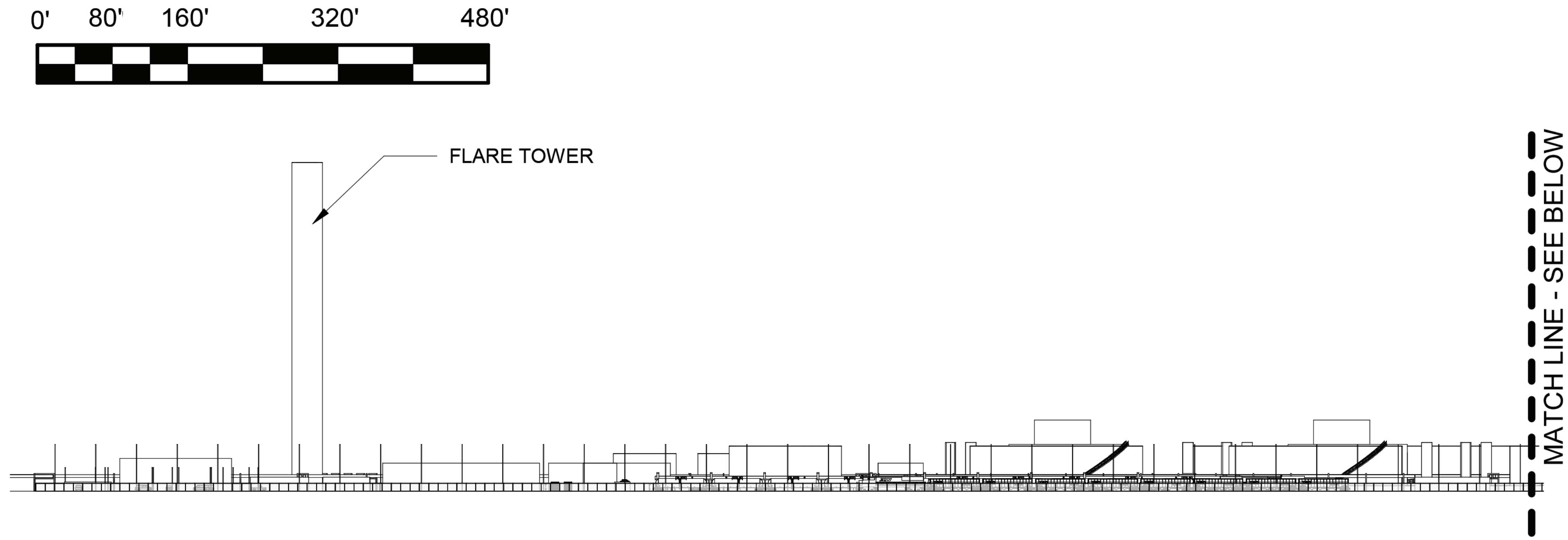
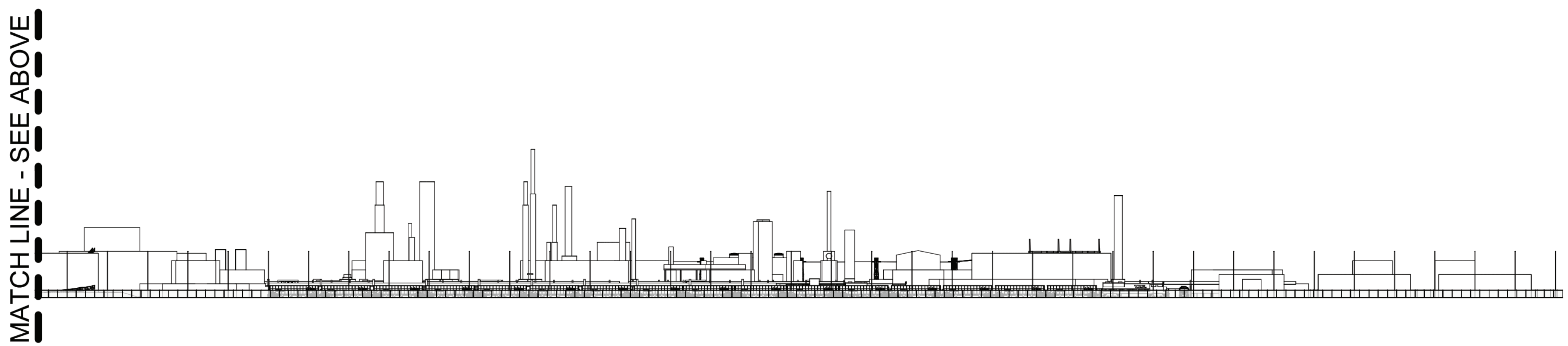
SITE LAYOUT

FIGURE 7A

NEXT-PortWestwardJPA-Rev2 Feb. 10, 2023



1
-
SOUTH ELEVATION
1" = 160'-0"



2
-
SOUTH ELEVATION
1" = 160'-0"

NEXT RENEWABLE FUELS

SOUTH ELEVATION

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PORT WESTWARD, OREGON
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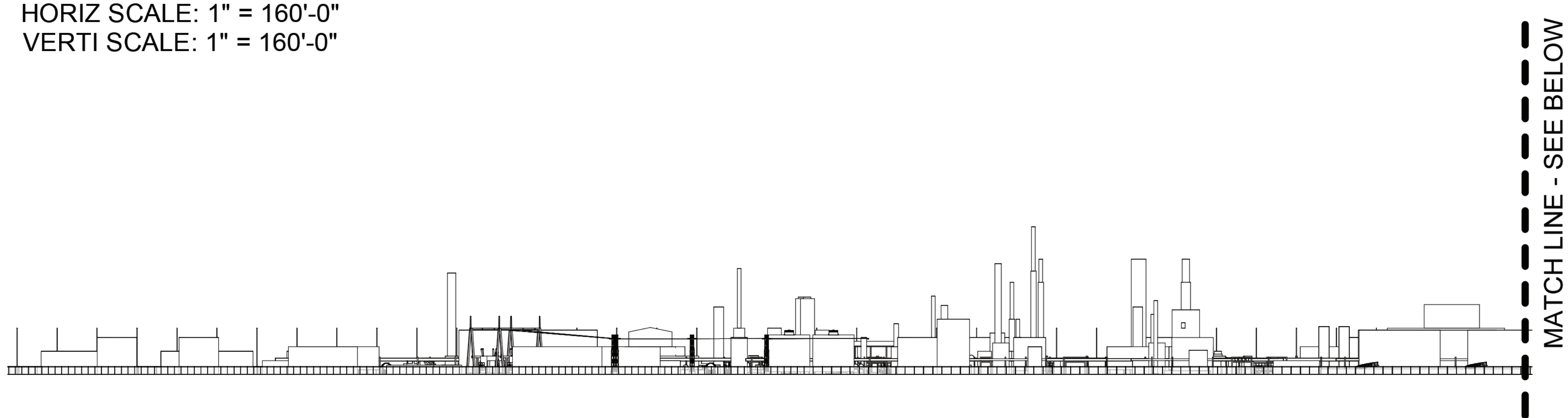
SOUTH ELEVATION

FIGURE 7B

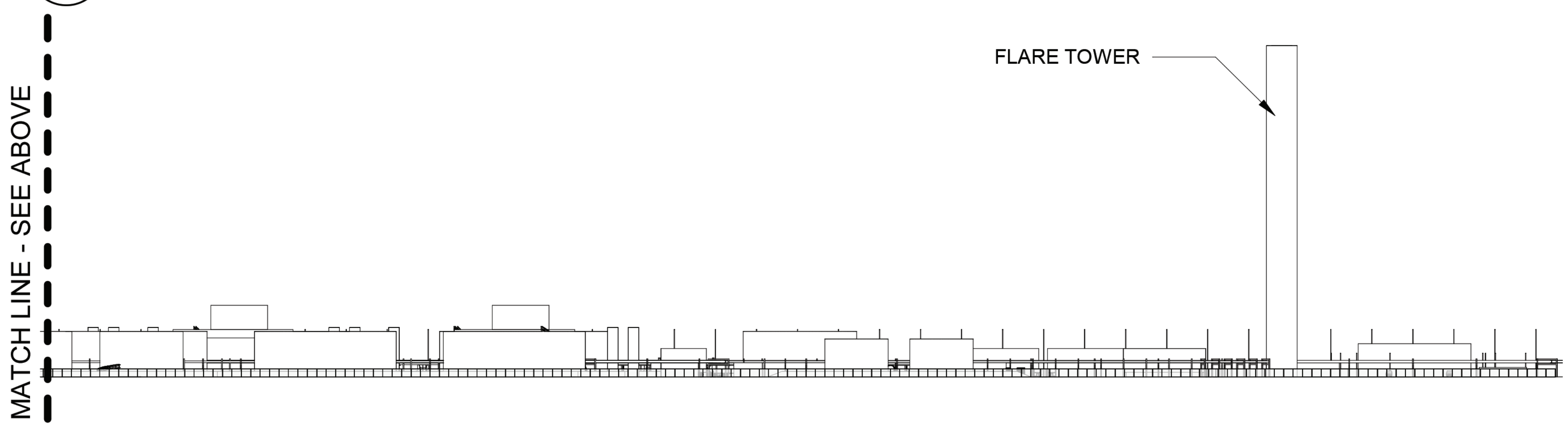
NEXT-PortWestwardJPA-Rev2 Dec. 9, 2022

0' 80' 160' 320' 480'

HORIZ SCALE: 1" = 160'-0"
VERTI SCALE: 1" = 160'-0"



1 NORTH ELEVATION
1" = 160'-0"



2 NORTH ELEVATION
1" = 160'-0"

NEXT RENEWABLE FUELS

NORTH ELEVATION

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PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

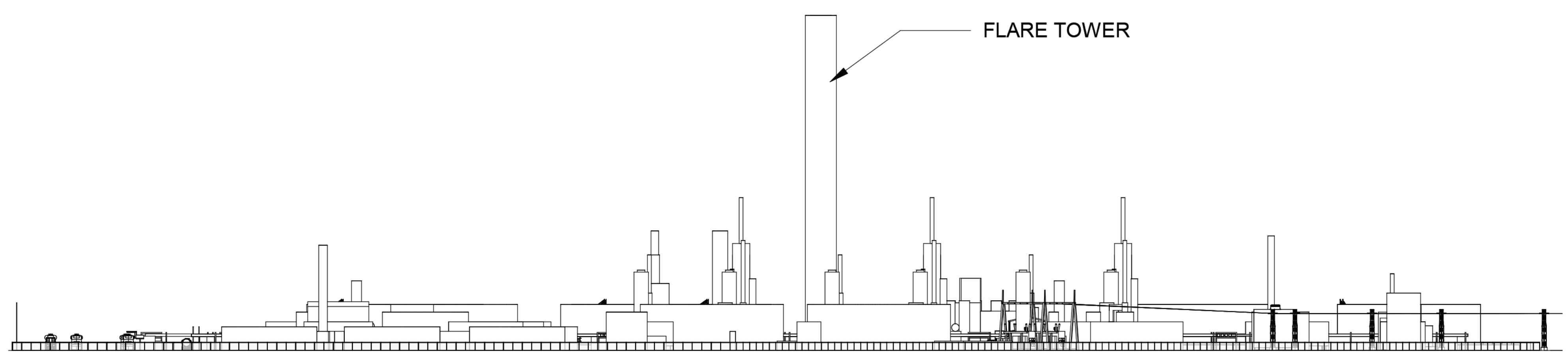
NORTH ELEVATION

FIGURE
7C

NEXT-PortWestwardJPA-Rev2 Dec. 9, 2022

0' 80' 160' 320' 480'

HORIZ SCALE: 1" = 160'-0"
VERTI SCALE: 1" = 160'-0"



1
-
EAST ELEVATION
1" = 160'-0"

NEXT RENEWABLE FUELS

EAST ELEVATION

NEXT Renewable Fuels, Inc.
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NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
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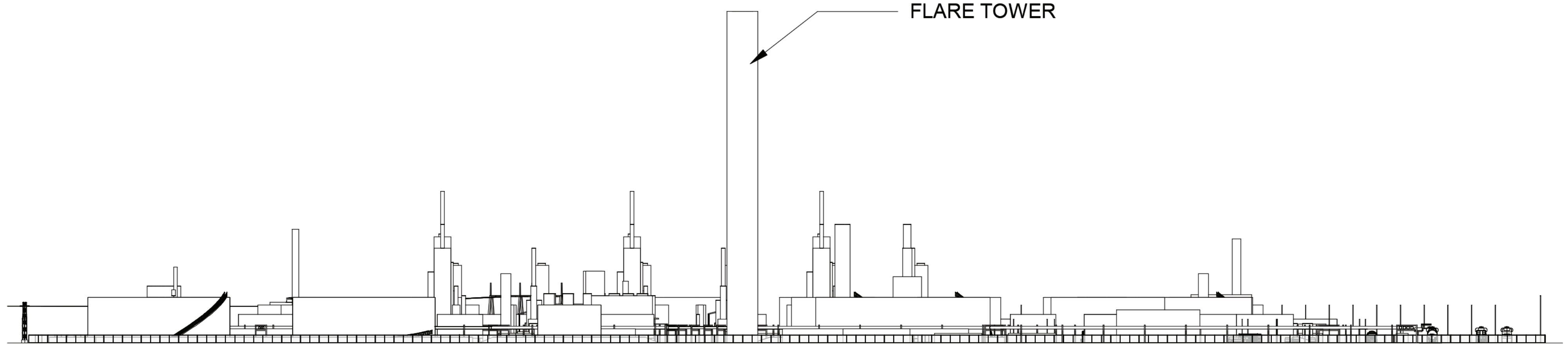
EAST ELEVATION

FIGURE
7D

NEXT-PortWestwardJPA-Rev2 Dec. 9, 2022

0' 80' 160' 320' 480'

HORIZ SCALE: 1" = 160'-0"
VERTI SCALE: 1" = 160'-0"



1
-

WEST ELEVATION
1" = 160'-0"

NEXT RENEWABLE FUELS

WEST ELEVATION

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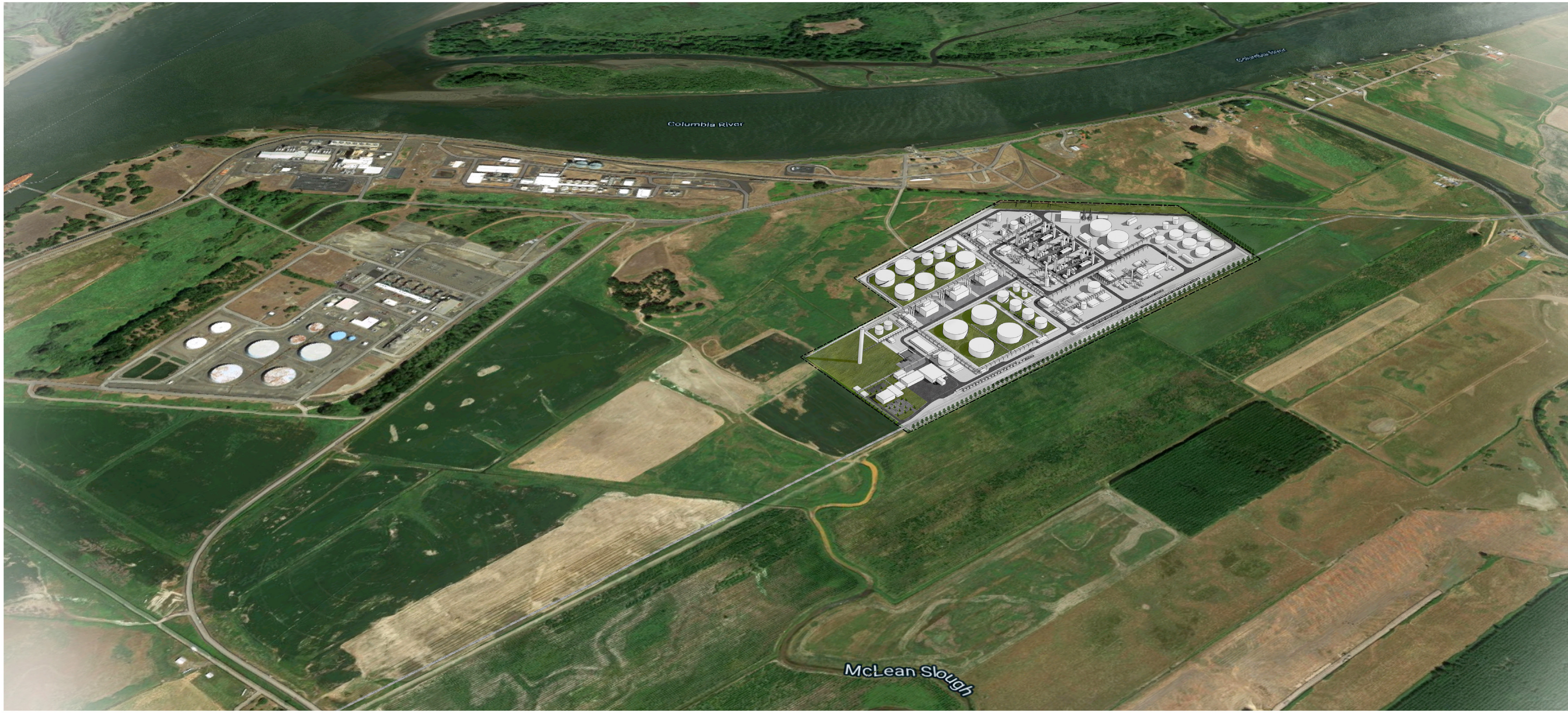
NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

WEST ELEVATION

FIGURE
7E



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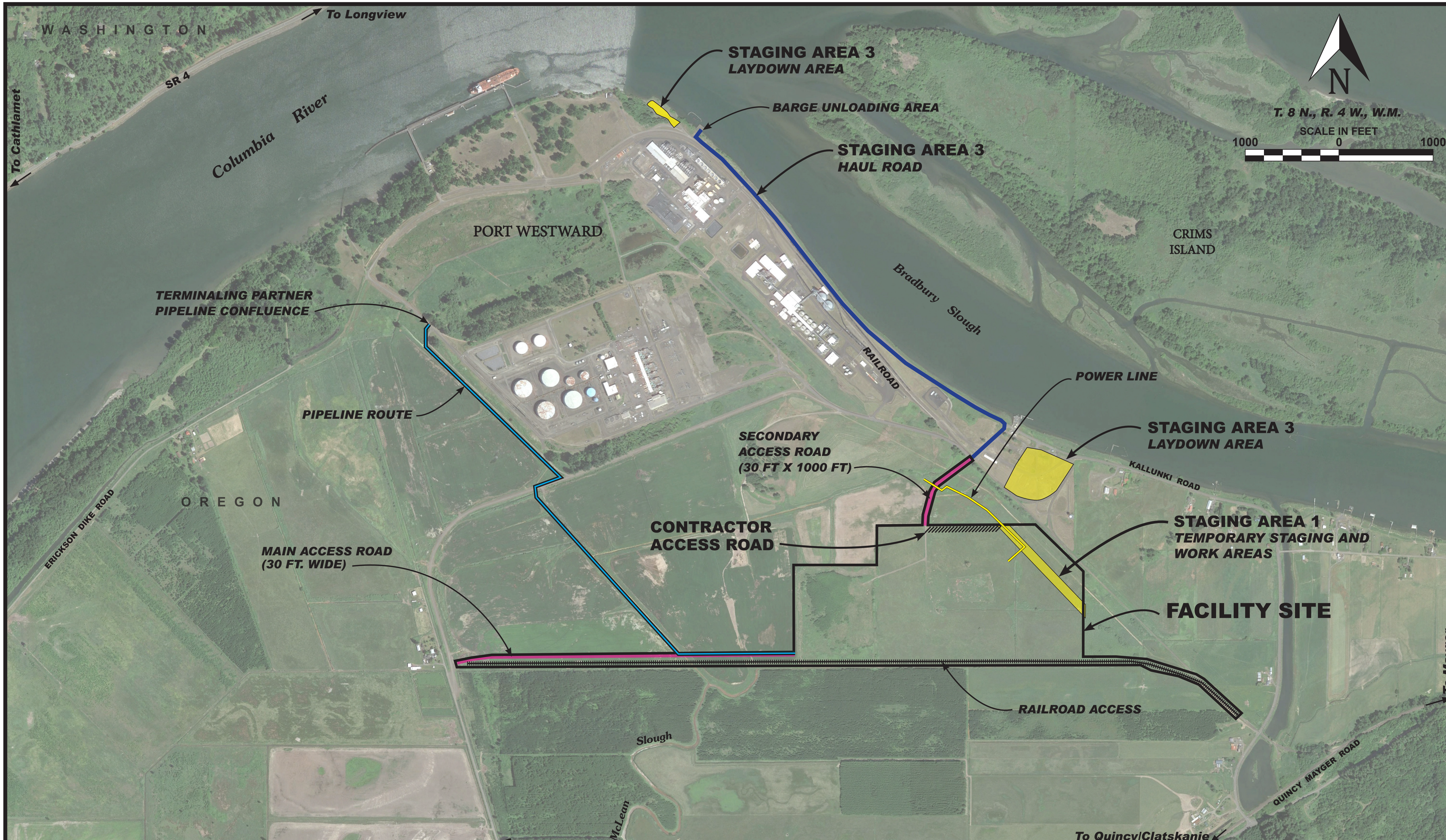
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

AERIAL PHOTO SITE RENDERING

FIGURE 7F



NOTE:
SEE AERIAL PHOTOGRAPH FIGURE 2 FOR SCHEMATIC UTILITY LOCATIONS FOR FACILITY SITE.

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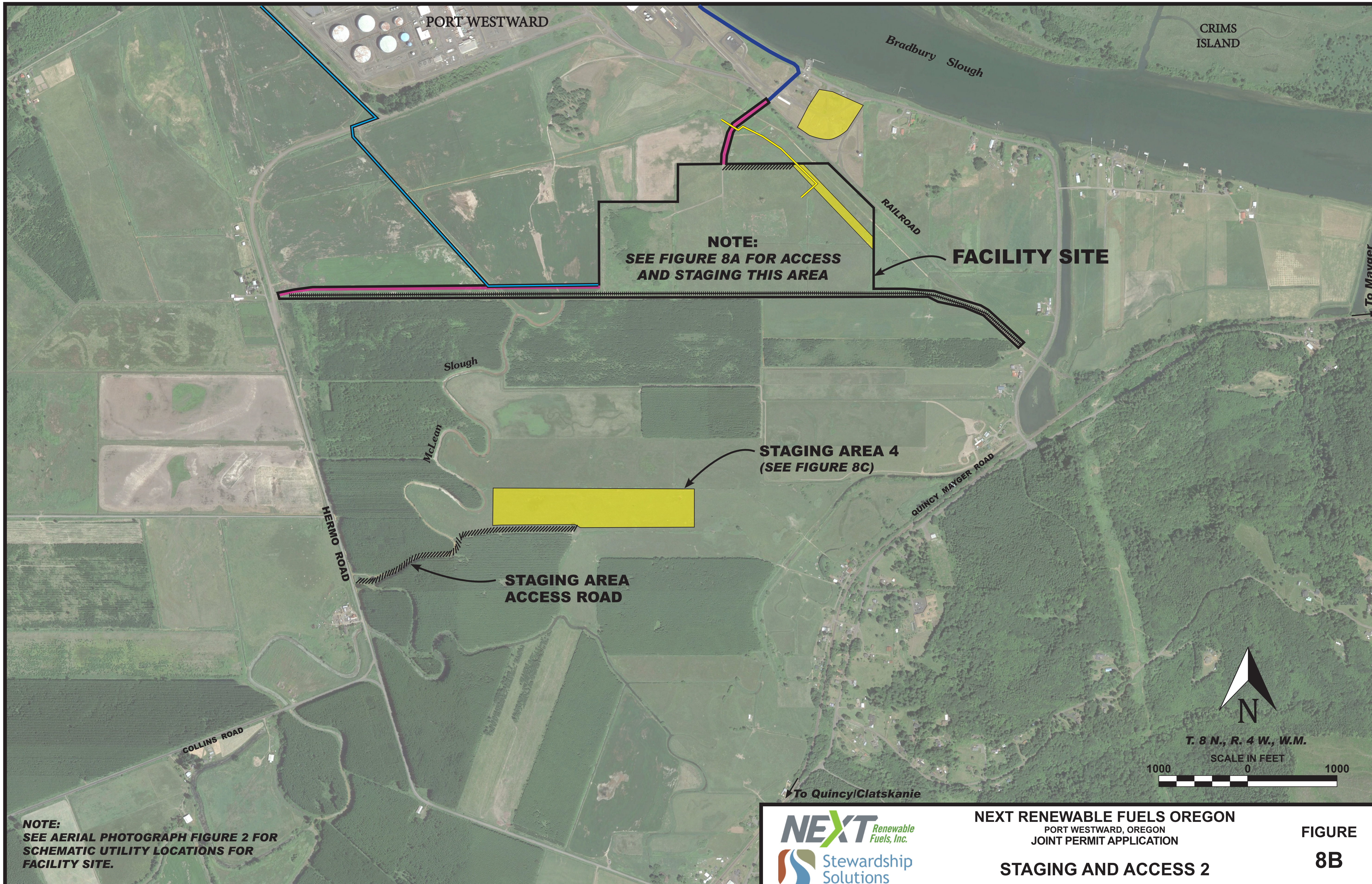
NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

STAGING AND ACCESS 1

FIGURE 8A

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023



NOTE:
SEE AERIAL PHOTOGRAPH FIGURE 2 FOR SCHEMATIC UTILITY LOCATIONS FOR FACILITY SITE.

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PORT WESTWARD, OREGON
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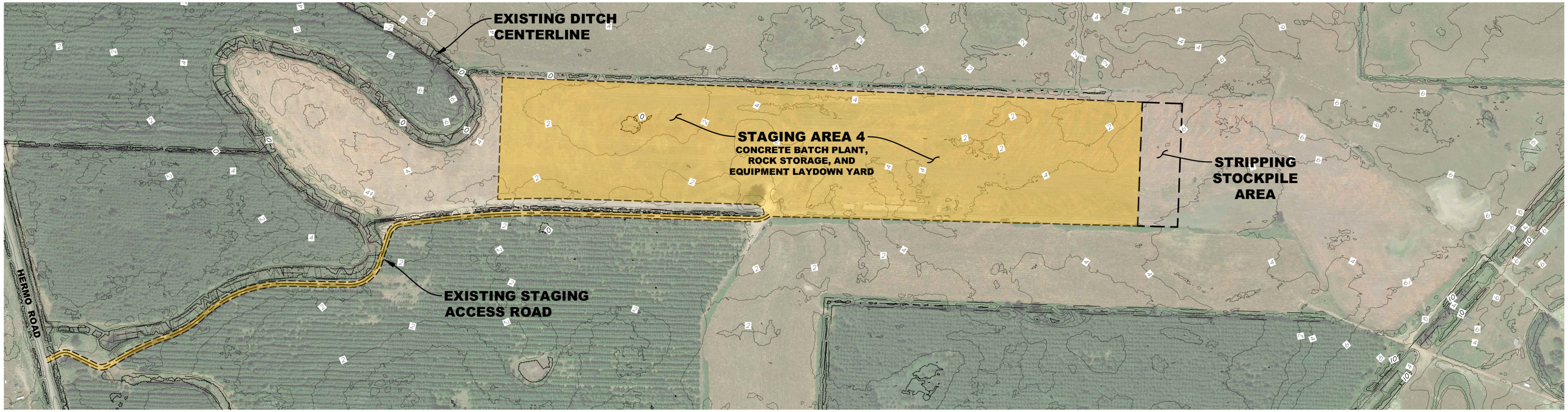
STAGING AND ACCESS 2

FIGURE 8B

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023

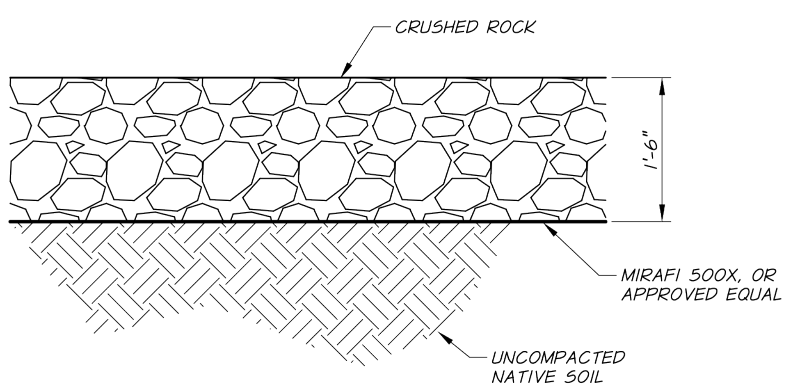


PLAN

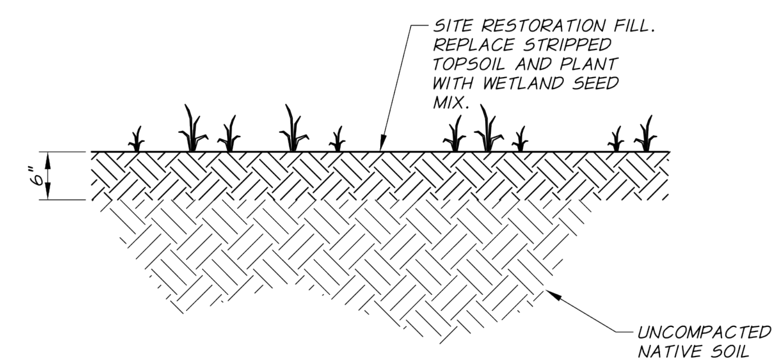
200 0 200 400 600
SCALE IN FEET

STAGING AREA SEQUENCE NOTES

1. STRIP 6 INCHES OF TOPSOIL WITHIN STAGING AREA AND STOCKPILE IN LOCATION SHOWN ON PLAN.
2. PLACE GEOTEXTILE FABRIC AND CRUSHED ROCK AS SHOWN IN TYPICAL SECTION.
3. UTILIZE STAGING AREA 4 AS NEEDED FOR DURATION OF PROJECT CONSTRUCTION.
4. REMOVE AND PROPERLY DISPOSE OF CRUSHED ROCK AND GEOTEXTILE FABRIC.
5. REPLACE TOPSOIL AND PLANT AS SHOWN IN TYPICAL SECTION.



TYPICAL SECTION - STAGING AREA
N.T.S.



TYPICAL SECTION - SITE RESTORATION
N.T.S.

NOTE:
DRAWING PROVIDED BY ANDERSON PERRY & ASSOCIATES, INC.

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PORT WESTWARD, OREGON
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STAGING AND ACCESS 3

FIGURE
8C

NEXT-PortWestwardJPA-Rev2 Dec. 9, 2022

NOTE:
ACCESS ROADS, RAILROAD ACCESS, UTILITIES, ETC.
NOT SHOWN ON THIS FIGURE FOR CLARITY. SEE AERIAL
PHOTOGRAPH, FIGURE 2, FOR SCHEMATIC LOCATIONS.

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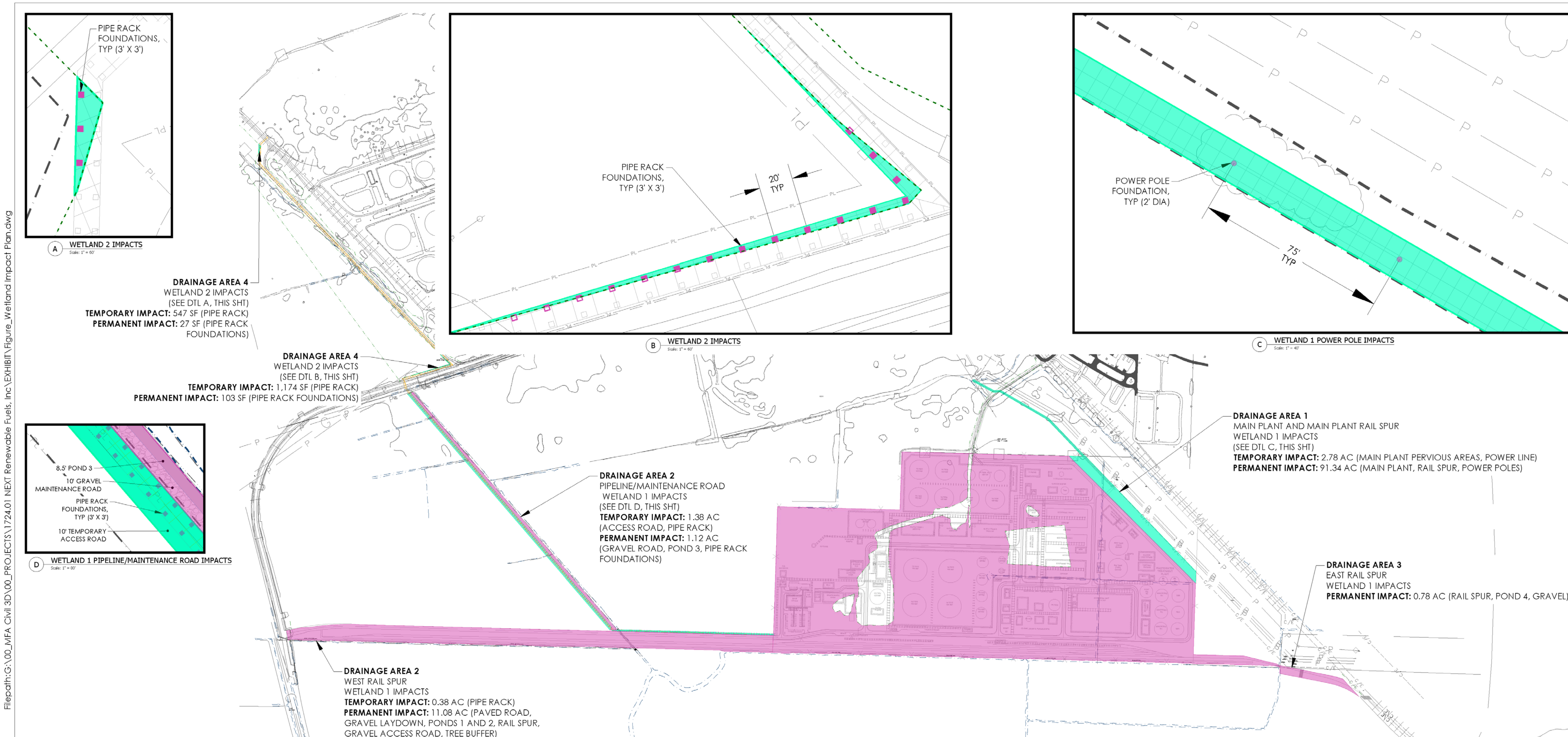
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

EXISTING WETLANDS

FIGURE
9

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023



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LEGEND

- PROPOSED TEMPORARY WETLAND IMPACT
- PROPOSED PERMANENT WETLAND IMPACT
- WETLAND BOUNDARY
- RAIL SPUR
- EXISTING WATERWAY
- PIPE RACK

WETLAND 1 IMPACT SUMMARY

DESCRIPTION	AREA (AC)
PROPOSED TEMPORARY WETLAND IMPACT AREA	4.5
PROPOSED PERMANENT WETLAND IMPACT AREA	104.3

WETLAND 2 IMPACT SUMMARY

DESCRIPTION	AREA (AC)
PROPOSED TEMPORARY WETLAND IMPACT AREA	0.04
PROPOSED PERMANENT WETLAND IMPACT AREA	0.003

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CHECKED: A. POLISKI
DRAWN: B. TINO

Date:2/17/2023 6:38:15 AM

MAUL FOSTER ALONGI
3140 NE BROADWAY STREET
PORTLAND, OR 97232
PHONE: 971.544.2139
www.maulfoster.com

NEXT Renewable Fuels, Inc.

WETLAND IMPACT PLAN

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 800' 1200'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

FIGURE 1

NOTE:
DRAWING PROVIDED MAUL FOSTER ALONGI

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PORT WESTWARD, OREGON
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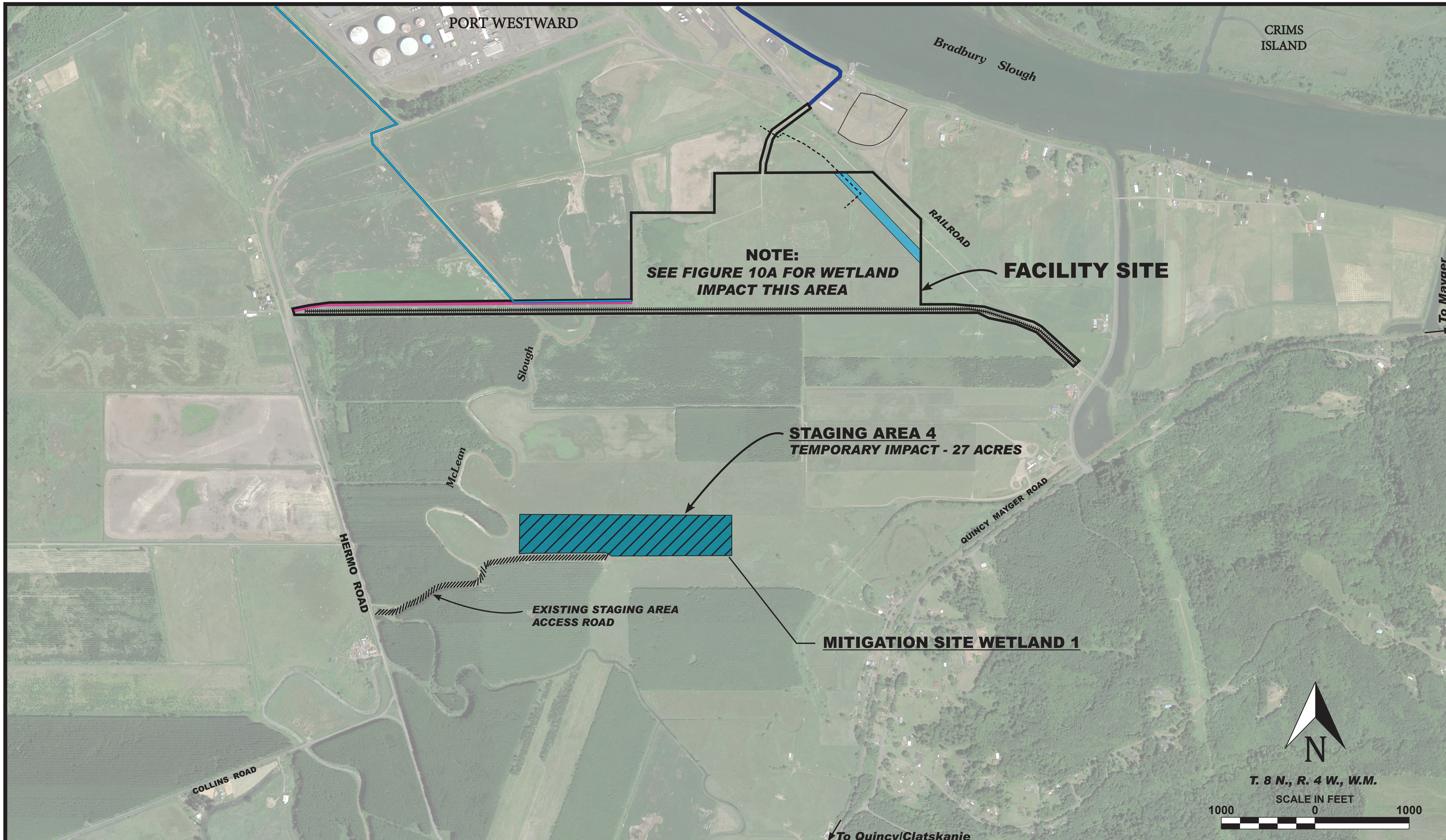
WETLAND IMPACT AREAS

FIGURE 10A

NEXT-PortWestwardJPA-Rev2 Feb. 18, 2023



NOTE:
SEE AERIAL PHOTOGRAPH FIGURE 2 FOR SCHEMATIC UTILITY LOCATIONS FOR FACILITY SITE.
SEE WETLAND MITIGATION AREA FIGURE 14 FOR MITIGATION AREA WETLAND DETAILS

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PORT WESTWARD, OREGON
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WETLAND IMPACT AREAS
STAGING AREA 4

FIGURE
10B

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023

NOTE:
ACCESS ROADS, RAILROAD ACCESS, UTILITIES, ETC. NOT SHOWN ON THIS FIGURE FOR CLARITY. SEE AERIAL PHOTOGRAPH, FIGURE 2, FOR SCHEMATIC LOCATIONS.

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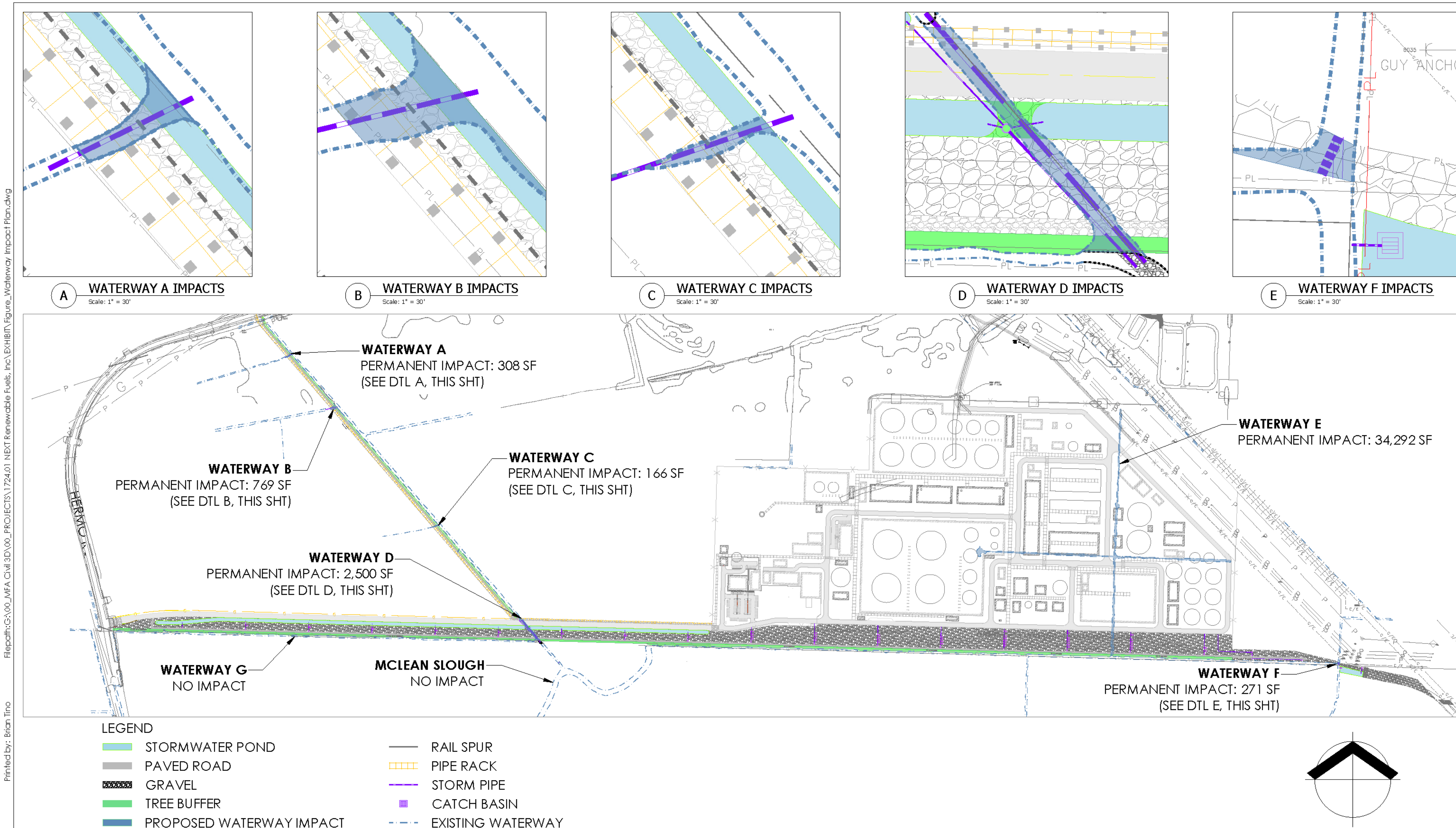
EXISTING WATERWAYS

FIGURE
11

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023



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DRAWN: L. DANIEL

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NEXT Renewable Fuels, Inc.

SITE LAYOUT

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 600' 1200'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

FIGURE 2

NOTE:
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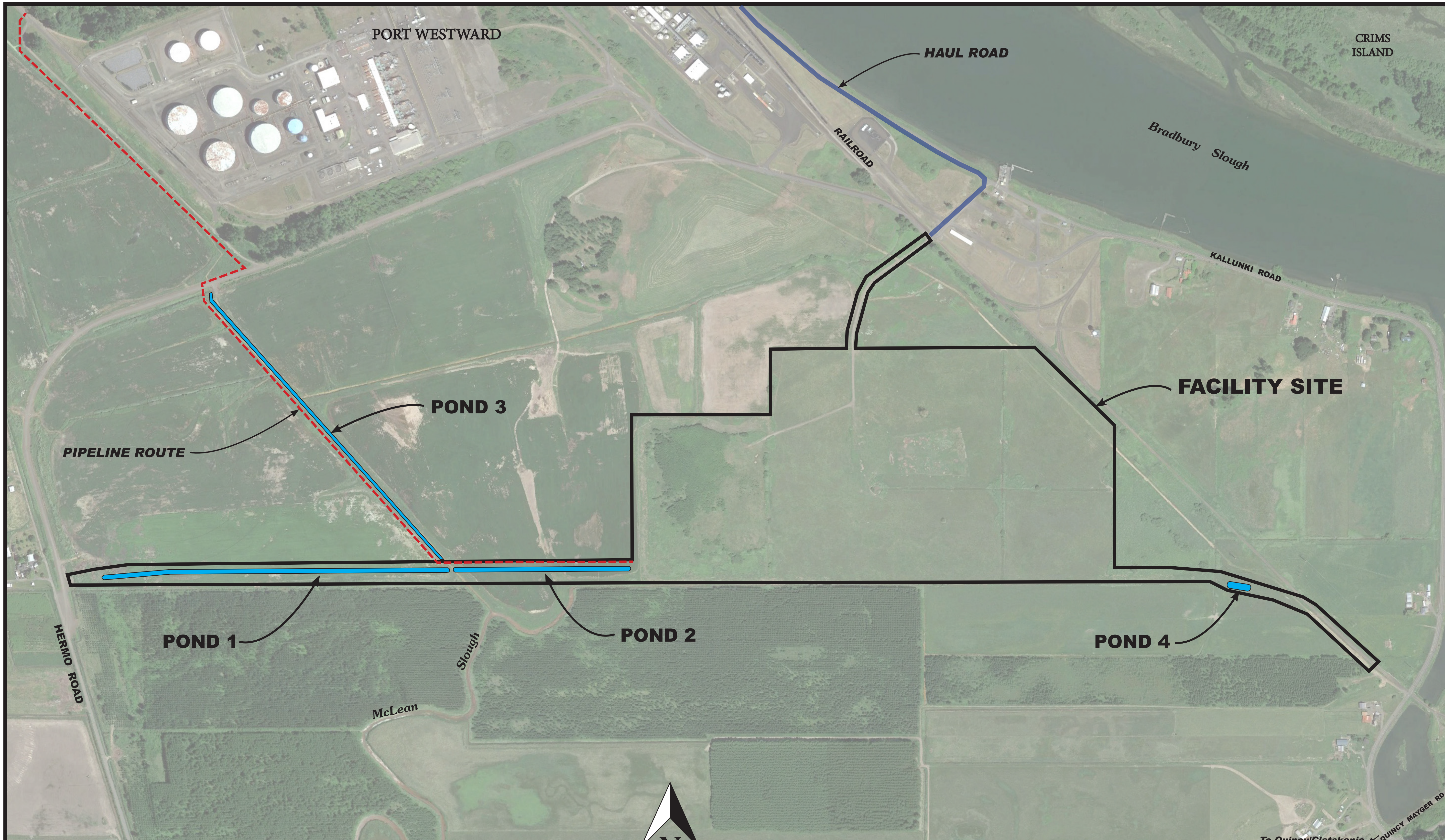
WATERWAY IMPACT AREAS

FIGURE 12

NEXT-PortWestwardJPA-Rev Feb. 18, 2023



NOTES:
ACCESS ROADS, RAILROAD ACCESS, UTILITIES, ETC. NOT SHOWN ON THIS FIGURE FOR CLARITY. SEE AERIAL PHOTOGRAPH, FIGURE 2, FOR SCHEMATIC LOCATIONS.

FOR ADDITIONAL STORMWATER INFORMATION, SEE NEXT RENEWABLE FUELS OREGON POST CONSTRUCTION STORMWATER MANAGEMENT PLAN.

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NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
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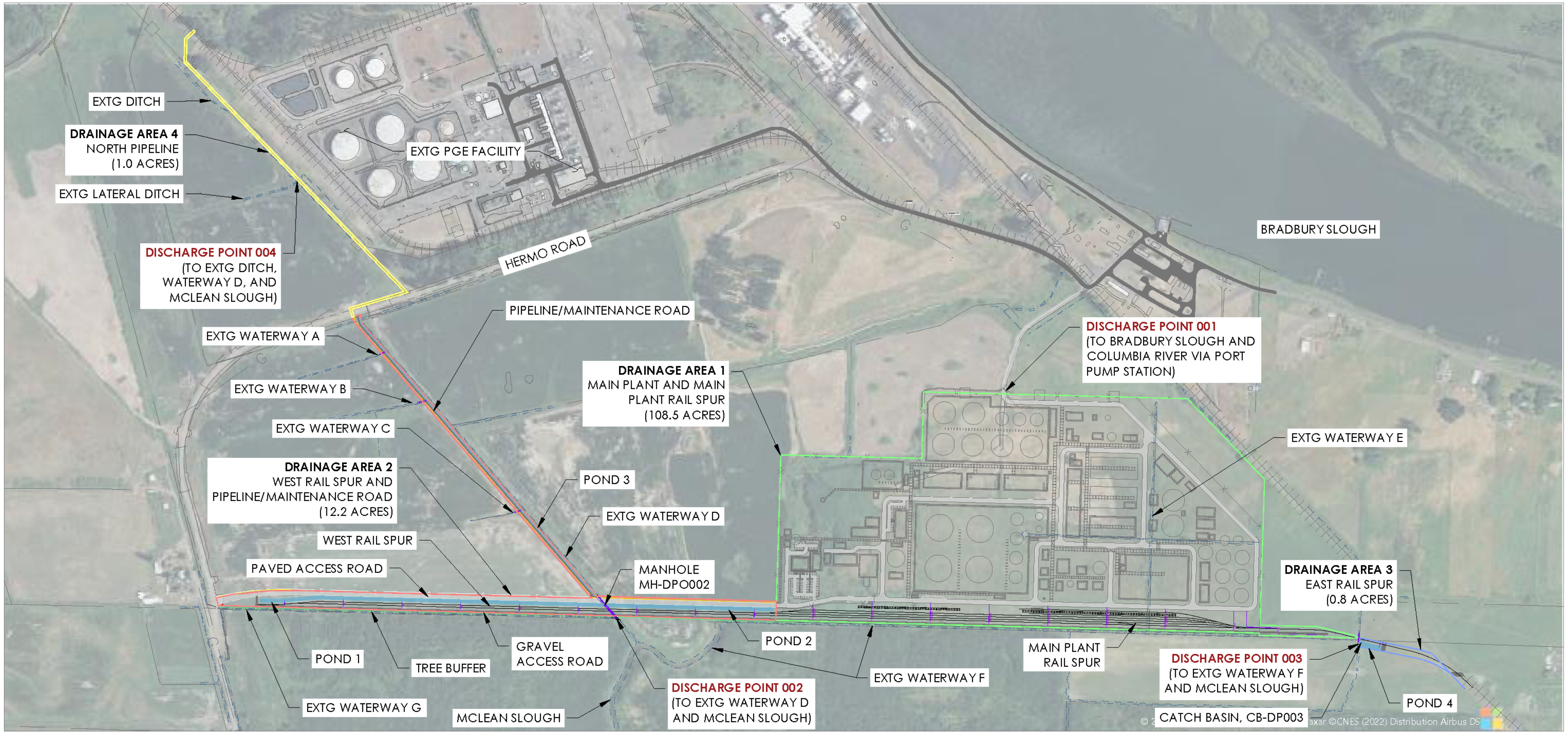
STORMWATER PONDS

FIGURE 13

NEXT-PortWestwardJPA-Rev2 Feb. 22, 2023



LEGEND

- STORMWATER POND
- PAVED ROAD
- GRAVEL
- TREE BUFFER
- DRAINAGE AREA BOUNDARY
- RAIL SPUR
- PIPE RACK
- STORM PIPE
- CATCH BASIN
- EXISTING WATERWAY/DITCH

Filepath: G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\EXHIBIT\Figure 2_SWMP.dwg

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NEXT Renewable Fuels, Inc.

STORMWATER PLAN SITE LAYOUT

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 700' 1400'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

FIGURE 2

NOTE:
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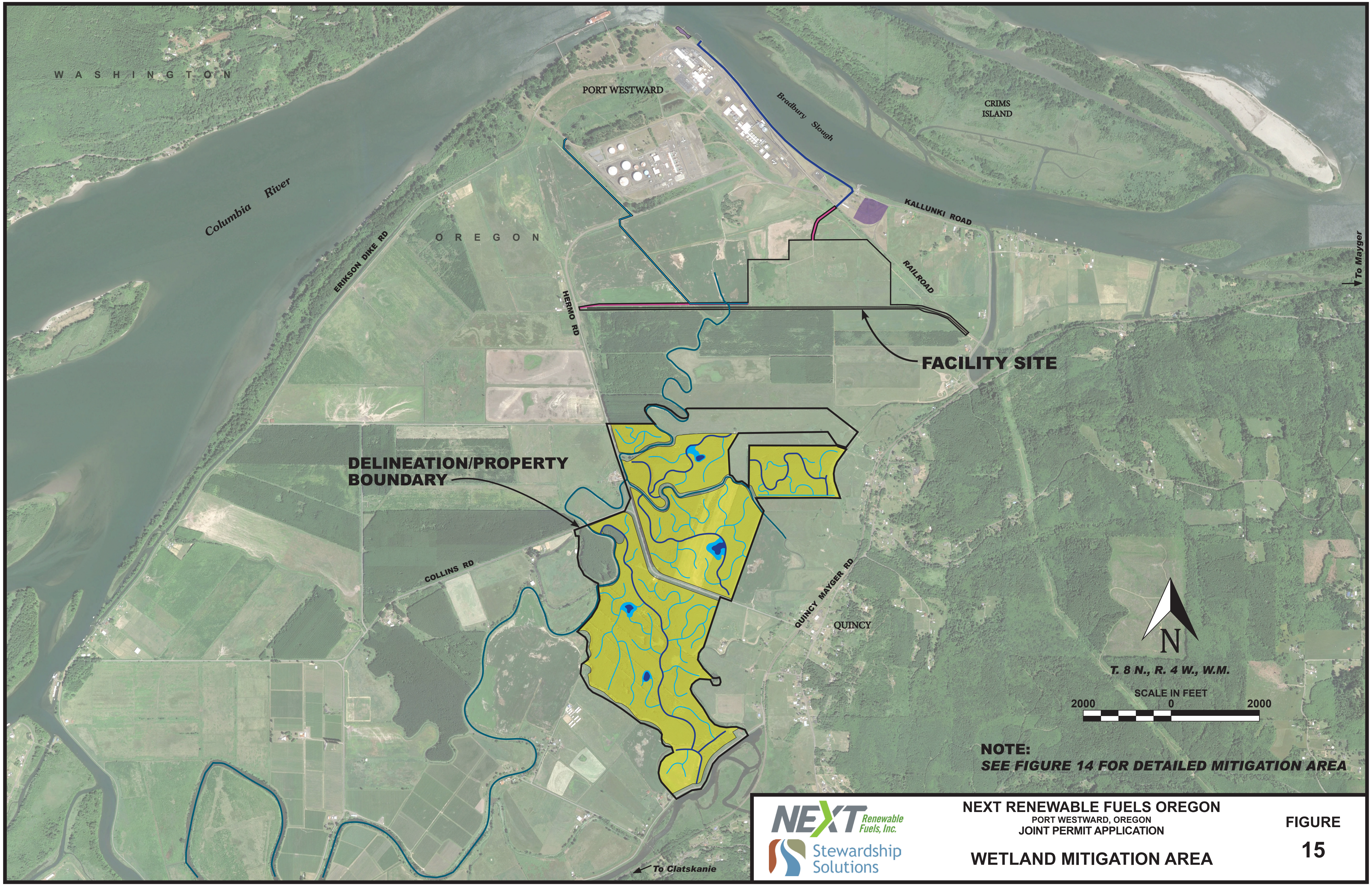
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

STORMWATER MANAGEMENT PLAN SITE LAYOUT

FIGURE 14

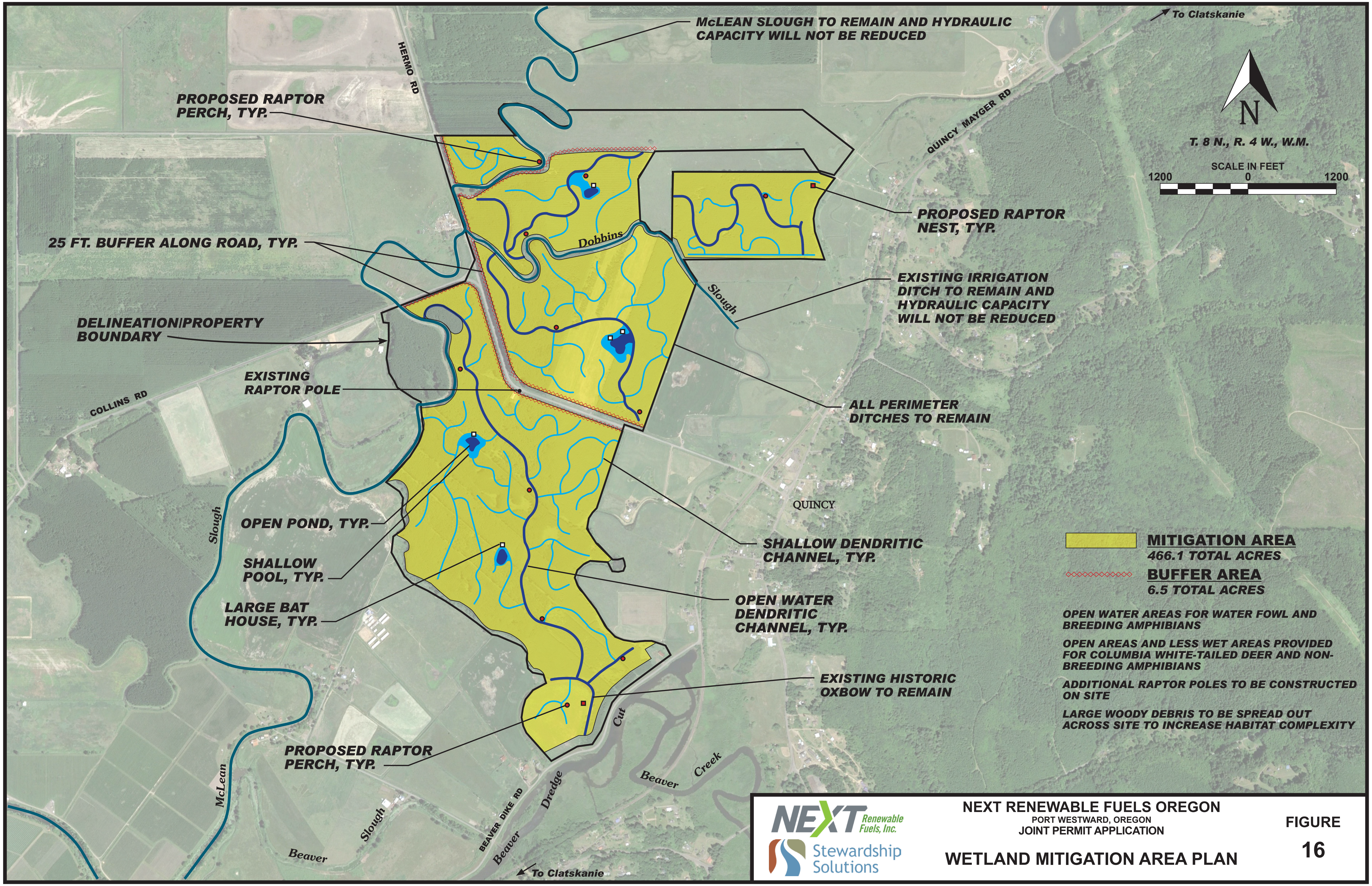


NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

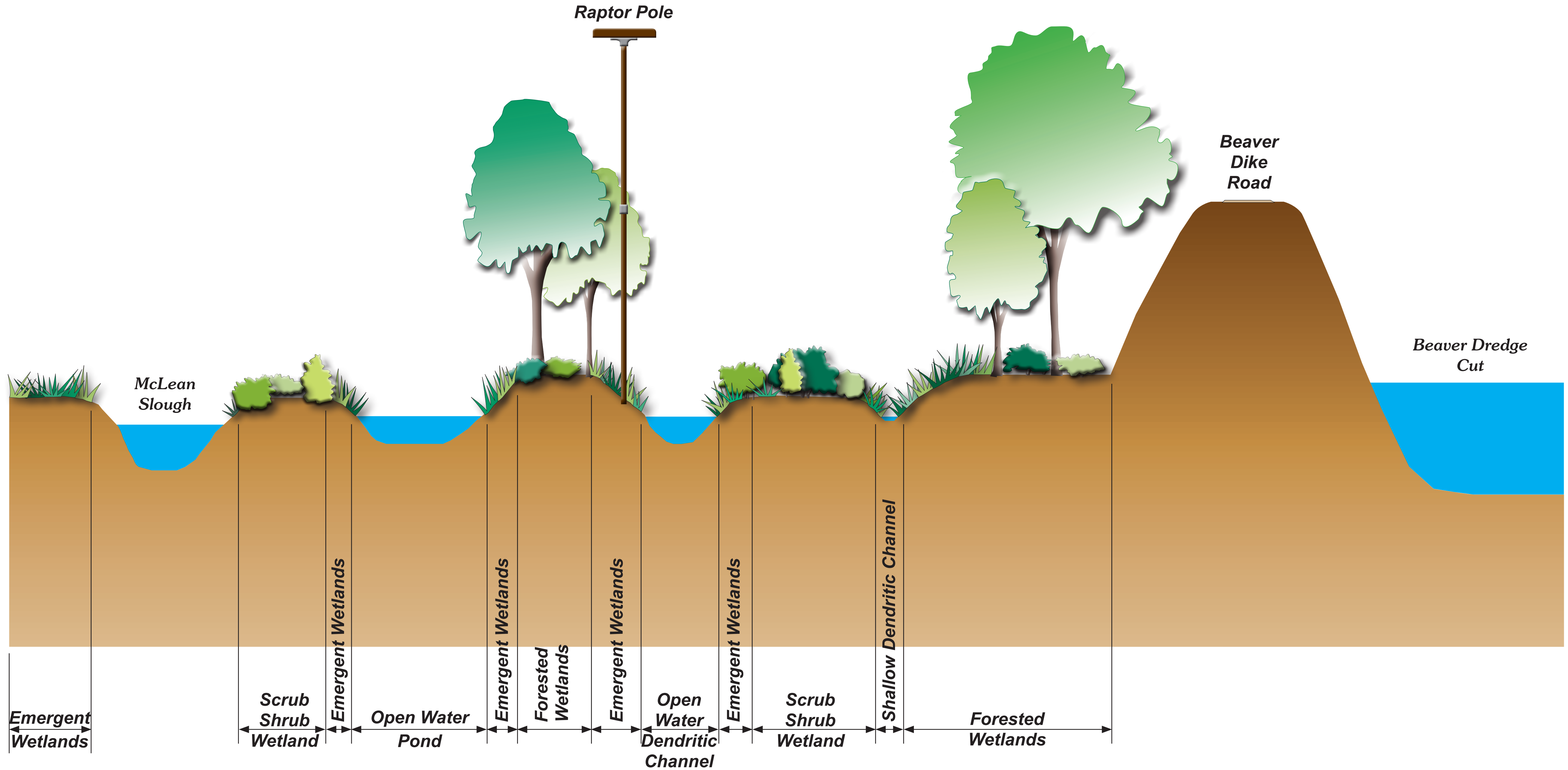
WETLAND MITIGATION AREA

FIGURE 15

NEXT-PortWestwardJPA-Rev2 Feb. 24, 2023



NEXT-PortWestwardJPA-Rev2 Feb. 24, 2023



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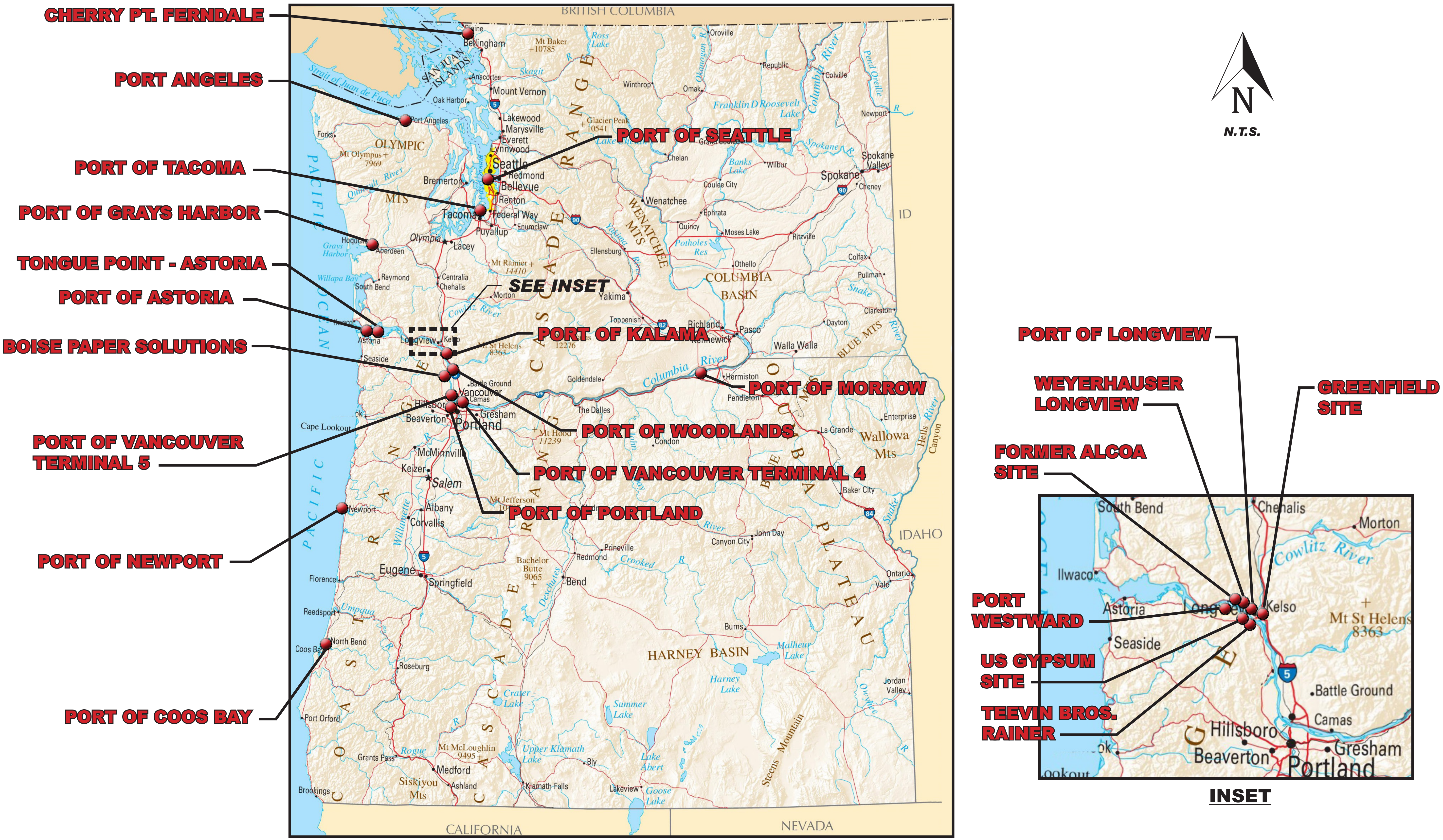
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

WETLAND MITIGATION AREAS
CONCEPTUAL SITE CROSS SECTION

FIGURE 17

NEXT-PortWestwardJPA-Rev2 Feb. 24, 2023



INSET

MAP OBTAINED FROM:
ontheworldmap.com

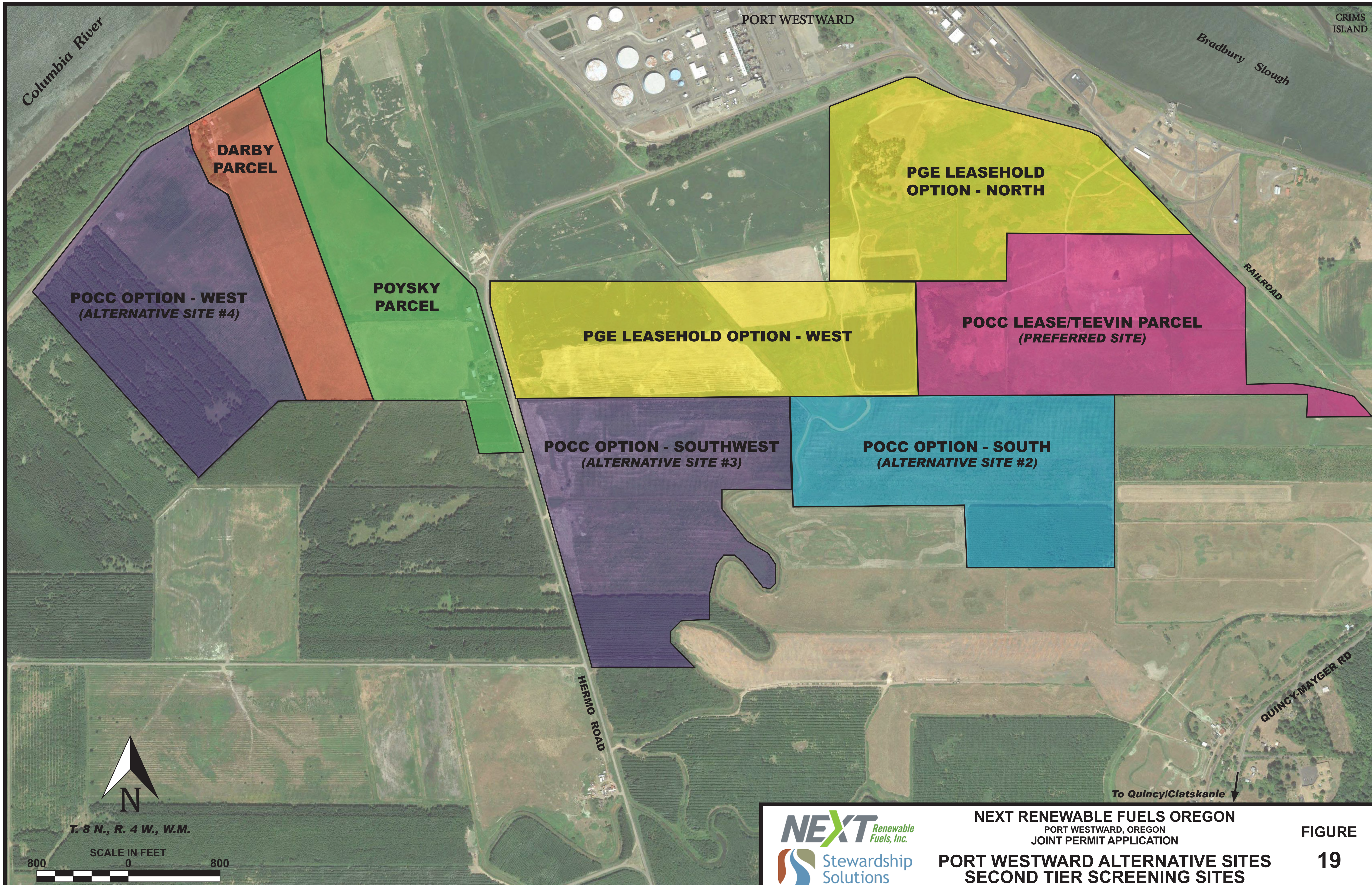
NEXT Renewable Fuels, Inc.
Stewardship Solutions

NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

VICINITY MAP
PACIFIC NORTHWEST SITES

FIGURE
18

NEXT-PortWestwardJPA-Rev2 Feb. 24, 2023



NEXT Renewable Fuels, Inc.
Stewardship Solutions

NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

PORT WESTWARD ALTERNATIVE SITES
SECOND TIER SCREENING SITES

FIGURE 19

NEXT-PortWestwardJPA-Rev2 Feb. 24, 2023

Attachment A

Property Owners

NEXT Renewable Fuels, Inc.

PROPERTY OWNERS

Property Owner/Leaseholder	Tax Lot
Port of Columbia County Attn: Shawn Clark PO Box 190 Columbia City, OR 97018	Tax Map 080422 Lots 100, 200, 400, 500, 600 Tax Map 080421 Lot 600 Tax Map 080416 Lot 200 Tax Map 080423B Lot 700
Port of Columbia County Leaseholder: Portland General Electric 121 SW Salmon Street, #1WTC510 Portland, OR 97231	Tax Map 080422 Lot 1100 Tax Map 080421 Lot 700 Tax Map 080416 Lot 200 Tax Map 080415 Lot 100, 300
NEXT Renewable Fuels Oregon, LLC 11767 Katy Freeway, Suite 705 Houston, TX 77079	Tax Map 080422 Lot 300
Felipe De La Cruz & Bobby De La Cruz 80393 Kallunki Road Clatskanie, OR 97016	Tax Map 080423 Lot 800
Oregon Port AG Investors, LLC Attn: Robert Russell 5130 S. Ft Apache Road, Suite 215-409 Las Vegas, NV 89148	Tax Map 080427 Lots 100, 200, 400, 1600 Tax Map 080428 Lots 300, 1400 Tax Map 080433 Lot 100 Tax Map 080434 Lot 300

Attachment B

Wetland and Waterway Impact Calculations

NEXT Renewable Fuels, Inc.

Attachment D – Removal/Fill Volumes

F. Removal Volumes and Dimensions (if more than 7 impact sites, include a summary table as an attachment)

Wetland / Waterbody Name *	Removal Dimensions					Time Removal is to remain**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq.ft. or ac.)	Volume (c.y.)		
Wetland 1	*	*	1	4,543,308	159,372	Permanent	Native Material
	*	*	1	196,455	4,440	Temporary	
Wetland 2	*	*	5.0	131	3800	Permanent	Native Material
	*	*	0.5	1742	60	Temporary	
Mitigation Site	-	-	-	-	-	Permanent	Native Material
Wetland 1	2200	500	1	27	43500	Temporary	
Waterway A	*	*	1.0	308	12	Permanent	Native Material
Waterway B	*	*	1.0	769	29	Permanent	Native Material
Waterway C	*	*	1.0	166	7	Permanent	Native Material
Waterway D	*	*	1.0	2500	100	Permanent	Native Material
Waterway E	*	*	1.0	34,292	1,280	Permanent	Native Material
Waterway F	*	*	1.0	271	15	Permanent	Native Material

G. Total Removal Volumes and Dimensions

Total Removal to Wetlands and Other Waters		Length (ft.)	Area (sq. ft or ac.)	Volume (c.y.)
Total Removal to Wetlands			104.3 Ac.	163,172 Cy
Total Removal Below Ordinary High Water			0.88 Ac.	1,443
Total Removal Below Highest Measured Tide				
Total Removal Below High Tide Line				
Total Removal Below Mean High Water Tidal Elevation				

H. Fill Volumes and Dimensions (if more than 7 impact sites, include a summary table as an attachment)

Attachment D – Removal/Fill Volumes

Wetland / Waterbody Name*	Fill Dimensions					Time Fill is to remain**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq. ft. or ac.)	Volume (c.y.)		
Wetland 1	*	*	1	4,543,308	657,317	Permanent	Soil/Aggregate/Piles/ Concrete/Paving
	*	*	1	196,455	7325	Temporary	
Wetland 2	*	*	5.0	131	3850	Permanent	Soil/Aggregate/Piles/ Concrete
	*	*	0.5	1742	90	Temporary	
Mitigation Site	-	-	-	0	0	Permanent	Aggregate/Concrete
Wetland 1	1150	500	15	10	175000	Temporary	
Waterway A	*	*	1.0	308	29	Permanent	Soil/Aggregate
Waterway B	*	*	1.0	769	72	Permanent	Soil/Aggregate
Waterway C	*	*	1.0	166	16	Permanent	Soil/Aggregate
Waterway D	*	*	1.0	2500	325	Permanent	Soil/Aggregate/Paving
Waterway E	*	*	1.0	34,292	3177	Permanent	Soil/Aggregate/Piles/ Concrete
Waterway F	*	*	1.0	271	26	Permanent	Soil/Aggregate

(4) PROJECT DESCRIPTION (CONTINUED)			
I. Total Fill Volumes and Dimensions			
Total Fill to Wetlands and Other Waters	**Length (ft.)**	**Area (sq. ft or ac.)**	**Volume (c.y.)**
Total Fill to Wetlands		104.30 Ac.	661,167
Total Fill Below Ordinary High Water		0.88 Ac.	3,645
Total Fill Below Highest Measured Tide			
Total Fill Below High Tide Line			
Total Fill Below Mean High Water Tidal Elevation			

* Areas are based on multiple impact areas with different lengths and widths. Please refer to Attachment B – Wetland and Waterway Impacts for additional details.

Attachment C

NEXT Exhibits Plan Sheets

NEXT Renewable Fuels, Inc.

NEXT RENEWABLE FUELS OREGON

PREPARED FOR:

NEXT RENEWABLE FUELS, INC.

LOCATED IN SEC. 16, T. 8 N., R. 4 W., W.M., COLUMBIA COUNTY, CLATSKANIE, OR

PROJECT CONTACTS

CLIENT
NEXT RENEWABLE FUELS, INC.
11767 KATY FREEWAY, SUITE 705
HOUSTON, TX 77079
P: 281-884-3680
CHRISTOPHER EFIRD
CHRIS@NEXTRENEWABLES.COM

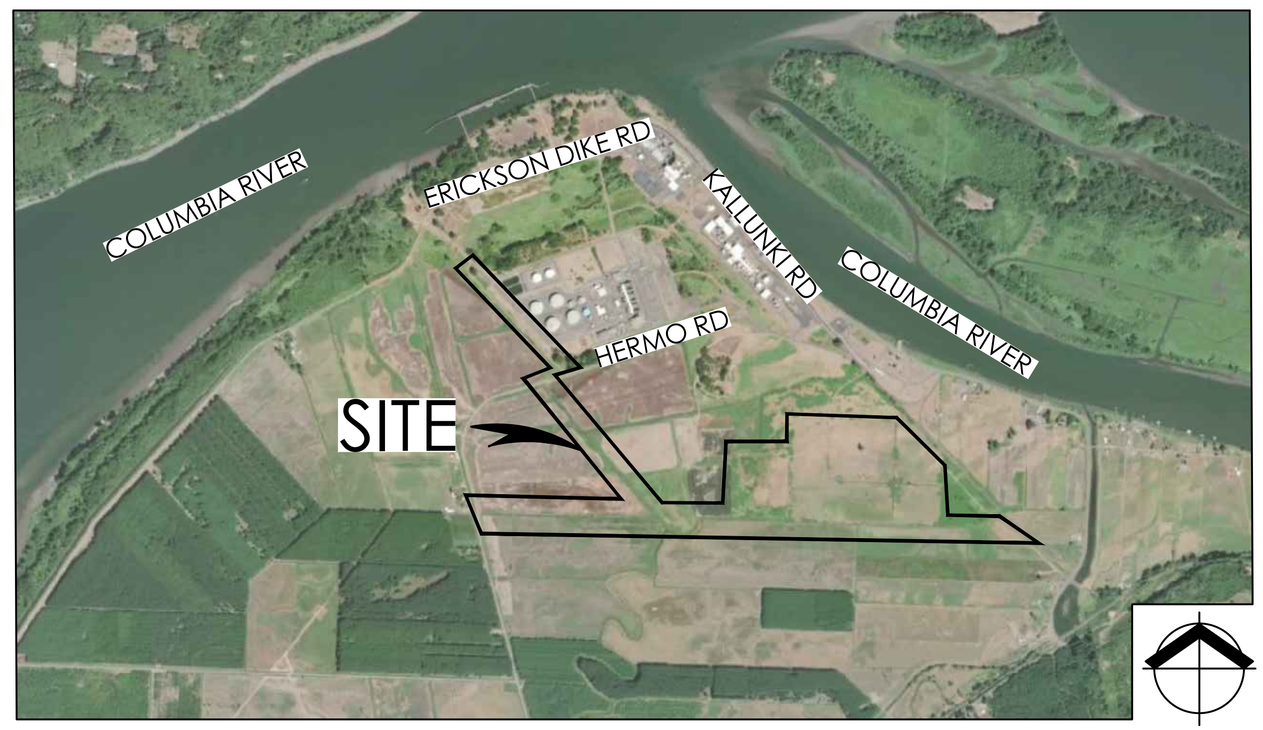
CIVIL ENGINEER
MAUL, FOSTER & ALONGI, INC.
3140 NE BROADWAY STREET
PORTLAND, OR 97232
P: 971-544-2139
BROOKE HARMON, PE
BHARMON@MAULFOSTER.COM

SURVEYOR
DAVE MILLS SURVEYING
BEAVERTON, OR 97008
P: 503-330-8646

PROJECT SUMMARY

SITE ADDRESS:
LOCATED IN THE PORT WESTWARD INDUSTRIAL PARK
BETWEEN KALLUNKI ROAD AND HERMO ROAD
COLUMBIA COUNTY
CLATSKANIE, OREGON

WORK DESCRIPTION:
NEXT RENEWABLE FUELS OREGON, LLC (NEXT) PROPOSES TO BUILD A RENEWABLE FUELS FACILITY TO SUPPLY RENEWABLE FUELS TO WEST COAST MARKETS.



VICINITY MAP

NOT TO SCALE

GENERAL NOTES

1. SURVEY PERFORMED BY DAVE MILLS SURVEYING IN 2020.
2. HORIZONTAL DATUM: OREGON STATE PLANE COORDINATE SYSTEM NORTH ZONE, NAD 83/91. ELEVATION DATUM: NGVD 29/47.

SHEET INDEX

PERMIT DOCUMENT

MFA JOB #:	M1724.01
ISSUE DATE:	12/09/2022
CHECKED:	A. BANASIKI
DRAWN:	L. DANIEL

MAUL FOSTER ALONGI
3140 NE BROADWAY ST
PORTLAND, OR 97232
PHONE: 971.544.2139
www.maulfoster.com

NEXT Renewable Fuels, Inc.

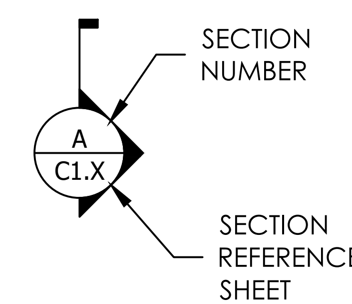
COVER SHEET

NEXT RENEWABLE FUELS OREGON
NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

COVER SHEET C0.0

SYMBOL EXIST.	SYMBOL PROP.	DESCRIPTION
		GAS METER
		GAS VALVE
		PAD-MOUNTED TRANSFORMER
P		POWER VAULT
		TRANSMISSION TOWER
		UTILITY POLE
		UTILITY POLE ANCHOR
		TELEPHONE RISER
T		TELEPHONE VAULT
		LIGHT POLE
		SAN. SEWER CLEAN OUT
	S	SAN. SEWER MANHOLE
CB		STORM DRAIN CATCH BASIN
		STORM DRAIN CULVERT
	D	STORM DRAIN MANHOLE
		DRY WELL
		AREA DRAIN
		STORM CLEANOUT
		STORM WATER FLOW ARROW
27		PROPOSED GRADE MAJOR CONTOUR (5.0' INTERVAL)
27		PROPOSED GRADE MINOR CONTOUR (1.0' INTERVAL)
		PROPOSED STORM DRAIN PIPE
		PROPOSED WATER PIPE
		PROPOSED SANITARY SEWER PIPE
		PROPOSED AC PAVEMENT
		PROPOSED CONCRETE SURFACING
		PROPOSED GRAVEL SURFACING
		PROPOSED BUILDING
X X		PROPOSED FENCE LINE
		PROPOSED ROAD CENTERLINE
		PROPOSED RIGHT-OF-WAY
PL		PROPOSED PROPERTY LINE
SF		PROPOSED SEDIMENT FENCE
		PROPOSED ABOVE GROUND PIPE RACK
		PROPOSED TREE BUFFER
		PROPOSED STORMWATER POND

SYMBOL	DESCRIPTION
27	EXISTING GRADE MAJOR CONTOUR
27	EXISTING GRADE MINOR CONTOUR
SD_x	EXISTING STORM DRAIN PIPE
W_x	EXISTING WATER PIPE
SS_x	EXISTING SANITARY SEWER PIPE
	EXISTING AC PAVEMENT
	EXISTING CONCRETE SURFACING
	EXISTING GRAVEL SURFACING
	EXISTING BUILDING
	EXISTING WETLAND BOUDARY
	EXISTING FENCE LINE
	EXISTING ROAD CENTERLINE
	EXISTING RIGHT-OF-WAY
PL	EXISTING PROPERTY LINE
OHW	EXISTING ORDINARY HIGH WATER MARK
E_x	EXISTING UNDERGROUND POWER
T	EXISTING UNDERGROUND TELEPHONE
G	EXISTING UNDERGROUND GAS
	INLET PROTECTION
	CONSTRUCTION ENTRANCE



TYPICAL SECTION CALLOUT

PERMIT DOCUMENT

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MFA JOB #: M1724.01
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DRAWN: L. DANIEL

MAUL FOSTER ALONGI
3140 NE BROADWAY STREET
PORTLAND, OR 97232
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www.maulfoster.com

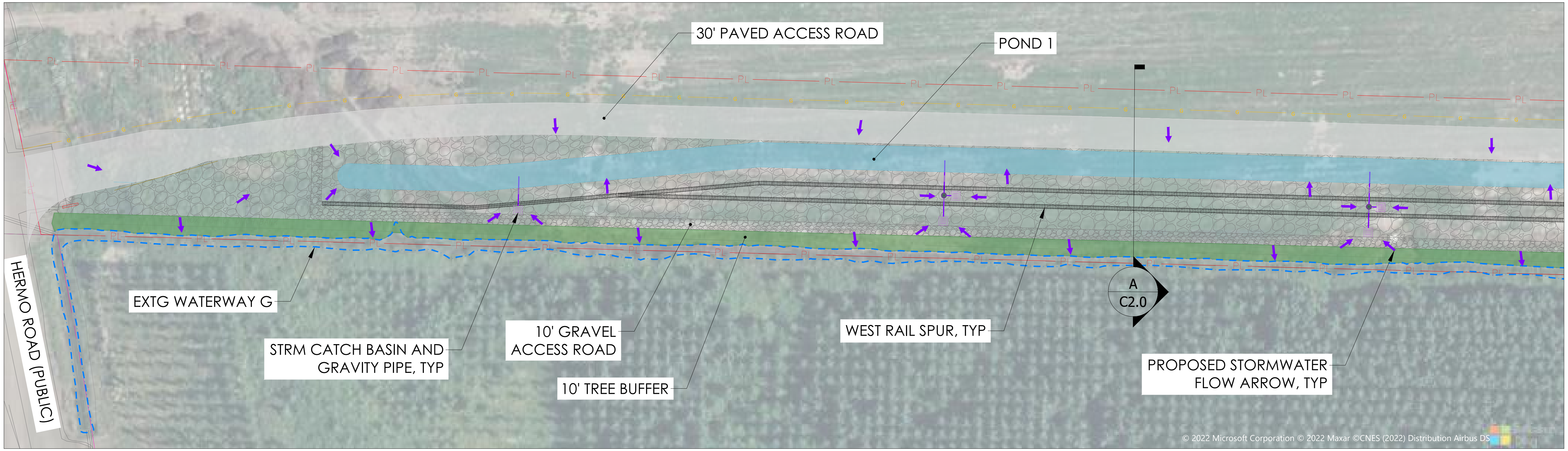
NEXT Renewable Fuels, Inc.

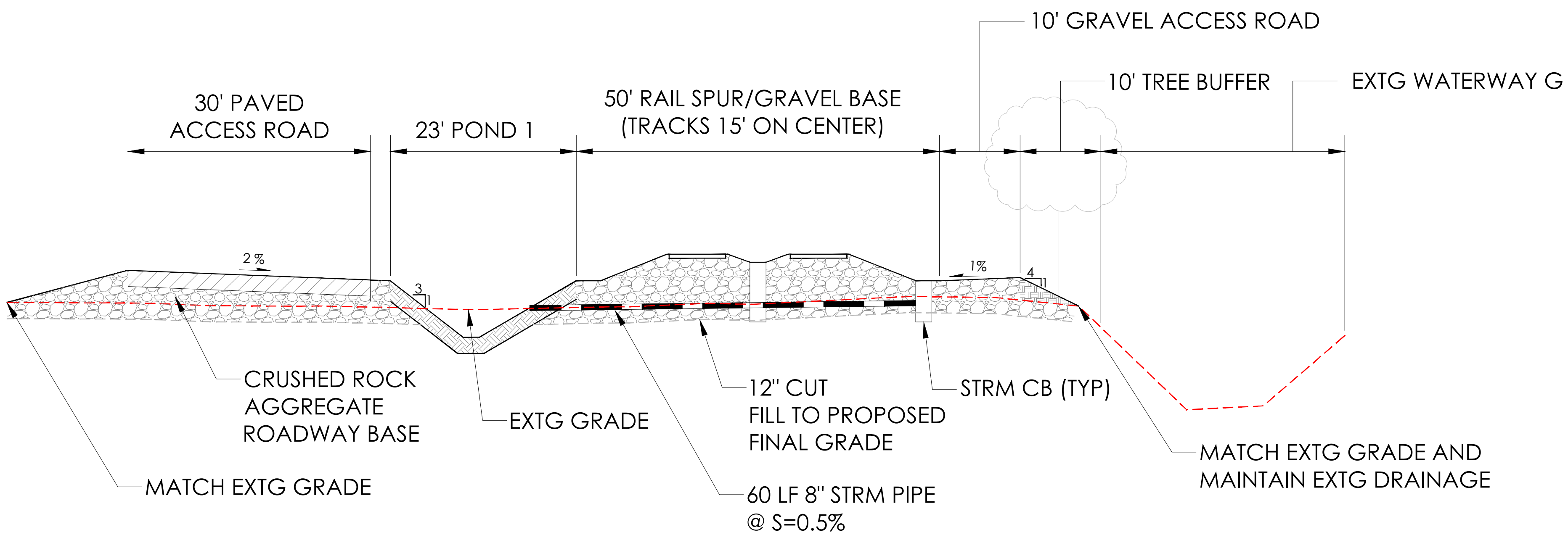
MASTER LEGEND

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

EXHIBIT
C1.0





A WEST RAIL SPUR TYPICAL SECTION

NOT TO SCALE

SITE LOCATION KEY

PERMIT DOCUMENT

MFA JOB #: M1724.01
ISSUE DATE: 12/09/2022
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DRAWN: L. DANIEL

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NEXT Renewable Fuels, Inc.

WEST RAIL SPUR PLAN AND SECTION I

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 100' 200'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

EXHIBIT
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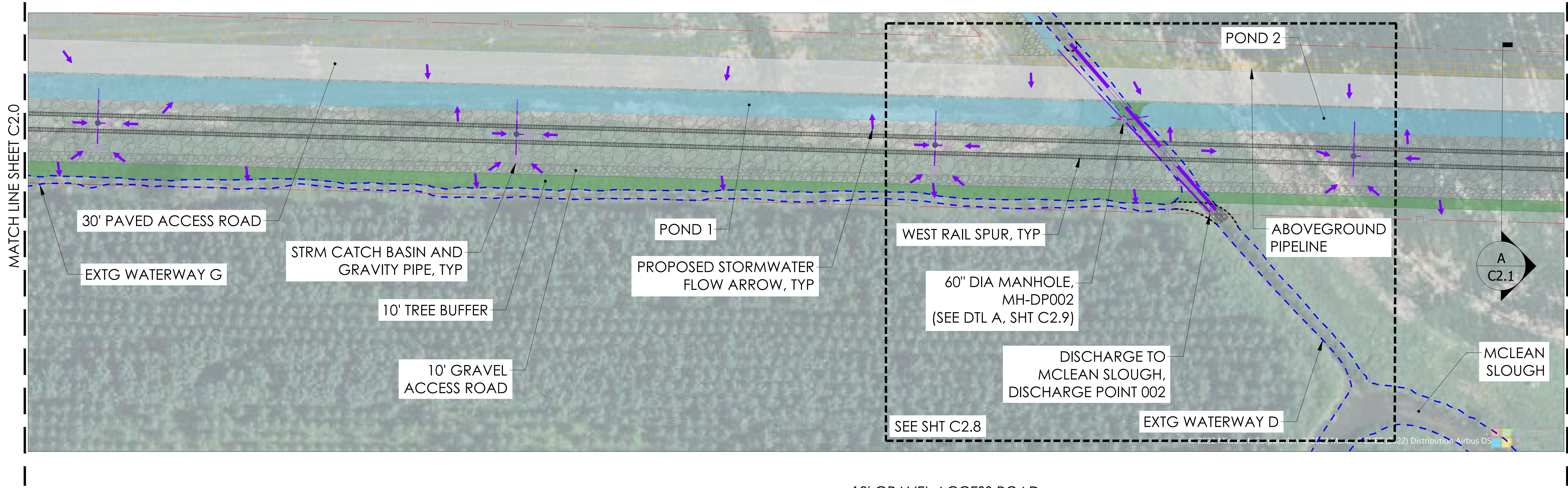

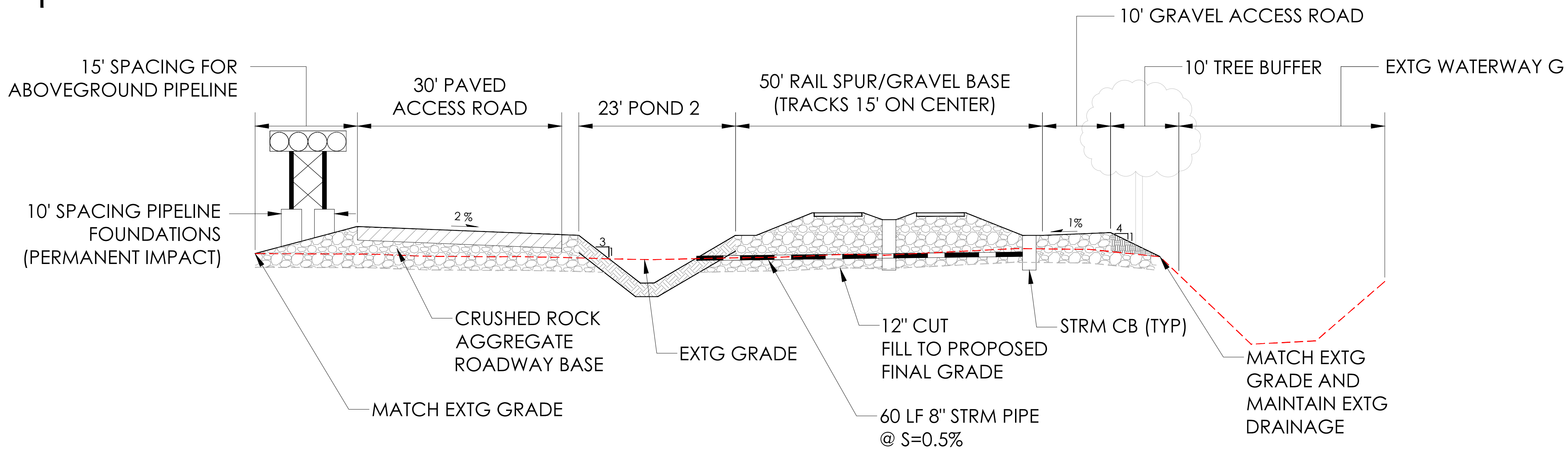

A WEST RAIL SPUR TYPICAL SECTION

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SITE LOCATION KEY

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NEXT Renewable Fuels, Inc.

WEST RAIL SPUR PLAN AND SECTION II

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 100' 200'

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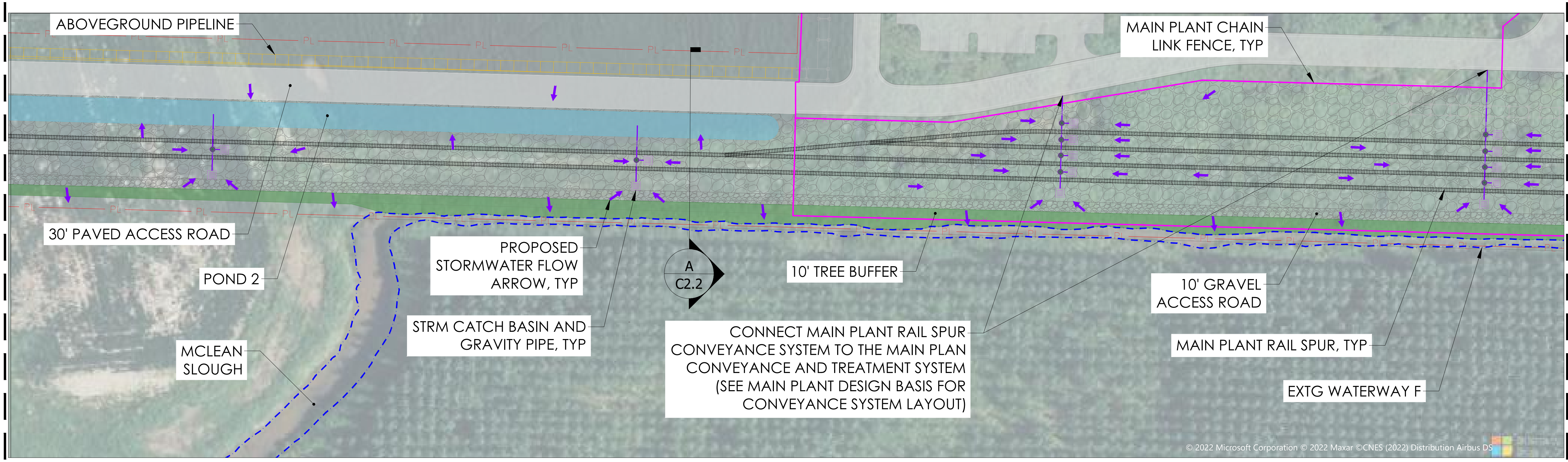

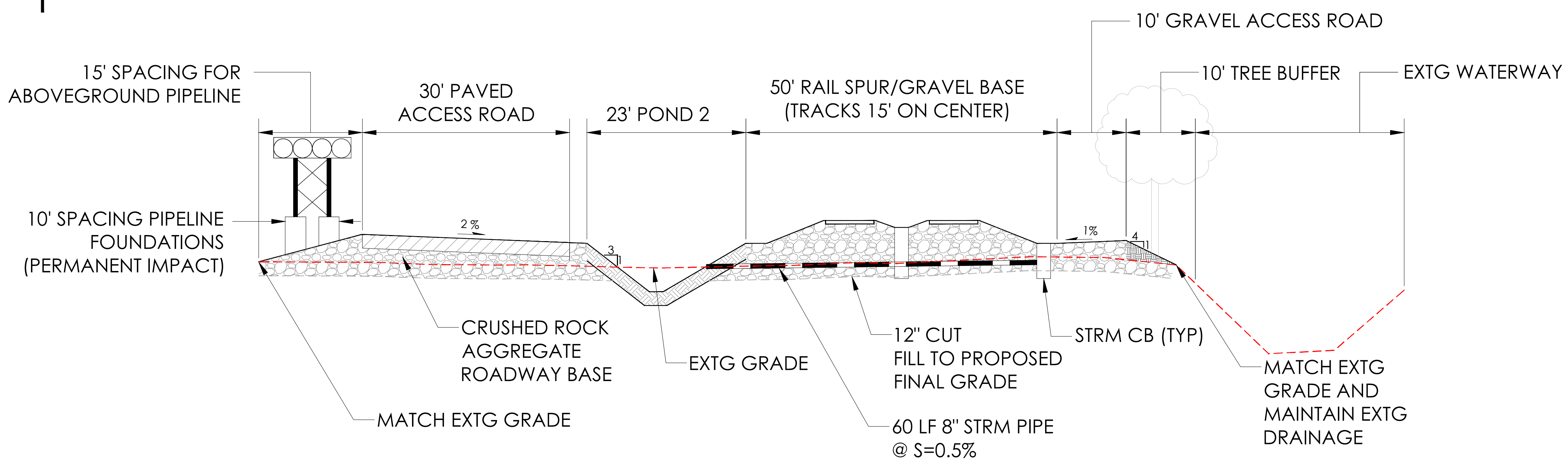

A WEST RAIL SPUR TYPICAL SECTION

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NEXT Renewable Fuels, Inc.

WEST RAIL SPUR PLAN AND SECTION III

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 100' 200'

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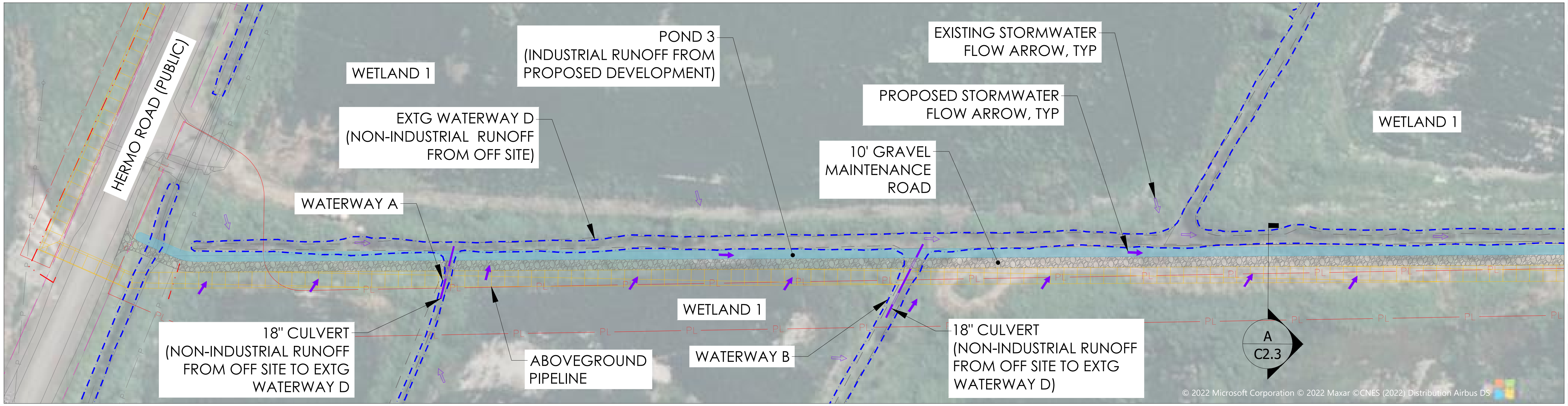

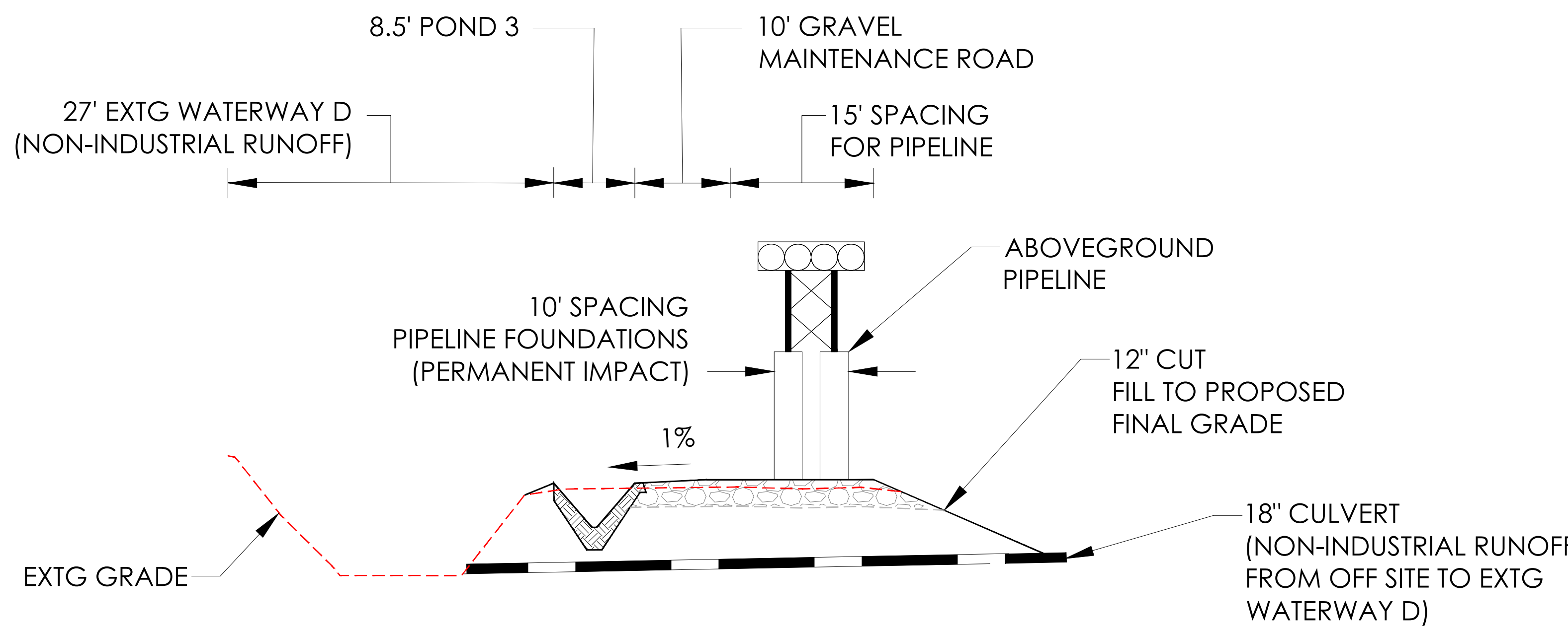

A PIPELINE/MAINTENANCE ROAD TYPICAL SECTION

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SITE LOCATION KEY

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NEXT Renewable Fuels, Inc.

PIPELINE/MAINTENANCE ROAD PLAN AND SECTION I

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 100' 200'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

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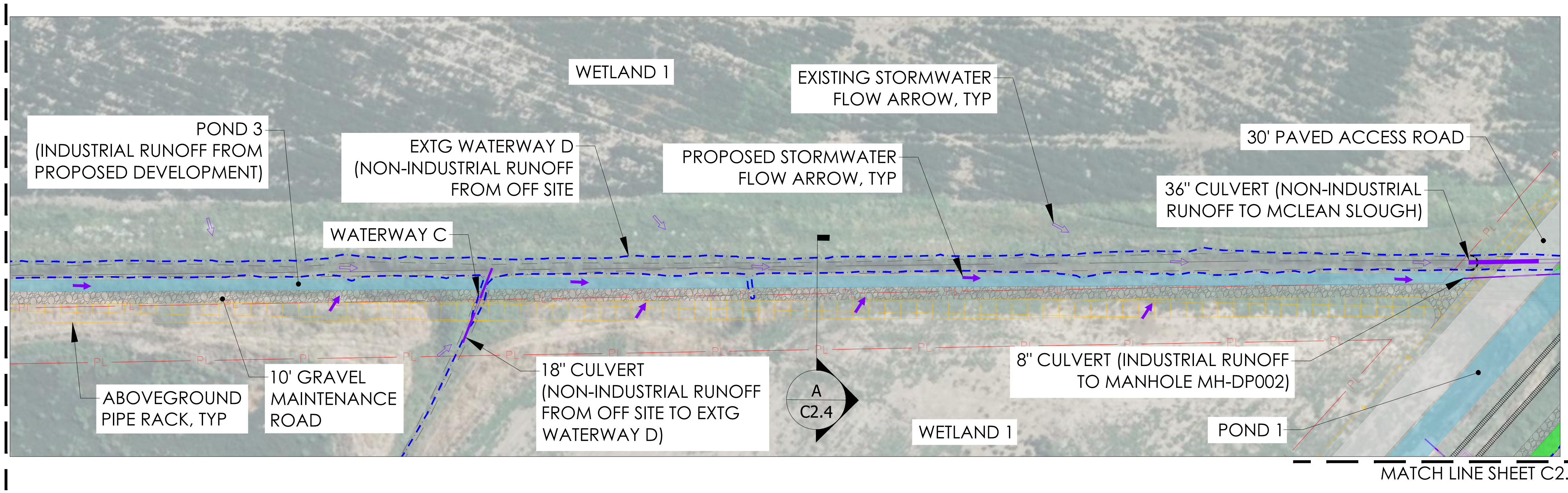

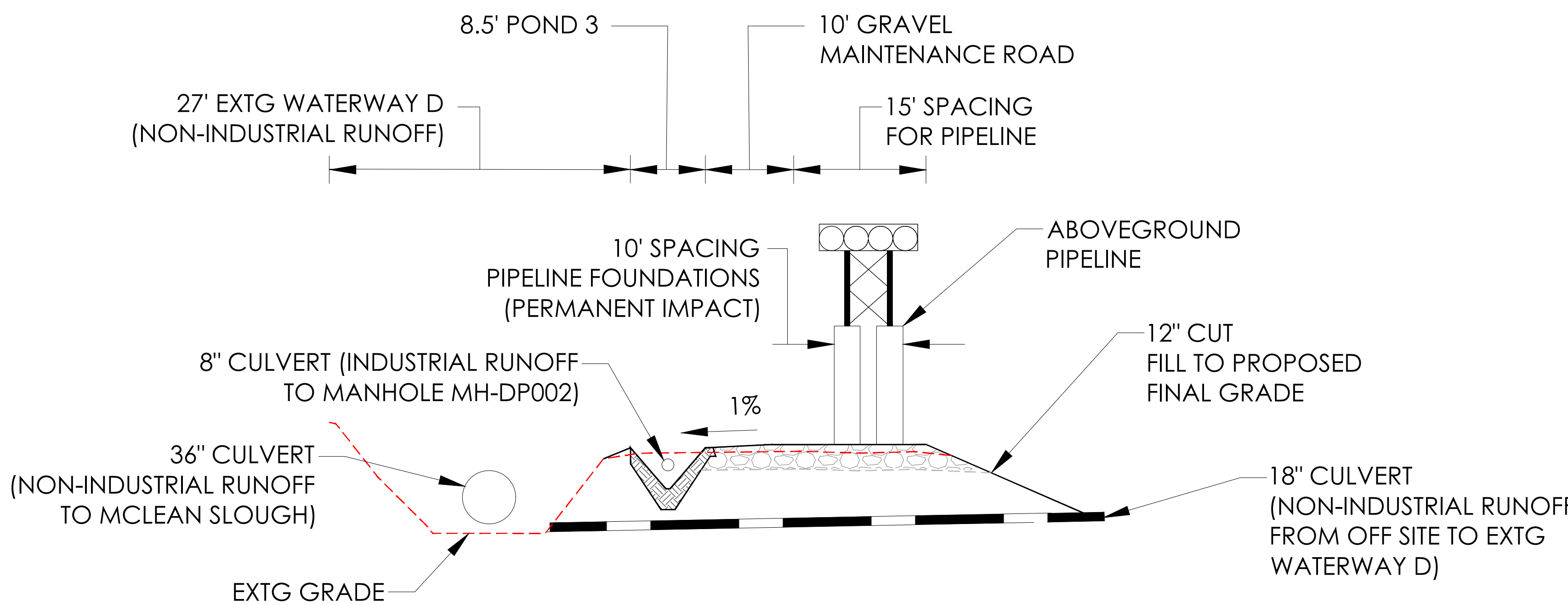

A PIPELINE/MAINTENANCE ROAD TYPICAL SECTION

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NEXT Renewable Fuels, Inc.

PIPELINE/MAINTENANCE ROAD PLAN AND SECTION II

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 100' 200'

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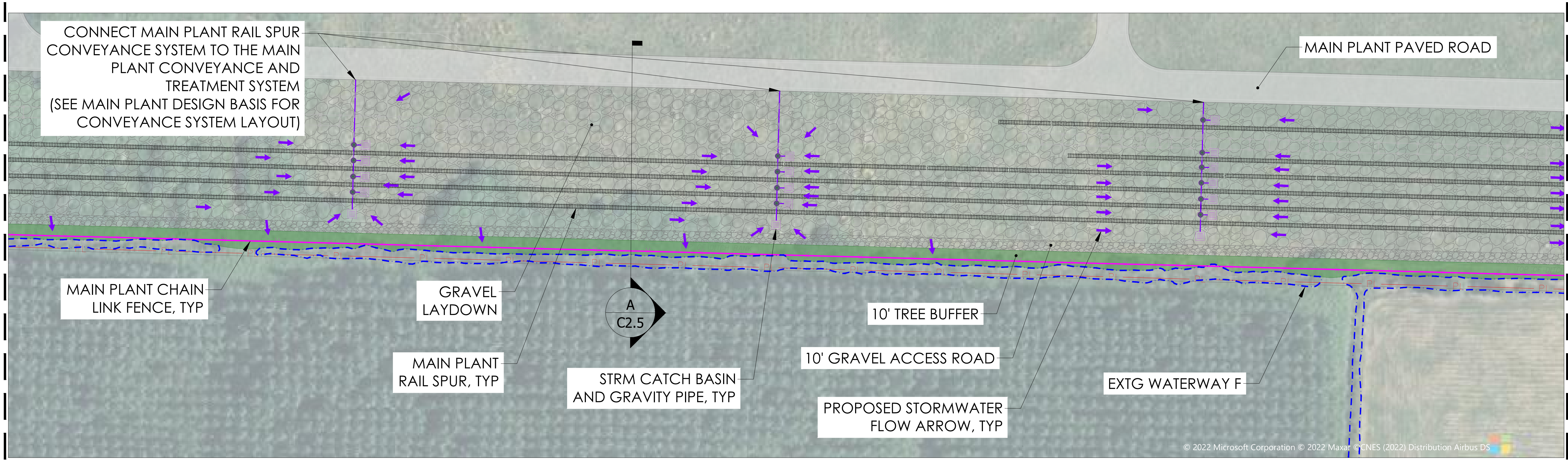

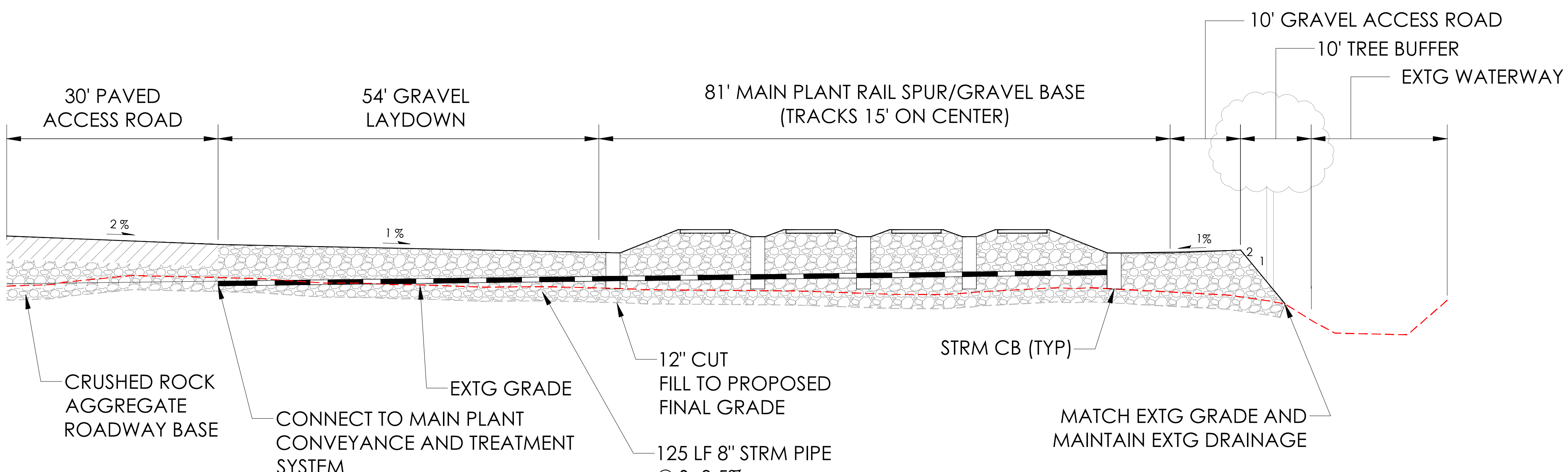

A MAIN PLANT RAIL SPUR TYPICAL SECTION

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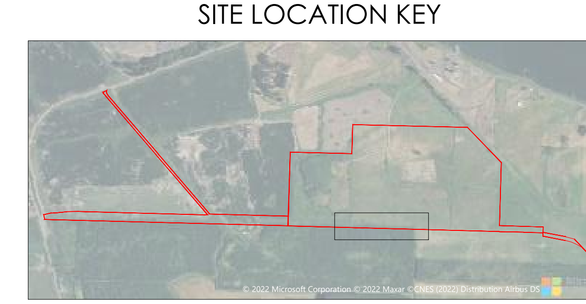

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DRAWN:	L. DANIEL

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3140 NE BROADWAY STREET
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PHONE: 971.544.2139
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NEXT Renewable Fuels, Inc.

MAIN PLANT RAIL SPUR PLAN AND SECTION I

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 100' 200'

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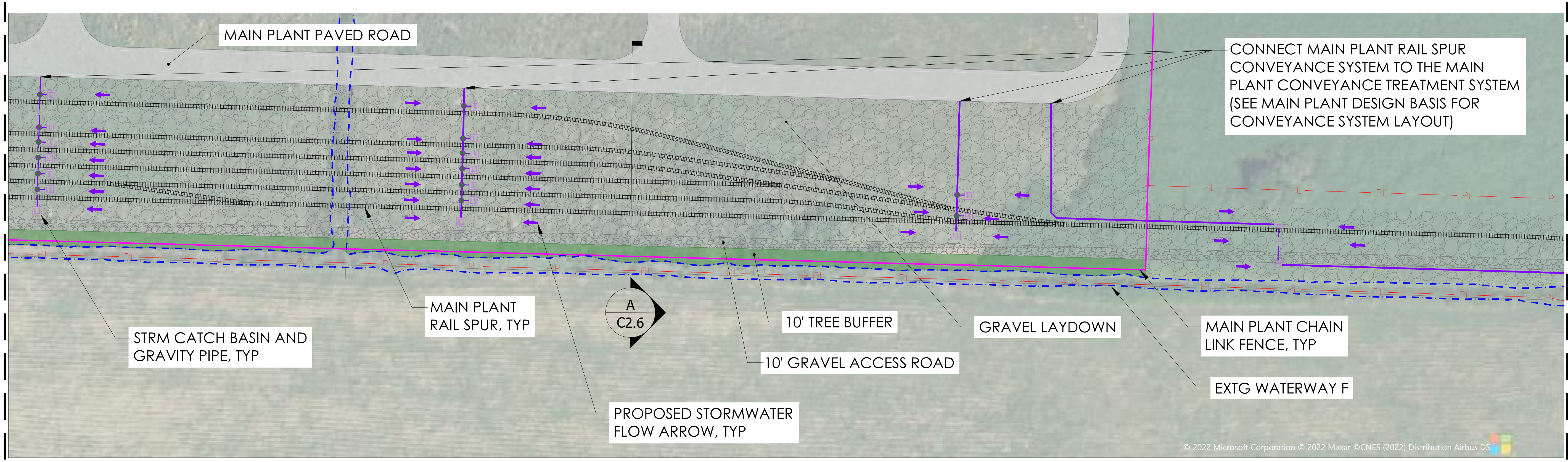

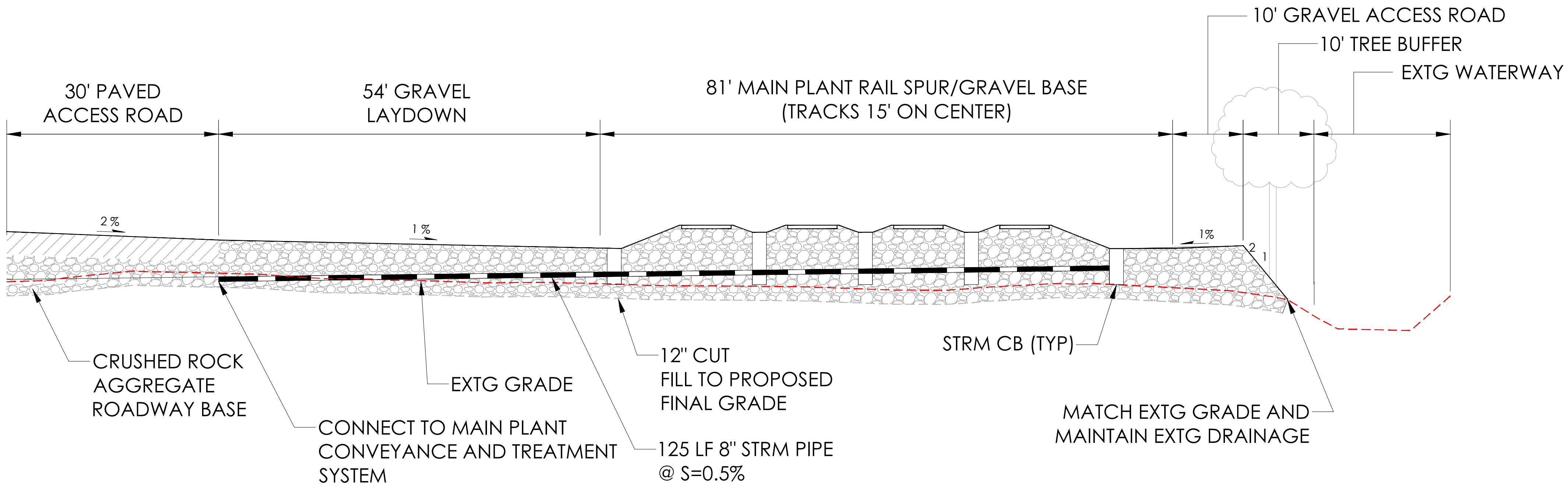

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MAIN PLANT RAIL SPUR TYPICAL SECTION

NOT TO SCALE

SITE LOCATION KEY

PERMIT DOCUMENT

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3140 NE BROADWAY STREET
PORTLAND, OR 97232
PHONE: 971.544.2139
www.maulfoster.com

NEXT Renewable Fuels, Inc.

MAIN PLANT RAIL SPUR PLAN AND SECTION II

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 100' 200'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

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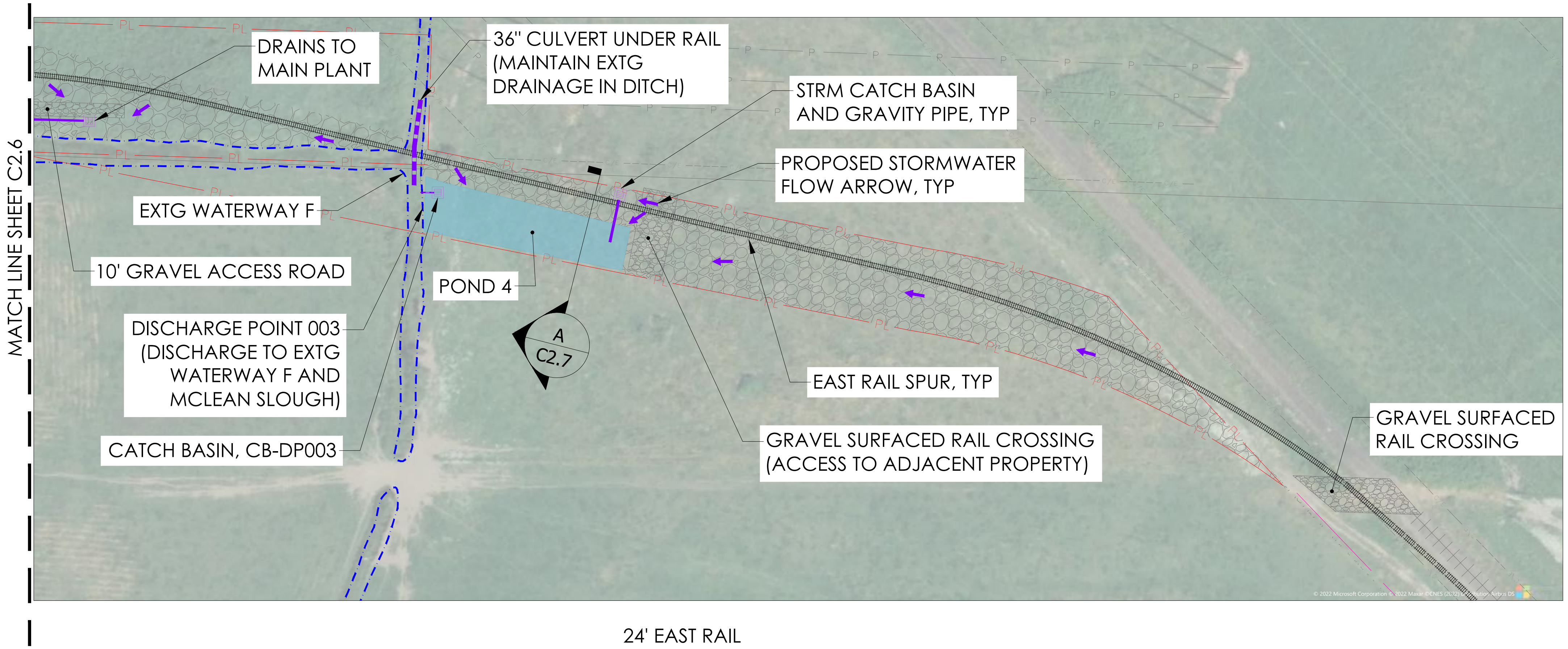

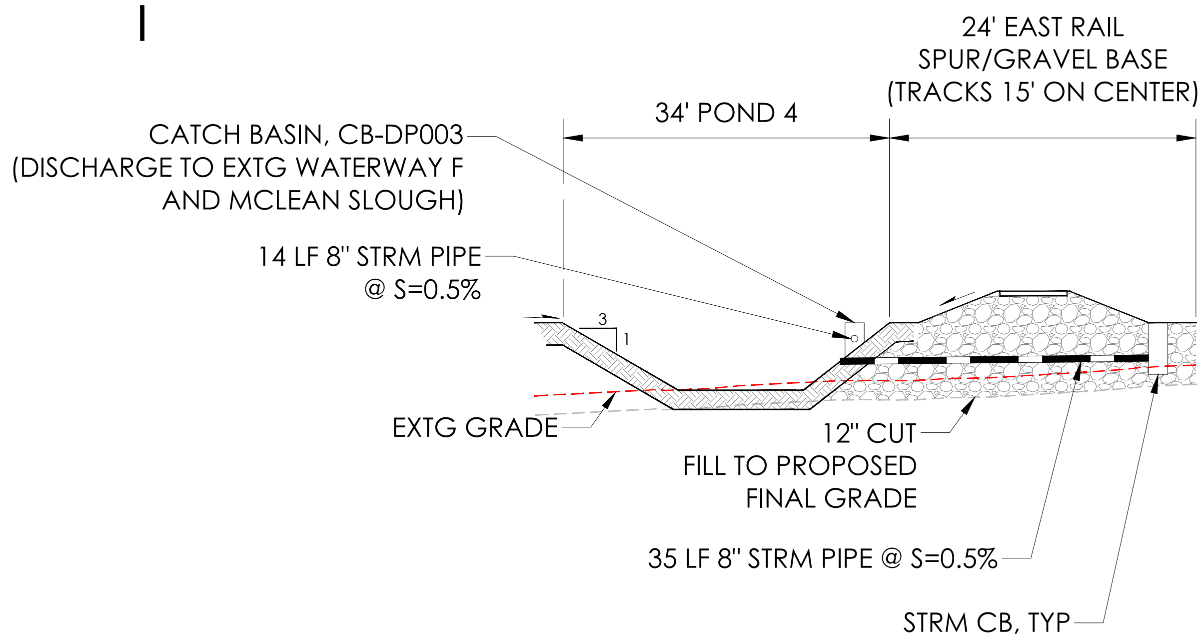

A EAST RAIL SPUR TYPICAL SECTION

NOT TO SCALE

SITE LOCATION KEY

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ISSUE DATE: 12/09/2022
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DRAWN: L. DANIEL

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3140 NE BROADWAY STREET
PORTLAND, OR 97232
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NEXT Renewable Fuels, Inc.

EAST RAIL SPUR PLAN AND SECTION

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 100' 200'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

EXHIBIT C2.7

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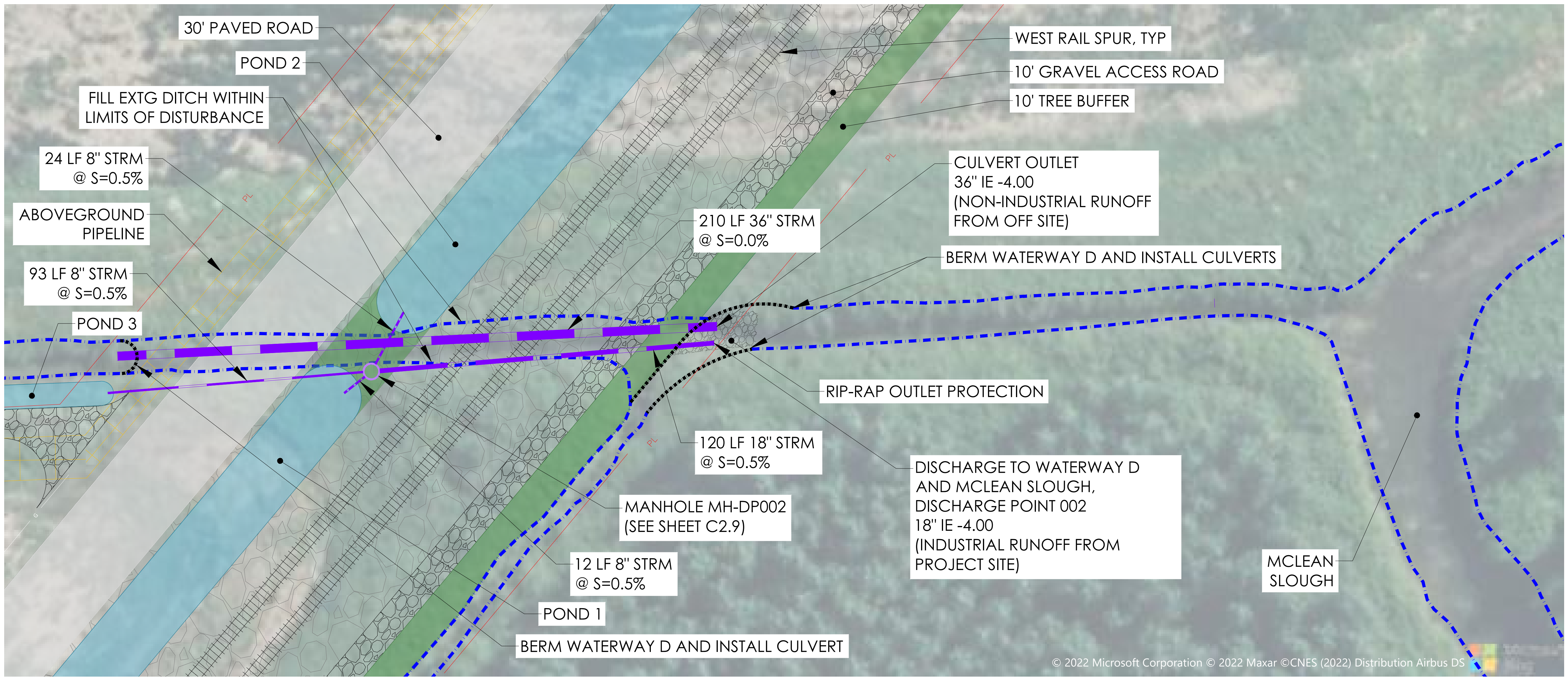

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DRAWN: L. DANIEL

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3140 NE BROADWAY STREET
PORTLAND, OR 97232
PHONE: 971.544.2139
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NEXT Renewable Fuels, Inc.

DISCHARGE POINT 002 PLAN

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 20' 40'

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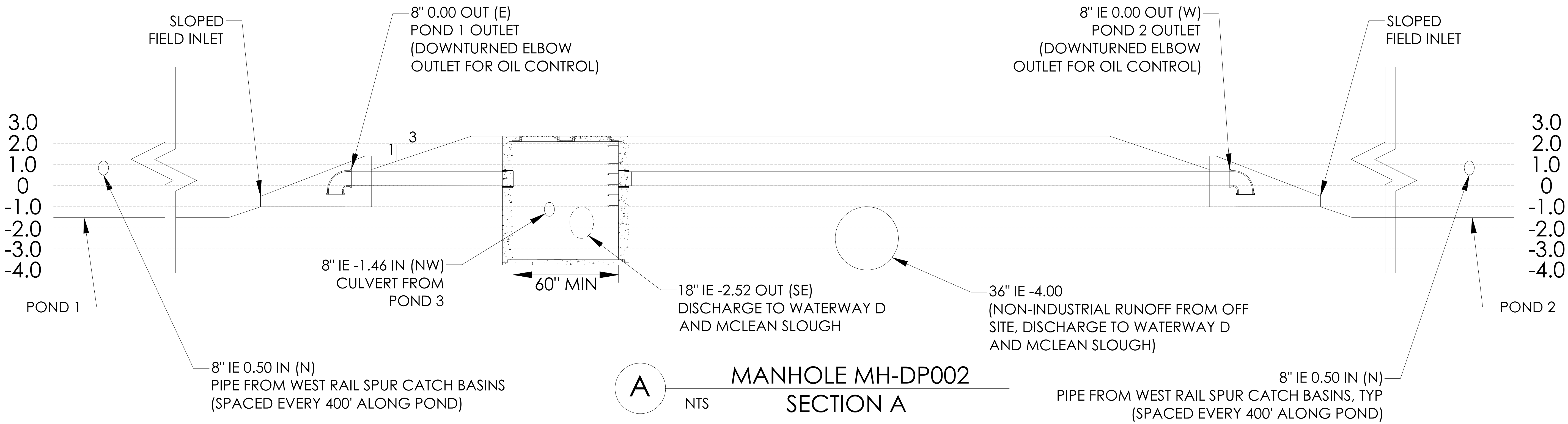
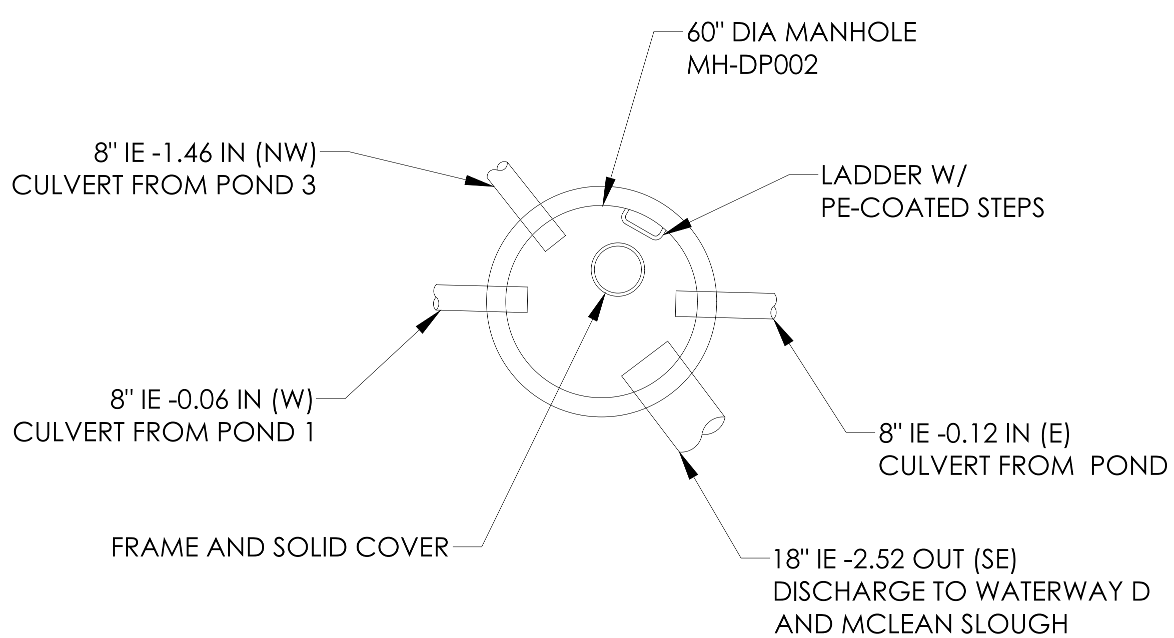
EXHIBIT C2.8



A MANHOLE MH-DP002
SECTION A
NTS



B MANHOLE MH-DP002 ENLARGED PLAN
NTS

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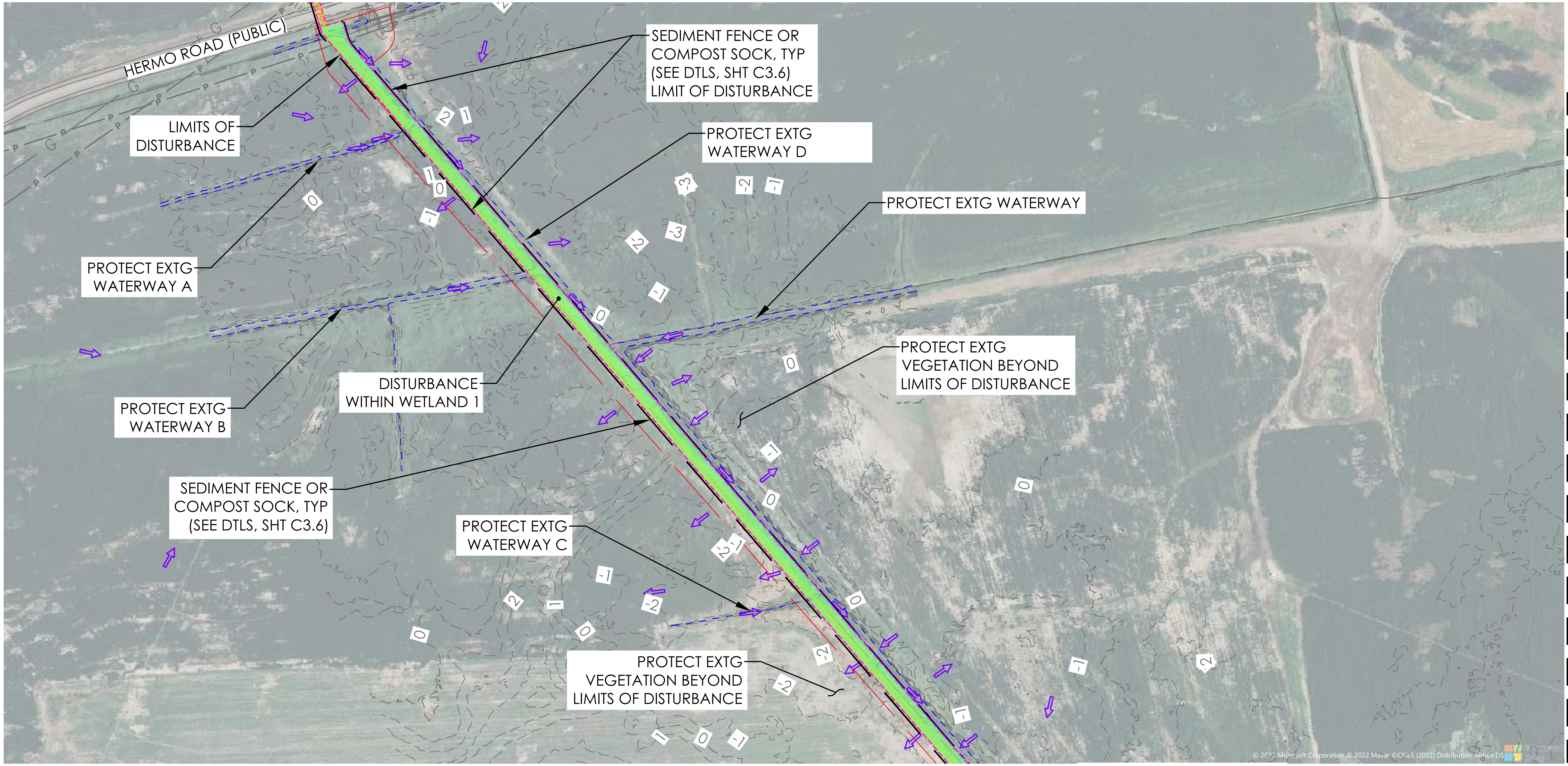
MANHOLE MH-DP002 DETAILS

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

EXHIBIT
C2.9

MATCH LINE SHEET C3.1



MATCH LINE SHEET C3.4

MATCH LINE SHEET C3.2

Filepath:G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\PLANS\EROSION CONTROL\C3.0 3.1 PIPELINE MAINTENANCE RD ESCP I.dwg

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NEXT Renewable Fuels, Inc.

PIPELINE/MAINTENANCE RD ESCP I

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 250' 500'

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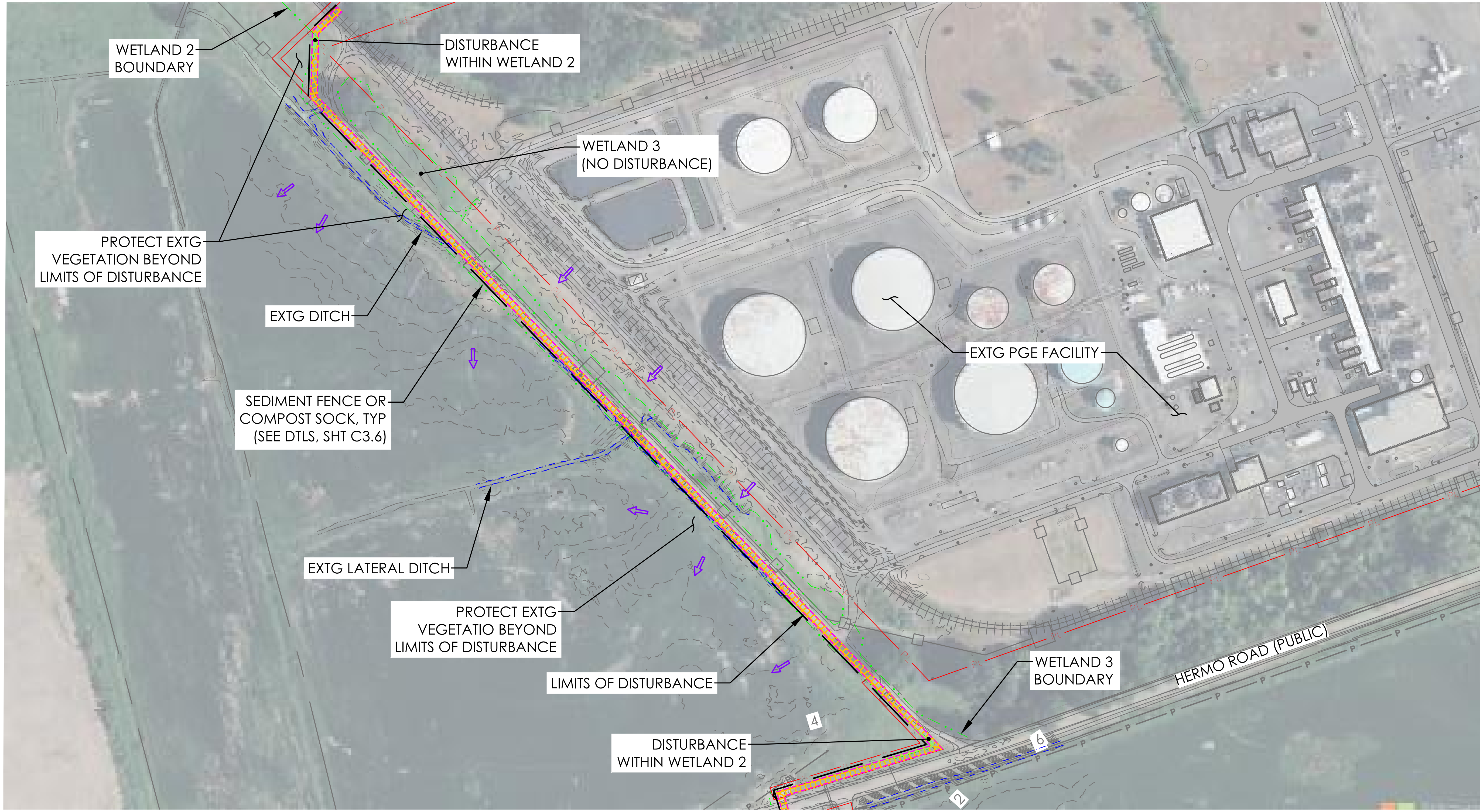
EXHIBIT C3.0



MATCH LINE SHEET C3.0

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NEXT Renewable Fuels, Inc.

PIPELINE/MAINTENANCE RD ESCP II

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 250' 500'

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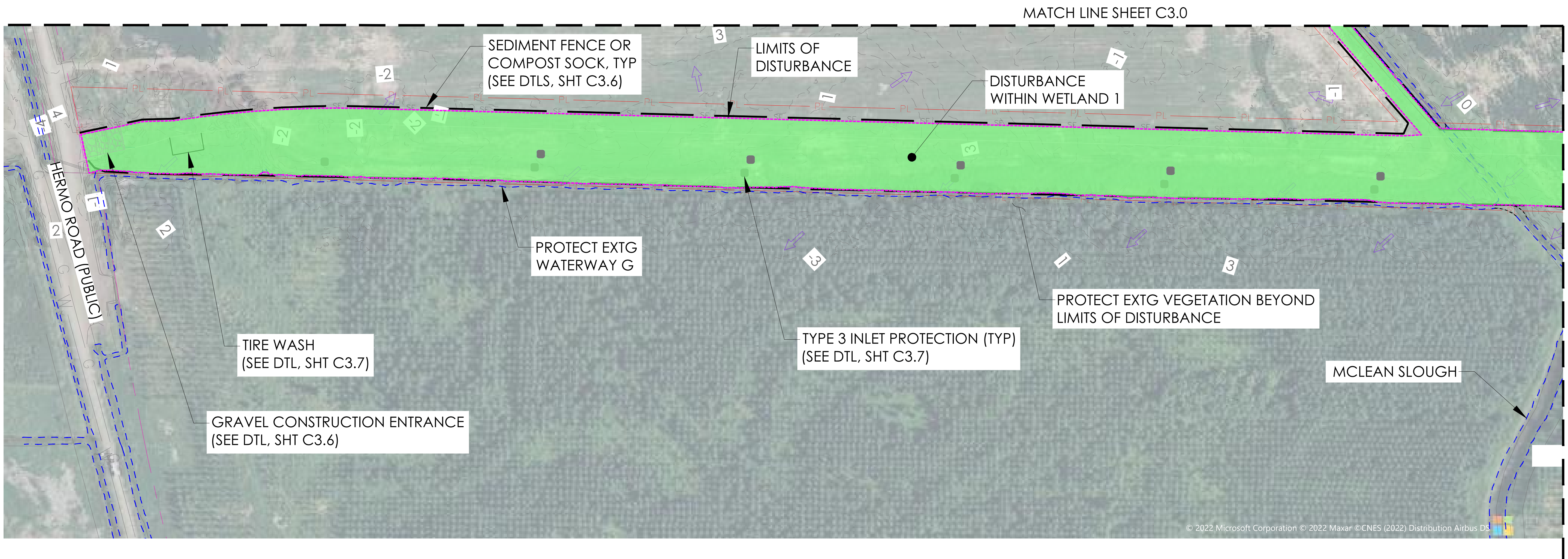
EXHIBIT C3.1



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NEXT Renewable Fuels, Inc.

WEST RAIL SPUR ESCP I

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 200' 400'

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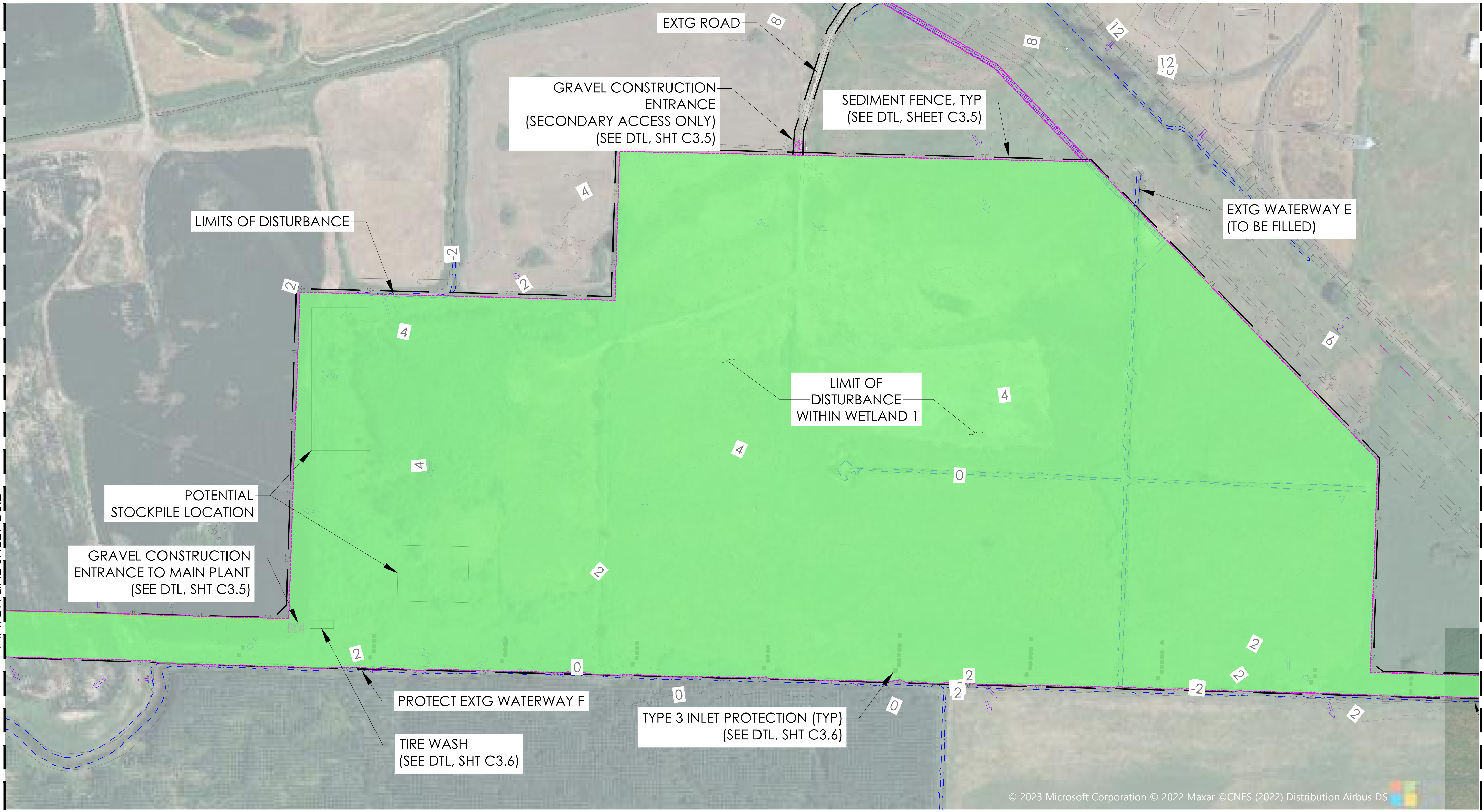
EXHIBIT C3.2



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NEXT Renewable Fuels, Inc.

MAIN PLANT ESCP

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 250' 500'

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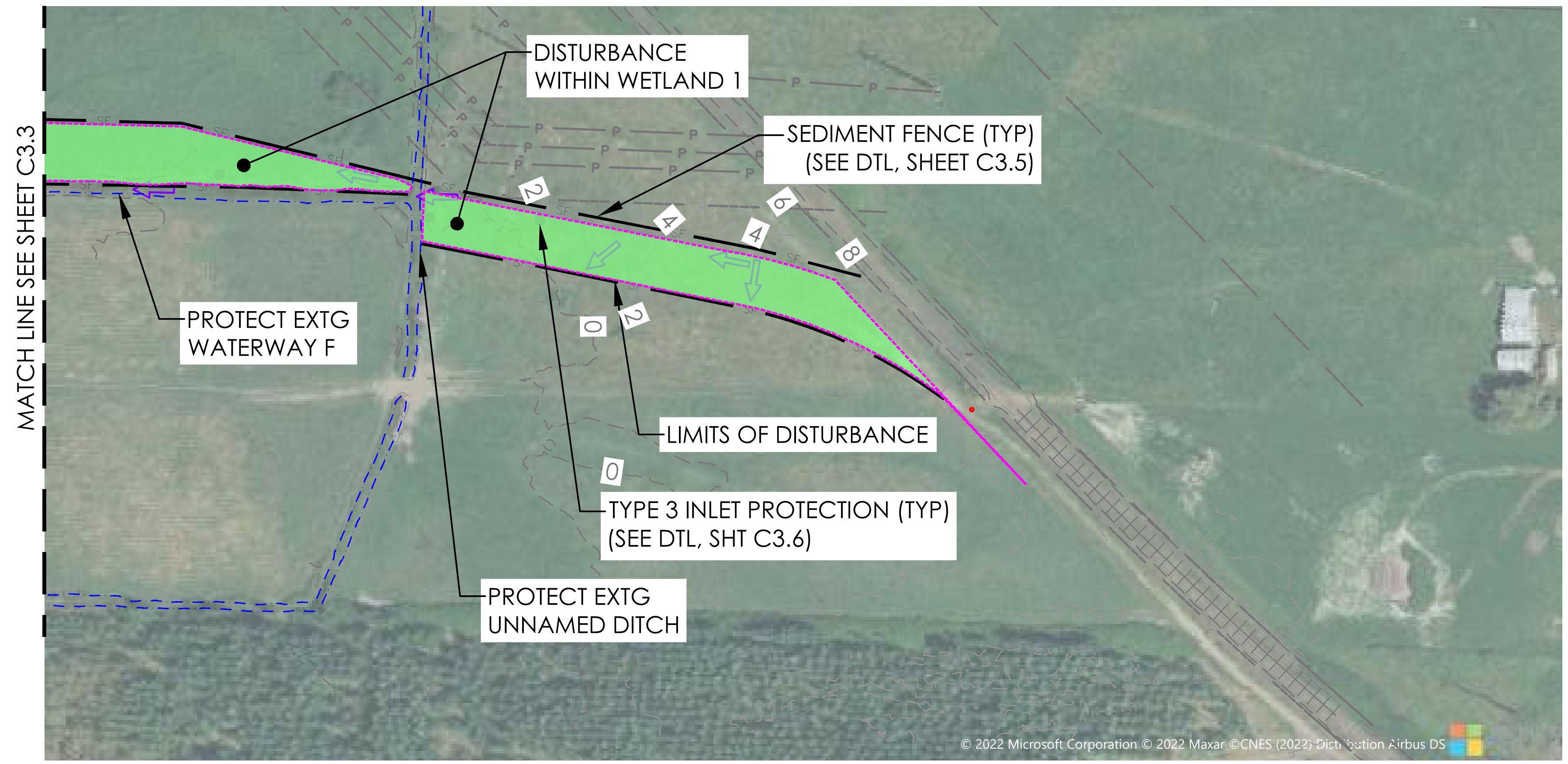
EXHIBIT C3.3



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NEXT Renewable Fuels, Inc.

EAST RAIL SPUR ESCP

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 200' 400'

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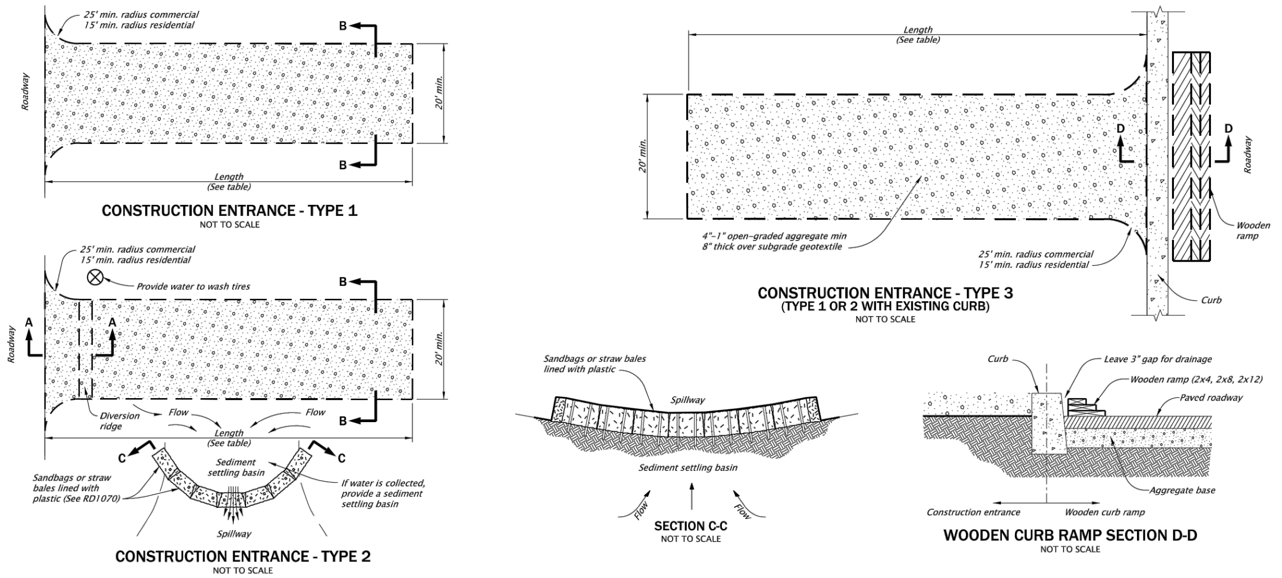
EXHIBIT C3.4



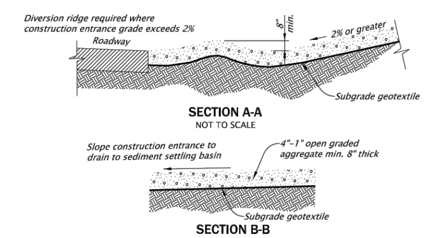
CONSTRUCTION ENTRANCE - TYPE 1
NOT TO SCALE

CONSTRUCTION ENTRANCE - TYPE 2
NOT TO SCALE

CONSTRUCTION ENTRANCE - TYPE 3
(TYPE 1 OR 2 WITH EXISTING CURB)
NOT TO SCALE

SECTION C-C
NOT TO SCALE

WOODEN CURB RAMP SECTION D-D
NOT TO SCALE



SECTION A-A
NOT TO SCALE

SECTION B-B
NOT TO SCALE

NOTES:
1. The Type 1 entrance is a simple entrance without a diversion ridge or settling basin.
2. The wooden ramp may be used on either Type 1 or Type 2 entrances in situations where there is curb and the curb is not removed for the construction entrance.

CONSTRUCTION ENTRANCE TABLE MINIMUM LENGTH	
Length (FT)	Area Of Exposed Soil (Acre)
20	0.25
50	0.25 < A < 1.0
100	A > 1.0

CALC. BOOK NO. N/A — SDR DATE January, 2021

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

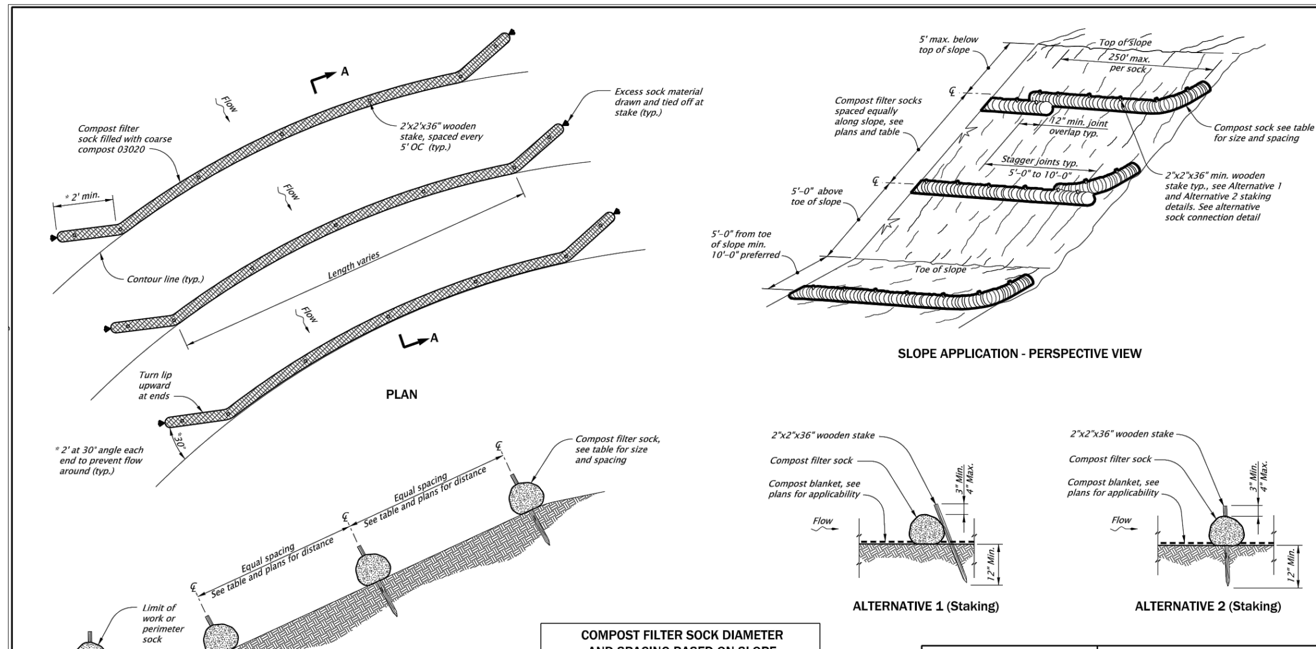
The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

CONSTRUCTION ENTRANCES

2021

DATE	REVISION DESCRIPTION
Jan 2021	Removed Calc book numbers



PLAN

SECTION A-A

SLOPE APPLICATION - PERSPECTIVE VIEW

ALTERNATIVE 1 (Staking)

ALTERNATIVE 2 (Staking)

NOTE:
Fully biodegradable compost sock mesh is recommended for permanent installations. Where compost socks must be moved or removed, synthetic sock mesh should be used.

COMPOST FILTER SOCK DIAMETER AND SPACING BASED ON SLOPE		
SLOPE	SPACING (ft)	DIAMETER (in)
<1:50	250	8
1:50 - 1:10	125	12
1:10 - 1:5	100	12
1:5 - 1:2	50	18
>1:2	25	18

COMPOST FILTER SOCK
NOT TO SCALE

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OREGON STANDARD DRAWINGS

SEDIMENT BARRIER TYPE 8

2021

DATE	REVISION DESCRIPTION
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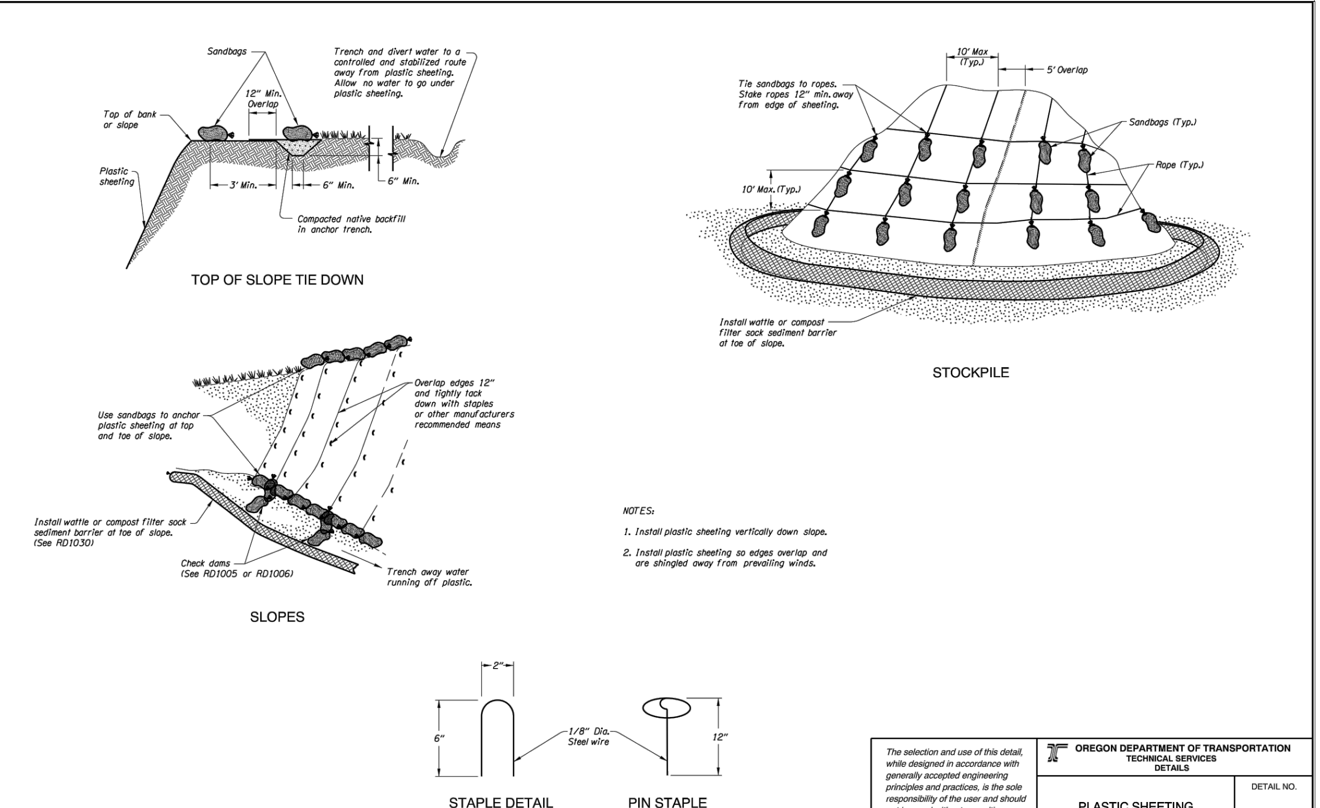


TOP OF SLOPE TIE DOWN

STOCKPILE

SLOPES

NOTES:
1. Install plastic sheeting vertically down slope.
2. Install plastic sheeting so edges overlap and are shingled away from prevailing winds.

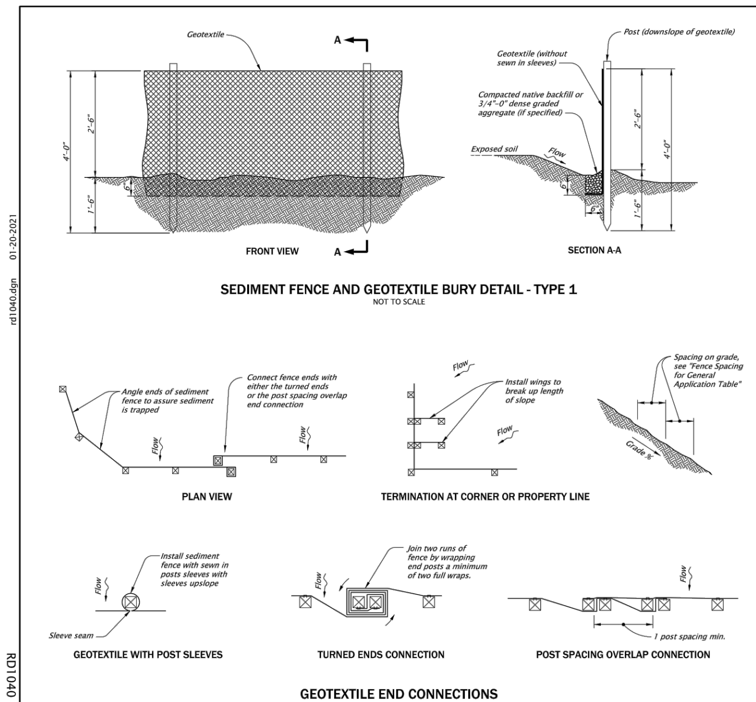
STAPLE DETAIL

PIN STAPLE

The selection and use of this detail, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES
DETAILS

PLASTIC SHEETING — DETAIL NO. DET6001



SEDIMENT FENCE AND GEOTEXTILE BURY DETAIL - TYPE 1
NOT TO SCALE

NOTES:
1. Use must be approved by the engineer.
2. Not approved for use with sediment fencing with sewn-in post sleeves.

ALTERNATE SEDIMENT FENCE WITHOUT TRENCHING - TYPE 2
NOT TO SCALE

PLAN VIEW

TERMINATION AT CORNER OR PROPERTY LINE

GENERAL NOTES:
1. Use 2"x2" wood fence posts.
2. Posts to be installed on downhill side of sediment fence geotextile. Position posts to prevent separation from geotextile.
3. Compact filter fabric trench backfill and soil on uphill side of fence.
4. Locate fence no closer than three feet to the toe of a slope.
5. Wing spacing shall comply with "Fence Spacing for General Application Table".

FENCE SPACING FOR GENERAL APPLICATION TABLE	
INSTALL PARALLEL ALONG CONTOURS AS FOLLOWS	
GRADE	MAXIMUM SPACING ON GRADE
Grade < 10%	300'
10% ≤ Grade < 15%	150'
15% ≤ Grade < 20%	100'
20% ≤ Grade < 30%	50'
30% ≤ Grade	25'

POST SPACING TABLE	
6'	Sediment Fence with Geotextile elongation less than 50%
4'	Sediment Fence with Geotextile elongation 50% or more

GEOTEXTILE WITH POST SLEEVES

TURNED ENDS CONNECTION

POST SPACING OVERLAP CONNECTION

GEOTEXTILE END CONNECTIONS
NOT TO SCALE

CALC. BOOK NO. N/A — SDR DATE January, 2021

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

SEDIMENT FENCE

2021

DATE	REVISION DESCRIPTION
Jan 2021	Removed Calc book numbers

Effective Date: June 1, 2022 - November 30, 2022 — RD1040

RD1040 — rd1040.dgn 01-20-2021

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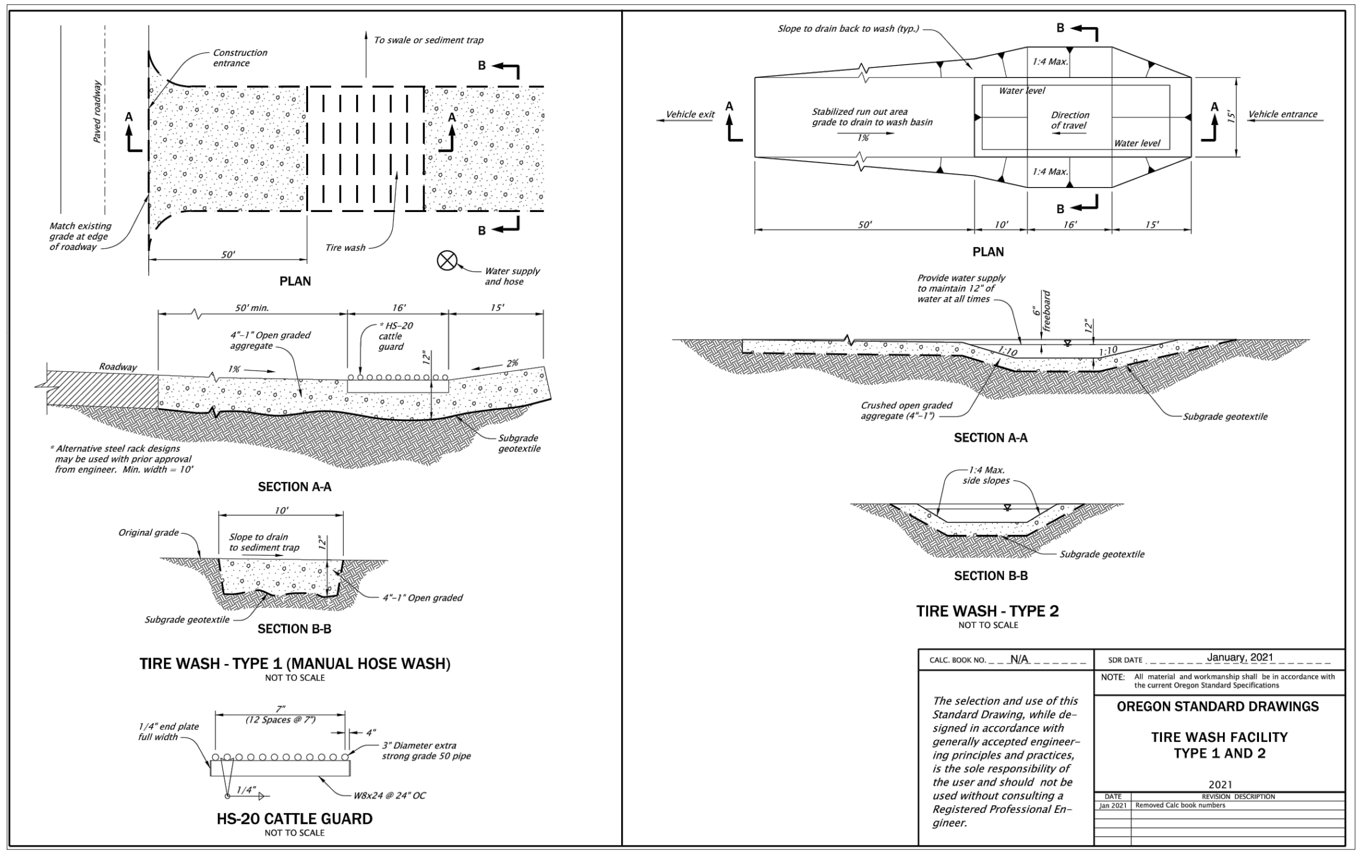
NEXT Renewable Fuels, Inc.

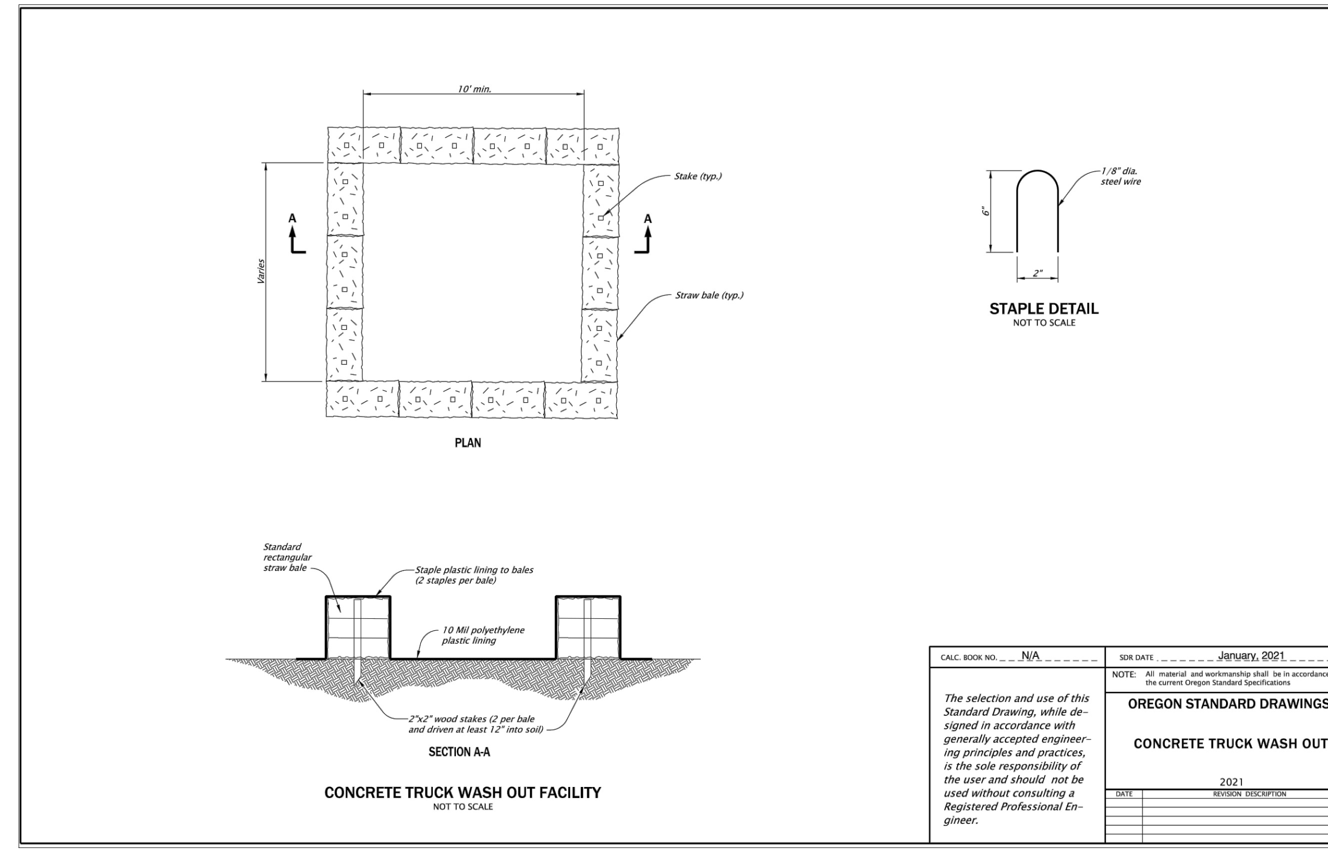
ESCP DETAILS I

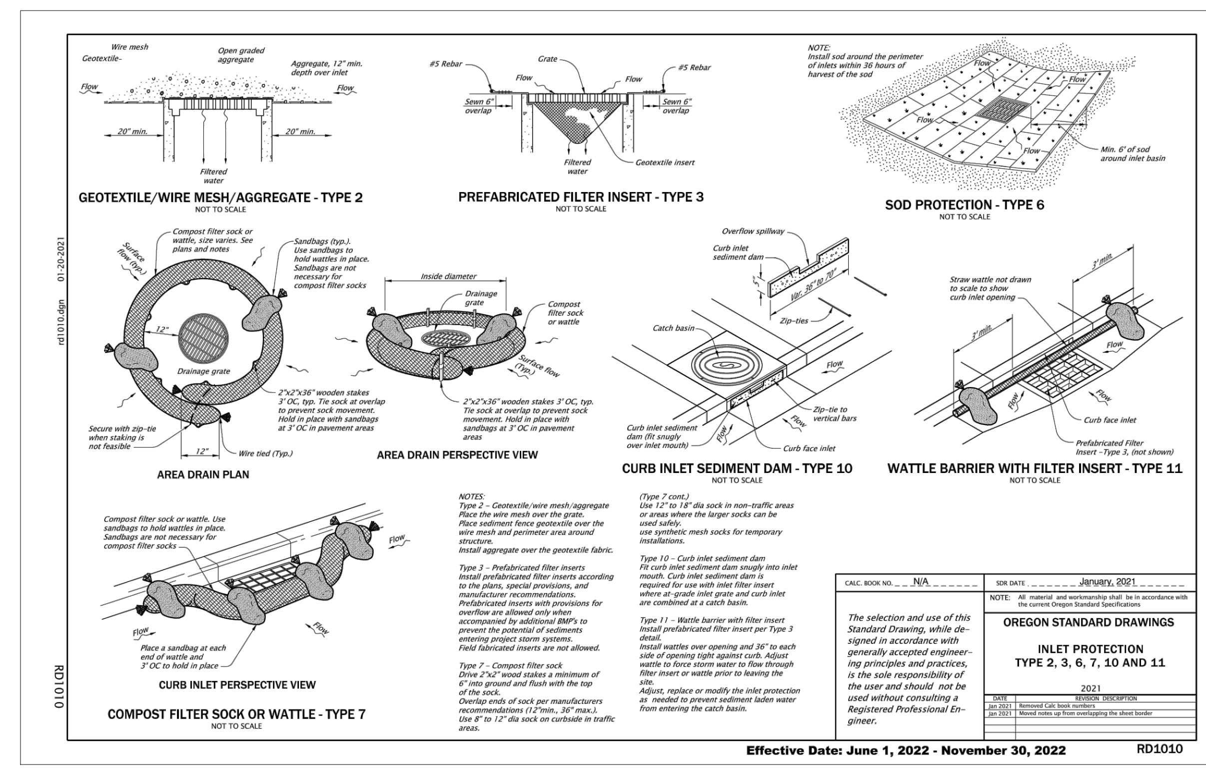
NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

EXHIBIT
C3.5







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NEXT Renewable Fuels, Inc.

ESCP DETAILS II

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

EXHIBIT
C3.6

1. ONCE KNOWN, INCLUDE A LIST OF ALL CONTRACTORS THAT WILL ENGAGE IN CONSTRUCTION ACTIVITIES ON SITE, AND THE AREAS OF THE SITE WHERE THE CONTRACTOR(S) WILL ENGAGE IN CONSTRUCTION ACTIVITIES. REVISE THE LIST AS APPROPRIATE UNTIL PERMIT COVERAGE IS TERMINATED (SECTION 4.4.C.I). IN ADDITION, INCLUDE A LIST OF ALL PERSONNEL (BY NAME AND POSITION) THAT ARE RESPONSIBLE FOR THE DESIGN, INSTALLATION AND MAINTENANCE OF STORMWATER CONTROL MEASURES (E.G., ESCP DEVELOPER, BMP INSTALLER (SEE SECTION 4.10), AS WELL AS THEIR INDIVIDUAL RESPONSIBILITIES. (SECTION 4.4.C.II)
2. VISUAL MONITORING INSPECTION REPORTS MUST BE MADE IN ACCORDANCE WITH DEQ 1200-C PERMIT REQUIREMENTS (SECTION 6.5)
3. INSPECTION LOGS MUST BE KEPT IN ACCORDANCE WITH DEQ'S 1200-C PERMIT REQUIREMENTS. (SECTION 6.5.Q)
4. RETAIN A COPY OF THE ESCP AND ALL REVISIONS ON SITE AND MAKE IT AVAILABLE ON REQUEST TO DEQ, AGENT, OR THE LOCAL MUNICIPALITY (SECTION 4.7)
5. THE PERMIT REGISTRANTS MUST IMPLEMENT THE ESCP. FAILURE TO IMPLEMENT ANY OF THE CONTROL MEASURES OR PRACTICES DESCRIBED IN THE ESCP IS A VIOLATION OF THE PERMIT (SECTIONS 4 AND 4.11)
6. THE ESCP MUST BE ACCURATE AND REFLECT SITE CONDITIONS (SECTION 4.8)
7. SUBMISSION OF ALL ESCP REVISIONS IS NOT REQUIRED. SUBMITTAL OF THE ESCP REVISIONS IS ONLY UNDER SPECIFIC CONDITIONS. SUBMIT ALL NECESSARY REVISION TO DEQ OR AGENT WITHIN 10 DAYS (SECTION 4.9)
8. SEQUENCE CLEARING AND GRADING TO THE MAXIMUM EXTENT PRACTICAL TO PREVENT EXPOSED INACTIVE AREAS FROM BECOMING A SOURCE OF EROSION (SECTION 2.2.2)
9. CREATE SMOOTH SURFACES BETWEEN SOIL SURFACE AND EROSION AND SEDIMENT CONTROLS TO PREVENT STORMWATER FROM BYPASSING CONTROLS AND PONDING (SECTION 2.2.3)
10. IDENTIFY, MARK, AND PROTECT (BY CONSTRUCTION FENCING OR OTHER MEANS) CRITICAL RIPARIAN AREAS AND VEGETATION INCLUDING IMPORTANT TREES AND ASSOCIATED ROOTING ZONES, AND VEGETATION AREAS TO BE PRESERVED IDENTIFY VEGETATIVE BUFFER ZONES BETWEEN THE SITE AND SENSITIVE AREAS (E.G., WETLANDS), AND OTHER AREAS TO BE PRESERVED, ESPECIALLY IN PERIMETER AREAS (SECTION 2.2.1)
11. PRESERVE EXISTING VEGETATION WHEN PRACTICAL AND RE-VEGETATE OPEN AREAS. RE-VEGETATE OPEN AREAS WHEN PRACTICABLE BEFORE AND AFTER GRADING OR CONSTRUCTION. IDENTIFY THE TYPE OF VEGETATIVE SEED MIX USED (SECTION 2.2.5)
12. MAINTAIN AND DELINEATE ANY EXISTING NATURAL BUFFER WITHIN THE 50-FEET OF WATERS OF THE STATE (SECTION 2.2.4)
13. INSTALL PERIMETER SEDIMENT CONTROL, INCLUDING STORM DRAIN INLET PROTECTION AS WELL AS ALL SEDIMENT BASINS, TRAPS, AND BARRIERS PRIOR TO LAND DISTURBANCE (SECTION 2.1.3)
14. CONTROL BOTH PEAK FLOW RATES AND TOTAL STORMWATER VOLUME, TO MINIMIZE EROSION AT OUTLETS AND DOWNSTREAM CHANNELS AND STREAMBANKS (SECTIONS 2.1.1 AND 2.2.16)
15. CONTROL SEDIMENT AS NEEDED ALONG THE SITE PERIMETER AND AT ALL OPERATIONAL INTERNAL STORM DRAIN INLETS AT ALL TIMES DURING CONSTRUCTION, BOTH INTERNALLY AND AT THE SITE BOUNDARY (SECTIONS 2.2.6 AND 2.2.13)
16. ESTABLISH CONCRETE TRUCK AND OTHER CONCRETE EQUIPMENT WASHOUT AREAS BEFORE BEGINNING CONCRETE WORK (SECTION 2.2.14)
17. APPLY TEMPORARY AND/OR PERMANENT SOIL STABILIZATION MEASURES IMMEDIATELY ON ALL DISTURBED AREAS AS GRADING PROGRESSES. TEMPORARY OR PERMANENT STABILIZATIONS MEASURES ARE NOT REQUIRED FOR AREAS THAT ARE INTENDED TO BE LEFT UNVEGETATED, SUCH AS DIRT ACCESS ROADS OR UTILITY POLE PADS (SECTIONS 2.2.20 AND 2.2.21)
18. ESTABLISH MATERIAL AND WASTE STORAGE AREAS, AND OTHER NON-STORMWATER CONTROLS (SECTION 2.3.7)
19. KEEP WASTE CONTAINER LIDS CLOSED WHEN NOT IN USE AND CLOSE LIDS AT THE END OF THE BUSINESS DAY FOR THOSE CONTAINERS THAT ARE ACTIVELY USED THROUGHOUT THE DAY. FOR WASTE CONTAINERS THAT DO NOT HAVE LIDS, PROVIDE EITHER (1) COVER (E.G., A TARP, PLASTIC SHEETING, TEMPORARY ROOF) TO PREVENT EXPOSURE OF WASTES TO PRECIPITATION, OR (2) A SIMILARLY EFFECTIVE MEANS DESIGNED TO PREVENT THE DISCHARGE OF POLLUTANTS (E.G., SECONDARY CONTAINMENT) (SECTION 2.3.7)
20. PREVENT TRACKING OF SEDIMENT ONTO PUBLIC OR PRIVATE ROADS USING BMPS SUCH AS: CONSTRUCTION ENTRANCE, GRAVELED (OR PAVED) EXITS AND PARKING AREAS, GRAVEL ALL UNPAVED ROADS LOCATED ONSITE, OR USE AN EXIT TIRE WASH. THESE BMPS MUST BE IN PLACE PRIOR TO LAND-DISTURBING ACTIVITIES (SECTION 2.2.7)
21. WHEN TRUCKING SATURATED SOILS FROM THE SITE, EITHER USE WATER-TIGHT TRUCKS OR DRAIN LOADS ON SITE (SECTION 2.2.7.F)
22. CONTROL PROHIBITED DISCHARGES FROM LEAVING THE CONSTRUCTION SITE, I.E., CONCRETE WASH-OUT, WASTEWATER FROM CLEANOUT OF STUCCO, PAINT AND CURING COMPOUNDS (SECTIONS 1.5 AND 2.3.9)
23. ENSURE THAT STEEP SLOPE AREAS WHERE CONSTRUCTION ACTIVITIES ARE NOT OCCURRING ARE NOT DISTURBED (SECTION 2.2.10)
24. PREVENT SOIL COMPACTION IN AREAS WHERE POST-CONSTRUCTION INFILTRATION FACILITIES ARE TO BE INSTALLED (SECTION 2.2.12)
25. USE BMPS TO PREVENT OR MINIMIZE STORMWATER EXPOSURE TO POLLUTANTS FROM SPILLS; VEHICLE AND EQUIPMENT FUELING, MAINTENANCE, AND STORAGE; OTHER CLEANING AND MAINTENANCE ACTIVITIES; AND WASTE HANDLING ACTIVITIES. THESE POLLUTANTS INCLUDE FUEL, HYDRAULIC FLUID, AND OTHER OILS FROM VEHICLES AND MACHINERY, AS WELL AS DEBRIS, FERTILIZER, PESTICIDES AND HERBICIDES, PAINTS, SOLVENTS, CURING COMPOUNDS AND ADHESIVES FROM CONSTRUCTION OPERATIONS (SECTIONS 2.2.15 AND 2.3)
26. PROVIDE PLANS FOR SEDIMENTATION BASINS THAT HAVE BEEN DESIGNED PER SECTION 2.2.17 AND STAMPED BY AN OREGON PROFESSIONAL ENGINEER (SEE SECTION 2.2.17.A)
27. IF ENGINEERED SOILS ARE USED ON SITE, A SEDIMENTATION BASIN/IMPOUNDMENT MUST BE INSTALLED (SEE SECTIONS 2.2.17 AND 2.2.18)
28. PROVIDE A DEWATERING PLAN FOR ACCUMULATED WATER FROM PRECIPITATION AND UNCONTAMINATED GROUNDWATER SEEPAGE DUE TO SHALLOW EXCAVATION ACTIVITIES (SEE SECTION 2.4)
29. IMPLEMENT THE FOLLOWING BMPS WHEN APPLICABLE: WRITTEN SPILL PREVENTION AND RESPONSE PROCEDURES, EMPLOYEE TRAINING ON SPILL PREVENTION AND PROPER DISPOSAL PROCEDURES, SPILL KITS IN ALL VEHICLES, REGULAR MAINTENANCE SCHEDULE FOR VEHICLES AND MACHINERY, MATERIAL DELIVERY AND STORAGE CONTROLS, TRAINING AND SIGNAGE, AND COVERED STORAGE AREAS FOR WASTE AND SUPPLIES (SECTION 2.3)
30. USE WATER, SOIL-BINDING AGENT OR OTHER DUST CONTROL TECHNIQUE AS NEEDED TO AVOID WIND-BLOWN SOIL (SECTION 2.2.9)
31. THE APPLICATION RATE OF FERTILIZERS USED TO REESTABLISH VEGETATION MUST FOLLOW MANUFACTURER'S RECOMMENDATIONS TO MINIMIZE NUTRIENT RELEASES TO SURFACE WATERS. EXERCISE CAUTION WHEN USING TIME-RELEASE FERTILIZERS WITHIN ANY WATERWAY RIPARIAN ZONE (SECTION 2.3.5)
32. IF AN ACTIVE TREATMENT SYSTEM (FOR EXAMPLE, ELECTRO-COAGULATION, FLOCCULATION, FILTRATION, ETC.) FOR SEDIMENT OR OTHER POLLUTANT REMOVAL IS EMPLOYED, SUBMIT AN OPERATION AND MAINTENANCE PLAN (INCLUDING SYSTEM SCHEMATIC, LOCATION OF SYSTEM, LOCATION OF INLET, LOCATION OF DISCHARGE, DISCHARGE DISPERSION DEVICE DESIGN, AND A SAMPLING PLAN AND FREQUENCY) BEFORE OPERATING THE TREATMENT SYSTEM. OBTAIN ENVIRONMENTAL MANAGEMENT PLAN APPROVAL FROM DEQ BEFORE OPERATING THE TREATMENT SYSTEM. OPERATE AND MAINTAIN THE TREATMENT SYSTEM ACCORDING TO MANUFACTURER'S SPECIFICATIONS. (SECTION 1.2.9)
33. TEMPORARILY STABILIZE SOILS AT THE END OF THE SHIFT BEFORE HOLIDAYS AND WEEKENDS, IF NEEDED. THE REGISTRANT IS RESPONSIBLE FOR ENSURING THAT SOILS ARE STABLE DURING RAIN EVENTS AT ALL TIMES OF THE YEAR. (SECTION 2.2)
34. AS NEEDED BASED ON WEATHER CONDITIONS, AT THE END OF EACH WORKDAY SOIL STOCKPILES MUST BE STABILIZED OR COVERED, OR OTHER BMPS MUST BE IMPLEMENTED TO PREVENT DISCHARGES TO SURFACE WATERS OR CONVEYANCE SYSTEMS LEADING TO SURFACE WATERS. (SECTION 2.2.8)
35. SEDIMENT FENCE: REMOVE TRAPPED SEDIMENT BEFORE IT REACHES ONE THIRD OF THE ABOVE GROUND FENCE HEIGHT AND BEFORE FENCE REMOVAL (SECTION 2.1.5.B)
36. OTHER SEDIMENT BARRIERS (SUCH AS BIOBAGS): REMOVE SEDIMENT BEFORE IT REACHES TWO INCHES DEPTH ABOVE GROUND HEIGHT AND BEFORE BMP REMOVAL (SECTION 2.1.5.C)
37. CATCH BASINS: CLEAN BEFORE RETENTION CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT. SEDIMENT BASINS AND SEDIMENT TRAPS: REMOVE TRAPPED SEDIMENTS BEFORE DESIGN CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT AND AT COMPLETION OF PROJECT (SECTION 2.1.5.D)
38. WITHIN 24 HOURS, SIGNIFICANT SEDIMENT THAT HAS LEFT THE CONSTRUCTION SITE, MUST BE REMEDIATED. INVESTIGATE THE CAUSE OF THE SEDIMENT RELEASE AND IMPLEMENT STEPS TO PREVENT A RECURRENCE OF THE DISCHARGE WITHIN THE SAME 24 HOURS. ANY IN-STREAM CLEAN-UP OF SEDIMENT SHALL BE PERFORMED ACCORDING TO THE OREGON DIVISION OF STATE LANDS REQUIRED TIMEFRAME. (SECTION 2.2.19.A)
39. THE INTENTIONAL WASHING OF SEDIMENT INTO STORM SEWERS OR DRAINAGE WAYS MUST NOT OCCUR. VACUUMING OR DRY SWEEPING AND MATERIAL PICKUP MUST BE USED TO CLEANUP RELEASED SEDIMENTS. (SECTION 2.2.19)
40. DOCUMENT ANY PORTION(S) OF THE SITE WHERE LAND DISTURBING ACTIVITIES HAVE PERMANENTLY CEASED OR WILL BE TEMPORARILY INACTIVE FOR 14 OR MORE CALENDAR DAYS (SECTION 6.5.F)
41. PROVIDE TEMPORARY STABILIZATION FOR THAT PORTION OF THE SITE WHERE CONSTRUCTION ACTIVITIES CEASE FOR 14 DAYS OR MORE WITH A COVERING OF BLOWN STRAW AND A TACKIFIER, LOOSE STRAW, OR AN ADEQUATE COVERING OF COMPOST MULCH UNTIL WORK RESUMES ON THAT PORTION OF THE SITE. (SECTION 2.2.20)
42. DO NOT REMOVE TEMPORARY SEDIMENT CONTROL PRACTICES UNTIL PERMANENT VEGETATION OR OTHER COVER OF EXPOSED AREAS IS ESTABLISHED. ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED, ALL TEMPORARY EROSION CONTROLS AND RETAINED SOILS MUST BE REMOVED AND DISPOSED OF PROPERLY, UNLESS NEEDED FOR LONG TERM USE FOLLOWING TERMINATION OF PERMIT COVERAGE (SECTION 2.2.21)
43. ALL FACILITIES TO BE USED FOR POST-CONSTRUCTION STORMWATER MANAGEMENT SHOULD BE DELINEATED ONCE CONSTRUCTED TO PREVENT TRAMPLING BY FOOT OR EQUIPMENT.
44. ONCE INSTALLED, INLET PROTECTION WILL BE IMPLEMENTED FOR EACH CATCH BASIN FOR THE DURATION OF CONSTRUCTION.

Filepath: G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\PLANS\EROSION CONTROL\C3.7 ESCP NOTES.dwg
Printed by: Brian Tino
Date: 12/7/2022 9:58:22 PM

MFA JOB #: M1724.01
ISSUE DATE: 12/09/2022
CHECKED: A. BANASIK
DRAWN: L. DANIEL

MAUL FOSTER ALONGI
3140 NE BROADWAY STREET
PORTLAND, OR 97232
PHONE: 971.544.2139
www.maulfoster.com

NEXT Renewable Fuels, Inc.

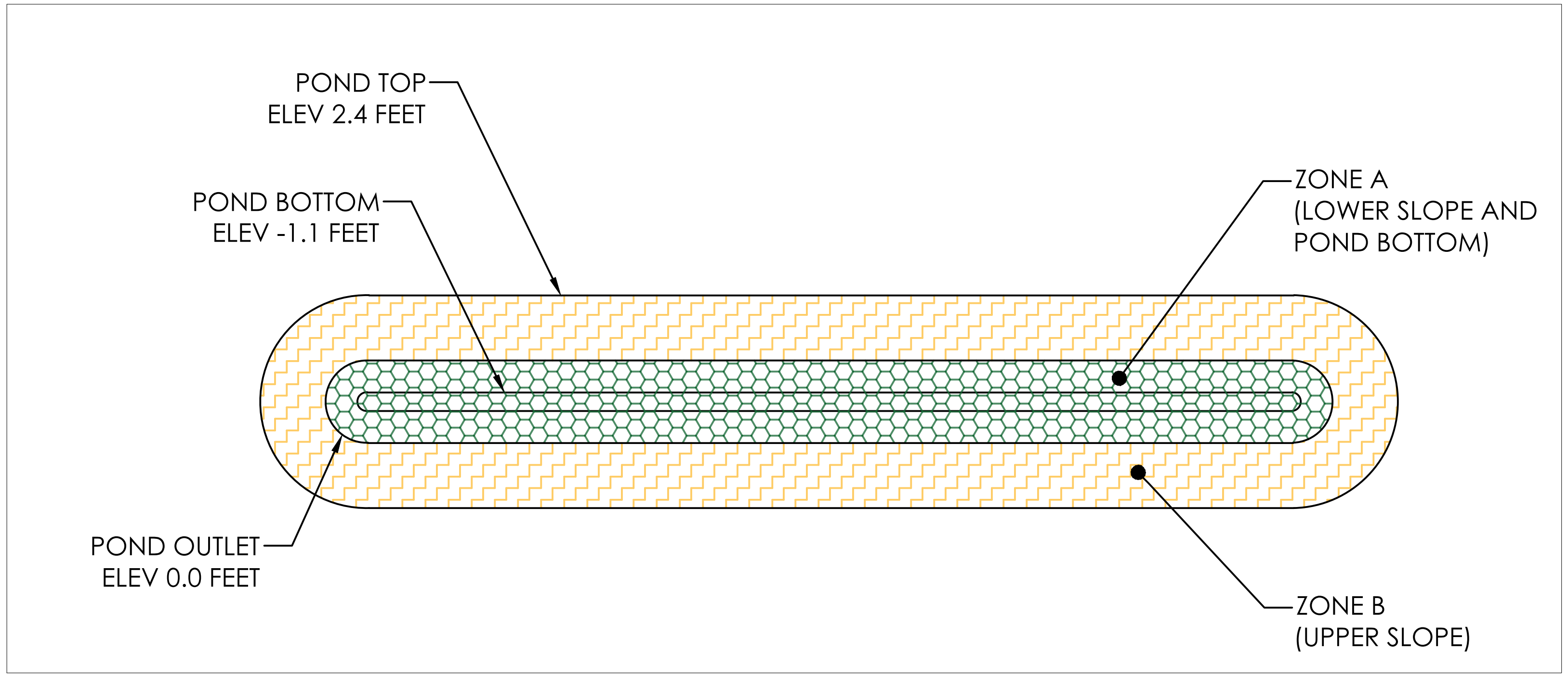
ESCP NOTES

NEXT RENEWABLE FUELS OREGON

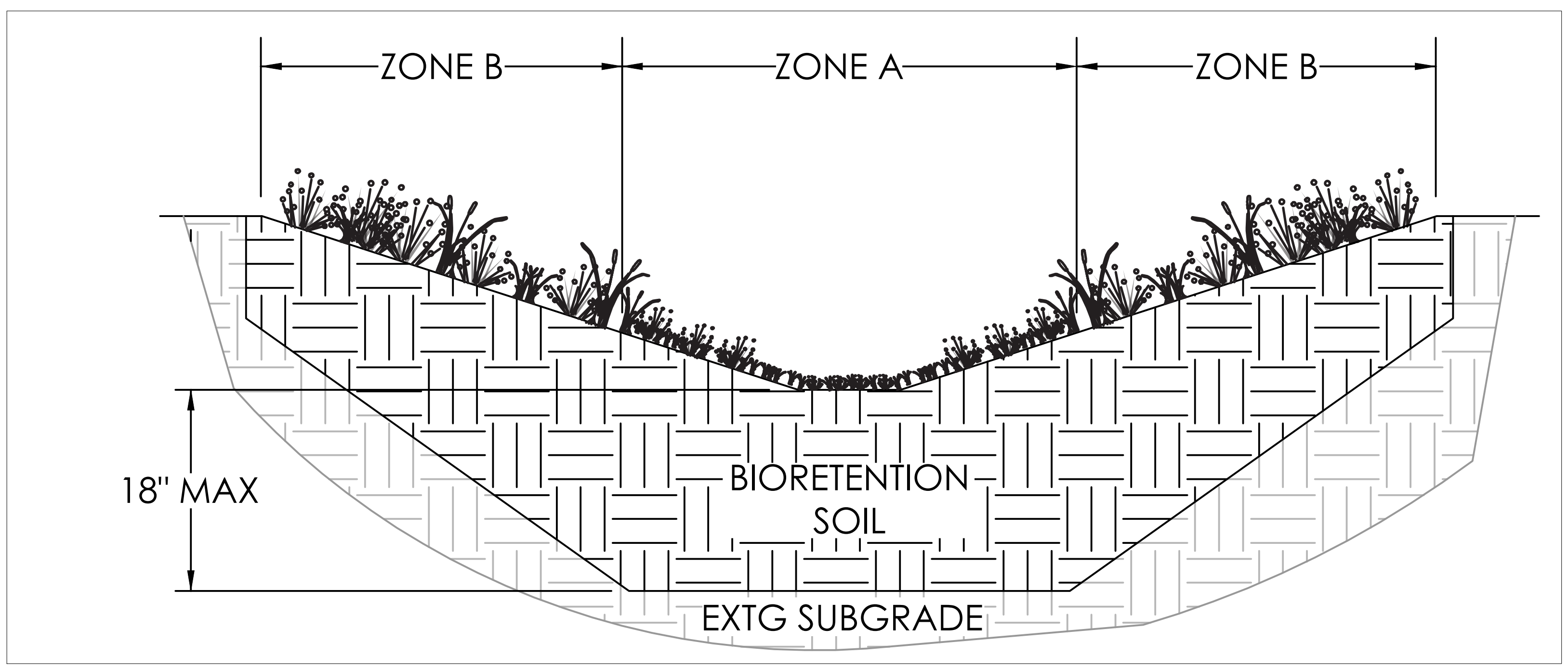
NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

EXHIBIT C3.7



A STORMWATER POND PLANTING PLAN, TYP
NOT TO SCALE



B STORMWATER POND DETAIL
NOT TO SCALE

SEED MIX

LOCATION	DESCRIPTION
ZONE A	PROTIME SEED MIX 440 (NATIVE BIOFILTER MIX): • MEADOW BARLEY (*HORDEUM BRACHYANTHERUM*) • BLUE WILDRYE (*ELYMUS GLAUCUS*) • TUFTED HAIRGRASS (*DESCHAMPSIA CESPITOSA*) • AMERICAN SLOUGHGRASS (*BECKMANNIA SYZIGACHNE*) • WESTERN MANNAGRASS (*GLYCERIA OCCIDENTALIS*)
ZONE B	PROTIME SEED MIX 498 NATIVE RIPARIAN MIX): • BLUE WILDRYE (*ELYMUS GLAUCUS*) • SPIKE BENTGRASS (*AGROSTIS EXARATA*) • SLENDER HAIRGRASS (*DESCHAMPSIA ELONGATA*) • LARGE LEAF LUPINE (*LUPINUS POLYPHYLLUS*)

POND DETAILS

- USE MAXIMUM 18" SOILS THAT MEET THE SPECIFICATIONS OF A HIGH PERFORMANCE BIORETENTION SOIL MIX AS DEFINED IN THE WASHINGTON DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON
- 3:1 SIDE SLOPES
- DELINEATION BETWEEN ZONE A AND B IS SET AT THE OUTLET ELEVATION (0.0 FEET)

CONSTRUCTION CONSIDERATIONS

MARK THE LOCATION OF PROPOSED FACILITIES AND FENCE OR COVER FACILITY LOCATIONS AFTER EXCAVATION. LEAVE AT LEAST 6" OF NATIVE SOIL DURING THE INITIAL EXCAVATION TO LIMIT COMPACTION DURING CONSTRUCTION. DO NOT ALLOW VEHICULAR TRAFFIC, FOOT TRAFFIC, MATERIAL STORAGE, OR HEAVY EQUIPMENT WITHIN 10 FEET OF THE POND AREA EXCEPT AS NEEDED TO EXCAVATE, GRADE, AND CONSTRUCT THE FACILITY. DO NOT ALLOW ENTRY OF RUNOFF OR SEDIMENT DURING CONSTRUCTION

MFA JOB #: M1724.01
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CHECKED: A. BANASIK
DRAWN: L. DANIEL

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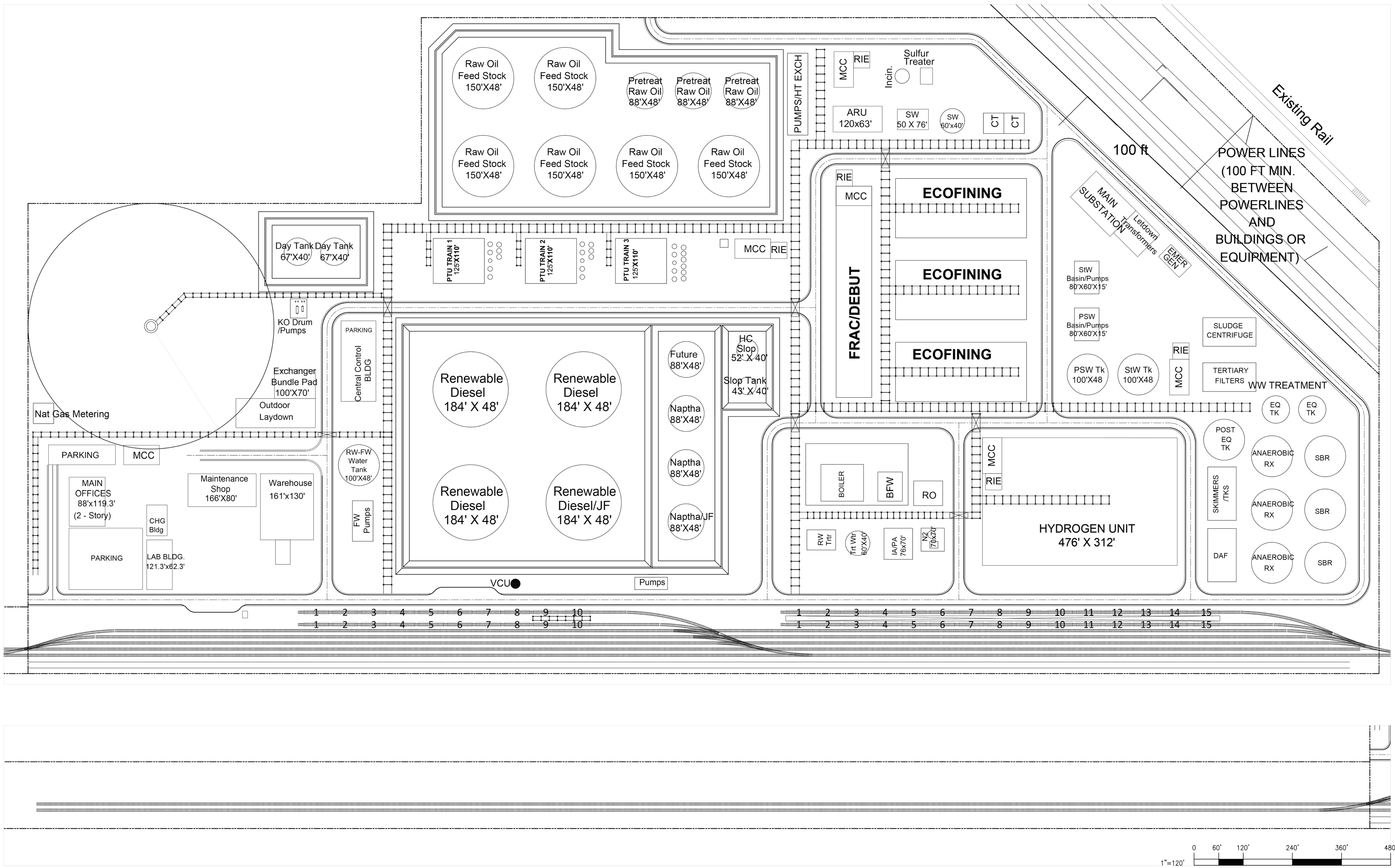
NEXT Renewable Fuels, Inc.

PLANTING PLAN AND POND DETAIL

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

EXHIBIT
C3.8



SEE SHEET 2 FOR WETLAND FILL CROSS SECTIONS

NOTES:
PLAN SHEET PROVIDED BY FLUOR

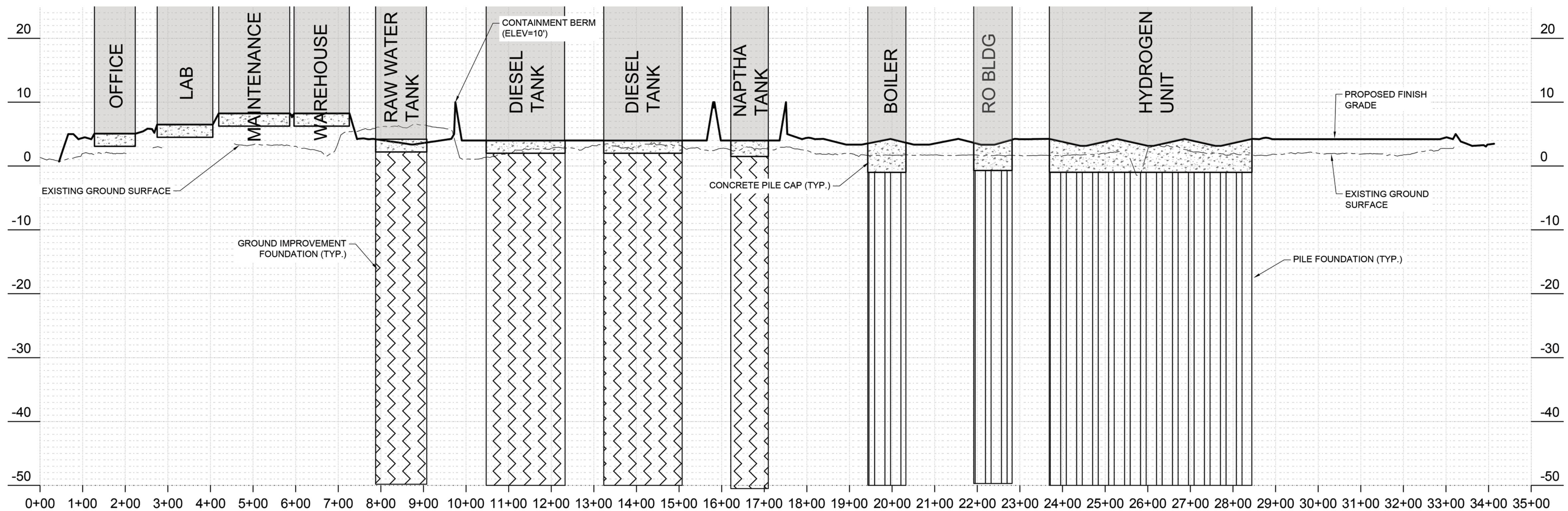
NEXT Renewable Fuels, Inc.
Stewardship Solutions

NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

SITE LAYOUT

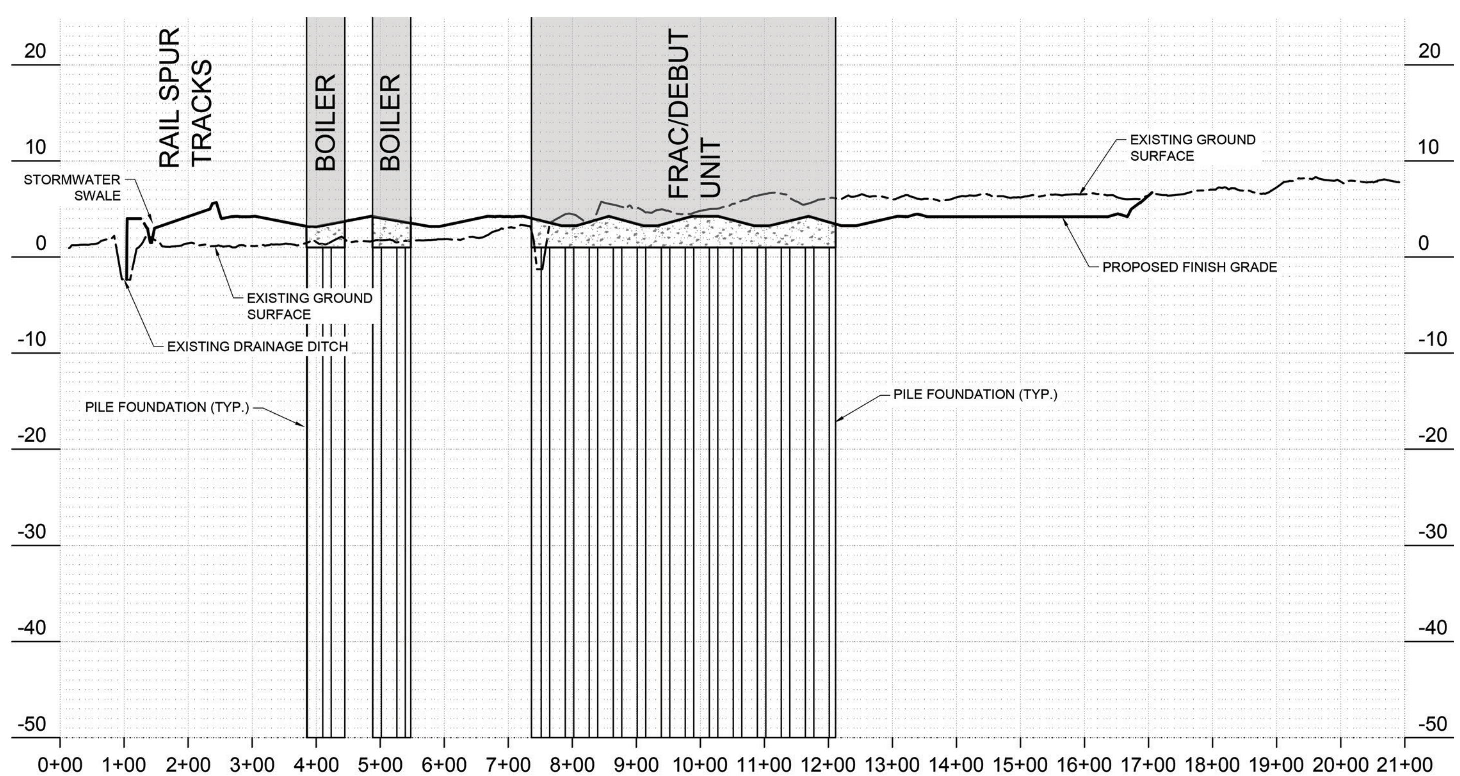
SHEET
1

NEXT-PortWestwardJPA-Rev2 Feb. 24, 2023



WETLAND FILL CROSS SECTION EAST-WEST

HORIZONTAL SCALE: 1" = 150'
VERTICAL SCALE: 1" = 10' (15X EXAGGERATION)



WETLAND FILL CROSS SECTION NORTH-SOUTH

HORIZONTAL SCALE: 1" = 150'
VERTICAL SCALE: 1" = 10' (15X EXAGGERATION)

NOTES:
PLAN SHEET PROVIDED BY MACKENZIE.

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PORT WESTWARD, OREGON
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WETLAND FILL CROSS SECTIONS

SHEET
2

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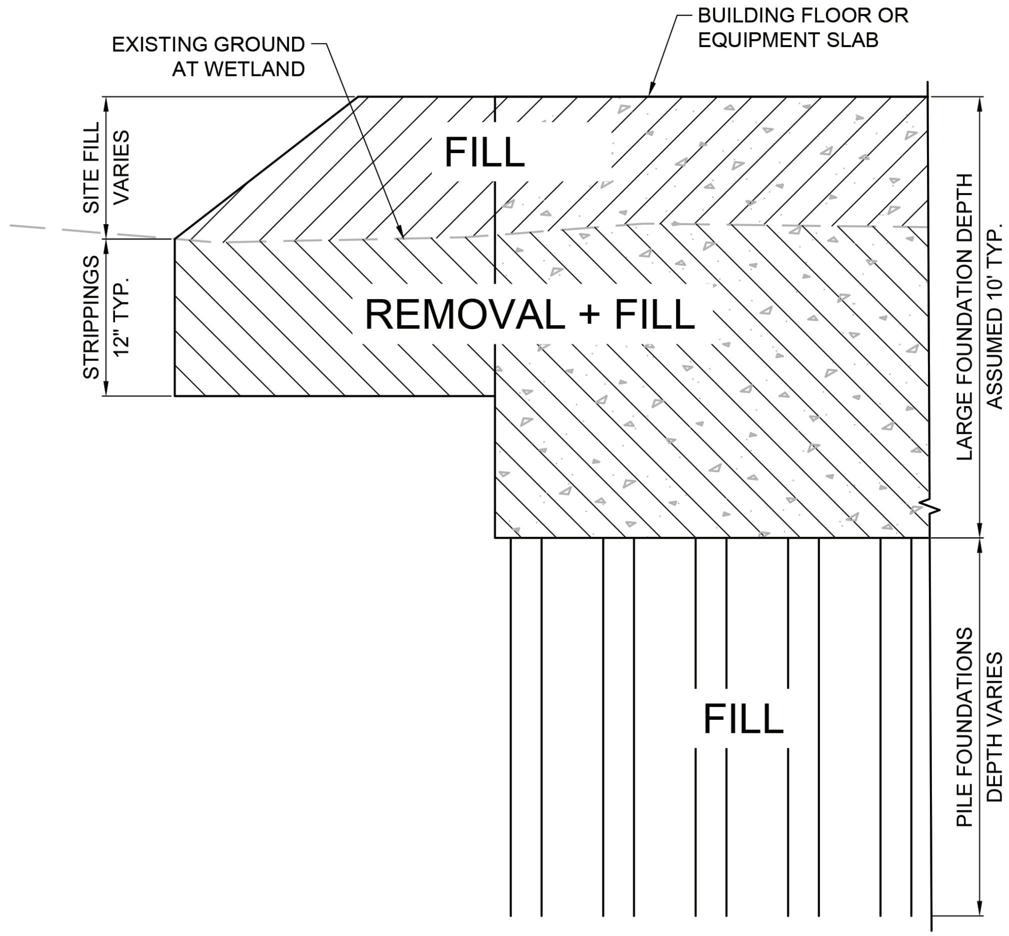
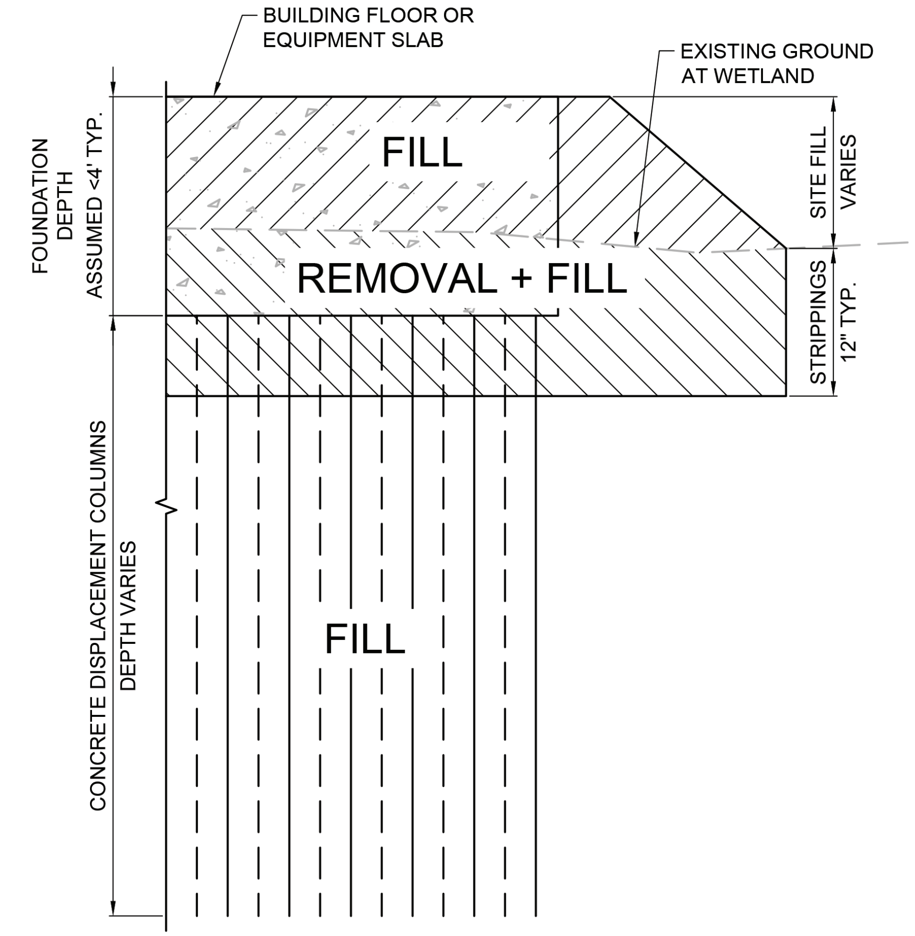


PILE FOUNDATION SCHEMATIC SECTION

N.T.S.



GROUND IMPROVEMENT SCHEMATIC SECTION

N.T.S.

EXCAVATION DEPTH BELOW EXISTING GRADE
CHARACTERIZED AS CUT VOLUME AND FILL VOLUME WHERE BACKFILLED WITH SOIL OR CONCRETE

FILL EMBANKMENT ABOVE EXISTING GRADE
CHARACTERIZED AS FILL VOLUME

PILE FOUNDATIONS
CHARACTERIZED AS FILL VOLUME, ASSUMES DISPLACEMENT PILES

CONCRETE DISPLACEMENT COLUMN FOUNDATIONS
CHARACTERIZED AS FILL VOLUME, ASSUMES 36% DISPLACEMENT FACTOR FOR CONCRETE FILL

NOTES:
PLAN SHEET PROVIDED BY MACKENZIE.

NEXT Renewable Fuels, Inc.
Stewardship Solutions

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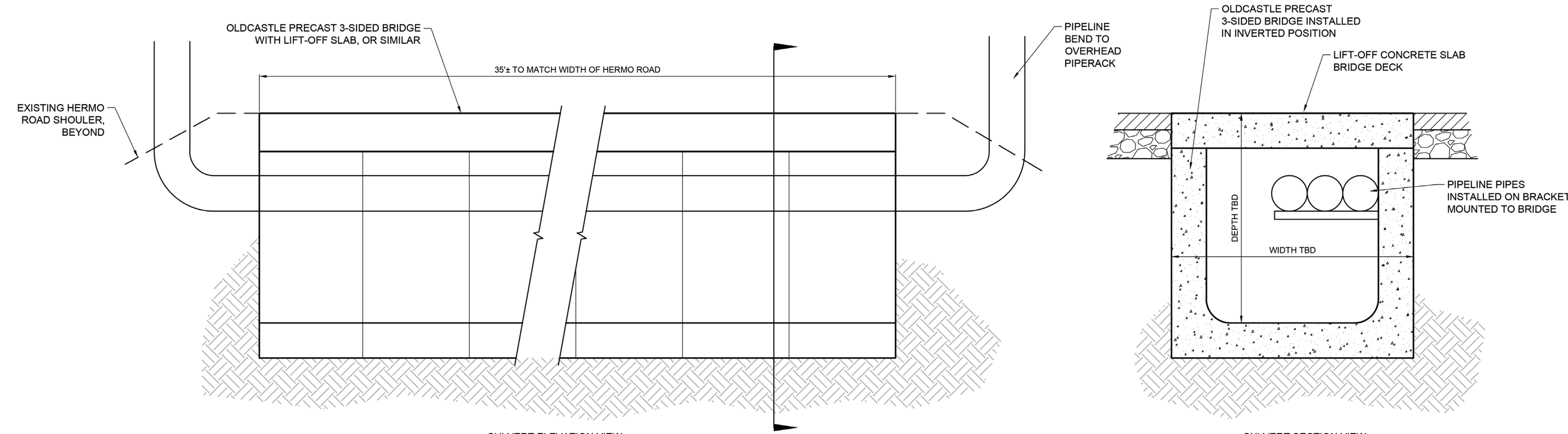
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

PILE FOUNDATION SCHEMATIC

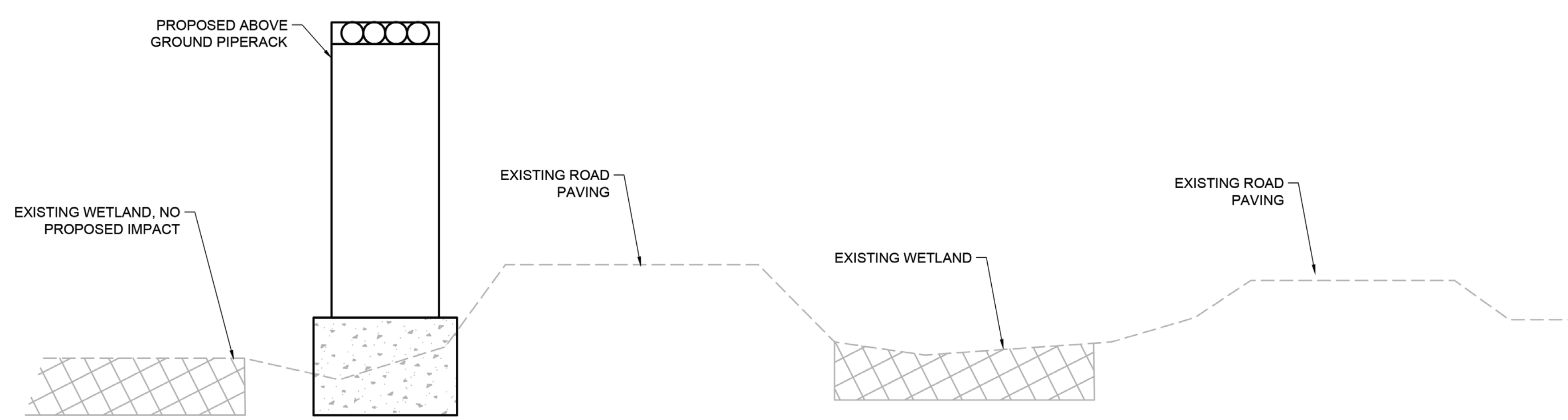
SHEET
3

NEXT-PortWestwardJPA-Rev2 Feb. 24, 2023



PIPELINE CULVERT ROAD CROSSING

NOT TO SCALE



TYPICAL CROSS-SECTION OF PIPERACK ALONG SERVICE ROAD

NOT TO SCALE

NOTES:
PLAN SHEET PROVIDED BY MACKENZIE.

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PORT WESTWARD, OREGON
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HERMO ROAD PIPERACK CROSSING CROSS SECTION

SHEET 4

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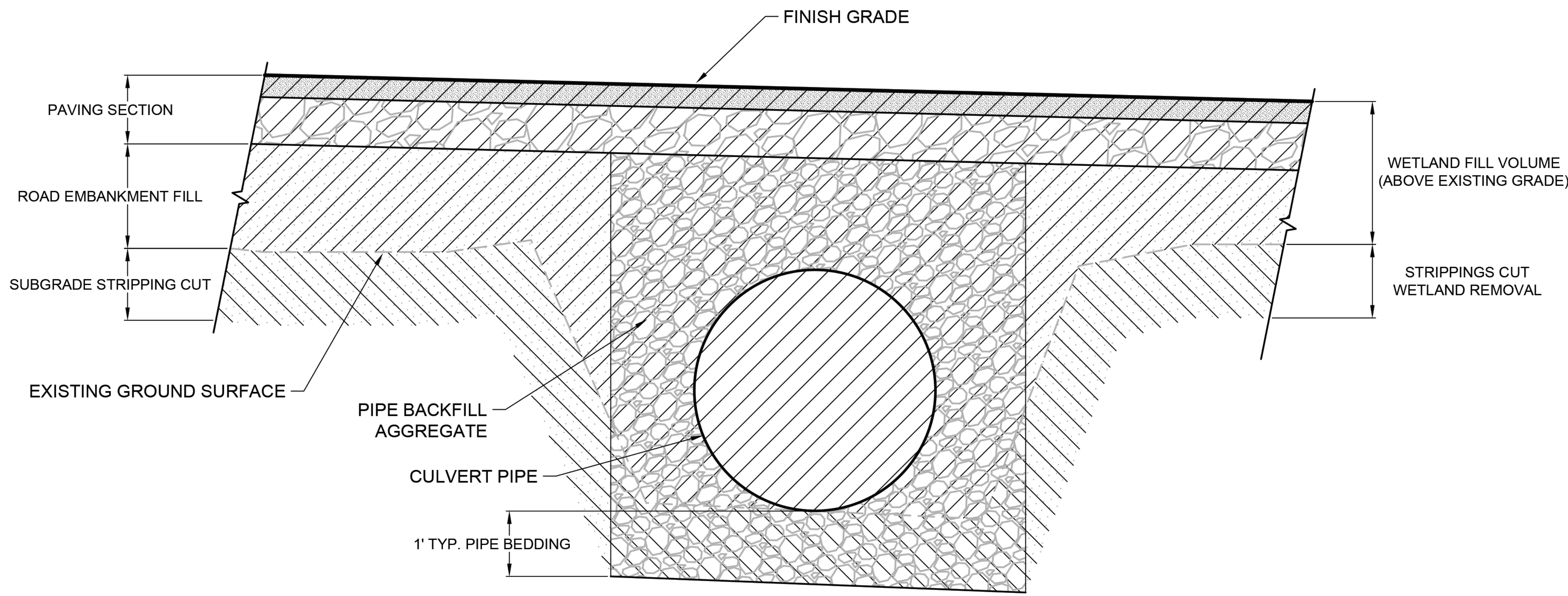

TYPICAL CROSS-SECTION OF CULVERT INSTALLATION

NOT TO SCALE

NOTES:
PLAN SHEET PROVIDED BY MACKENZIE.

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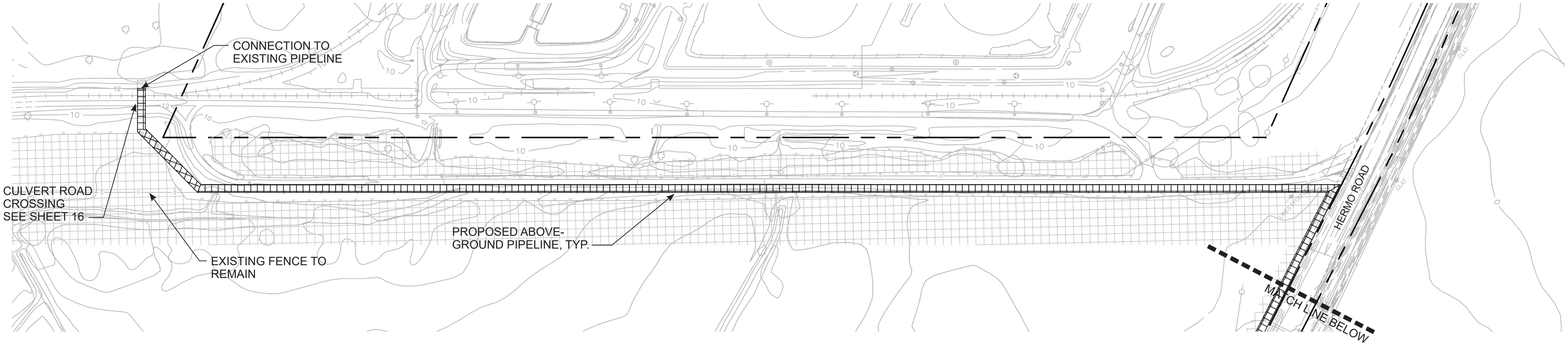
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

TYPICAL CULVERT INSTALLATION CROSS SECTION

SHEET 5

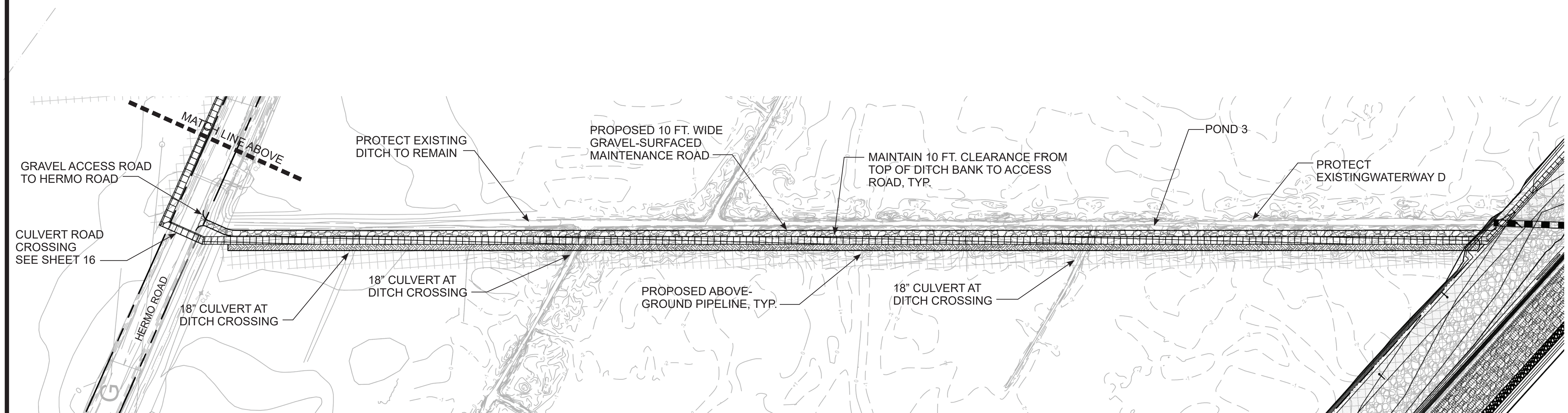
NEXT-PortWestwardJPA-Rev2 Feb. 24, 2023



PIPELINE ALIGNMENT PLAN

100 0 50 100 200 400

(IN FEET)



PIPELINE ALIGNMENT PLAN

100 0 50 100 200 400

(IN FEET)

NOTES:
PLAN SHEET PROVIDED BY MACKENZIE.

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PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

PIPELINE ALIGNMENT PLAN

SHEET
6

NEXT-PortWestwardJPA-Rev2 Feb. 24, 2023

ATTACHMENT D

Removal/Fill Table

Attachment D – Removal/Fill Volumes

F. Removal Volumes and Dimensions (if more than 7 impact sites, include a summary table as an attachment)							
Wetland / Waterbody Name *	**Removal Dimensions**					**Time Removal is to remain****	**Material*****
	Length (ft.)	**Width (ft.)**	**Depth (ft.)**	**Area (sq.ft. or ac.)**	**Volume (c.y.)**		
Wetland 1	*	*	1	4,543,308	159,372	Permanent	Native Material
	*	*	1	196,455	4,440	Temporary	
Wetland 2	*	*	5.0	131	3800	Permanent	Native Material
	*	*	0.5	1742	60	Temporary	
Mitigation Site	-	-	-	-	-	Permanent	Native Material
Wetland 1	2200	500	1	27	43500	Temporary	
Waterway A	*	*	1.0	308	12	Permanent	Native Material
Waterway B	*	*	1.0	769	29	Permanent	Native Material
Waterway C	*	*	1.0	166	7	Permanent	Native Material
Waterway D	*	*	1.0	2500	100	Permanent	Native Material
Waterway E	*	*	1.0	34,292	1,280	Permanent	Native Material
Waterway F	*	*	1.0	271	15	Permanent	Native Material

G. Total Removal Volumes and Dimensions				
Total Removal to Wetlands and Other Waters		**Length (ft.)**	**Area (sq. ft or ac.)**	**Volume (c.y.)**
Total Removal to Wetlands			117.64 ac	195,284 Cy
Total Removal Below Ordinary High Water			78,210 sf	2,168
Total Removal Below Highest Measured Tide				
Total Removal Below High Tide Line				
Total Removal Below Mean High Water Tidal Elevation				

H. Fill Volumes and Dimensions (if more than 7 impact sites, include a summary table as an attachment)

Attachment D – Removal/Fill Volumes

Wetland / Waterbody Name*	Fill Dimensions					Time Fill is to remain**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq. ft. or ac.)	Volume (c.y.)		
Wetland 1	*	*	1	4,543,308	657,317	Permanent	Soil/Aggregate/Piles/ Concrete/Paving
	*	*	1	196,455	7325	Temporary	
Wetland 2	*	*	5.0	131	3850	Permanent	Soil/Aggregate/Piles/ Concrete
	*	*	0.5	1742	90	Temporary	
Mitigation Site	-	-	-	0	0	Permanent	Aggregate/Concrete
Wetland 1	1150	500	15	10	175000	Temporary	
Waterway A	*	*	1.0	308	29	Permanent	Soil/Aggregate
Waterway B	*	*	1.0	769	72	Permanent	Soil/Aggregate
Waterway C	*	*	1.0	166	16	Permanent	Soil/Aggregate
Waterway D	*	*	1.0	2500	325	Permanent	Soil/Aggregate/Paving
Waterway E	*	*	1.0	34,292	3177	Permanent	Soil/Aggregate/Piles/ Concrete
Waterway F	*	*	1.0	271	26	Permanent	Soil/Aggregate

(4) PROJECT DESCRIPTION (CONTINUED)			
I. Total Fill Volumes and Dimensions			
Total Fill to Wetlands and Other Waters	**Length (ft.)**	**Area (sq. ft or ac.)**	**Volume (c.y.)**
Total Fill to Wetlands		108.92	786,698
Total Fill Below Ordinary High Water		28,592	5,004
Total Fill Below Highest Measured Tide			
Total Fill Below High Tide Line			
Total Fill Below Mean High Water Tidal Elevation			

* Areas are based on multiple impact areas with different lengths and widths. Please refer to Attachment B – Wetland and Waterway Impacts for additional details.

APPENDIX D

Compensatory Wetland Mitigation Plan

Next Renewable Fuels, Oregon, LLC.
Joint Permit Application
January 2021, Revise February 2023

COMPENSATORY WETLAND MITIGATION PLAN

FOR

NEXT RENEWABLE FUELS OREGON

FEBRUARY 2022
REVISED SEPTEMBER 2022
REVISED MAY 2023

Prepared for the
NEXT RENEWABLE FUELS OREGON, LLC

anderson perry

1901 N. Fir Street, La Grande, Oregon
214 E. Birch Street, Walla Walla, Washington
3818 S.W. 21st Street, Suite 302, Redmond, Oregon
243 E. Main Street, Suite C, Hermiston, Oregon
103 Highway 82, Suite 1B, Enterprise, Oregon

COMPENSATORY WETLAND MITIGATION PLAN

FOR

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS OREGON, LLC

FEBRUARY 2022
REVISED SEPTEMBER 2022
REVISED MAY 2023

ANDERSON PERRY & ASSOCIATES, INC.

La Grande, Redmond, Hermiston, and Enterprise, Oregon
Walla Walla, Washington

 Job No. 1199-829

Table of Contents

TABLES

FIGURES

APPENDICES

Section 1.0 - Compensatory Wetland Mitigation Plan Overview

1.1 Introduction and Background

This Compensatory Wetland Mitigation Plan (CWMP) details compensatory mitigation for unavoidable wetland impacts associated with the NEXT Renewable Fuels Oregon project located in Columbia County, Oregon.

NEXT Renewable Fuels Oregon, LLC, proposes to construct a renewable fuels facility at Port Westward, near the City of Clatskanie in Columbia County, Oregon. The facility will produce renewable fuel by recycling various cooking oils, greases, and other animal and vegetable fats. Storage facilities for raw oil feedstocks and renewable fuel, processing facilities, waste handling facilities, administrative buildings, and other structures required for facility operation will be included. In addition, an access road will be constructed west of the facility to connect with Hermo Road, the existing gravel access road to the north will be improved, and an electrical connection will be constructed to tie into the existing power lines to the north. Also, pipelines will be constructed to transport raw materials and renewable fuel to and from the existing terminaling provider, and a rail connector will be constructed to the south and east to tie into the existing rail line near Kallunki Road.

Figures 1 through 5 provide location and vicinity maps, an aerial photograph, a tax lot map, site photographs, and a map of the impacted wetlands to aid in review of the proposed project.

1.2 Historical Conditions

Historically, the proposed renewable fuels facility site was a bottomland depression connected to annual high flows from the Columbia River. The proposed renewable fuels facility site was drained in the early 1900s, primarily with surface ditches. This coincided with drainage for agriculture for a large portion of the historic Port Westward area. Seasonal flooding of the area continued until the 1940s, when the Columbia River dams were constructed upriver along with more sophisticated local pumping and dike construction by the Beaver Drainage District (BDD). With the site cut off from the river due to dike construction, hydrology is now influenced primarily by direct precipitation, management of the BDD by the Beaver Drainage Improvement Company, Inc. (BDIC) and hydrostatically to an unknown extent by the seasonal rise and fall of the nearby Columbia River.

The proposed compensatory wetland mitigation (CWM) site is covered by hybrid poplar plantations of varying ages, which are also used for grazing. The younger plantation areas have extensive areas of Himalayan blackberry thickets, as well as smaller openings with no poplars that support herbaceous vegetation communities. A wetland delineation was completed in which two wetlands were identified that cover the majority of the CWM site. Disturbance within the proposed CWM site is a result of past and current agricultural use on the property and construction and maintenance of roads and drainage ditches. Lands outside the proposed CWM site have been altered by past and current activities associated with agriculture, industrial development, and the construction and maintenance of roads and the railroad.

1.3 Ecological Goals and Objectives

The overall purpose of the project is to produce renewable fuel. Construction of the renewable fuels facility will result in permanent impacts to wetlands; however, the proposed CWM site will be constructed concurrently with construction of the new facility. Proposed mitigation for wetland impacts associated with the project will involve enhancement of degraded wetlands located southwest of the proposed renewable fuels facility site. The goal of this mitigation activity is to offset permanent, unavoidable impacts to wetlands by enhancing Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS), and Palustrine Forested (PFO) wetland areas with essentially similar or better attributes as the impacted wetlands.

In addition to offsetting permanent wetland impacts resulting from the proposed project, the proposed CWM site is designed to provide benefits to local wildlife populations, in particular Columbian white-tailed deer, various avian species, and amphibians. Using an integrated, comprehensive ecological enhancement approach with a robust planting plan, focused on multiple species of wildlife, is anticipated to provide a maximum benefit to wildlife through improved habitat, landscape diversity, and food source opportunities.

Further benefits resulting from enhanced wetland habitat include improved water storage and drought resiliency. One function of a healthy wetland ecosystem includes slowing down the momentum of water as it travels across the landscape and through the soil. This effect, a result of the construction of dendritic channels within the proposed CWM site, decreases the erosive potential of surface water and allows for improved groundwater recharge. This perpetual recharge of groundwater aids in maintaining the base flow of surface water further into the dry season, thereby improving drought resiliency. Slower velocity and slower release of water resulting from the dendritic channels also offer the benefit during wetter months of not overloading the BDIC pump station.

Contrasting the effect of the existing straight drainage ditches in the proposed CWM site, the dendritic channels are designed to retain water on site longer, which would allow precipitation to better infiltrate into the ground and help increase groundwater elevation on site. Improved infiltration is due to the dendritic channels having more sinuosity, a higher invert elevation than the drainage ditches, and a greater wetted surface area. The dendritic channels are also designed to distribute water more evenly throughout the site and increase groundwater elevation in localized areas within the CWM site currently experiencing lower groundwater. Additional information on how the proposed CWM site meets these goals and objectives is included in Section 6.0.

Similarly, the capacity for water storage of a wetland can also reduce flood levels within an aquatic system, resulting in greater flood protection for surrounding areas. Additionally, wetlands improve water quality by removing pollutants and excessive nutrients. This beneficial function of wetlands also occurs as water velocity slows within a wetland, allowing sediment that potentially contains pollutants to settle to the wetland substrate. As the slowing water settles around vegetation, pollutants and accumulated nutrients are absorbed by plant roots and microorganisms in the soil. In addition to enhanced wetland habitat providing ecological benefits, improved drought resiliency and flood protection can also result in economic benefits for property owners.

1.4 Description of Compensatory Wetland Mitigation Concept

The concept of this CWMP is to replace the functions and values of wetlands lost from construction of the renewable fuels facility, through enhancement of a wetland in an area southwest of the proposed renewable fuels facility site and impacted wetlands (see Figure 5 and Appendix A). Enhancement of the vegetation and hydrology at this proposed CWM site is anticipated to re-establish a native Columbia River bottomland emergent and shrubby wetland community.

The proposed CWM site was selected due to its proximity to the impacted wetlands and its ability to provide naturally functioning hydrology and long-term sustainability. NEXT Renewable Fuels Oregon, LLC, has entered into a long-term lease agreement for the site and will be able to control activities on it to ensure long-term viability of the wetlands. The wetlands being enhanced consist of PEM and PSS wetlands found in historical floodplains along the Columbia River. These wetlands are supported by precipitation, groundwater, and/or surface runoff. A 17-acre wetland mitigation site constructed in 2018 is located approximately 1 mile north of the proposed mitigation site. The 17-acre site was used as a reference site for the design of this proposed CWM site.

According to local Oregon Department of Fish and Wildlife staff, the proposed CWM site currently contains marginal habitat for the wildlife species mentioned above. With enhancement of the proposed CWM site, wildlife in the area will have greatly improved habitat that will help promote healthier populations.

1.5 Site Preparation

The mitigation project will conduct one year of control measures prior to establishing native plant populations. The project will take an agricultural approach to controlling noxious weeds and non-native plant species, using a combination of tillage and chemical applications to prepare the site for planting. Prior to the start of the mitigation site construction, NEXT Renewable Fuels Oregon will conduct tree removal to clear the existing hybrid poplar plantations. Tree removal will occur beginning in summer 2022 and be completed in spring 2023.

Following tree removal, the site will be tilled and a minimum of eight shallow groundwater monitoring wells and nine stilling wells will be installed across the site and in critical perimeter ditches and sloughs. Groundwater monitoring is not required; however, the design team believes the information will assist in refining the final project design and ensure success of the project. The monitoring information will also be used later to assess performance standards. The site will not be tilled again to quiet the existing seed bank and minimize further weed seed germination. Anticipated regrowth from reed canarygrass rhizomes and the exposed portion of the weed seed bank will be treated with glyphosate herbicide (Rodeo®). The first herbicide application will occur in summer 2023. Because glyphosate is non-selective, some damage to remnant native plants will likely occur. This will be acceptable to obtain a "clean" site, rather than attempt to work around the few existing native plants (these species will be re-established during planting). A second herbicide application will occur in spring 2024 to target weed regrowth, which will enhance control. Site grading and seeding will occur early fall 2024 and planting will begin in fall 2025.

To construct the proposed CWM site, the upper 6 to 12 inches of topsoil is anticipated to be removed, shallow pools will be constructed, and dendritic channels will be added. Depending on results from the groundwater monitoring wells, dendritic channels and pools will be excavated approximately 2 to 5 feet to create and provide greater hydrologic diversity across the site while maintaining hydraulic connectivity with the adjacent McLean Slough. The excavated material will be disposed of at an approved off-site location.

Additionally, some interior linear ditches will be modified or filled to prepare the site for grading. The potential presence of fish species in these ditches may warrant fish salvage or relocation activities be conducted prior to modifying or filling these ditches. Although some of the interior ditches go dry in the summer, others may contain native or introduced fish species that will require relocation. Due to mud and deep water, electroshocking with backpack units as a method for any potential fish salvage activities is neither feasible nor safe. Alternative methods for potential relocation of fish will be performed to ensure safe working conditions for personnel while meeting fish salvage requirements. Salvage operations may be conducted using seine nets to relocate or exclude fish as necessary.

Depending on the size of the ditch, relocating fish present in interior ditches may require two methods of seine netting. Small drainages to be filled would be seined moving from one end of the drainage to the other end in the direction of filling. This method would involve personnel operating the seine nets from each side of the bank, which would require all brush be removed from the banks prior to seining operations. Large drainages to be modified by deepening or widening would be seined with two nets positioned in both (opposing) directions, moving away from the work area. Depending on the depth, steepness of the bank, and substrate conditions of the ditch, personnel may operate the seine nets from either the bank or from the water.

Monitoring of shallow groundwater elevations at the proposed CWM site will be initiated following tilling and tree removal and will continue through the final design process. Groundwater elevation data will enable a precise understanding of the range and duration of the shallow groundwater fluctuations and how they are tied to precipitation events and, potentially, to Columbia River surface elevations. Electronic data loggers will be used to automatically record water levels on a twice-daily basis. A minimum of eight data loggers will be individually housed in slotted polyvinyl chloride tubes installed to a depth of approximately 10 feet below ground surface. Monitoring groundwater data for approximately one year through the design process will aid in determining dendritic channel depths that can maintain wetland vegetation without the need for artificial hydrology. In addition to groundwater monitoring, surface water elevations will also be measured using stilling wells at nine strategic locations along the sloughs adjacent to the CWM site. The stilling wells will help define how the existing site interacts with the wider BDD.

Following construction, the proposed CWM site will be monitored for a minimum of five years and adaptive maintenance will be provided to help establish a thriving and robust wetland area. Fencing will be installed around the perimeter of the site to discourage the local deer population from damaging young plantings and vegetation. Site fencing will remain throughout the first five years following construction of the mitigation site, to protect the plantings as they become established.

Adaptive wildlife management measures will also be implemented in conjunction with the development of the proposed CWM site. This approach is designed to function as an ongoing, dynamic examination of the goals and objectives of a project and whether or not they are being met. Project management is informed by a process of monitoring, evaluation, and management adjustment, a cycle that may be repeated, if necessary, throughout a project's timeline. The design of a project may then be modified to respond to any impediments to achieving the desired objectives. Adaptive management is a learning-based process that will help guide and inform decision making pertaining to the wildlife populations that the proposed CWM site is designed to benefit. Adaptive management will be used throughout the long-term management of the mitigation site.

1.6 Summary of Compensatory Wetland Mitigation Acreages

Using the Draft Compensatory Mitigation Eligibility and Accounting Determination Form developed by the Oregon Department of State Lands (DSL) and in coordination with DSL staff, it was determined that 3.9 acres of mitigation will be required per acre of impact (3.9:1 ratio).

The proposed renewable fuels facility will require permanent fill in two wetlands, with an area of permanent wetland impact of 104.30 acres (requiring a minimum of 406.77 acres of mitigation using the 3.9:1 ratio). To mitigate this impact, 466.10 acres of wetland will be enhanced southwest of the proposed renewable fuels facility (see Appendix A).

In terms of mitigation credits, the 466.10 acres of enhancement mitigation represents 119.51 acres of mitigation credit, which exceeds the minimum required (104.30 acres) under the 3.9:1 mitigation ratio, as shown on Table 1-1.

TABLE 1-1
WETLAND MITIGATION SUMMARY

	Impact Site			Proposed CWM Site					
Wetland ID	**Cowardin**	**HGM[1]**	**Acres**	**Mitigation Method**	**Cowardin**	**HGM**	**Acres**	**Mitigation Ratio**	**Mitigation Credits Gained**
1	PEM/PSS	Flats	104.30						
2	PEM	Flats	0.003						
CWM				Enhance	PEM	Flats	226.20	3.9:1	58.00
CWM				Enhance	PSS	Flats	177.43	3.9:1	45.49
CWM				Enhance	PFO	Flats	62.47	3.9:1	16.02
Total			**104.30**				**466.10**		**119.51**

[1]*HGM = Hydrogeomorphic classification*

1.7 Summary of Function and Value Gains and Losses

The Oregon Rapid Wetland Assessment Protocol was used to assess the functions and values of the wetland impact and wetland mitigation sites (see Appendix B). A loss of wetland functions and values will occur as a result of the proposed construction; these losses will be offset by the anticipated functions and values from the proposed CWM site. For details of each attribute's function and value, see Section 5.0 of this CWMP.

Section 2.0 - Compensatory Wetland Mitigation Site Information

2.1 Site Owner Information

The proposed renewable fuels facility site is located on property that will be owned by NEXT Renewable Fuels Oregon, LLC, and on property owned by the Port of Columbia County, which will be leased to NEXT Renewable Fuels Oregon, LLC. The proposed compensatory wetland mitigation (CWM) site is located on property that will be owned by Oregon Port AG Investors, LLC, and leased to NEXT Renewable Fuels Oregon, LLC. Contact information is provided below:

Contacts: Sean Clark
Port of Columbia County
100 E Street
Columbia City, Oregon 97018
Phone: 503-410-5915
E-mail: clark@portofcolumbiacounty.org

Christopher Efird
NEXT Renewable Fuels Oregon, LLC
11767 Katy Freeway, Suite 201
Houston, Texas 77079
Phone: 503-867-8100

Robert Russell
Oregon Port AG Investors, LLC
5130 S. Fort Apache, Suite 215-409
Las Vegas, Nevada 89148

Property owners adjacent to the proposed CWM site are provided in Appendix C.

2.2 Physical Location Information

The proposed renewable fuels facility and CWM sites are located approximately 4 miles northeast of Clatskanie, Oregon, between Kallunki Road and Quincy-Mayger Road to the east, Hermo Road to the west, and the Port Westward industrial area to the north. The legal description of the proposed project site is Township 8 North, Range 4 West, Section 16 (Tax Lot 200), Section 21 (Tax Lot 700), Section 22 (Tax Lots 100, 200, 300, and 1100), and Section 23 (Tax Lots 700 and 800, at approximate Latitude 46.16676791 and Longitude -123.16346365. The legal description of the proposed CWM site is Township 8 North, Range 4 West, Section 27 (Tax Lots 100, 200, 400, and 1600), Section 28 (Tax Lots 300 and 1400), Section 33 (Tax Lot 100) and Section 34 (Tax Lot 300). The proposed CWM site will be constructed southwest of the proposed project site, at approximate Latitude 46.152259 and Longitude -123.172541.

Section 3.0 - Description of How the Compensatory Wetland Mitigation Addresses the Principal Objectives

3.1 Wetland Objectives

3.1.1 Function and Value Replacement

The impacted wetlands are classified as Palustrine Emergent (PEM) and Palustrine Scrub-Shrub (PSS) (Cowardin et al., 1979). The proposed compensatory wetland mitigation (CWM) site is anticipated to be classified as PEM, PSS, and Palustrine Forested (PFO). As shown in Section 5.0, the functions and values of the proposed CWM site will be equal to or better than the functions and values of the impacted wetlands.

3.1.2 Local Replacement of Locally Important Functions and Values

The proposed CWM site is expected to provide similar or better functions and values as the impacted wetlands. The proposed CWM site is located southwest of the impact site, in the same 6th field HUC subwatershed (Lower Beaver Creek - Frontal Columbia River: 170800030207) as the impact site. The impact site and the proposed CWM site are both located withing the Beaver Drainage District and have similar hydrologic conditions. Both sites receive the same amount of annual rainfall, are hydraulically connected to the Columbia River and Beaver Dredge Cut, to a degree, through groundwater flow, and are managed by the Beaver Drainage Improvement Company, Inc., for drainage and irrigation in a similar manner.

Regulations require that a mitigation site be located within the same 4th field HUC (17080003, Lower Columbia-Clatskanie). The only viable site with sufficient acreage found within the area was the proposed site, which is also within the same 6th field HUC as the proposed facility (170800030207, Lower Beaver Creek-Frontal Columbia River). While not required by the Oregon Department of State Lands, siting the mitigation within the same 6th Field HUC provides a more localized function and value replacement, as the mitigation will be within the same drainage district and in close proximity to the impacts associated with the facility development.

Once established, the proposed CWM site will provide a number of ecological benefits resulting from wetland enhancement. Wetland habitat improves water quality from the absorption and filtration of pollutants, and allows increased water storage that is naturally released for a longer duration, possibly into the dry season. Similarly, functions and values pertaining to flood control and drought resiliency are anticipated to be improved following establishment of the CWM site.

3.1.3 Self-Sustaining/Minimum Maintenance Needs

The proposed CWM site will be self-sustaining since it will receive the same surface/subsurface water input from the natural groundwater and precipitation that is sustaining the existing wetland. The proposed CWM site will have wetland channels slightly lower than existing channels to collect and convey water to all areas within the mitigation site and rewater areas that have been drained by the perimeter drainage ditch. The new channels will have an appropriate bank slope for stability and vegetation establishment.

The existing ditches located around the perimeter of the site will remain in place to avoid raising groundwater elevations in the field adjacent to the mitigation site. As a contingency plan for the hydrology to the site, small adjustable check structures will be provided at strategic locations to help ensure plant establishment and adjust the groundwater levels within the mitigation site. The check structures will help plant establishment by allowing wooden stop logs to be installed to help control water flowing into or out of the mitigation site where the dendritic channels will connect to the main sloughs. Other future maintenance needs may include periodic weed control. The site hydrology is further described in the description of existing and proposed hydrology.

3.1.4 Siting Considerations

The proposed renewable fuels facility project has been designed to minimize wetland impacts to the extent possible. Permanent impacts to wetlands on the proposed renewable fuels facility site were unavoidable, and the proposed CWM site is located southwest of the proposed renewable fuels facility and within the same subwatershed (HUC12: 170800030207, Lower Beaver Creek-Frontal Columbia River).

The proposed CWM site was selected due to its ability to provide naturally functioning hydrology and long-term sustainability, and its location on property that is leased long-term to NEXT Renewable Fuels Oregon, LLC, ensuring control of activities on it and long-term viability of the wetlands.

Existing ditches and channels below the ordinary high water elevation are considered jurisdictional Waters of the State/U.S. and impacts to these areas are anticipated when existing channels are filled and new channels are constructed.

3.1.5 Minimize Temporal Loss

The greatest temporal loss is associated with disturbance to hydric soil. This unavoidable temporal loss is accounted for in the mitigation ratio. The mitigation site will be constructed prior to or concurrently with construction of the renewable fuel facility.

3.2 Wildlife Habitat Objectives

3.2.1 Columbian White-tailed Deer Habitat

Once listed as endangered under the Endangered Species Act, Columbian white-tailed deer have been identified as occurring in only two locations in the U.S.: in Douglas County in southern Oregon and along the lower Columbia River in western Oregon and Washington. Although the southern Oregon population has been delisted, the lower Columbia River population of Columbia white-tailed deer remains listed as threatened. Columbian white-tailed deer have evolved with particular habitat needs that are vital to successful recovery of the population and this mitigation plan is designed with these habitat needs in mind.

The habitat preferred by Columbian white-tailed deer consists of deciduous forest with an open understory, as well as open grasslands and woodland edges (Oregon Department of Fish and Wildlife [ODFW], 2016). As such, the mitigation site is designed to resemble a mosaic of these varying habitats, which will provide the deer with optimal cover and food sources. A robust planting strategy involving a variety of native vegetation will be utilized to achieve this objective. Although Columbian white-tailed deer have a preference for forested upland areas, they have also adapted to use lower elevation floodplain areas, where they seek out deciduous forests and woodland edges (Washington Department of Fish and Wildlife, 2021). These features are incorporated into the CWM design as a component of the PFO and PSS wetland areas, which will be planted with a variety of woody vegetation species.

Although the lower elevation floodplains the Columbian white-tailed deer have been relegated to using is suboptimal compared to the historically used habitat of prairie edges and woodland habitat, there are benefits that result from such habitat being available at the proposed CWM site. Columbian white-tailed deer populations are generally small, isolated, and vulnerable; having a large intact parcel of land that will be protected from future development will benefit the deer, particularly as habitat fragmentation is an increasing overall threat to the species. With habitat connectivity in increasingly short supply, this species would stand to benefit from the enhancement of the CWM site. The higher elevation areas of the CWM site are slightly dryer than the surrounding area and will be planted as a palustrine forested wetland, which will provide woodland-type habitat for the Columbian white-tailed deer. Brush piles will be installed throughout the CWM site, and the palustrine forested areas will also help provide habitat diversity for the Columbian white-tailed deer. Columbian white-tailed deer depend on floodplain habitat as their suitable habitat; to have floodplain habitat available that is protected from flooding is an ancillary benefit unique to this site that may not be available at other similar habitats in the region utilized by the deer. Furthermore, NEXT Renewable Fuels Oregon, LLC, is in consultation with the U.S. Fish and Wildlife Service regarding additional habitat requirements for the Columbian white-tailed deer.

Successful establishment of the proposed CWM site is dependent on the installation and maintenance of a perimeter fence around the site, which will prevent deer and other wildlife from damaging or destroying young plantings before they are able to mature. Columbian white-tailed deer are known for their jumping ability, so it is imperative that fencing installed around the CWM site be an appropriate height to successfully exclude the deer. ODFW recommends the following for appropriately effective deer fencing:

- Seven- to 8-foot tall woven wire fencing is recommended for perimeter fencing.
- Woven wire should have 14.5-gauge filler wire and 11-gauge top and bottom wires, with vertical stays no more than 6 inches apart.
- Corner fence posts should be wooden posts at least 9.5 feet long and 5 inches in diameter.
- Line posts are recommended to be either 3-inch in diameter wooden posts or 8-foot studded steel T-posts.

- Any wooden posts used should have at least the bottom 3 feet treated with a preservative, being sure to avoid any copper-type wood preservatives. Wooden posts should be sunk approximately 2.5 feet in the ground.
- Line posts should be spaced no greater than 15 feet apart; however, using even shorter intervals between line posts will yield greater success at keeping the fence taut.

The fence design proposed in this Compensatory Wetland Mitigation Plan incorporates elements that meet or exceed the recommendations of ODFW. The proposed fence design will utilize 6-foot woven wire fencing with three strands of smooth wire installed above the wire fence at 5-inch intervals, to achieve a fence height of approximately 7.5 feet. The fence material will be commercial-grade, rectangular galvanized woven wire fabric with 12.5-gauge filler wire and 10-gauge top and bottom wire. Corner posts will be treated wood, either 6-inch by 6-inch lumber posts or 6-inch diameter round posts, 12 feet in length, and be set 4 feet in the ground. Line posts to be used will either be 10-foot T-posts or 10-foot treated wooden posts that are either 4-inch by 4-inch lumber posts or 4-inch diameter round posts, with maximum spacing set 8 feet apart.

Considering the varying topography of the site, it is recommended that attention be given to keeping the fence flush with the ground, as gaps as narrow as 6 inches can be used by deer to push underneath fencing. Similarly, to deter deer from attempting to jump the fence, polyvinyl chloride pipe, flagging, or some other high-visibility attachment will be secured to the top of fence lines to prevent deer from misjudging the fence height. Cross braces will be utilized at corners, angles, adjacent to gates, and at intervals along longer sections of fence. Gates are recommended to be placed at or near each fence corner and will also be of equal height to the fence to deter deer from jumping. The location of the fence is shown on the Drawings, Sheets 4 through 6, and the fence details are shown on Sheets 16 and 17. The fence design meets or exceeds ODFW recommendations outlined above.

Once established, the proposed CWM site will provide this threatened species with improved habitat availability, and in particular, improved habitat connectivity, which will be of greater benefit to the deer compared to the sporadic habitat and monoculture currently available on the surrounding farmlands.

3.2.2 Waterfowl Habitat

Numerous species of waterfowl exist in the lower Columbia River basin. Overall, these species rely on diverse water features; however, two main habitat components are essential to waterfowl: open water for security and adjacent floodplain fields for feeding (ODFW, 2016). The proposed CWM site is designed with diverse water features such as shallow dendritic channels, deeper main channels, shallow pools, and deeper pools. These features will provide food sources necessary to waterfowl populations, such as aquatic plants, macroinvertebrates, and fish. Additionally, a robust planting plan that incorporates planting native shrubs along the edges of waterbodies would facilitate nutrient loading through decomposition of organic matter in the water. In turn this would benefit benthic macroinvertebrate communities, creating an improved food source for waterfowl.

3.2.3 Amphibian Habitat

Wetland ecosystems offer ideal habitat for amphibians. Many amphibian species require shallow and still waterbodies with ample sunlight. Waterbodies used for breeding must retain water for at least five months for the tadpoles to metamorphose, and also be free of predators and disturbance. Upland habitat with brush piles and downed logs is needed for cover during the non-breeding season. Maintaining native wetland vegetation is also essential for amphibian populations, specifically, availability of aquatic vegetation with sturdy stems used for attaching eggs and eventually habitat for tadpole rearing (ODFW, 2016). With the network of wetland channels varying in size and depth and the planting plan incorporating numerous native grass, shrub, and tree species, the proposed CWM site is designed to incorporate these habitat features essential to amphibian populations.

Components of successful amphibian habitat include appropriate pool depths and bank slopes for aquatic habitat, appropriate vegetative plantings, and suitable terrestrial habitat in the form of brush piles and large wood structures. Optimal aquatic habitat for amphibians involves varying water depths for wetland ponds and pools, with ideal depths for breeding habitat ranging from 1.5 to 6 feet, and ideal depths for incubation of egg masses ranging from 6 to 36 inches. The ideal bank slope of wetland ponds and pools for breeding amphibians is no greater than 3H:1V. This bank slope will provide shallower, warmer water, which is ideal for rearing and foraging of amphibian larvae. In addition, the shallower water will encourage growth of native emergent wetland vegetation, provide protective cover from predators, and also provide sturdy vegetation stems and root stringers to serve as attachment sites for amphibian egg masses.

The open bank slope of the shallow dendritic channels is 4H:1V and the bank slopes of the open water dendritic channels and open water ponds vary between 3H:1V and 4H:1V to provide amphibian and aquatic habitat. The open water ponds and open water dendritic channels are designed to provide sections of open water that maintain a minimum of approximately 2.5 feet of water depth during the low groundwater period while the shallow 3H:1 and 4H:1V bank slopes will provide locations with varying water depth. Large woody debris will be placed along the banks of the constructed channels so that approximately one-third of the stem is below the minimum water level as shown on Sheet 11. The woody debris will be placed throughout the site at varying orientations and depths to provide a variety of habitat. Some of the large woody debris will incorporate full root wads that will provide interstitial space for species to escape predation. The woody material will also serve as a food source as macroinvertebrates grow on the wood.

Brush piles and large wood structures are an important component of habitat for amphibians, among other species. Brush piles can provide habitat for nesting, feeding, rearing, resting, and protection from predators. Brush piles should be located near amphibian breeding habitats but primarily in upland habitat. Providing numerous brush piles of varying sizes is recommended by ODFW, with consideration given to size of wood used, tree species, and decay class. In addition to strategic placement of brush piles with regard to breeding habitat, as well as upland habitat, random placement of brush piles is also recommended, with consideration given to locating structures near one another to encourage wildlife movement between structures.

ODFW recommends that brush pile size generally be 5 feet high and 8 feet in diameter, with each component of a brush pile being a minimum of 6 feet long and 6 inches in diameter at the small end, with a total volume of at least 10 cubic feet. When constructing the structures, the largest size components will be placed at the bottom of the brush pile to prevent accelerated decay of the materials, and 2 to 4 feet of smaller size components, such as leafy boughs, will be placed on top of this foundation. The species selected for brush pile construction will be a minimum of 50 percent conifer. Specific species included will likely consist of Douglas fir, Western redcedar, bigleaf maple, and black cottonwood. When selecting brush pile components, logs will have at least 75 percent of the bark tightly adhered. Additionally, brush pile components will be selected from areas as close as possible to the CWM site and inspected to minimize the introduction of fungal diseases and insects. From improved food source opportunities to improved protective cover and microclimate conditions, the use of brush piles and large wood structures have the potential to provide numerous benefits to small wildlife and amphibian communities. Additional details on the brush piles are included on Sheet 19.

3.2.4 Raptor Habitat

Enhancement of the proposed CWM site will also allow for the opportunity to improve habitat for raptor species. Raptor habitat improvements will include the installation of nesting platforms as well as perch poles. Nesting platforms differ from perch poles in that nesting platforms are used by raptors primarily for feeding, resting, and rearing juveniles, and perch poles are used primarily for hunting activity. ODFW recommends nesting platforms be placed a minimum distance of 0.5 mile from one another. The size of the proposed CWM site will allow for approximately three to four raptor nesting platforms.

Perch poles facilitate hunting activity for raptor species, particularly when located adjacent to appropriate food source habitats. Perch poles used by osprey and bald eagles are best located adjacent to waterbodies and riparian areas; perch poles used by red-tailed hawks, kestrels, and northern harriers are best located adjacent to wetlands, grasslands, and scrublands; perch poles used by owls are best located adjacent to an interlocking forest canopy. ODFW recommends perch poles be placed a minimum of 50 yards from one another. Additional details of raptor nesting platforms and perch poles are included on Sheet 18. Natural nesting boxes and perch poles are preferred; therefore, the constructed artificial structures are considered temporary. Artificially constructed structures will be necessary during the initial establishment of the proposed CWM site, as they will provide habitat while the native vegetation continues to mature. Due to the benefits to habitat, native vegetation such as black cottonwood trees are included in the planting plan.

3.2.5 Songbird Habitat

Songbirds are an additional element of the wildlife community that stand to benefit from the availability of wetland habitat, as well as contribute to the health and successful functioning of the proposed CWM site. Wetland ecosystems provide a steady food source in the form of insects for songbirds and their offspring. The availability of this food source, in addition to the brush piles and large wood structures that will be installed at the proposed CWM site, will promote and support songbird populations in the vicinity of the site. Moreover, the variety of native vegetation that will be strategically planted throughout the proposed CWM site will also be beneficial to songbirds. A diverse selection of native grasses, trees, and shrubs will provide songbirds with structurally diverse available habitat, as well as provide seasonal variation in the seeds and fruits available for food. Similarly, the proposed CWM site is being designed with emergent, scrub-shrub, and forested wetland species, and the transitioning habitat among these three planting regimes will create a substantial amount of ideal songbird habitat in the form of habitat edges, which are preferred by many species of songbirds. Having a robust population of songbirds will, in turn, enhance the local ecosystem not only through the benefit of pest and insect control, but also through the beneficial role that birds play regarding seed dispersal and pollination.

3.2.6 Bat Habitat

Providing suitable habitat for bats is an important component of maintaining a diverse and healthy wildlife community. Wetlands and similar aquatic habitat provide ideal food source opportunities for bats and, therefore, allow bats to have a highly compatible coexistence with wetland ecosystems. In addition to the important role that bats play regarding insect control, bats also provide ecological benefit through their role as pollinators.

The installation of multiple bat boxes at strategic locations within the proposed CWM site will assist in establishing a healthy bat population to benefit the local ecosystem. Bat boxes larger in size and designed with multiple chambers have been shown to result in greater use than smaller size bat boxes. Boxes will be installed a minimum of 12 feet above the ground in an area that receives a minimum of four hours of direct sunlight on days with sunshine, ideally facing south or southeast. Boxes will also be installed in areas adjacent to open water, and at least 30 feet from any raptor perches or nesting structures. Additional predator control measures will include installing boxes on a smooth metal pole or installing smooth metal sheeting below the boxes to prevent access by predators. Additional details of the bat boxes are included on Sheet 18.

Section 4.0 - Compensatory Wetland Mitigation Existing Site Conditions

4.1 Wetland Delineation or Determination Results

A Wetland Delineation Report (WDR) for the proposed renewable fuels facility study area was submitted to the Oregon Department of State Lands (DSL) in November 2020 (WD2020-0663). A revised version of the report was submitted in July 2021. The WDR described six wetlands totaling 141.04 acres within the proposed renewable fuels facility site, and several unnamed drainage ditches. Concurrence was received for this delineation on September 21, 2021.

A WDR for the proposed compensatory wetland mitigation (CWM) site has been prepared and was submitted to the DSL on September 1, 2021. This WDR describes two wetlands covering most of the area within the 580-acre proposed CWM site study area, as well as several waterways (McLean Slough and numerous unnamed drainage ditches). Concurrence was received for this delineation on February 3, 2022.

4.2 Existing Hydrogeomorphic and Cowardin Classes On-Site

The impacted wetlands at the proposed renewable fuels facility site are classified as Palustrine Emergent (PEM) and Palustrine Shrub-Scrub (PSS) habitat using the Cowardin classification system and Flats using the hydrogeomorphic classification system. Currently, the proposed CWM site contains wetlands classified as PEM, PSS, Palustrine Forested, and Flats; however, the existing hybrid poplar plantation will be removed prior to construction of the proposed CWM site.

Photographs of the existing wetland areas are shown on Figures 4A though 4K.

4.3 Description of Existing and Proposed Hydrology

Currently, the impacted wetlands appear to be supported by natural precipitation, groundwater, and/or surface runoff. Following construction, the impacted wetlands will contain structures, culverts, impermeable surfaces, and road fill. Rainfall and runoff will be treated before leaving the impact site, and surface flow will be routed around the site.

The proposed CWM site is located within the Beaver Drainage District (BDD). The BDD is managed by the Beaver Drainage Improvement Company, Inc. (BDIC) to provide drainage during the winter and sub-irrigation during the summer. Throughout the BDD there are a series of private and BDIC ditches that provide drainage. The typical drainage layout consists of private drainage ditches constructed straight across fields that drain to McLean Slough, Dobbins Slough, and Beaver Slough. The sloughs then generally flow from the northeast to the southwest. Ultimately, the flow ends up in Beaver Slough where a pump station pumps the water out of the BDD into the Beaver Dredge Cut, which then flows to the Columbia River. The pump station is operated to maintain a water surface elevation of approximately -6.1 to -7.1 feet during the winter.

The pump station operating elevations were determined based on a description of the pump operation provided by the BDIC. The elevations provided by the BDIC were adjusted to the project vertical datum of North American Vertical Datum of 1988 based on a GPS survey of the staff gauge located at the pump station.

During the summer, water from the Columbia River flows through John Slough to an irrigation intake on Kallunki Road. From the intake, the irrigation water is distributed via a series of sloughs and ditches in the northeastern portion of the BDD. Wooden checkboards are installed across McLean Slough at the intersection with Collins Road. The checkboards are placed to maintain a water surface elevation of 0.4 foot upstream of Collins Road. During this time, the water surface elevation at the pump station is set to an elevation of -4.6 feet. The BDIC prefers to regulate inflow at Kallunki Road to control the water surface elevation within the BDD rather than incurring the cost associated with pumping.

The CWM site is almost entirely surrounded by sloughs or drainage ditches that serve various functions for the BDIC. The hydraulic capacity of these drainage features will be maintained, and the ditches and sloughs will be improved to create a perimeter ditch system. Perimeter ditches will help maintain operation of the BDIC and limit potential groundwater impacts to neighboring properties. The perimeter ditches are further described in Section 6.2.

The proposed CWM site will have increased hydrologic connectivity with McLean Slough as a result of lowering the ground surface elevation and constructing a network of dendritic channels throughout the site, excluding the low impact zone near the Beaver Cut Levee (see Section 6.2.4). Approximately 6 to 12 inches of topsoil is anticipated to be removed from the CWM site, and channels will be excavated 2.5 to 4 feet deep on average with limited areas being excavated approximately 6 feet deep to construct open water channels and ponds. The net elevation reduction across the site will be approximately 1.5 feet. Lowering the ground surface elevation of the site is anticipated to provide a period of surface saturation for part of the year and promote the growth of species adapted to wetter conditions. The dendritic channels will allow for hydraulic connectivity as well as reduce potential for inundation of the site. The dendritic channels and site grading will also be designed to work with the summer and winter operating levels of the BDD.

4.4 Existing Plant Communities

The impacted wetland areas contain tule (*Schoenplectus acutus*), sedges (*Carex nebrascensis*), cattails (*Typha latifolia*), rushes (*Juncus balticus*), reed canarygrass (*Phalaris arundinacea*), common spikerush (*Eleocharis palustris*), and Himalayan blackberry (*Rubus armeniacus*). Additional plant species include hybrid poplar (*Populus balsamifera*), Kentucky bluegrass (*Poa pratensis*), perennial ryegrass (*Lolium perenne*), creeping thistle (*Cirsium arvense*), peppermint (*Mentha x piperita*), common bent (*Agrostis capillaris*), meadow foxtail (*Alopecurus pratensis*), panicled bullrush (*Scirpus microcarpus*), velvetgrass (*Holcus lanatus*), spike bentgrass (*Agrostis exarata*), horsetail (*Equisetum arvense*), curly dock (*Rumex crispus*), creeping buttercup (*Ranunculus repens*), white clover (*Trifolium repens*), ladysthumb (*Polygonum persicaria*), and Douglas hawthorn (*Crataegus douglasii*).

The proposed CWM site is currently dominated by hybrid poplar plantations. Herbaceous vegetation observed in these wetlands included reed canarygrass, creeping buttercup, horsetail, sedges, rushes, various native and introduced grasses, and smaller amounts of forbs. There are extensive Himalayan blackberry thickets in some areas, smaller patches of elderberry, and hybrid poplars of varying ages throughout the proposed CWM site.

4.5 Existing Soil Conditions

Soils within and adjacent to the proposed CWM site have been influenced by the Columbia River and impacted by agriculture/grazing, construction and maintenance of roads, the railroad, and the construction and maintenance of the energy infrastructure at Port of Columbia County.

Soils mapped in the mitigation site by the Natural Resources Conservation Service (NRCS) are Lacoda silt loam, protected; Wauna silt-loam, protected; Wauna-Lacoda silt loams, protected; and Crims silt loam, protected. These soils formed in depressions on the Columbia River floodplain, and all soils are all listed as hydric (NRCS, 2021).

The soil types present at the CWM site are classified as either poorly drained or very poorly drained, with moderately high to high Ksat values (saturated hydraulic conductivity or the capacity of the most limiting layer to transmit water) ranging from 0.20 inch per hour to 1.98 inches per hour. The parent material of the Locoda silt loam, Wauna silt loam, and Wauna-Locoda silt loam is silty alluvium derived from mixed sources, and the parent material of Crims silt loam originates from partially decomposed herbaceous material over silty alluvium (NRCS, 2021). These soil types are ideal for adequate functioning of wetland hydrology.

Due to the history of both agricultural development and flood control development at the CWM site, it could be anticipated that soil health may have degraded over time. Therefore, the soil may be augmented with nutrients or fertilizer prior to planting and/or during site maintenance. This will aid in establishment of native plant communities and contribute to the overall success of the CWM site.

4.6 Site Constraints or Limitations

Constraints at the proposed CWM site include the presence of Hermo Road, which bisects the site, and agricultural fields to the west, north, east, and south. McLean Slough is present in the northwest section of the proposed mitigation area. Two known cultural resource sites are located within or near the CWM site. The general area of the cultural resource sites is near the intersection of Collins Road and McLean Slough, and east of Hermo Road between Collins Road and Collins Road 1. The mitigation site has been designed with a 50-foot setback to avoid ground disturbance in these areas.

Once constructed, the proposed renewable fuels facility and access road will present site constraints to the north. The Beaver Cut Levee is located on the southeast side of the mitigation site. The CWM site is also in the BDD, which is operated by the BDIC. The CWM site will be designed to maintain the operational capability of the BDIC to provide irrigation and drainage to neighboring properties. A detailed discussion of how this will be accomplished is included in Section 6.2.

Other constraints are related to habitat, such as the persistent and regional threat of invasive species such as reed canarygrass and Himalayan blackberry.

Section 5.0 - Functions and Values Assessment

5.1 Rationale for Method Used

Since the proposed project area is not tidally influenced or located in the Willamette Valley, Oregon Rapid Wetland Assessment Protocol (ORWAP) was used, as required by the Oregon Department of State Lands. The data sheets from these evaluations are included in Appendix B.

5.2 Summary of Expected Gains and Losses

The functions and values of the impacted wetlands and the proposed compensatory wetland mitigation (CWM) site (pre- and post-construction) were evaluated using ORWAP. Construction of the renewable fuels facility will remove all functions of the impacted wetlands. These losses will be offset by the creation of the proposed CWM site, which is anticipated to have functions and values similar to or better than the majority of the impacted wetlands.

Since the proposed CWM site includes existing wetlands, Table 5-1 presents a comparison of the pre- and post-construction function and value ratings of this area. The pre-construction evaluation is the projected condition of the site after the existing poplar plantations have been harvested. Table 5-2 includes a summary of the existing and predicted ratings for the impact and mitigation sites, respectively.

TABLE 5-1
SUMMARY OF COMPENSATORY WETLAND MITIGATION SITE WETLAND FUNCTIONS AND VALUES

Functions and Values			Pre-Construction Existing Rating	Pre-Construction Rating Break Proximity	Post-Construction Predicted Rating	Post-Construction Rating Break Proximity
GROUPS	Hydrologic Function	Function	Lower		Lower	
		Value	Lower		Lower	
	Water Quality Support	Function	Moderate		Moderate	
		Value	Higher		Higher	
	Fish Habitat	Function	Lower		Lower	
		Value	Lower		Lower	
	Aquatic Habitat	Function	Higher	MH	Higher	
		Value	Higher		Higher	
	Ecosystem Support	Function	Moderate		Higher	MH
		Value	Higher		Higher	
SPECIFIC FUNCTIONS AND VALUES	Water Storage and Delay	Function	Lower		Lower	
		Value	Lower		Lower	
	Sediment Retention and Stabilization	Function	Lower	LM	Moderate	
		Value	Higher		Higher	
	Phosphorus Retention	Function	Moderate		Moderate	
		Value	Higher		Higher	
	Nitrate Removal and Retention	Function	Lower	LM	Moderate	
		Value	Higher		Higher	
	Anadromous Fish Habitat	Function	Lower		Lower	
		Value	Lower		Lower	
	Resident Fish Habitat	Function	Lower		Lower	
		Value	Lower		Lower	
	Amphibian and Reptile Habitat	Function	Higher		Higher	
		Value	Lower		Lower	
	Waterbird Nesting Habitat	Function	Higher	MH	Higher	
		Value	Higher		Higher	
	Waterbird Feeding Habitat	Function	Higher		Higher	
		Value	Higher		Higher	
	Aquatic Invertebrate Habitat	Function	Lower		Moderate	LM
		Value	Lower		Lower	
	Songbird, Raptor, Mammal Habitat	Function	Moderate		Moderate	MH
		Value	Higher		Higher	
	Water Cooling	Function	Moderate		Moderate	
		Value	Higher		Higher	
	Native Plant Diversity	Function	Moderate	MH	Higher	
		Value	Lower		Lower	
	Pollinator Habitat	Function	Moderate	MH	Higher	MH
		Value	Moderate	MH	Moderate	
	Organic Nutrient Export	Function	Moderate		Moderate	
		Value	N/A		N/A	
	Carbon Sequestration	Function	Moderate	MH	Moderate	
		Value	N/A		N/A	
	Public Use and Recognition	Function	N/A		N/A	
		Value	Lower	LM	Moderate	

LM = low-moderate, MH = moderate-high

TABLE 5-2
SUMMARY OF WETLAND FUNCTIONS AND VALUES

Functions and Values			Impact Site		CWM Site		Attribute Replaced?	Mitigation Exceeds Impact Function Rating?
			Existing Rating	Rating Break Proximity	Predicted Rating	Rating Break Proximity		
GROUPS	Hydrologic Function	Function	Lower		Lower		Yes	
		Value	Lower		Lower		Yes	
	Water Quality Support	Function	Moderate		Moderate		Yes	
		Value	Higher		Higher		Yes	
	Fish Habitat	Function	Lower		Lower		Yes	
		Value	Lower		Lower		Yes	
	Aquatic Habitat	Function	Higher	MH	Higher		Yes	
		Value	Higher		Higher		Yes	
	Ecosystem Support	Function	Higher	MH	Higher	MH	Yes	
		Value	Moderate		Higher		Yes	
SPECIFIC FUNCTIONS AND VALUES	Water Storage and Delay	Function	Lower		Lower		Yes	
		Value	Lower		Lower		Yes	
	Sediment Retention and Stabilization	Function	Lower	LM	Moderate		Yes	
		Value	Higher		Higher		Yes	
	Phosphorus Retention	Function	Moderate		Moderate		Yes	
		Value	Higher		Higher		Yes	
	Nitrate Removal and Retention	Function	Lower		Moderate		Yes	Yes
		Value	Higher		Higher		Yes	
	Anadromous Fish Habitat	Function	Lower		Lower		Yes	
		Value	Lower		Lower		Yes	
	Resident Fish Habitat	Function	Lower		Lower		Yes	
		Value	Lower		Lower		Yes	
	Amphibian and Reptile Habitat	Function	Higher		Higher		Yes	
		Value	Lower		Lower		Yes	
	Waterbird Nesting Habitat	Function	Higher	MH	Higher		Yes	
		Value	Higher		Higher		Yes	
	Waterbird Feeding Habitat	Function	Higher		Higher		Yes	
		Value	Higher		Higher		Yes	
	Aquatic Invertebrate Habitat	Function	Lower		Moderate	LM	Yes	
		Value	Lower		Lower		Yes	
	Songbird, Raptor, Mammal Habitat	Function	Moderate		Moderate	MH	Yes	
		Value	Higher		Higher		Yes	
	Water Cooling	Function	Lower	LM	Moderate		Yes	
		Value	Higher		Higher		Yes	
	Native Plant Diversity	Function	Moderate	MH	Higher		Yes	
		Value	Lower		Lower		Yes	
	Pollinator Habitat	Function	Higher	MH	Higher	MH	Yes	
		Value	Moderate		Moderate		Yes	
	Organic Nutrient Export	Function	Moderate		Moderate		Yes	
		Value	N/A		N/A		N/A	
	Carbon Sequestration	Function	Moderate		Moderate		Yes	
		Value	N/A		N/A		N/A	
	Public Use and Recognition	Function	N/A		N/A		N/A	
		Value	Lower	LM	Moderate		Yes	

5.3 Considerations to Address Expected Losses

Losses to the functions and values of the impacted wetlands will be addressed through enhancement of a similar wetland area southwest of the impacted wetland area.

Section 6.0 - Compensatory Wetland Mitigation Plan, Construction Maps, and Drawings

6.1 Basic Mitigation Plan

The objective of this Compensatory Wetland Mitigation Plan (CWMP) is to enhance the hydrology and vegetation of the proposed compensatory wetland mitigation (CWM) site, which will improve wetland functions and values, as well as provide valuable wildlife habitat. This will be accomplished by the following activities:

1. Strategically fill approximately 26,800 linear feet of the site's existing interior private drainage ditches. No perimeter ditches will have their hydraulic capacity reduced.

2. Utilize one growing season of mechanical (plowing/discing/grading) and chemical (herbicide) controls to reduce the presence and potential re-establishment of invasive plant species prior to re-establishing native vegetation.

3. Create small, dendritic channels patterned after those typically found in lower Columbia River backwater sloughs.

4. Create shallow pools. This will provide an opportunity to diversify emergent vegetation and provide potential reproductive habitat for amphibians and other aquatic wildlife.

5. Create overall surface roughness (enhanced microtopography). Surface microtopography will be incorporated throughout the site to diversify surface hydrology and resultant vegetation. Microtopography will consist of machinery-induced undulations from site preparation tillage and will result in generally 6-inch height/depth variations.

6. Revegetate with native species of appropriate genetic stock to establish a mix of native forbs, grasses, sedges, rushes, and woody species compatible with lower Columbia River bottomland emergent, forested, and shrub habitat.

7. Utilize adaptive management throughout the project to react quickly and effectively to unforeseen events.

8. Incorporate five years of annual vegetation monitoring (see Section 7.0).

6.2 Grading Plan Objectives

Currently, the proposed CWM site is flat, with relatively little surface topography except for numerous drainage ditches. Depending on results from groundwater monitoring data, the site will be constructed by removing approximately 6 to 12 inches of the topsoil layer, if needed, to lower the elevation and remove the non-native seed bed. Ongoing results from groundwater monitoring may warrant adjustments to the grading plan. Any adjustments or refinements to the grading plan are anticipated to be minor and will be used with the goal of better meeting design criteria and project objectives. Tree removal will be required to clear the site of the existing commercial hybrid poplar plantation to allow excavation of the channels and re-establishment of native wetland species. Dendritic channels will be constructed throughout the site to create wildlife habitat diversity and reconnect hydrology. One objective of this CWMP is to grade the proposed CWM site to an elevation sufficient to enhance wetland hydrology, support wetland vegetation, and allow hydric soils to develop. Because NEXT Renewable Fuels Oregon, LLC, has entered into a long-term lease of the property, the proposed CWM site will be protected from haying, grazing, and other agricultural activities.

6.2.1 Hydrology Enhancement

The wetland hydrology at the CWM site will be enhanced through two primary grading activities. First, the entire site, excluding the low impact zone, as described in Section 6.2.4.2, is anticipated to be lowered approximately 6 to 12 inches to help the roots of wetland plants reach the saturation zone of current groundwater conditions. The depth of 6 to 12 inches was determined based on site investigations and GPS survey points that were collected. The survey points collected water surface elevations throughout and adjacent to the site to help understand groundwater and surface water conditions.

Areas within the CWM site that had better functioning wetland and hydrologic characteristic were also noted during site investigations. GPS survey points were taken in these locations and compared to the available light detection and ranging (LiDAR) data. These locations were used as references when developing the preliminary grading plan for the rest of the CWM site. Monitoring wells will be installed throughout the site as discussed in the description of hydrology monitoring; the monitoring wells will more accurately determine the existing groundwater conditions throughout the year at the CWM site. Additionally, following tree removal beginning in summer 2022 and completed in spring 2023, new LiDAR data will be collected for the entire CWM site. Updated LiDAR data in conjunction with monitoring well data will help determine the final adjustments to the grading of the CWM site with the goal of improving hydrologic function by lowering the CWM site to function with the existing hydrologic conditions.

The second grading activity that will enhance the hydrologic function of the CWM site is the replacement of the straight interior drainage ditches with dendritic channels. The drainage ditches currently function to efficiently drain the site to McLean Slough during the wet season. Since the dendritic channels are designed to retain water on site longer, this will allow precipitation to better infiltrate into the ground and help increase groundwater elevation on site. This is due to the dendritic channels having more sinuosity, a higher invert elevation than the drainage ditches, and a greater wetted surface area. The dendritic channels are also designed to distribute water more evenly throughout the site and increase groundwater elevation in localized areas on the CWM site that are currently experiencing lower groundwater. During the summer, the site receives sub-irrigation from the intake on Kallunki Road, and the dendritic channels will distribute the sub-irrigation water more evenly throughout the CWM site. Although water may temporarily inundate the proposed CWM site during the spring, especially during very wet years, the design is based on saturation by groundwater, which was observed while conducting the wetland delineation.

6.2.2 Controlling Groundwater Rise

Construction of the proposed CWM site is not anticipated to cause adjacent properties to flood or change the water table in surrounding properties from its existing conditions. This will be accomplished by maintaining and installing perimeter ditches around the proposed CWM site. The perimeter ditches will intercept any potential increase in groundwater elevation that occurs on the CWM site and allow it to drain to McLean Slough before impacting an adjacent property. The perimeter ditches are not anticipated to drain the CWM site since they are existing ditches, and the water surface elevations are controlled based on McLean Slough and local groundwater elevations. Drainage discharges to McLean Slough are not being altered as part of the design, and the CWM site was designed to function within the current water surface elevations of the ditches and McLean Slough. Additionally, the wetland delineation confirmed that the existing ditches do not and will not cause a groundwater drawdown that significantly dewaters the wetlands since wetlands were delineated right up to the edge of the existing perimeter ditches.

An increase in the Beaver Drainage Improvement Company, Inc. (BDIC) pumping cost associated with the CWM site is not anticipated since the proposed enhancements are not adding or subtracting water to the Beaver Drainage District (BDD) system. The enhancements are designed to work with the volume of water already present at the site. The CWM site may act as a buffer within the BDD by slowing the release of water from the site during the wet season, but it is not anticipated to increase the volume of water within the BDD.

6.2.3 Maintaining Beaver Drainage Improvement Company, Inc., Operation and Capacity

The CWM site is located within the BDD, and the BDIC needs to maintain the ability to provide drainage and irrigation to the surrounding properties. McLean Slough and Dobbins Slough are the two primary conveyance features within the CWM site. The CWM improvements will consist of minimal alteration to these conveyance features and would not reduce their hydraulic capacity. Alterations may include minor grading adjacent to the sloughs and minor grading along the bank where the existing drainage ditches and proposed dendritic channels connect to the sloughs.

Improvements may also consist of replacement or construction of control structures. Currently, the BDIC utilizes a control structure on McLean Slough at the intersection of Collins Road to control sub-irrigation during the summer. Improvements may be needed at this control structure. The improvements will be designed to maintain the capacity and operational function of the existing structure. The improvements are anticipated to improve the function and reduce the operation and maintenance for the BDIC through installation of a newer and more efficient structure.

6.2.3.1 Beaver Drainage Improvement Company, Inc., Maintenance Areas

NEXT Renewable Fuels Oregon, LLC, worked with the BDIC regarding access and maintenance for sloughs through the CWM site. These maintenance areas will be outside the mitigation site and are not counted toward the required mitigation acreage. These maintenance areas include the following:

1) The safety strip, extending 100 feet from the toe of Beaver Cut Levee along the full extent of the levee along the edge of the mitigation site

2) A 30-foot maintenance strip along Hermo Road and Collins Road and between Hermo Road and Dobbins Slough for the relocated internal drainage ditch discussed in Section 6.2.3.2

3) A 30-foot maintenance strip along Dobbins Slough to provide adequate width for access and maintenance

NEXT will complete grading activities to reduce the presence of invasive plant species directly in the easement areas, excluding the safety strip, adjacent to the mitigation site. NEXT is not responsible for any additional improvements BDIC completes within the provided easements. All easement areas will be left as unimproved dirt surfaces planted with the native palustrine emergent wetland seed mix used within the mitigation site. The additional easement areas provide BDIC with area to maintain their responsibilities within the BDD. This reduces the potential of BDIC impacting the mitigation site while completing maintenance of the BDD.

6.2.3.2 Drainage Patterns

In addition to the sloughs, there are a series of drainage ditches throughout the CWM site. The sole purpose of many of these ditches is for the benefit of drainage on the CWM site and not for drainage within the BDD. These ditches are considered private drainage ditches and will be eliminated as part of the CWM site and will not impact the BDIC's ability to provide drainage to adjacent property within the BDD.

Besides McLean Slough and Dobbins Slough, the only area the BDIC serves via ditches through the CWM site is an area adjacent to the southeast edge of the CWM site between Beaver Dike Road and Hermo Road. The BDIC currently drains this area via a ditch that runs through the southern portion of the CWM site. NEXT Renewable Fuels Oregon, LLC, is working with the BDIC to relocate this drainage path from the middle of the CWM site to a ditch along the southern edge of Hermo Road and Collins Road as shown on Sheets 14 and 15. A one dimensional hydraulic analysis will be completed using U.S. Army Corps of Engineers' Hydrologic Engineering Center's River Analysis System (HEC-RAS). The HEC-RAS analysis will be used to help ensure the relocated internal drainage ditch substantially provides the same drainage capacity provided by the existing internal drainage ditches. Relocation of the drainage path would include improvements to the ditch along the southern edge of Hermo Road and Collins Road as part of the construction of the CWM site. The improvements would include cleaning, deepening, and widening of the ditch along the new drainage path as needed to provide the capacity to continue to drain the areas outside of the CWM site. Similar to McLean Slough and Dobbins Slough, the BDIC would be able to access and maintain the ditch, and this area is not included in the CWM site. Routing this drainage around the southeast corner of the CWM site and along the southern edge of Hermo Road and Collins Road will provide conveyance that is easy for the BDIC to access and maintain since it will be adjacent to farm fields and Hermo Road and Collins Road instead of through the middle of the CWM site. Routing the drainage around the site is anticipated to also reduce ditch maintenance associated with beaver activity.

Based on observations at other wetland mitigation sites, concerns have been raised regarding the negative drainage effects the widening or deepening of the ditch could have on the surrounding mitigation area. One concern is the wetlands would become dewatered adjacent to the ditch, therefore, effecting functionality of the wetlands in these locations. This proposed CWM site is unique, however, in that the wetland delineation demonstrated that the large ditches do not appear to effectively lower the groundwater table adjacent to the bank, and the existing wetland delineated boundary extends all the way up to the edge of the existing ditches.

The widening and deepening of the ditch along Hermo Road and Collins Road will be completed to replace the BDIC conveyance capacity that will be cut off within the mitigation site. Widening the large perimeter ditches will essentially realign the conveyance capacity of the interior ditches to the edge of the CWM site along Hermo Road and Collins Road. These modifications will not have a negative drainage effect on the mitigation area and will maintain the regional hydrology of neighboring properties.

These modifications are not anticipated to affect the water surface elevations in the perimeter drainage ditch being modified. The water surface in the ditch is controlled based on the water surface elevation in McLean Slough and not on the geometry or slope of the ditch. The increased area of the ditch is designed to provide the same capacity of the realigned interior BDIC ditch being filled in.

A shallow dendritic channel will be constructed on the northeast block of the mitigation area. The channel will be along the southern property boundary of the block and will serve a dual purpose. First, it will function as a dendritic channel similar to the rest of the CWM site. Secondly, it will help to minimize potential surface water impacts to the neighboring property from the CWM site.

6.2.3.3 Artesian Flows

In this context, artesian flows are defined as “water from a confined aquifer that rises above the confining layer elevation.” The concern with artesian flows is that they will increase the volume of water entering the BDD drainage system. Artesian flows may be encountered throughout the site due to the high groundwater elevations coupled with the possibility of sand lenses overlain with a confining silt layer. A review of the well logs from adjacent parcels described a sandy layer of soil that held water was encountered from a depth of 5 to 17 feet below existing ground surface. This layer produced artesian-like flows, but those flows did not rise above the existing ground surface. BDIC believes it is possible for the areas with deeper excavation of the mitigation site to encounter a similar situation.

NEXT will cap artesian flows (as defined above) encountered during construction of the mitigation site with native material when the flows rise above the elevation of the outlet control structures on the mitigation site. Additionally, dendritic channels may be rerouted as described in Section 6.2.5, Adaptive Management During Construction. Limiting when artesian flows would be capped allows the mitigation site to become more hydrologically connected to the groundwater and allow the dendritic channels to spread this water throughout the mitigation site. Comparing the still water elevation of artesian flows to the outlet control structures will allow NEXT to demonstrate that the confined aquifer will remain under the same head pressure and is not anticipated to increase the volume of water entering the BDD. If an artesian flow is encountered that does raise above the outlet control structure elevation, the flow will be capped so the overall flow into the BDD will not be increased.

6.2.3.4 Summary

As outlined above, the proposed CWM site will not affect the BDIC's ability to control water levels on surrounding properties due to the CWM design, which includes perimeter ditches, no reduction in capacity of McLean Slough or Dobbins Slough, the design of a conveyance path that will provide drainage to the properties at the southeast corner of the CWM site, and management of artesian flows that may be encountered during construction that could impact flows into the BDD.

6.2.4 Protection of the Beaver Cut Levee

During coordination with the BDIC, several items were identified relating to the Beaver Cut Levee, located on the southeast side of the mitigation site. These include future levee maintenance and improvement needs and prevention of the formation of new sand boils that may compromise the integrity of the levee toe and increase the volume of water entering the BDD drainage system.

6.2.4.1 Safety Strip

To allow repairs or potential future improvements to the Beaver Cut Levee, a 100-foot offset between the toe of the levee and the mitigation site was incorporated in the design. Within this safety strip, no grading, complete removal of trees or other deeply rooted vegetation, or soil removal is allowed, although NEXT will cut the existing poplar trees but not remove their roots.

No part of the safety strip will be used for the mitigation site or counted toward the required acreage, and NEXT will not complete any grading within this area. Not including the safety strip in the mitigation site allows the BDIC to carry out necessary activities to maintain the integrity of the Beaver Cut Levee. BDIC is solely responsible for obtaining permits for any future work completed within the safety strip. NEXT will cut down the existing trees within the safety strip and will carry out initial weed control to help prevent future propagation of weeds into the mitigation site. Future weed control will be the BDIC's responsibility.

6.2.4.2 Low Impact Zone

In addition to the safety strip, a low impact zone adjacent to the safety strip was incorporated into the mitigation design. Within this area, NEXT will not create new dendritic channels and will minimize permanent soil excavation (i.e., grading). NEXT may, at its discretion, scrape the top 6 to 8 inches of soil material to remove invasive plants and the associated seed bank from the mitigation site.

Within the low impact zone, NEXT proposes to keep excavation to a minimum while still improving the hydrology of the low impact zone for inclusion within the mitigation site. The low impact zone will be within the temporary perimeter fence for the mitigation site and will have the same deed restriction as the rest of the mitigation site. No future improvements or construction activities related to the Beaver Cut Levee will be allowed to occur within the low impact zone.

Although grading will be kept to a minimum in the low impact zone, hydrologic conditions of this area will still be improved by filling the existing drainage ditches and placing open-water dendritic channels directly outside the low impact zone. Additionally, an open-water dendritic channel will connect to the existing oxbow partially within the low impact zone. The open-water dendritic channel will hydrologically connect the oxbow to the rest of the mitigation site and will help enhance the hydrology of the low impact zone. Currently, the oxbow is connected to a perimeter drainage ditch. This connection will be plugged to prevent draining of the oxbow and the mitigation site into the perimeter ditch at this location. These activities will help equalize groundwater throughout the low impact zone and the mitigation site.

One of the primary uses of the dendritic channels within the mitigation site is to better connect the hydrology of the entire mitigation site. Placement of water control structures at the connection of the open-water dendritic channels, the bordering perimeter ditches, and McLean Slough will help retain and raise the groundwater within the entire mitigation site. Thus, even though grading will be minimized within the low impact zone, the hydrologic conditions of the area will be improved by filling in the existing drainage ditches and placing open-water dendritic channels that connect the existing oxbow and the low impact zone to the larger mitigation site.

6.2.4.3 Sand Boils

In this context, a sand boil is defined as "the rupture of the top foundation stratum landward of the Beaver Cut Levee caused by excess hydrostatic head in the substratum," which could negatively impact the structural integrity of the levee and potentially increase the volume of water entering the BDD drainage system. NEXT will address sand boils that develop within the immediate vicinity of the Beaver Cut Levee, and per USACE general guidance are of the greatest risk to the levee, during construction of the mitigation site. The safety strip (0 to 100 feet from the toe of the levee) protects the area of greatest concern for the formation of sand boils, will be the BDIC's responsibility to maintain and monitor, and is outside the mitigation site.

The low impact zone protects the area where sand boils are most likely to form within the mitigation site, since excavation will be minimized in this area. More significant permanent excavation will occur beyond the low impact zone from the Beaver Cut Levee, and it is anticipated that groundwater will be encountered during these activities. If groundwater is encountered within the vicinity of the Beaver Cut Levee and meets the definition of a sand boil, the sand boil will be addressed by initially using sandbags to surround the sand boil and raise the head pressure. The head pressure will be increased until flow stops. A permanent solution will be to replace the soil covering the sand boil to return the head pressure to its preexisting levels. Addressing sand boils within the immediate vicinity of the Beaver Cut Levee will help reduce risk of negative impacts to the foundation of the levee from seepage and increased water input to the BDD drainage system.

6.2.5 Adaptive Management During Construction

The CWM site will be designed to enhance wetland hydrology at the CWM site by working with and maintaining current groundwater conditions and operation of the BDD. A concern has been expressed by the BDIC that during construction of the CWM site, a sand lens could be exposed and create artesian flows or sand boils that potentially increase the flow volume into the BDD. The increased flow volume could result in increased pumping costs to the BDIC. If the sand lens meets the definitions of an artesian flow, the actions described above will be taken. As previously stated, sand boils will only be addressed if encountered within the immediate vicinity of the Beaver Cut Levee.

The likelihood of uncovering new substantial sand lenses during construction is considered to be low due to the presence of the existing drainage ditches that systematically transect the CWM site. These drainage ditches likely would have already transected a sand lens that the CWM site excavation would encounter. If a sand lens is encountered during construction, meets the definitions of an artesian flow, and the still water elevation rises above the elevation of the outlet control structure, the site grading could be adjusted to avoid the area to help reduce the possibility of increased inflow into the BDD. Additionally, it is anticipated that excavation would not occur below current drainage ditch invert elevations, which will help reduce the risk of encountering a sand lens that has not already been disturbed.

As described above, if a sand boil or artesian flow is encountered during construction, measures will be taken to restore the hydrostatic head of sand boils or cap artesian flows under the situations described in Sections 6.2.4 and 6.2.5, to reduce the possibility of increasing the inflow volume into the BDD.

6.3 Planting List and Rationale

Seeding with native species will prevent erosion and stabilize the soil as the natural seed bank in the reserved topsoil establishes. To help with establishing the proposed CWM site, the seed mix shown on Table 6-1 will be applied.

TABLE 6-1
SUGGESTED SEED MIX

Species	Wetland Indicator Status	Percent Mix Desired
Meadow barley (*Hordeum brachyantherum*)	FACW	10
Western mannagrass (*Glyceria occidentalis*)	OBL	15
Tufted hairgrass (*Deschampsia cespitosa*)	FACW	15
American sloughgrass (*Beckmannia syzigachne*)	OBL	15
Spike bentgrass (*Agrostis exarata*)	FACW	15
Annual hairgrass (*Deschampsia danthonioides*)	FACW	15
Baltic rush (*Juncus balticus*)	FACW	15

FACW = Facultative wetland species

OBL = Obligate wetland species

Tree and shrub replanting will focus on selected areas of the proposed CWM site to better represent the natural habitat and function of emergent wetlands. The proposed CWM site is anticipated to re-establish native Columbia River bottomland emergent wetland with a forested component, a shrub component, and native dominated groundcover. Woody vegetation species to be planted may include, but are not limited to, Oregon ash (*Fraxinus latifolia*), black cottonwood (*Populus balsamifera*), locally adapted willows (*Salix spp.*), redosier dogwood (*Cornus sericea*), Pacific ninebark (*Physocarpus capitatus*), and salmonberry (*Rubus spectabilis*). The forested wetland species, such as cottonwood and ash, will be strategically located in areas of the proposed CWM site that are higher and drier than the surrounding areas to provide for the optimal growing conditions particular to these species. Although these areas are higher and drier, they are currently and will remain wetlands.

The inclusion of black cottonwood on the planting list raises concern regarding the potential for cotton to affect nearby industrial operations (particularly intake fans, etc.). Therefore, strategically locating this particular tree species at the most interior locations possible within the proposed CWM site is anticipated to help minimize this concern. The presence of hybrid poplar plantations in the vicinity provides a good indication that this species will successfully establish and mature. Including this species will provide wildlife and raptor habitat and diversity.

In addition, native herbaceous wetland species plugs will be planted along the perimeter of the constructed pools to aid in the rapid establishment of desirable native species. These plugs may be sourced from the impact sites or another approved location. Species may include, but are not limited to, Columbia sedge (*Carex aperta*), slough sedge (*Carex obnupta*), bur-reed (*Sparganium emersum*), and water plantain (*Alisma sp.*).

6.4 Wetland Buffers

Buffers are an integral component of wetland ecosystems that serve multiple purposes. Buffers serve the benefit of providing a layer of protection for plant and animal communities in a wetland, while reducing impacts from adjacent properties and roads. Ecological benefits of buffers to wetlands include moderating stormwater runoff, stabilizing soil, filtering pollutants and excessive nutrients, and reducing human disturbance. Existing ditches are located within the buffer along Hermo Road. These ditches may significantly contribute to a well-functioning buffer by deterring human disturbance and capturing stormwater runoff, pollutants, and excessive nutrients.

Planting of woody vegetation adjacent to the buffer was considered; however, it would potentially invite unwanted beaver activity, which is likely to create the need for increased ongoing maintenance and ditch cleaning. For this reason, the planting plan was designed with a 165-foot swath between the perimeter ditch and significant woody vegetative plantings, as it has been observed that beaver activity often extends no greater than 165 feet from any habitat material source (Washington Department of Fish and Wildlife, 2022).

6.5 Construction Schedule

The proposed CWM site will be constructed concurrently with the construction of the NEXT Renewable Fuels Oregon, LLC, renewable fuels facility, approximately from summer 2024 through fall 2025. Excavation of the proposed CWM site will be completed with track excavators and dump trucks. When the desired finished grade elevation is achieved, the site will be seeded and planted.

Section 7.0 - Monitoring Plan

7.1 Proposed Performance Standards

The following criteria will be used to evaluate the success of the proposed compensatory wetland mitigation (CWM) site:

1. The cover of native herbaceous species is at least 60 percent.

2. The cover of invasive species is no more than 10 percent.

3. Bare substrate represents no more than 20 percent cover.

4. By Year 3 and thereafter, at least six different native species are occupying at least 5 percent average cover and occurring in at least 10 percent of the plots sampled.

5. Prevalence Index is less than 3.0.

6. In the Palustrine Scrub-Shrub (PSS) and Palustrine Forested (PFO) planting areas, the density of woody vegetation is at least 1,600 native plants (shrubs) and/or stems (trees) per acre, or the cover of native woody vegetation is at least 50 percent. Native species volunteering on the site may be included, dead plants do not count, and the standard must be achieved for two years without irrigation.

7. The site is a minimum of 458.80 acres of Palustrine Emergent, PSS, and PFO wetland, as determined using the criteria stated in the *1987 U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual and 2010 Western Mountains, Valleys, and Coast Regional Supplement*, by the end of the fifth year following construction.

7.2 Hydrology Monitoring

Hydrology monitoring will be conducted at the proposed CWM site after removal of the poplar tree plantation, throughout the duration of the final design process to assist in project design, and during the post-construction monitoring period to assess performance standards. A minimum of eight shallow groundwater monitoring wells will be strategically located and installed within the mitigation area. Slotted polyvinyl chloride observation tubes will be installed to a depth of approximately 10 feet below ground surface and will be equipped with electronic data loggers to provide twice-daily groundwater elevation readings.

Nine stilling wells will also be installed at strategic locations in adjacent sloughs and perimeter ditches to measure surface water elevations. These observation locations will help confirm how the seasonal operation of the Beaver Drainage District (BDD) impacts the surface and groundwater elevations at the CWM site. These observation locations will also help determine the relationship of the groundwater within the site to the surface water in the sloughs. As the proposed CWM site is being developed, an adaptive management approach will inform monitoring methods through a process of ongoing evaluation and potential adjustment of monitoring methods, and adaptive management principles will be applied as necessary throughout the monitoring timeline. Once project design has been finalized, a long-term management and maintenance plan will be developed to aid in successful establishment and maturity of the proposed CWM site.

Hydrology monitoring will continue once construction of the proposed CWM site is complete. Ongoing monitoring will allow site managers to observe site conditions to help determine the success of the proposed CWM site. The groundwater monitoring wells will provide data to help evaluate whether objectives of the proposed CWM site (such as increased detention of surface water) are being met. It is anticipated that as precipitation accumulates, the dendritic channels that are incorporated into the site design will slow the release of water from the proposed CWM site to the surrounding drainage ditches and promote infiltration into soils within the proposed CWM site.

The groundwater monitoring will also be used as a tool during plant establishment. If the wetland plantings struggle to establish, the groundwater monitoring data can help inform adaptive management techniques such as adjusting the control structures to help manage groundwater elevations and improve plant establishment.

Hydrology monitoring will also allow stakeholders to observe interactions between the rainfall, groundwater, and surrounding BDD ditches. This ongoing monitoring will help confirm that the proposed CWM site is not negatively impacting the BDD or surrounding properties through increased flow into the BDD or increased groundwater elevations.

7.3 Monitoring Methods

The following methods will be used yearly to assess the condition of the proposed CWM site:

1. Permanent photo points will be established to provide an overall assessment of the created wetland.

2. Establishment of herbaceous plant species will be determined by sampling the proposed CWM site with plots. Ten transects with 1-square meter plots spaced at 20-meter intervals will be laid out within the proposed CWM site (locations to be determined following site construction). Percent cover of all species present will be recorded.

3. Establishment of PSS and PFO planting areas will be evaluated by establishing ten large sample plots with 10-meter diameters (locations to be determined following site construction). Stem counts and percent cover of woody species present in the sample plots will be recorded.

In addition to the above steps, the proposed CWM site will be delineated, and a functions and values assessment (Oregon Rapid Wetland Assessment Protocol) will be conducted, by the end of the fifth growing season following construction to evaluate the size of the wetland and its characteristics. This delineation will be conducted in accordance with the *1987 USACE Wetland Delineation Manual and the 2010 Western Mountains, Valleys, and Coast Regional Supplement*.

7.4 Monitoring Schedule

A post-construction report will be provided documenting the as-built condition of the site. A five-year monitoring program is proposed beginning the year following construction completion. Once annually, the proposed CWM site will be evaluated, and results will be compared to the success criteria. Notable conditions of the vegetation and site will be recorded, and a report will be submitted to the Oregon Department of State Lands by December 31 of each year.

To determine whether the required acreage of enhanced wetland is present, the proposed CWM site will be delineated no later than the fifth growing season following construction.

7.5 Rationale for Plot and Photo-Documentation Locations

The sampling transects will be located to provide a representative sampling of the vegetation in the proposed CWM site, and the photo point locations will be placed to provide good views of the site as a whole, with closer details as needed.

Section 8.0 - Long-Term Protection and Financial Security Instruments

8.1 Description of Proposed Protection Instrument

A portion of the NEXT Renewable Fuels Oregon, LLC, facility site will be owned by NEXT Renewable Fuels Oregon, LLC, and the remaining section of the project site will be leased from the Port of Columbia County. NEXT Renewable Fuels Oregon, LLC, has entered into a long-term lease agreement with Oregon Port AG Investors, LLC, for the mitigation site. Oregon Port AG Investors, LLC, will record a deed restriction on the property confirming the exclusive and sole use of the property for the approved CWM and require protections for the proposed CWM site, including requirements for maintaining the fences for the duration of the monitoring period, excluding livestock, controlling weeds, and ensuring viable wetland vegetation. Such deed restriction will prohibit activity that would alter hydrology of the site, remove vegetation other than that required for maintenance (e.g., weed treatments or tree thinning for habitat improvements), or remove or place material into the wetland that adversely impacts the mitigation site, as well as exclude livestock, controlling weeds, and ensuring viable wetland vegetation. NEXT Renewable Fuels Oregon, LLC, will adopt a management plan, which may ultimately include having a third-party conservation organization with experience with wetland management take operational responsibility for the proposed CWM site.

8.2 Description of Proposed Financial Security Instruments

Long-term maintenance of the proposed CWM site will be the responsibility of NEXT Renewable Fuels Oregon, LLC, and will be funded by NEXT Renewable Fuels Oregon, LLC. NEXT Renewable Fuels Oregon, LLC, will obtain a bond guaranteeing the proposed CWM site performance from a corporate surety licensed to do business in Oregon. NEXT Renewable Fuels Oregon, LLC, will use the surety bond template provided by the Oregon Department of State Lands.

NEXT Renewable Fuels Oregon, LLC, is an Oregon limited liability company. NEXT Renewable Fuels Oregon, LLC, has one member, which is NEXT Renewable Fuels, Inc.; NEXT Renewable Fuels, Inc., is not a closely held corporation. NEXT Renewable Fuels, Inc., will provide a guarantee securing compliance with mitigation obligations pursuant to Oregon Administrative Rules 141-085-0705(1)(l).

8.3 Long-Term Maintenance Plan

The proposed CWM site will be maintained by NEXT Renewable Fuels Oregon, LLC, and they will be responsible for weed control or other remedial measures required at the site. NEXT Renewable Fuels Oregon will adopt a management plan for long-term maintenance. Management and care of the proposed CWM site may ultimately be turned over to a third-party conservation organization with wetland management experience, but NEXT Renewable Fuels Oregon, LLC, or the owner of the proposed facility will maintain long-term financial responsibility for the proposed CWM site.

Long-term maintenance will be necessary to ensure that the CWM site continues to function as designed. A long-term maintenance plan may entail weed and invasive species management, or augmenting soil health through the use of fertilizers or other nutrients as necessary. Additionally, maintenance of perimeter fencing may be necessary to prevent wildlife damage during establishment of the CWM site, and, once the site is established, removal of perimeter fencing following the monitoring period will be necessary to allow for natural patterns of wildlife migration. The installation of signs at strategic locations along the perimeter of the CWM site will help alert the public to the ongoing enhancement activities, as well as advise about sensitive areas existing within the site. Adaptive management principles will also benefit the long-term maintenance plan by incorporating data collected from monitoring efforts and applying the data to the ongoing management and maintenance of the CWM site.

References

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe (1979). *Classification of Wetlands and Deepwater Habitats of the United States.* Washington, D.C., Government Printing Office.

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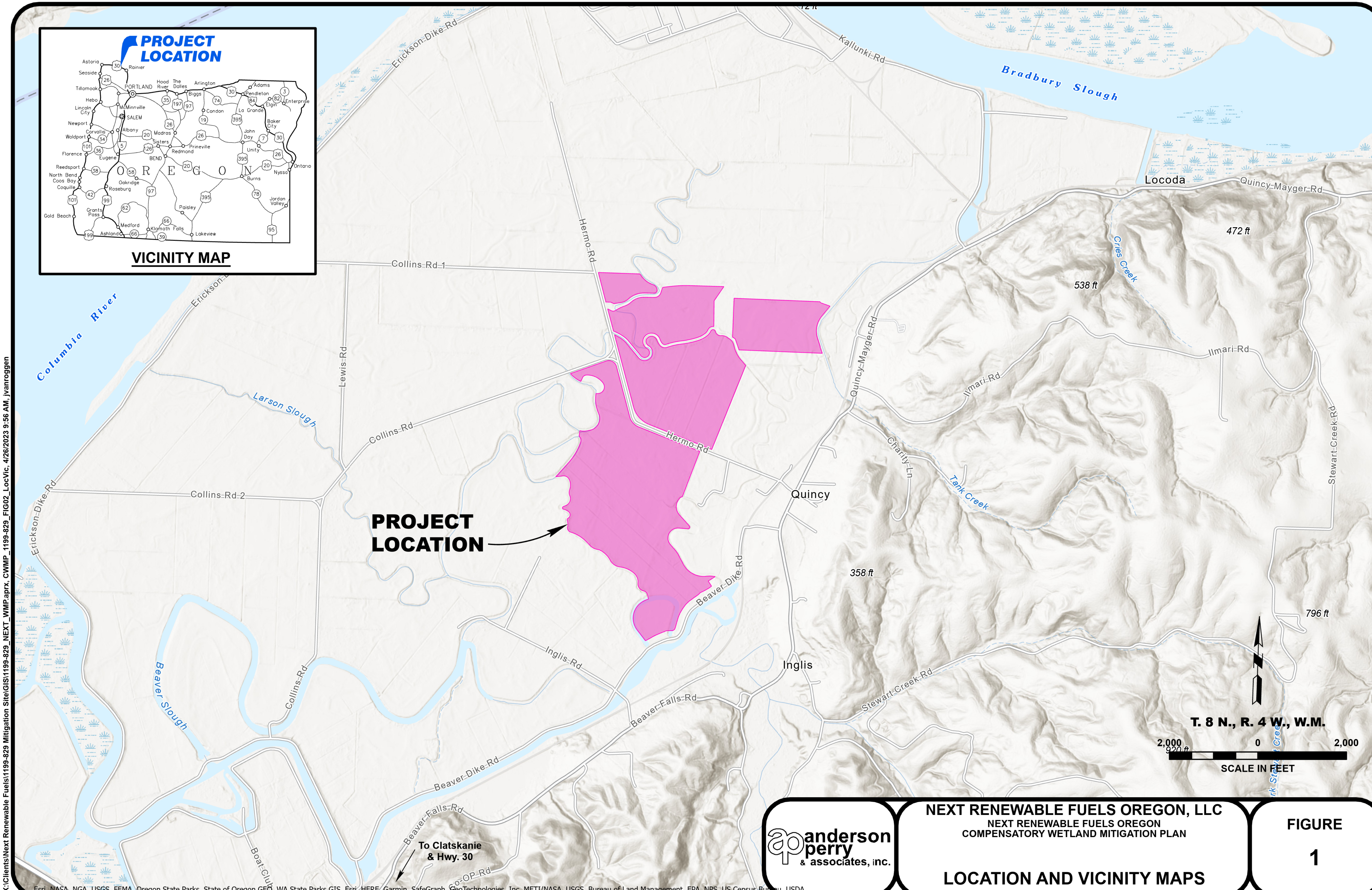
Oregon Department of Fish and Wildlife (2016). Oregon Conservation Strategy. Accessed 1 July 2021. https://www.oregonconservationstrategy.org/strategy-species/columbia-white-tailed-deer/

Washington Department of Fish and Wildlife (WDFW) (2021). Species and Habitats, Columbian white-tailed deer. Accessed 1 July 2021. https://wdfw.wa.gov/species-habitats/species/odocoileus-virginianus-leucurus

WDFW (2022). Species and Habitats, Beaver. Accessed 4 February 2022. https://wdfw.wa.gov/species-habitats/species/castor-canadensis#living

FIGURES



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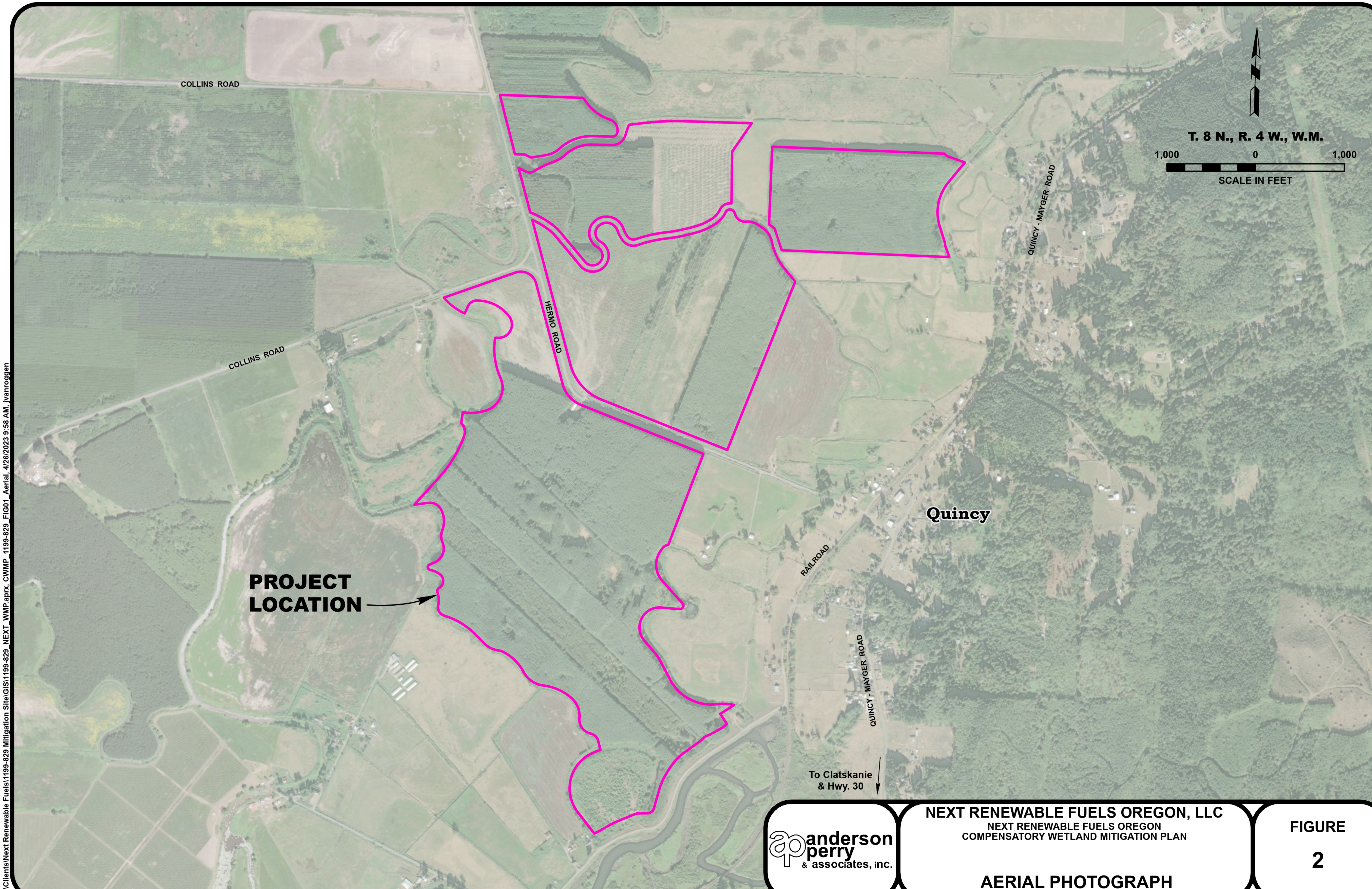

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NEXT RENEWABLE FUELS OREGON, LLC
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COMPENSATORY WETLAND MITIGATION PLAN

AERIAL PHOTOGRAPH

FIGURE 2

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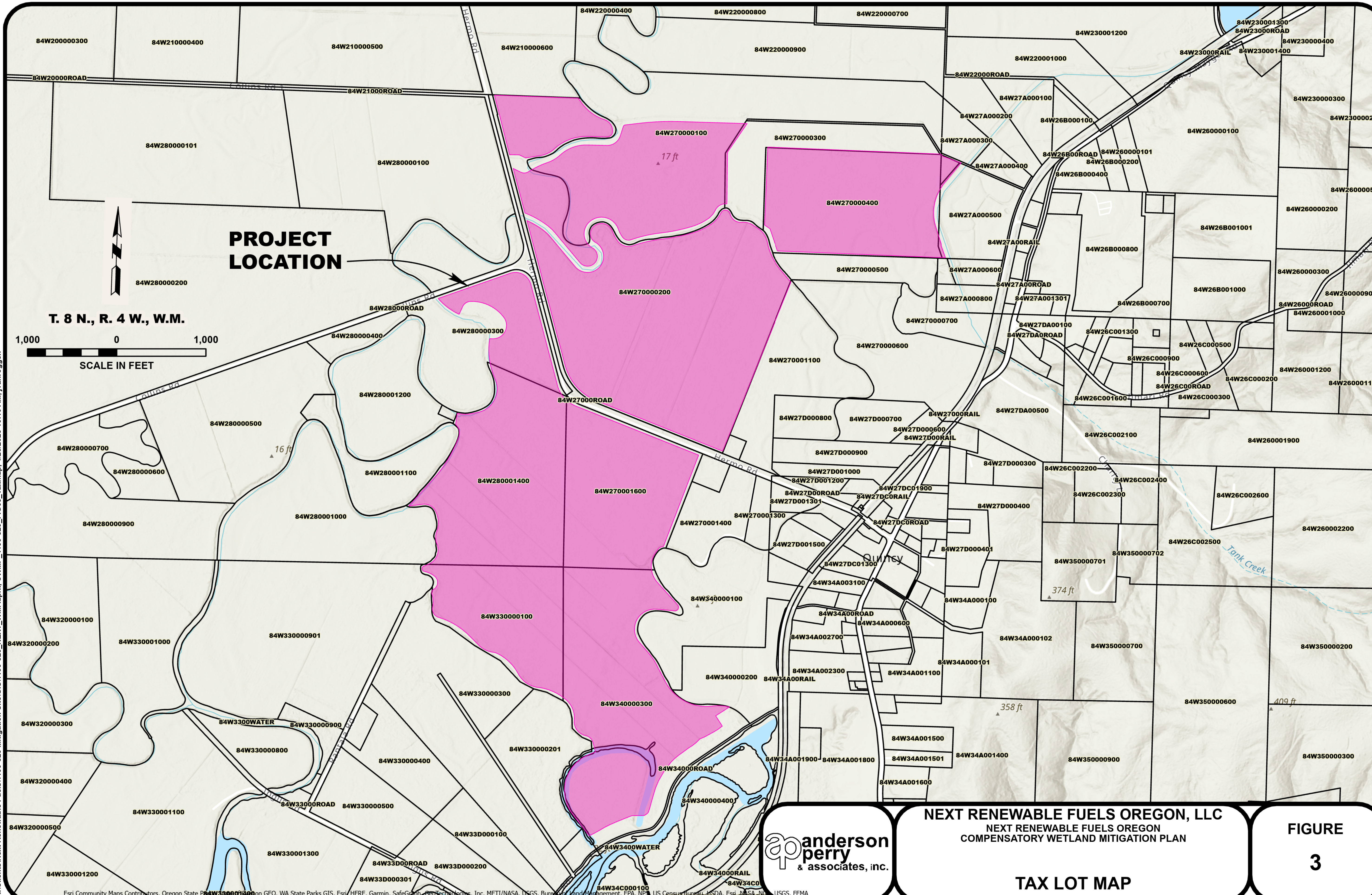

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COMPENSATORY WETLAND MITIGATION PLAN

TAX LOT MAP

FIGURE 3

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PHOTOGRAPH 1 - Wetland 1, looking west at Plots 5 and 5a. Photograph taken by Sue Brady on October 23, 2018.

PHOTOGRAPH 2 - Wetland 1, looking west at Plots 8 and 8a. Photograph taken by Sue Brady on November 28, 2018.

PHOTOGRAPH 3 - Wetland 1, looking west at Plot 16. Photograph taken by Sue Brady on November 29, 2018.

PHOTOGRAPH 4 - Wetland 1, looking east at Plot 28. Photograph taken by Sue Brady on November 29, 2018.

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COMPENSATORY WETLAND MITIGATION PLAN

SITE PHOTOGRAPHS

FIGURE

4B

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PHOTOGRAPH 5 - Wetland 1, looking southeast at Plot 33. Photograph taken by Sue Brady on November 14, 2019.

PHOTOGRAPH 6 - Wetland 1, looking southeast at Plot 35. Photograph taken by Sue Brady on November 14, 2019.

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COMPENSATORY WETLAND MITIGATION PLAN

SITE PHOTOGRAPHS

FIGURE 4C

PHOTOGRAPH 7 - Wetland 2, looking northwest at Plots 40 and 40a. Photograph taken by Sue Brady on November 29, 2018.

PHOTOGRAPH 8 - Wetland 3, looking northwest at Plots 42 and 42a. Photograph taken by Sue Brady on September 30, 2020.

PHOTOGRAPH 9 - Mitigation site, looking north. Photograph taken by Sue Brady on May 4, 2021.

PHOTOGRAPH 10 - Mitigation site ponded area, looking east. Photograph taken by Sue Brady on May 4, 2021.

PHOTOGRAPH 11 - Mitigation site, looking southwest along McLean Slough. Photograph taken by Sue Brady on May 4, 2021.

PHOTOGRAPH 12 - Mitigation site, looking south. Photograph taken by Sue Brady on May 6, 2021.

PHOTOGRAPH 13 - Mitigation site, looking east.
Photograph taken by Sue Brady on May 6, 2021.

PHOTOGRAPH 14 - Mitigation site, looking west.
Photograph taken by Sue Brady on May 6, 2021.

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COMPENSATORY WETLAND MITIGATION PLAN

SITE PHOTOGRAPHS

FIGURE 4G

PHOTOGRAPH 15 - Mitigation site, looking northeast along drainage ditch. Photograph taken by Sue Brady on May 6, 2021.

PHOTOGRAPH 16 - Mitigation site, looking southeast. Photograph taken by Shiloh Simrell on May 4, 2021.

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COMPENSATORY WETLAND MITIGATION PLAN

SITE PHOTOGRAPHS

FIGURE 4H

PHOTOGRAPH 17 - Mitigation site, looking northeast along drainage swale. Photograph taken by Shiloh Simrell on May 4, 2021.

PHOTOGRAPH 18 - Mitigation site, looking northeast. Photograph taken by Shiloh Simrell on May 5, 2021.

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COMPENSATORY WETLAND MITIGATION PLAN

SITE PHOTOGRAPHS

FIGURE
4I

PHOTOGRAPH 19 - Mitigation site, looking northwest along McLean Slough. Photograph taken by Shiloh Simrell on May 5, 2021.

PHOTOGRAPH 20 - Mitigation site, looking north. Photograph taken by Shiloh Simrell on May 6, 2021.

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COMPENSATORY WETLAND MITIGATION PLAN

SITE PHOTOGRAPHS

FIGURE
4J

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PHOTOGRAPH 21 - Mitigation site, looking northwest along Beaver Slough oxbow. Photograph taken by Shiloh Simrell on May 6, 2021.

PHOTOGRAPH 22 - Mitigation site, looking northwest along drainage ditch. Photograph taken by Shiloh Simrell on May 6, 2021.

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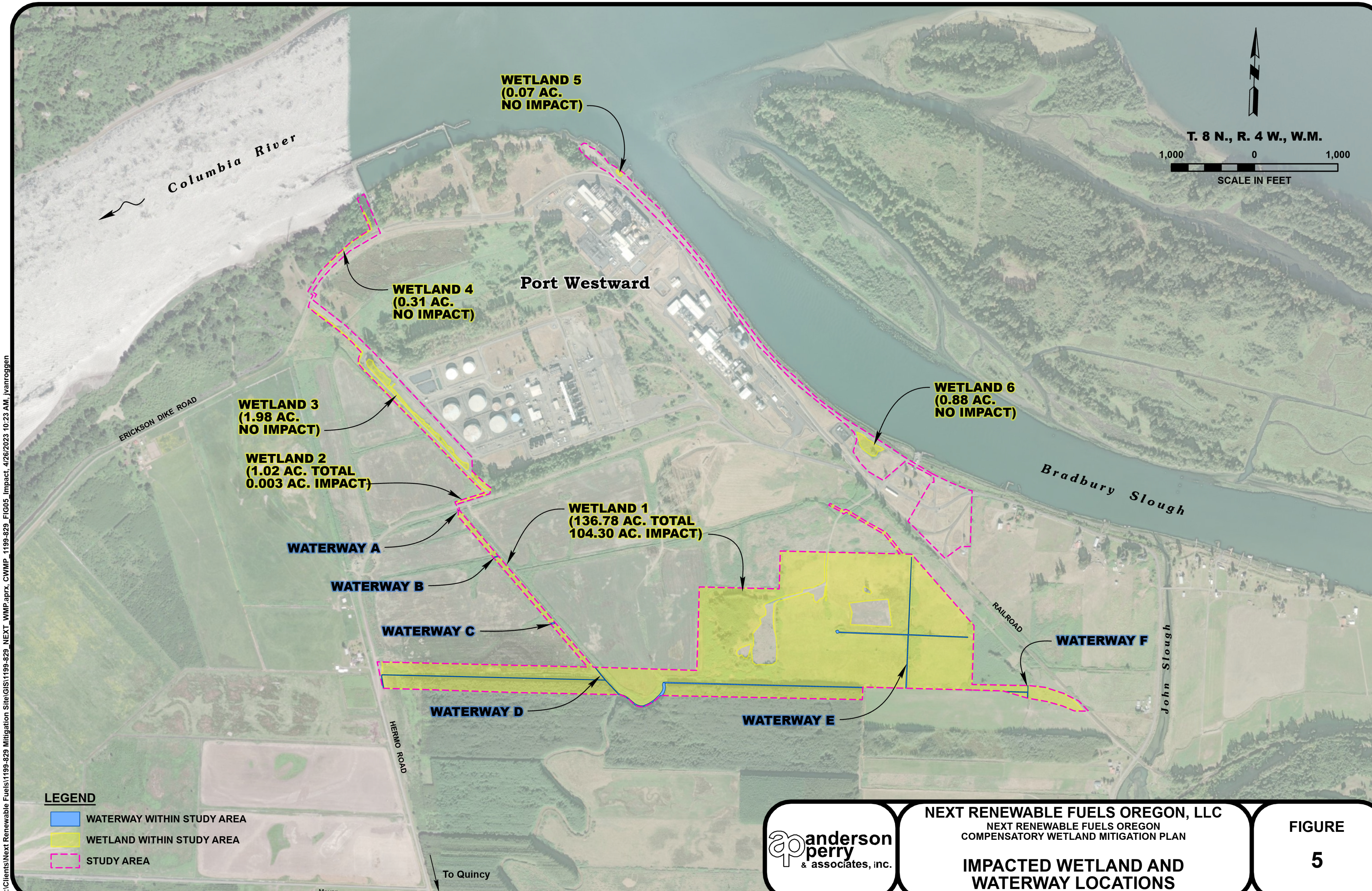
COMPENSATORY WETLAND MITIGATION PLAN

SITE PHOTOGRAPHS

FIGURE 4K



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COMPENSATORY WETLAND MITIGATION PLAN

IMPACTED WETLAND AND WATERWAY LOCATIONS

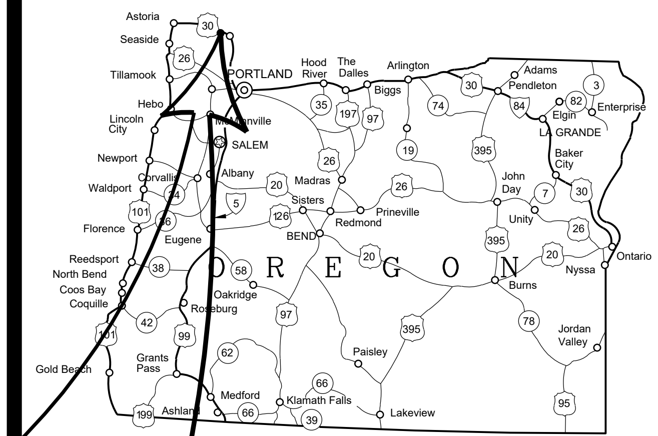
FIGURE 5

Appendices Table of Contents

APPENDIX A
Wetland Impact Areas and Wetland Mitigation Plan Drawings

NEXT RENEWABLE FUELS OREGON, LLC

WETLAND MITIGATION PLAN
COLUMBIA COUNTY, OREGON
T8N, R4W, SECTIONS 27, 28, 33, AND 34
2023



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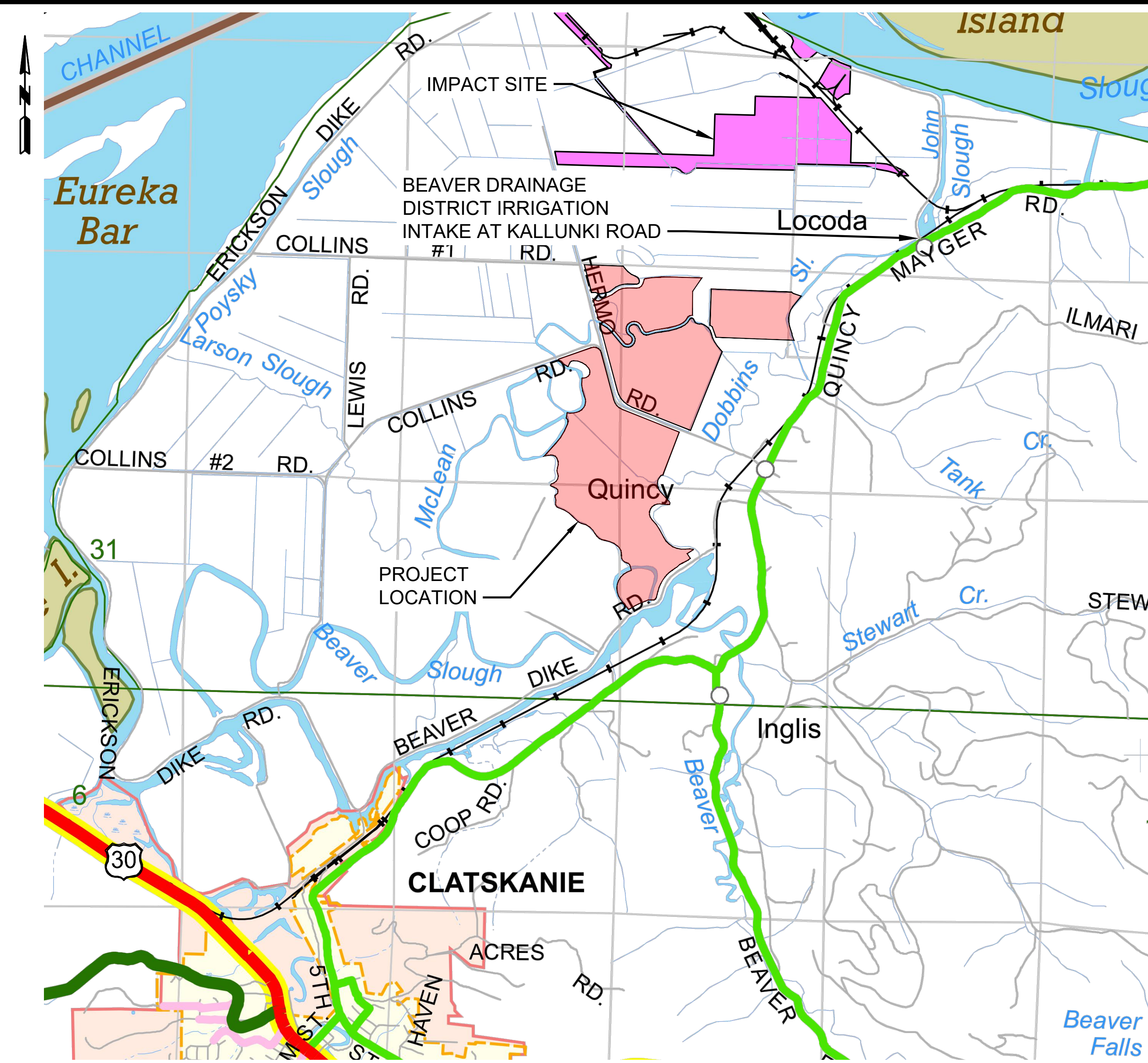

VICINITY MAP

N.T.S.

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HOUSTON, TX 77079

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1901 N. Fir Street - La Grande, OR 97850 Ph: (541)963-8309 Fax: (541)963-5456
LA GRANDE, OR. WALLA WALLA, WA. HERMISTON, OR.

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DATUM STATEMENT

THIS LIDAR WAS DOWNLOADED FROM THE STATE OF OREGON DOGAMI WEBSITE USING THE OREGON LIDAR CONSORTIUM NORTH COAST 2009 DATA SET.

VERTICAL DATUM: NAVD 88

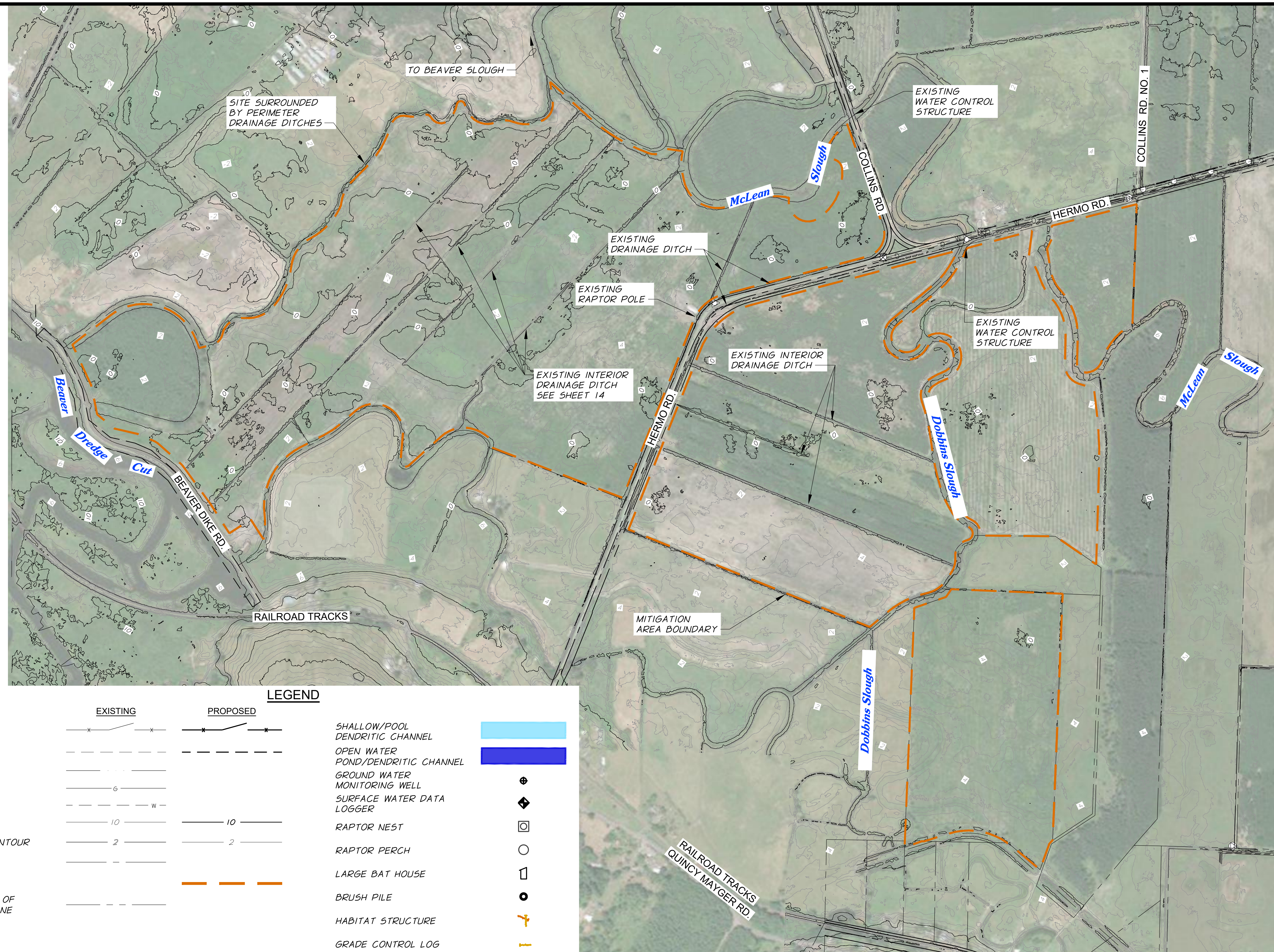
HORIZONTAL DATUM: OREGON COORDINATE SYSTEM - NORTH ZONE NAD 83, INTERNATIONAL FEET

SURVEY NOTE

PROPERTY BOUNDARIES AND EASEMENT LOCATIONS SHOWN ARE APPROXIMATE.

GENERAL NOTE

SEE SHEET 14 FOR FLOW DIRECTION AND DRAINAGE PATHS.



LEGEND

	EXISTING	PROPOSED
FENCE LINE/GATE		
EDGE OF GRAVEL		
DRAINAGE DITCH		
GAS LINE	G	
WATER LINE	W	
INDEX CONTOUR	10	10
INTERMEDIATE CONTOUR	2	2
CENTERLINE		
MITIGATION AREA BOUNDARY		
PROPERTY/RIGHT OF WAY/EASEMENT LINE		

SHALLOW/POOL DENDRITIC CHANNEL

OPEN WATER POND/DENDRITIC CHANNEL

GROUND WATER MONITORING WELL

SURFACE WATER DATA LOGGER

RAPTOR NEST

RAPTOR PERCH

LARGE BAT HOUSE

BRUSH PILE

HABITAT STRUCTURE

GRADE CONTROL LOG

REVISION	BY	DATE

DESIGNED BY A. HAMILTON

DRAWN BY G. SAURBIER

REVIEWED BY C. HUTCHINS

400 0 400 800 1200
SCALE IN FEET

JOB NUMBER 1199-829 DATE 2023

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NEXT RENEWABLE FUELS OREGON, LLC
WETLAND MITIGATION PLAN
COLUMBIA COUNTY, OREGON

LEGEND AND EXISTING SITE PLAN

SHEET 1

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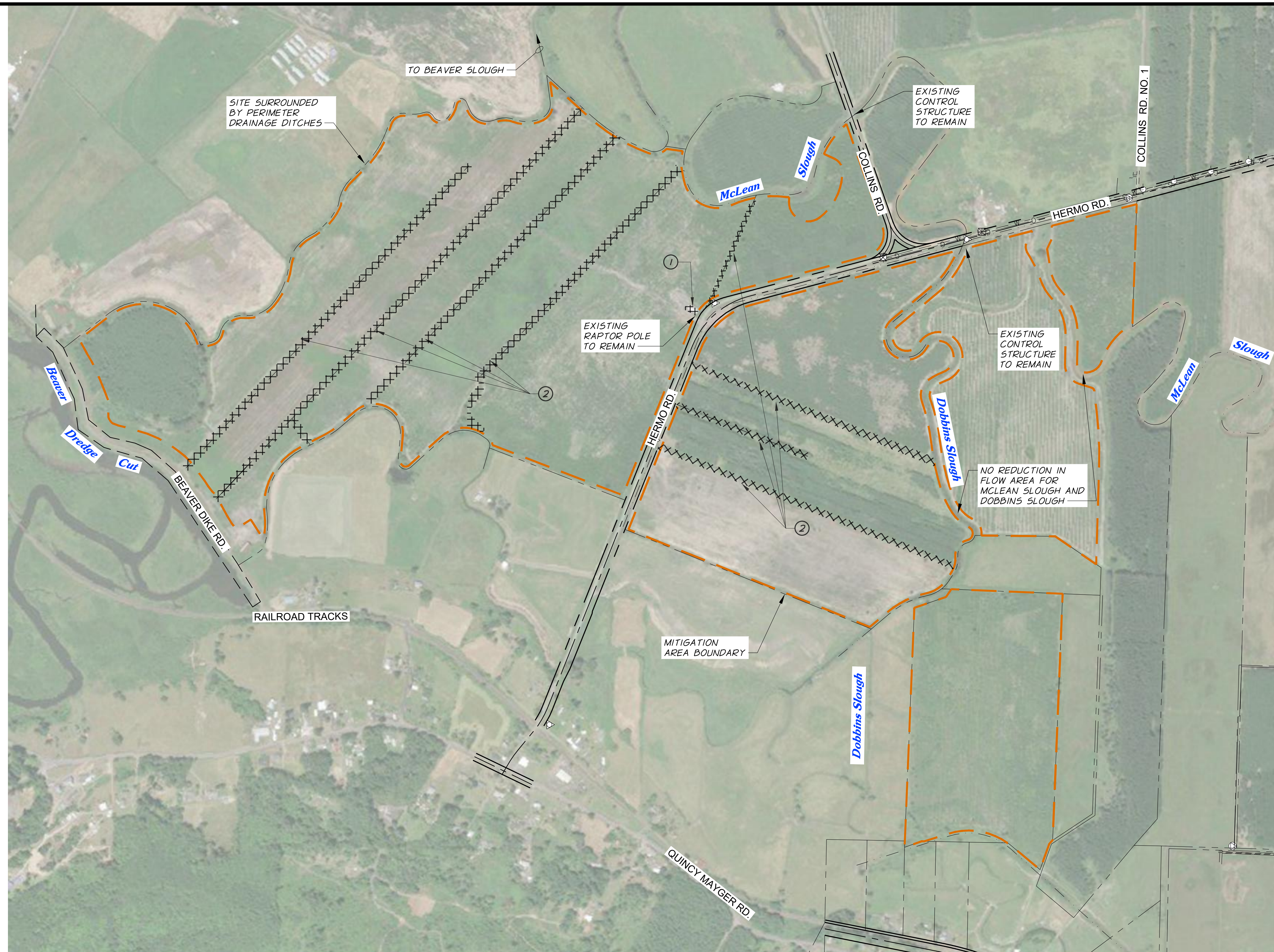
DEMOLITION SCHEDULE

1. REMOVE/DEMOLISH EXISTING BUILDING AND ASSOCIATED FOUNDATIONS, UTILITIES AND RELATED FEATURES.
2. INTERIOR DITCHES TO BE FILLED IN PER PROPOSED SITE PLAN, SHEET 3

LEGEND

REMOVE/DEMOLISH OR FILL AS REQUIRED



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REVISION	BY	DATE

DESIGNED BY A. HAMILTON
DRAWN BY G. SAURBIER
REVIEWED BY C. HUTCHINS

JOB NUMBER 1199-829 DATE 2023
ACAD FILE: 1199-829-060C-106DEMO.dwg

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NEXT RENEWABLE FUELS OREGON, LLC
WETLAND MITIGATION PLAN
COLUMBIA COUNTY, OREGON

DEMOLITION PLAN

SHEET **2**

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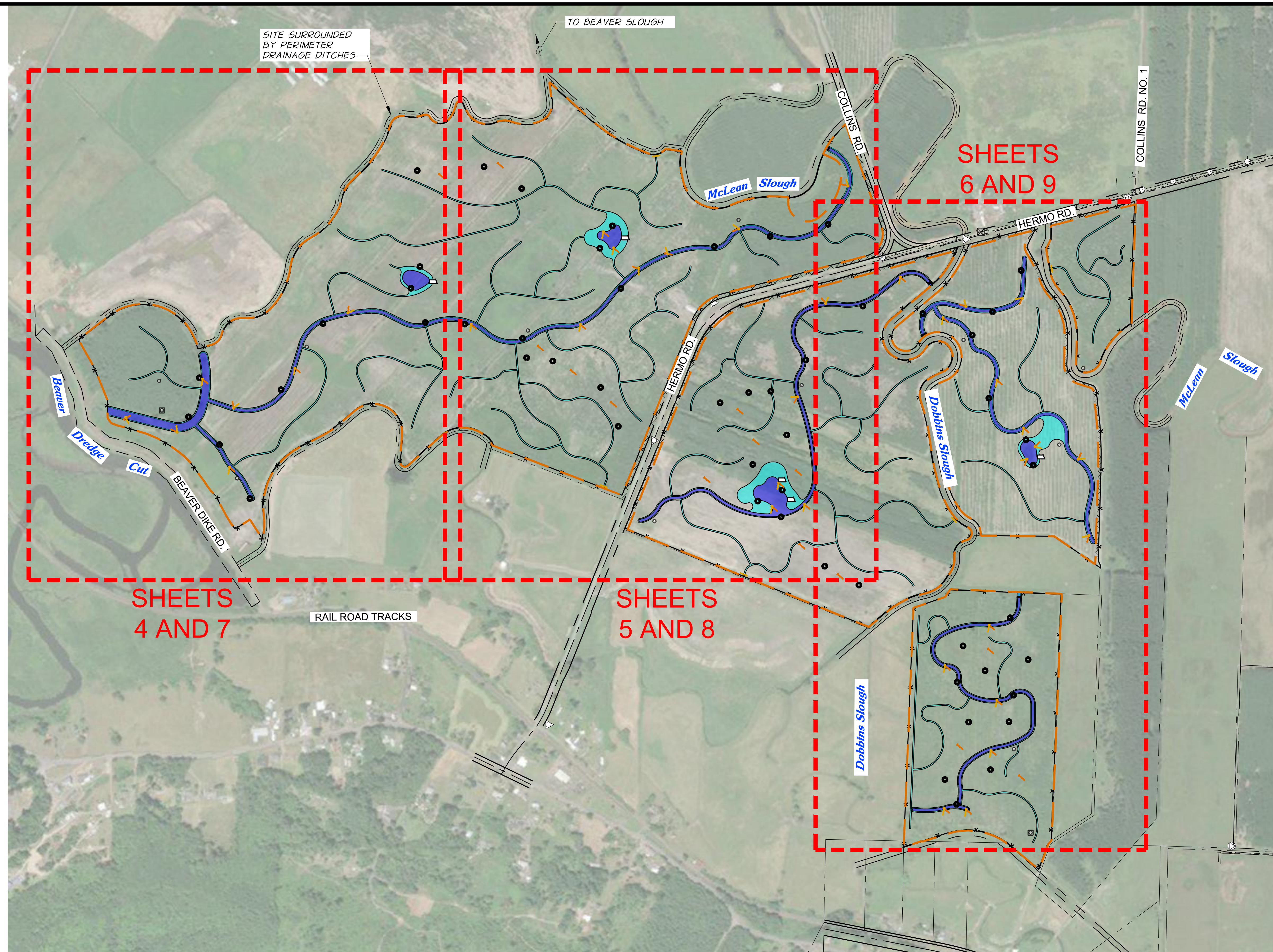
CONSTRUCTION SEQUENCE NOTES

1. APPLY GLYPHOSATE HERBICIDE (TO MANUFACTURER'S SPECIFICATIONS) TO THE SITE A MONTH PRIOR TO REMOVAL OF TOPSOIL (BY OTHERS).
2. REMOVE 6" OF TOPSOIL AND EXPORT OFF-SITE TO AN APPROVED UPLAND AREA. THIS PROCESS WILL BE PERFORMED DURING SUMMER MONTHS WHEN THE SOIL CONDITIONS ARE OPTIMAL.
3. GRADE TO FINISHED SURFACE ELEVATIONS.
4. INSTALL CONCRETE WEIR STRUCTURE, SEE DETAILS, SHEET 20.
5. INSTALL DEER FENCE, SEE DETAILS SHEETS 16 AND 17.
6. APPLY GLYPHOSATE HERBICIDE ONE MONTH PRIOR TO SEEDING.
7. APPLY SEEDING TO MITIGATION SITE.
8. WEED CONTROL AS REQUIRED, SEE TECHNICAL SPECIFICATIONS.
9. INSTALL FINAL PLANTINGS TO MITIGATION SITE ONE YEAR FROM SEEDING.
10. CONDUCT SITE CLEANUP AND SURFACE RESTORATION.
11. SEE GENERAL REQUIREMENTS FOR CONSTRUCTION SEQUENCING TIMING.



REVISION	BY	DATE
DESIGNED BY	A. HAMILTON	
DRAWN BY	G. SAURBIER	
REVIEWED BY	C. HUTCHINS	

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JOB NUMBER 1199-829 DATE 2023
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NEXT RENEWABLE FUELS OREGON, LLC
WETLAND MITIGATION PLAN
COLUMBIA COUNTY, OREGON

SITE PLAN SHEET INDEX

SHEET
3

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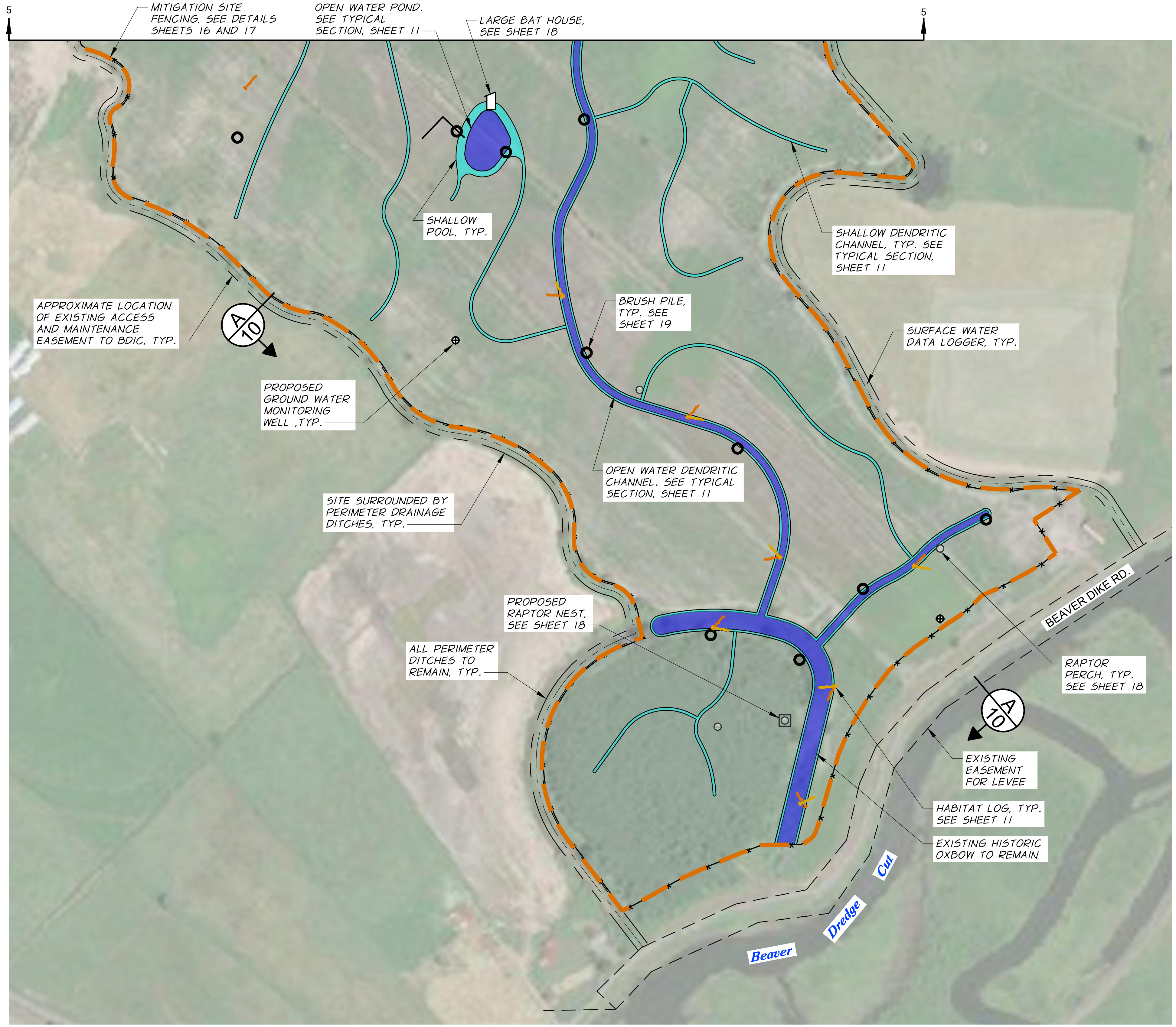
CONSTRUCTION NOTES

1. IF DREDGED SANDS OR ENGINEERED FILL ARE ENCOUNTERED AFTER THE INITIAL GRADING THEN THEY MUST BE REMOVED DOWN TO DEPTH WHERE THE NATIVE SILT LOAM IS ENCOUNTERED OR 12" BELOW FINISH GRADE. THEN FILL WITH NATIVE SILT LOAM TO FINISH GRADE.
2. ALL WETLANDS MUST BE CONSTRUCTED WITH THE NATIVE SILT LOAM.
3. THE CONTRACTOR SHALL GIVE 48-HOUR NOTIFICATION IN ACCORDANCE WITH ORS 757-541. THE "CALL BEFORE YOU DIG" NUMBER IS 811 OR 1-800-332-2344. THE CONTRACTOR SHALL PERFORM ALL NECESSARY COORDINATION WORK WITH THE UTILITY COMPANIES IN PERFORMING THE WORK AND SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE TO EXISTING UTILITIES CAUSED BY THE CONTRACTOR'S OPERATIONS.
4. CONTRACTOR SHALL COORDINATE ALL PLANTINGS AND SEEDING WITH WEED CONTROL CONTRACTOR. NO PLANTINGS AND SEEDING SHALL BE INSTALLED WITHIN 30 DAYS OF HERBICIDE APPLICATION.
5. GROUND CONTOURS NOT SHOWN FOR CLARITY. SEE GRADING PLAN SHEETS 7-9.



REVISION	BY	DATE

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SCALE IN FEET

DESIGNED BY	A. HAMILTON
DRAWN BY	P. RICHARDSON
REVIEWED BY	C. HUTCHINS
JOB NUMBER	1199-829
DATE	2023
ACAD FILE:	1199-829-060C-109PSP.dwg

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NEXT RENEWABLE FUELS OREGON, LLC
WETLAND MITIGATION PLAN
COLUMBIA COUNTY, OREGON

PROPOSED SITE PLAN I

SHEET
4

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CONSTRUCTION NOTES

1. IF DREDGED SANDS OR ENGINEERED FILL ARE ENCOUNTERED AFTER THE INITIAL GRADING THEN THEY MUST BE REMOVED DOWN TO DEPTH WHERE THE NATIVE SILT LOAM IS ENCOUNTERED OR 12" BELOW FINISH GRADE. THEN FILL WITH NATIVE SILT LOAM TO FINISH GRADE.
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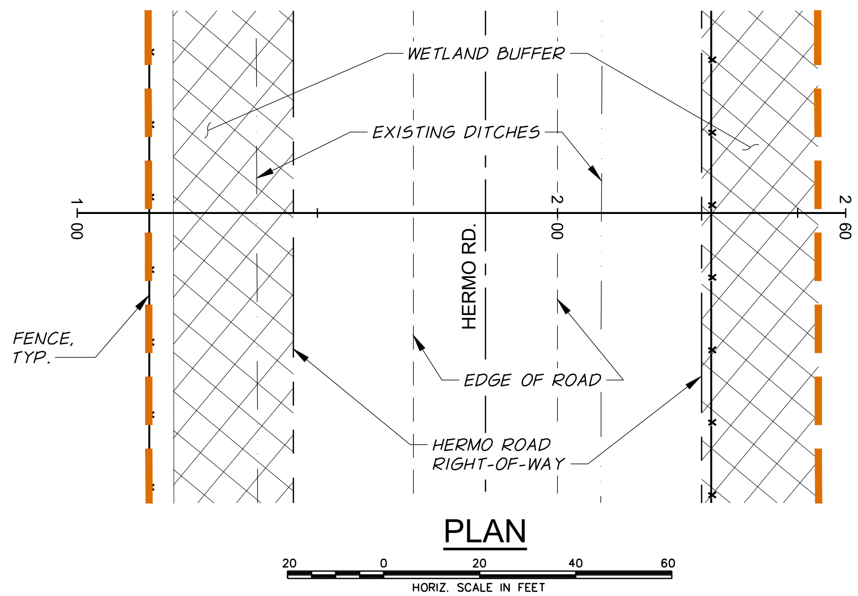
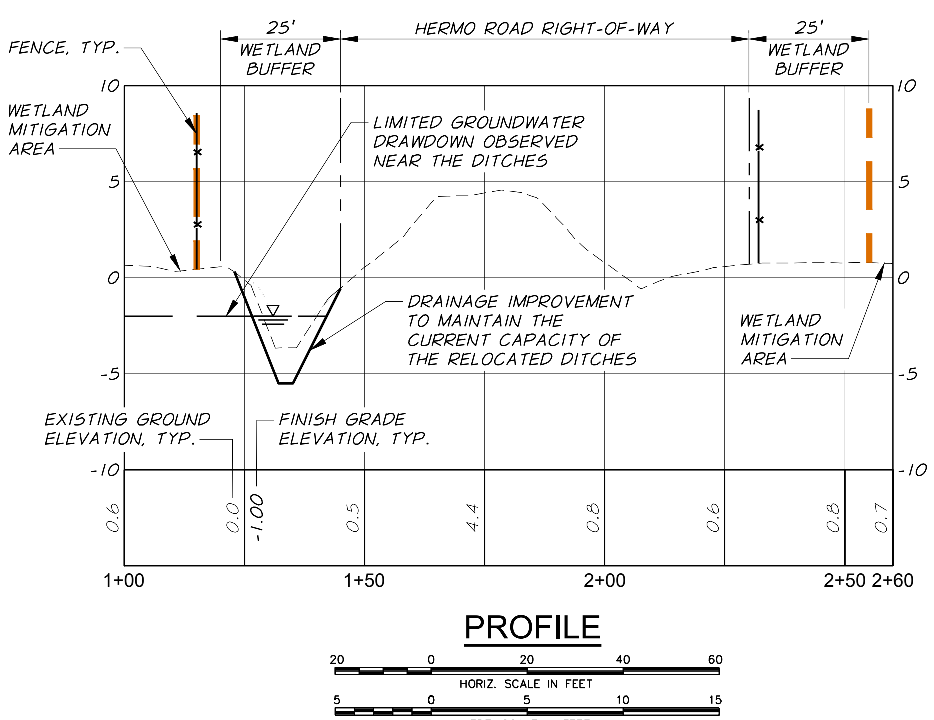
4. CONTRACTOR SHALL COORDINATE ALL PLANTINGS AND SEEDING WITH WEED CONTROL CONTRACTOR. NO PLANTINGS AND SEEDING SHALL BE INSTALLED WITHIN 30 DAYS OF HERBICIDE APPLICATION.
5. GROUND CONTOURS NOT SHOWN FOR CLARITY, SEE GRADING PLAN SHEETS 7-9.



PLAN



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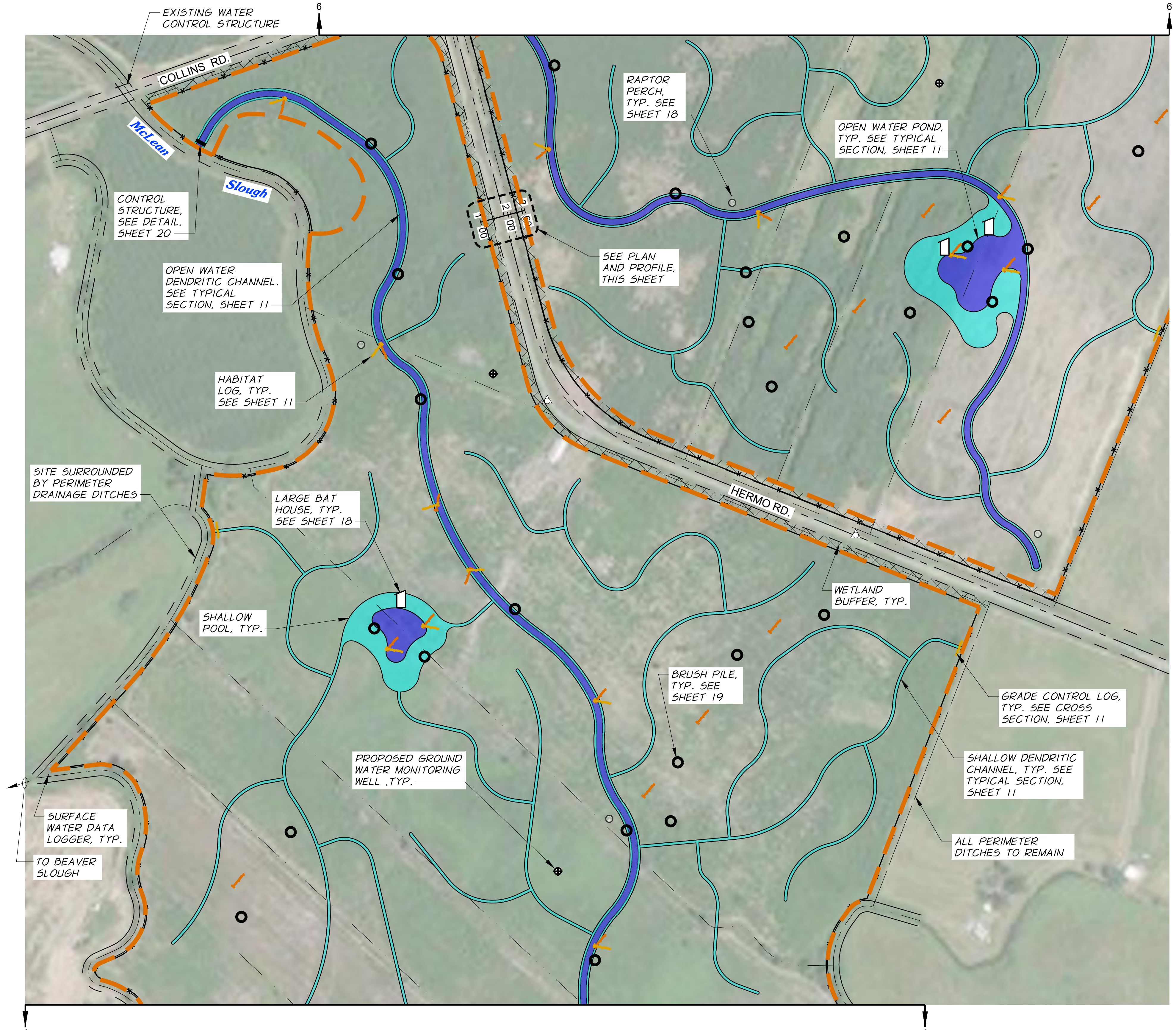

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DRAWN BY P. RICHARDSON
REVIEWED BY C. HUTCHINS
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WETLAND MITIGATION PLAN
COLUMBIA COUNTY, OREGON

PROPOSED SITE PLAN II AND DETAIL

SHEET
5

CONSTRUCTION NOTES

1. IF DREDGED SANDS OR ENGINEERED FILL ARE ENCOUNTERED AFTER THE INITIAL GRADING THEN THEY MUST BE REMOVED DOWN TO DEPTH WHERE THE NATIVE SILT LOAM IS ENCOUNTERED OR 12" BELOW FINISH GRADE. THEN FILL WITH NATIVE SILT LOAM TO FINISH GRADE.
2. ALL WETLANDS MUST BE CONSTRUCTED WITH THE NATIVE SILT LOAM.
3. THE CONTRACTOR SHALL GIVE 48-HOUR NOTIFICATION IN ACCORDANCE WITH ORS 757-541. THE "CALL BEFORE YOU DIG" NUMBER IS 811 OR 1-800-332-2344. THE CONTRACTOR SHALL PERFORM ALL NECESSARY COORDINATION WORK WITH THE UTILITY COMPANIES IN PERFORMING THE WORK AND SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE TO EXISTING UTILITIES CAUSED BY THE CONTRACTOR'S OPERATIONS.
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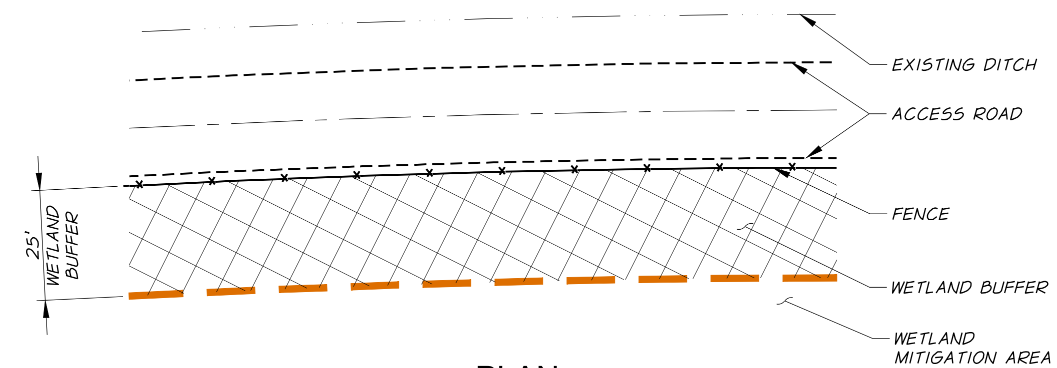
5. GROUND CONTOURS NOT SHOWN FOR CLARITY, SEE GRADING PLAN SHEETS 7-9.



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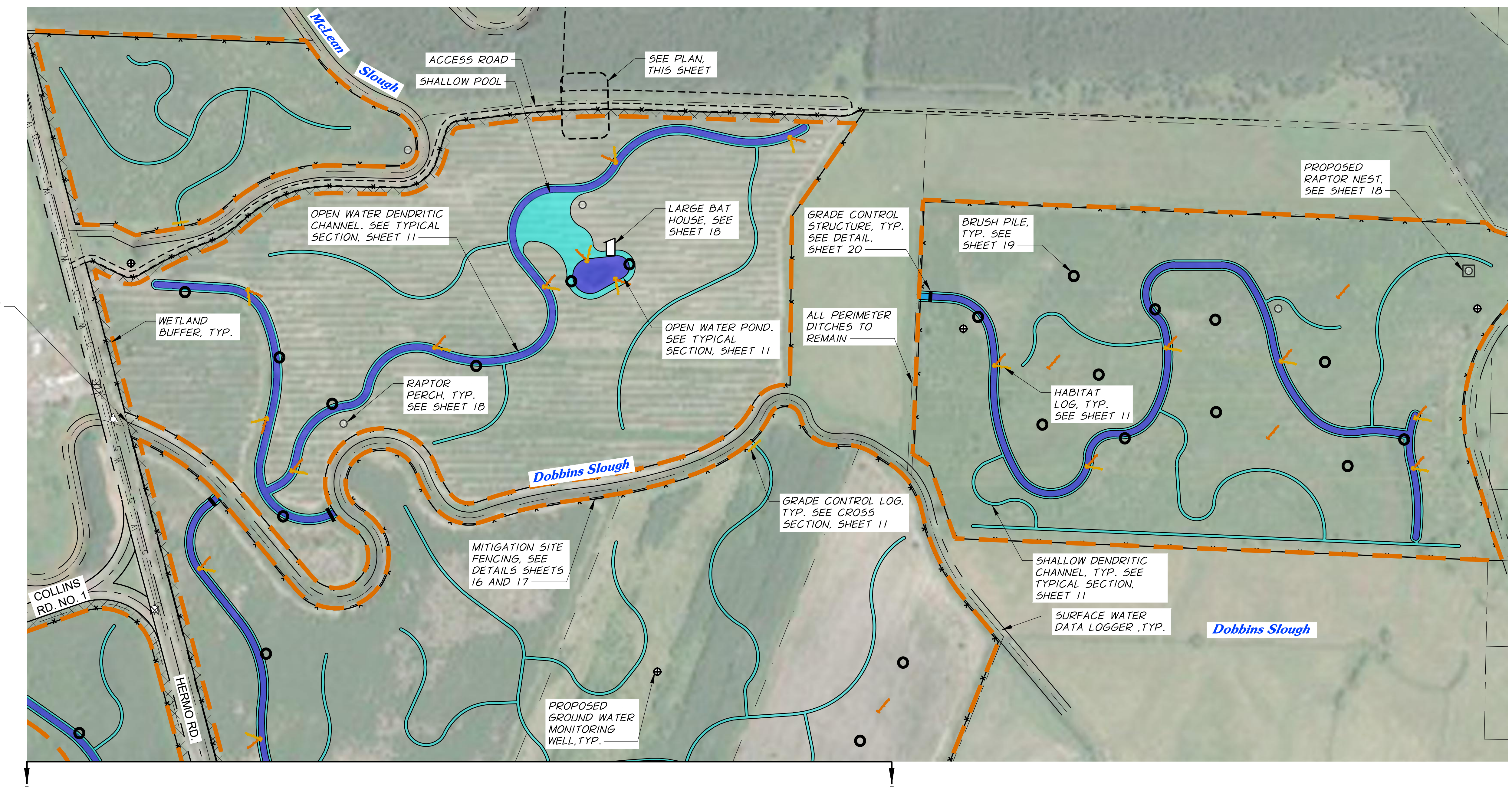

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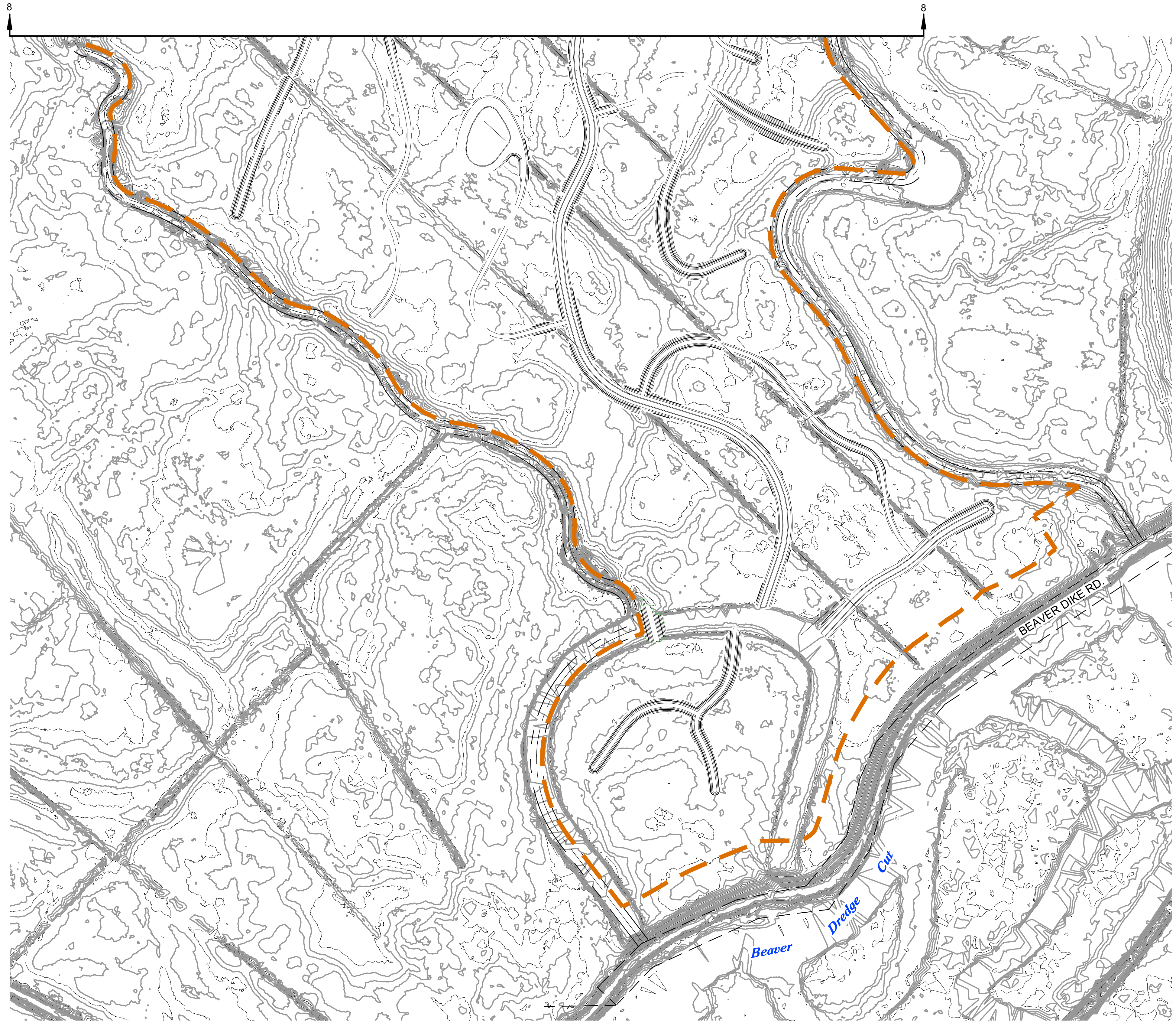
WETLAND MITIGATION PLAN
COLUMBIA COUNTY, OREGON

PROPOSED SITE PLAN III

SHEET
6

GRADING NOTES

1. EXISTING SITE TO BE STRIPPED 6 INCHES.
2. FINISHED GRADES TO BE GRADED TO 6'± TO CREATE MICROTOPOGRAPHY THROUGHOUT THE WETLAND MITIGATION SITE AS DIRECTED BY A WETLAND SPECIALIST DURING CONSTRUCTION.



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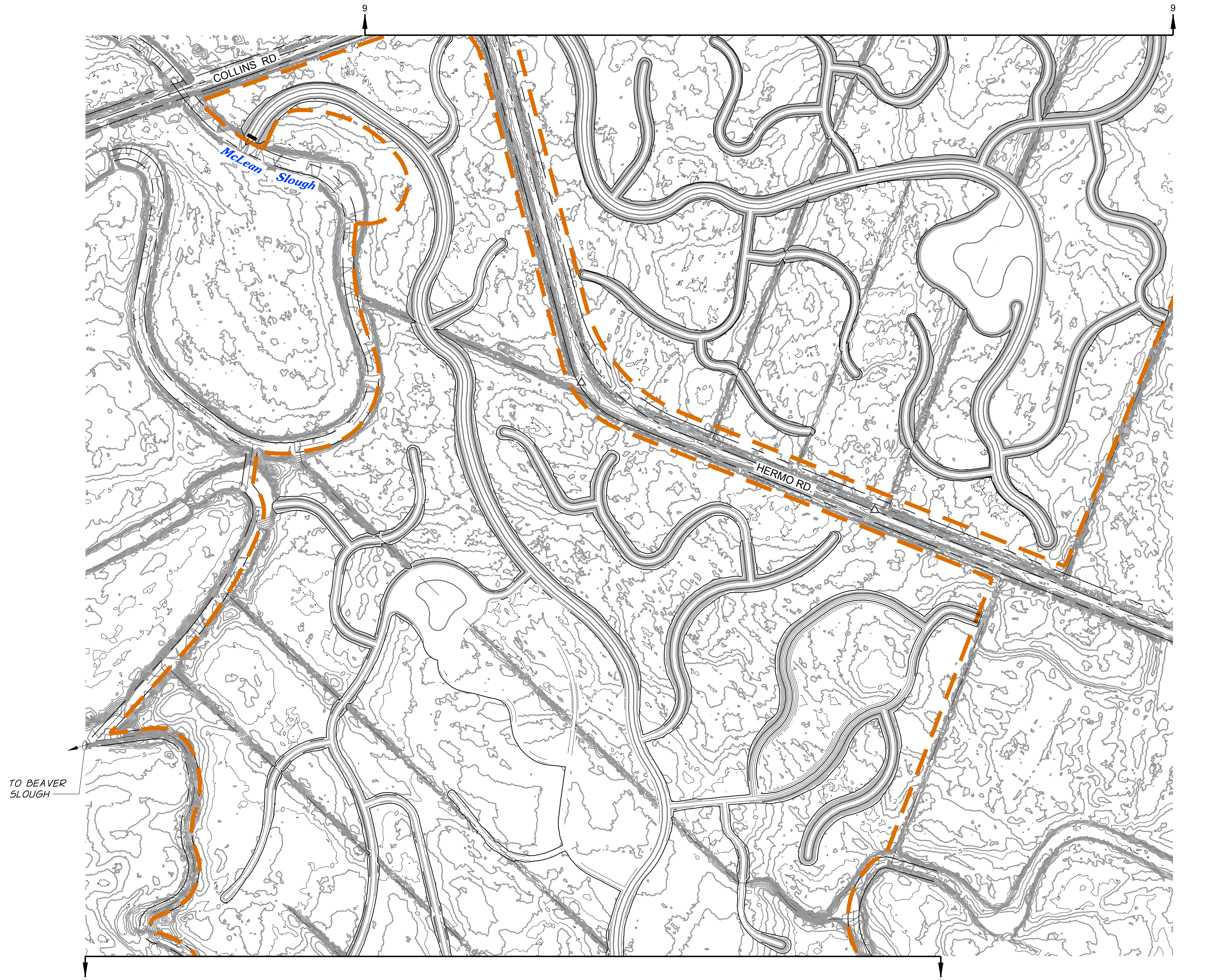
GRADING PLAN I

SHEET
7

GRADING NOTES

1. EXISTING SITE TO BE STRIPPED 6 INCHES.
2. FINISHED GRADES TO BE GRADED TO 6'± TO CREATE MICROTOPOGRAPHY THROUGHOUT THE WETLAND MITIGATION SITE AS DIRECTED BY A WETLAND SPECIALIST DURING CONSTRUCTION.



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SCALE IN FEET

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GRADING PLAN II

SHEET 8

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GRADING NOTES

1. EXISTING SITE TO BE STRIPPED 6 INCHES.
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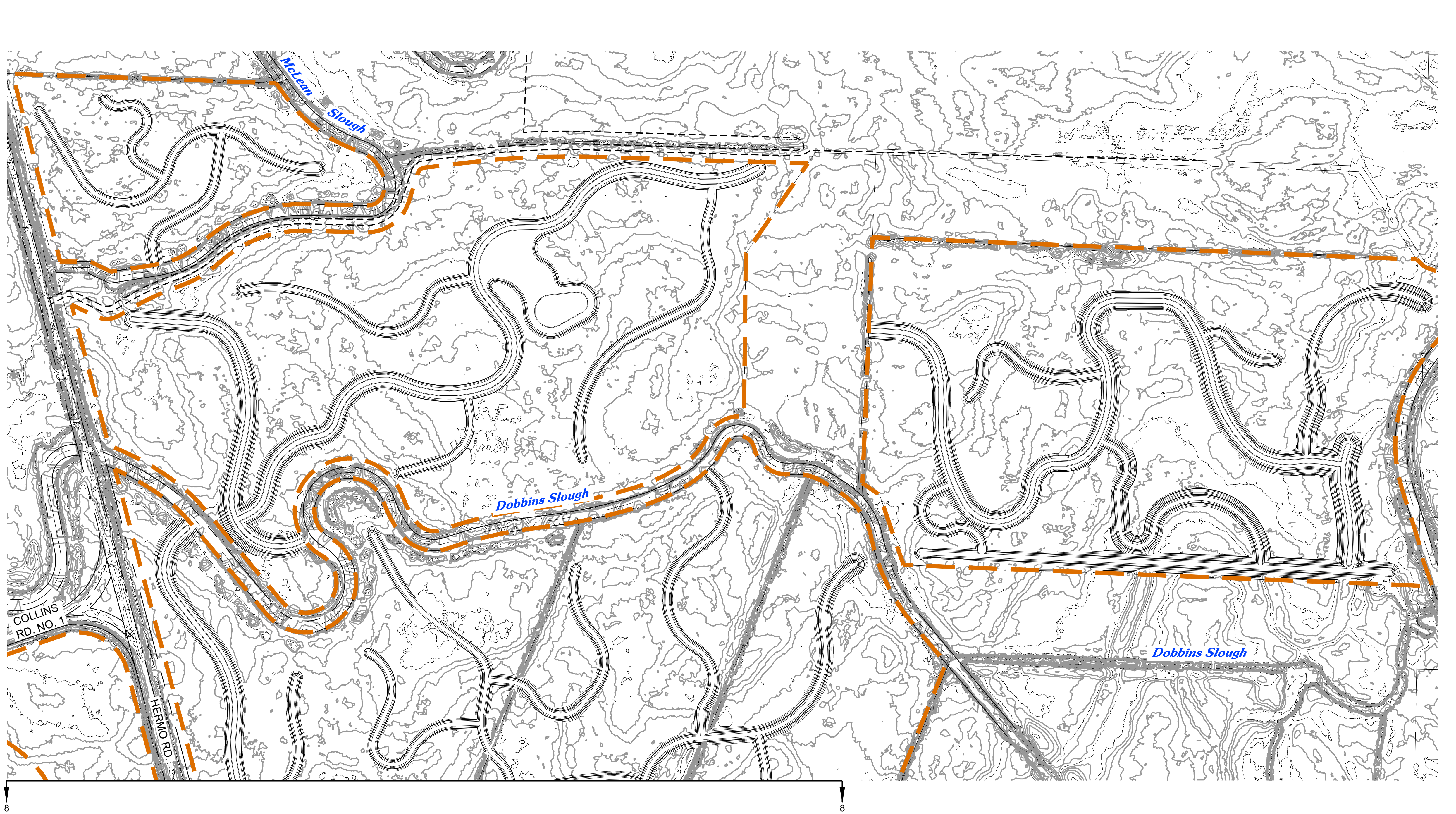

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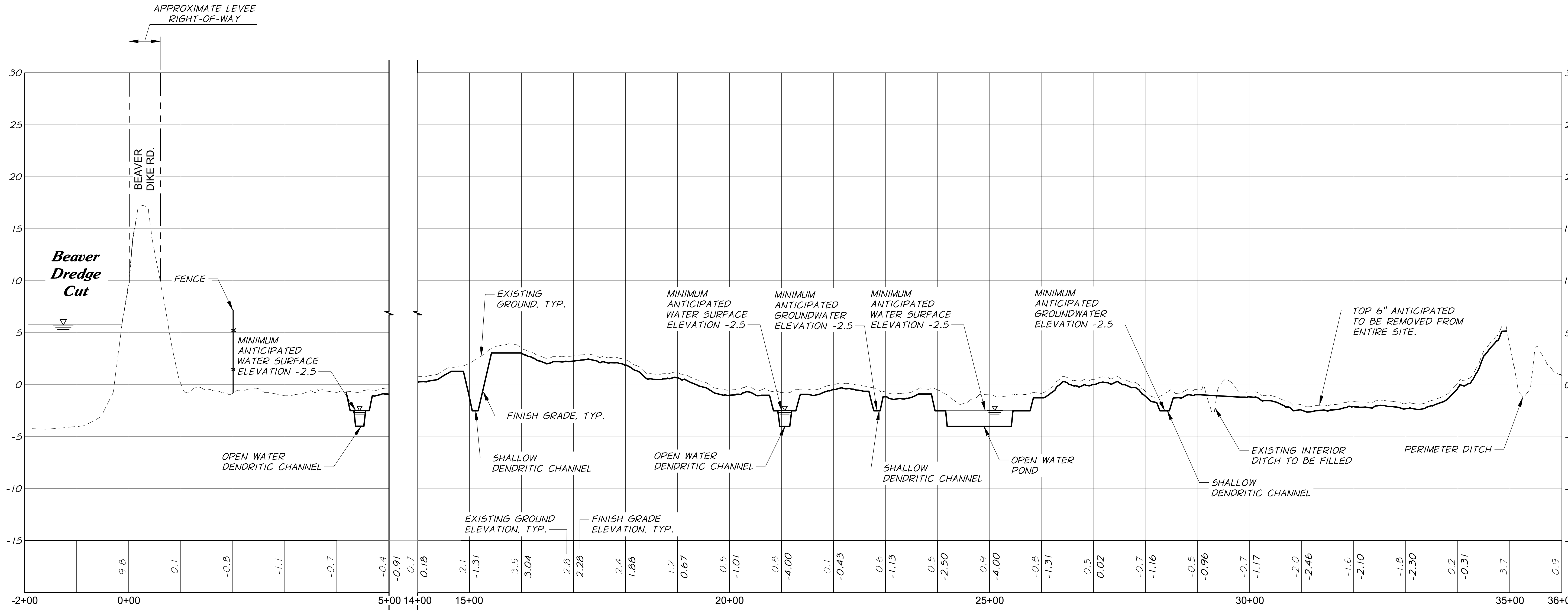
GRADING PLAN III

SHEET
9



SECTION A/4

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5 0 5 10 15 VERTICAL SCALE IN FEET

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COLUMBIA COUNTY, OREGON

TYPICAL SECTIONS I

SHEET **10**

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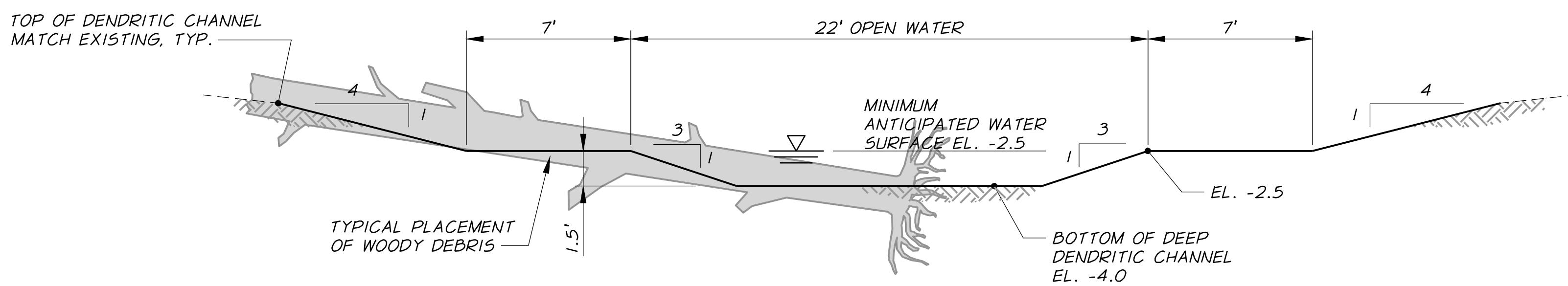
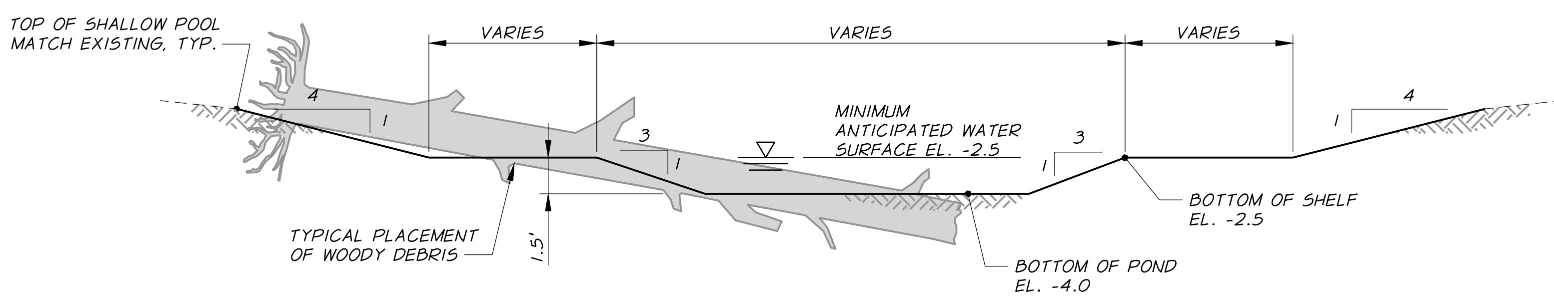


TYPICAL OPEN WATER DENDRITIC CHANNEL SECTION

N.T.S.

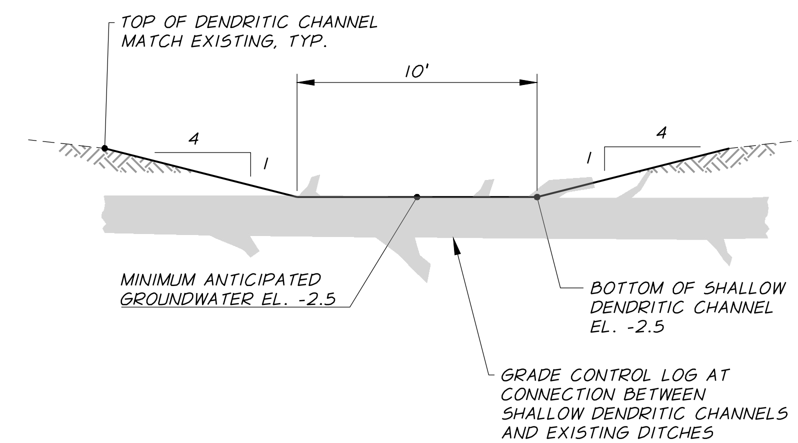
NOTE

FINISH GRADES TO BE GRADED TO 6"± TO CREATE MICROTOPOLOGY THROUGHOUT THE WETLAND SITE AS DIRECTED BY A WETLAND SPECIALIST DURING CONSTRUCTON.



TYPICAL OPEN WATER POND SECTION

N.T.S.



TYPICAL SHALLOW DENDRITIC CHANNEL SECTION

N.T.S.

ESTIMATED PRELIMINARY QUANTITIES

THE QUANTITIES SHOWN ARE NEAT LINE ESTIMATES PREPARED BY THE ENGINEER FOR REMOVAL OF 6" TOPSOIL AND WETLANDS GRADING WORK AND ARE BASED UPON PRELIMINARY DESIGN SHOWN ON THE DRAWINGS. THE ENGINEER'S ESTIMATED QUANTITIES ARE FOR INFORMATION ONLY, AND ARE NOT TO BE USED FOR BIDDING PURPOSES. THE ENGINEER/OWNER SHALL NOT BE HELD RESPONSIBLE FOR THE USE OF THESE ESTIMATED QUANTITIES.

WETLAND GRADING

ESTIMATED TOTAL CUT:	724,000 C.Y.
ESTIMATED TOTAL FILL:	52,000 C.Y.*

*INCLUDES FILLING OF EXISTING ON-SITE DITCHES.

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WETLAND MITIGATION PLAN
COLUMBIA COUNTY, OREGON

TYPICAL SECTIONS II

SHEET
11

PALUSTRINE EMERGENT WETLAND PLANTINGS

SPECIES	STOCK TYPE
COLUMBIA SEDGE (CAREX APERTA)	PLUGS
SLOUGH SEDGE (CAREX OBNUPTA)	PLUGS
BUR-REED (SPARGANIUM EMERSUM)	PLUGS
WATER PLANTAIN (ALISMA SP.)	PLUGS
MEADOW BARLEY (HORDEUM BRACHYANTHERUM)	DRILL OR BROADCAST
SPIKE BENTGRASS (AGROSTIS EXARATA)	DRILL OR BROADCAST
TUFTED HAIRGRASS (DESCHAMPSIA CESPITOSA)	DRILL OR BROADCAST
ANNUAL HAIRGRASS (DESCHAMPSIA DANTHONIOIDES)	DRILL OR BROADCAST
WESTERN MANNAGRASS (GLYCERIA XOCCIDENTALIS)	DRILL OR BROADCAST
AMERICAN SLOUGHGRASS (BECKMANNIA SYZIGACHNE)	DRILL OR BROADCAST
BALTIC RUSH (JUNCUS ARCTICUS)	DRILL OR BROADCAST

PALUSTRINE SCRUB SHRUB WETLAND PLANTINGS

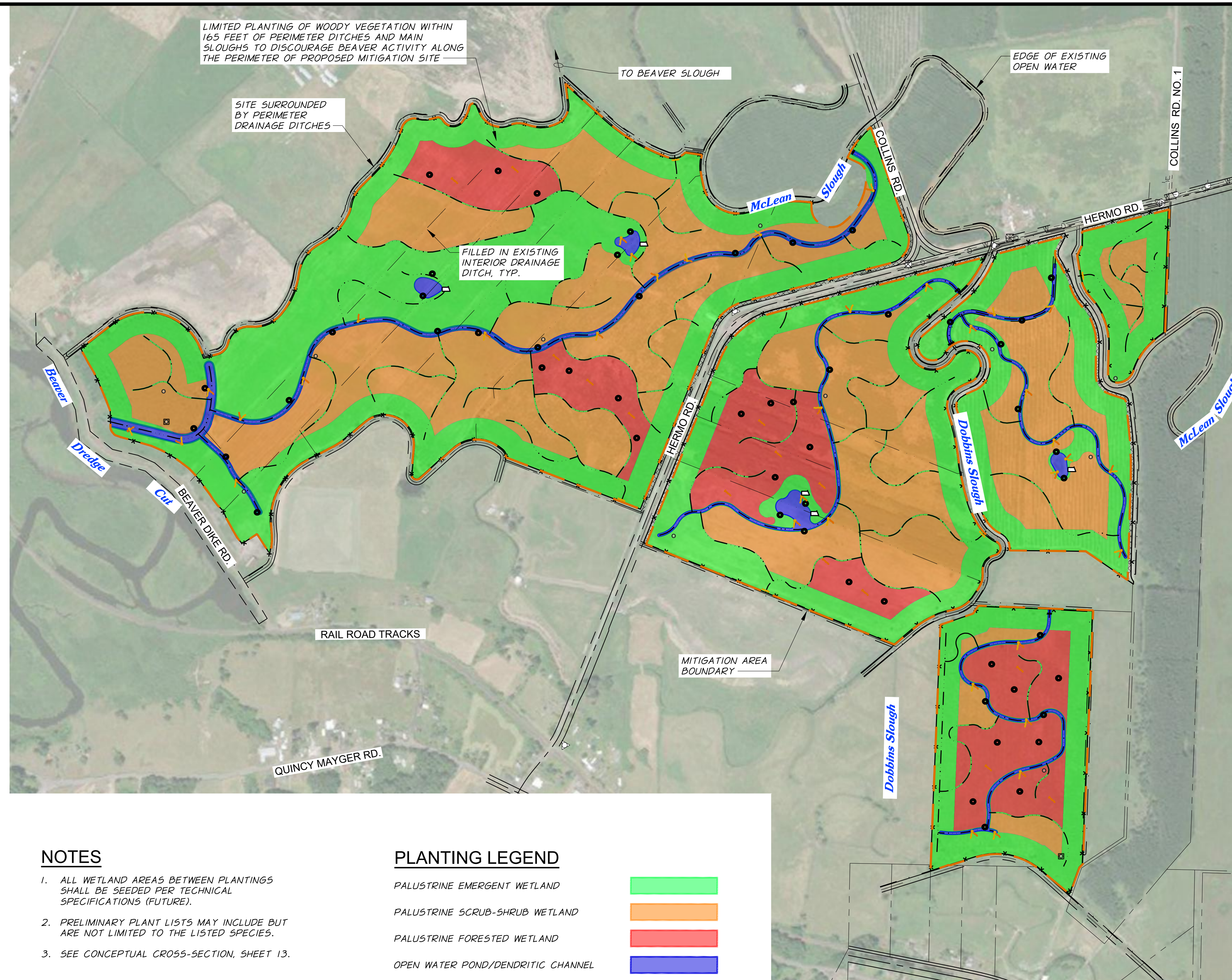
SPECIES	STOCK TYPE
OREGON ASH (FRAXINUS LATIFOLIA)	CONTAINER
REDOSIER DOGWOOD (CORNUS SERICA)	CUTTINGS
PACIFIC NINEBARK (PHYSOCARPUS CAPITATUS)	CONTAINER
LOCALLY ADAPTED WILLOW (SALIX SPP.)	CUTTINGS
SALMONBERRY (RUBUS SPECTABILIS)	CONTAINER

PALUSTRINE FORESTED WETLAND PLANTINGS

SPECIES	STOCK TYPE
OREGON ASH (FRAXINUS LATIFOLIA)	CONTAINER
REDOSIER DOGWOOD (CORNUS SERICA)	CONTAINER
PACIFIC NINEBARK (PHYSOCARPUS CAPITATUS)	CONTAINER
LOCALLY ADAPTED WILLOW (SALIX SPP.)	CONTAINER
SALMONBERRY (RUBUS SPECTABILIS)	CONTAINER
BLACK COTTONWOOD (POPULUS BALSAMIFERA)	CONTAINER

WETLAND MITIGATION AREAS

WETLAND TYPE	AREA (ACRES)
PALUSTRINE EMERGENT	226.20
PALUSTRINE SCRUB SHRUB	177.43
PALUSTRINE FORESTED	62.47
TOTAL	466.10



NOTES

1. ALL WETLAND AREAS BETWEEN PLANTINGS SHALL BE SEEDED PER TECHNICAL SPECIFICATIONS (FUTURE).
2. PRELIMINARY PLANT LISTS MAY INCLUDE BUT ARE NOT LIMITED TO THE LISTED SPECIES.
3. SEE CONCEPTUAL CROSS-SECTION, SHEET 13.

PLANTING LEGEND

- PALUSTRINE EMERGENT WETLAND
- PALUSTRINE SCRUB-SHRUB WETLAND
- PALUSTRINE FORESTED WETLAND
- OPEN WATER POND/DENDRITIC CHANNEL

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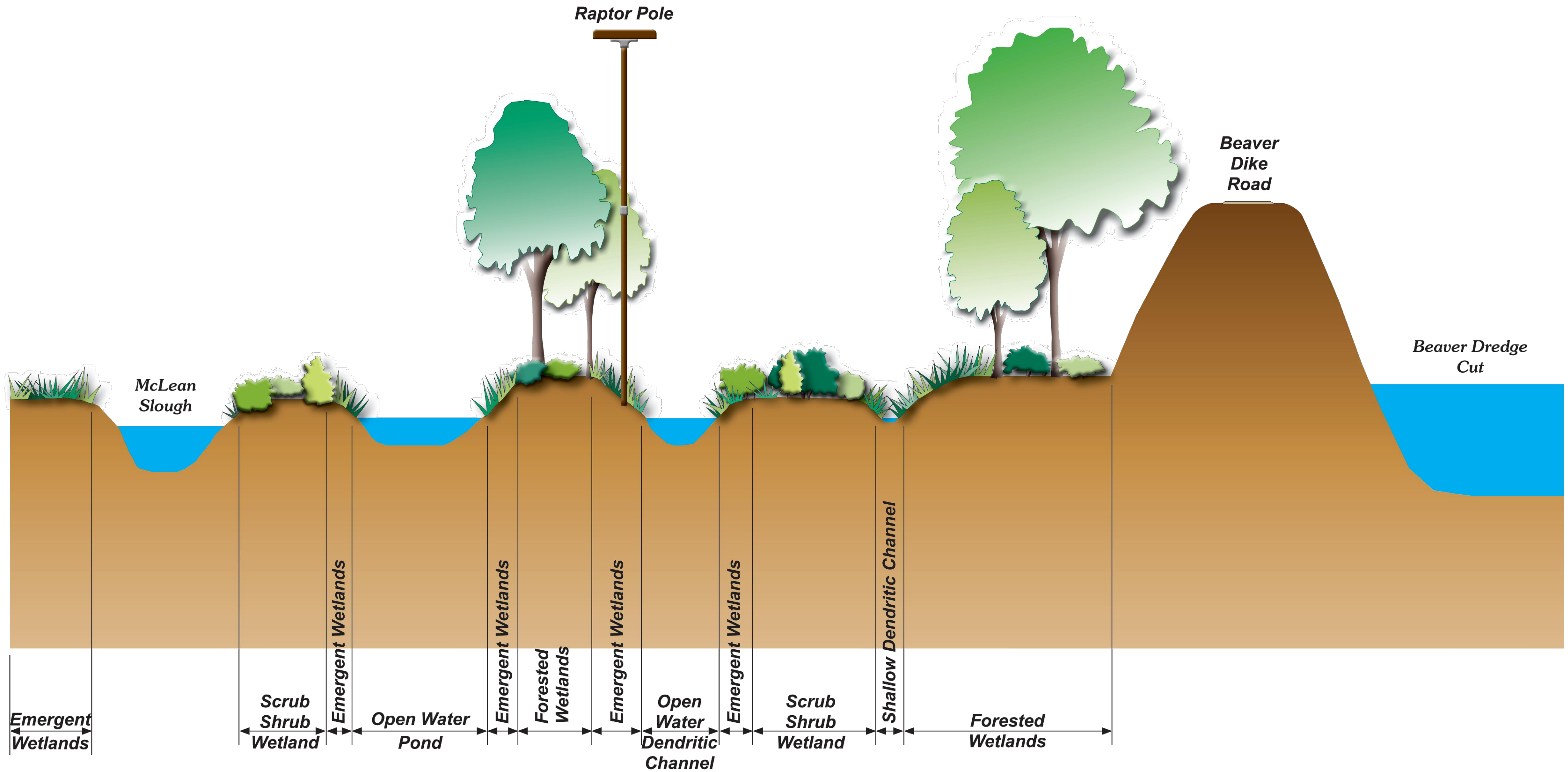
COLUMBIA COUNTY, OREGON

PLANTING PLAN

SHEET
12



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COLUMBIA COUNTY, OREGON

MITIGATION AREA CONCEPTUAL CROSS-SECTION

SHEET
13

NOTES

1. DRAWING SHOWS THE ESTIMATED FLOW PATTERNS OF SITE BASED ON DESKTOP REVIEW, PRELIMINARY SITE INVESTIGATIONS, AND DISCUSSIONS WITH ADJACENT LANDOWNERS AND BOARD OF DIRECTORS FOR THE BDIC.
2. FLOW PATTERN FOR THE SITE WILL BE REFINED WITH FINDINGS FROM THE FUTURE DETAILED GROUNDWATER STUDY FOR THE PROPOSED MITIGATION SITE.

LEGEND

PROPOSED MITIGATION SITE

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EXISTING DRAINAGE PATHS

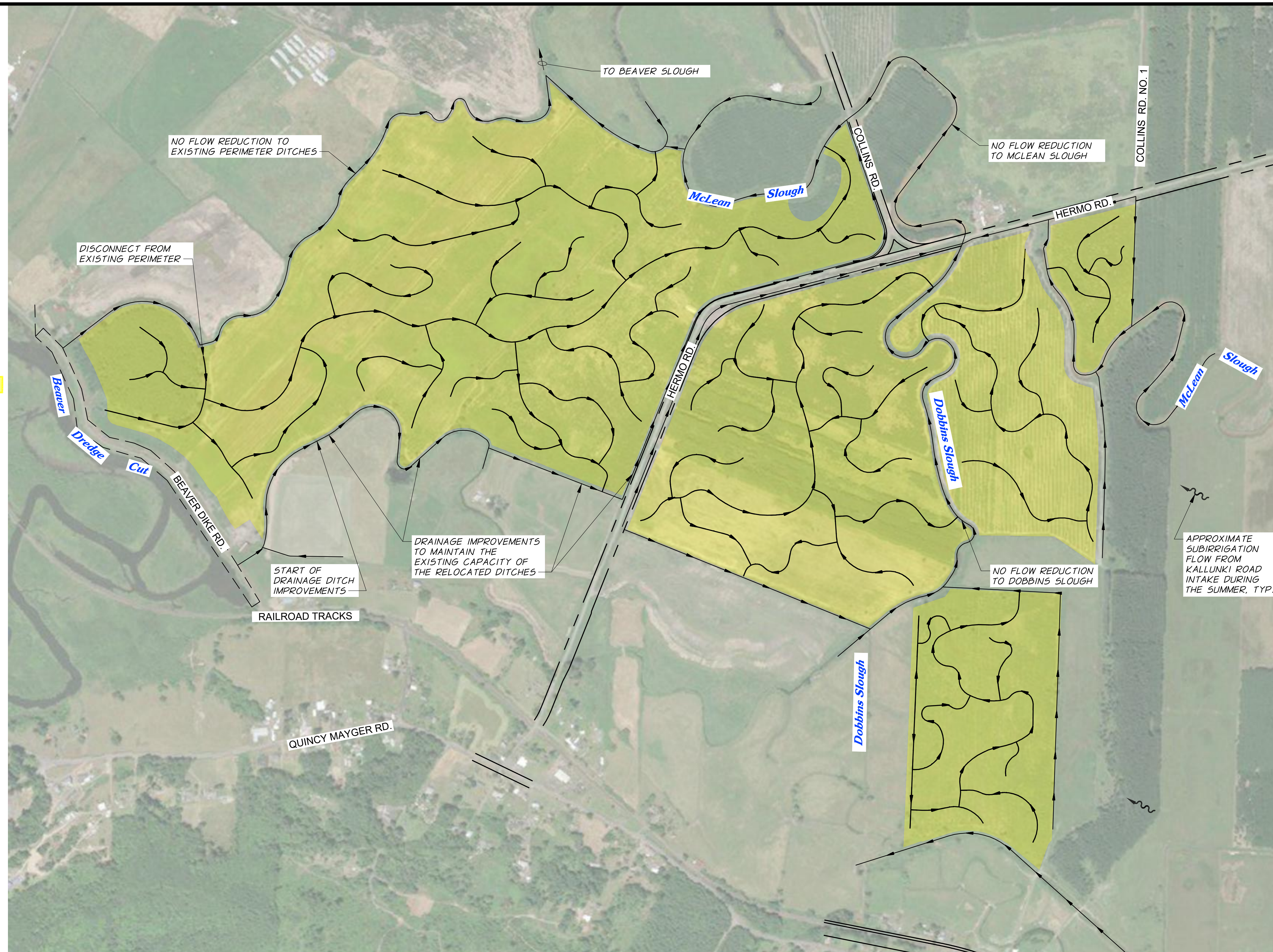
SHEET
14

NOTES

1. DRAWING SHOWS THE ESTIMATED FLOW PATTERNS OF PROPOSED SITE BASED PRELIMINARY INVESTIGATIONS AND PROPOSED WORK WITHIN THE MITIGATION SITE.
2. FLOW PATTERN FOR THE PROPOSED SITE WILL BE REFINED WITH FINDINGS FROM FUTURE DETAILED GROUNDWATER STUDY FOR THE PROPOSED MITIGATION SITE AND CONTINUED COORDINATION WITH ADJACENT LANDOWNERS.

LEGEND

PROPOSED MITIGATION SITE



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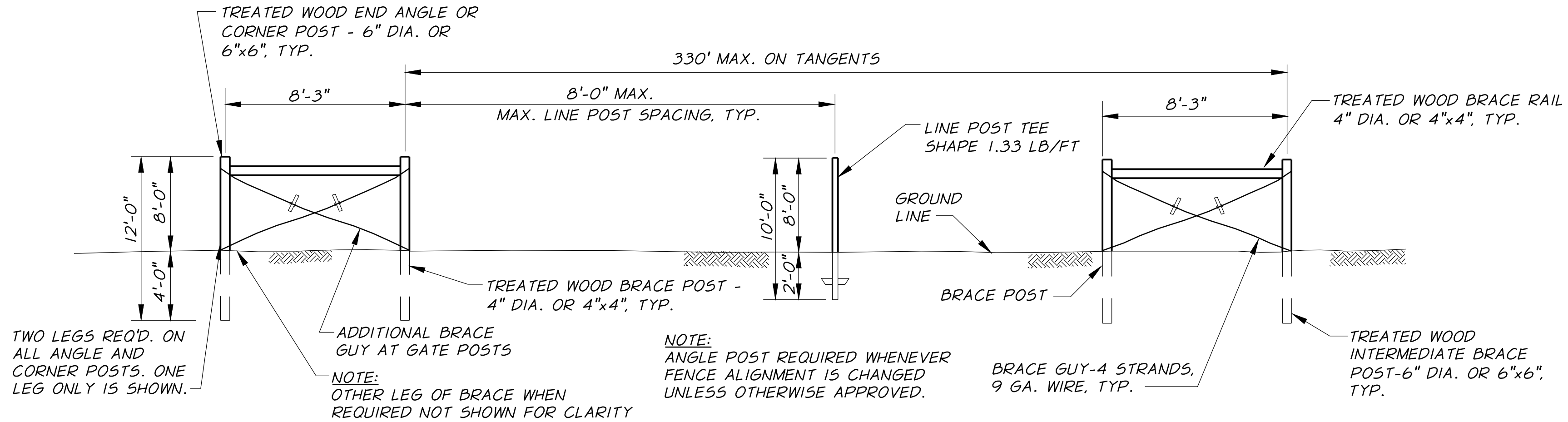
PROPOSED DRAINAGE PATHS

SHEET
15

NOTES

1. DO NOT USE POSTS TREATED WITH COPPER-TYPE WOOD PRESERVATIVES.



TREATED WOOD AND STEEL FENCE POSTS DETAIL

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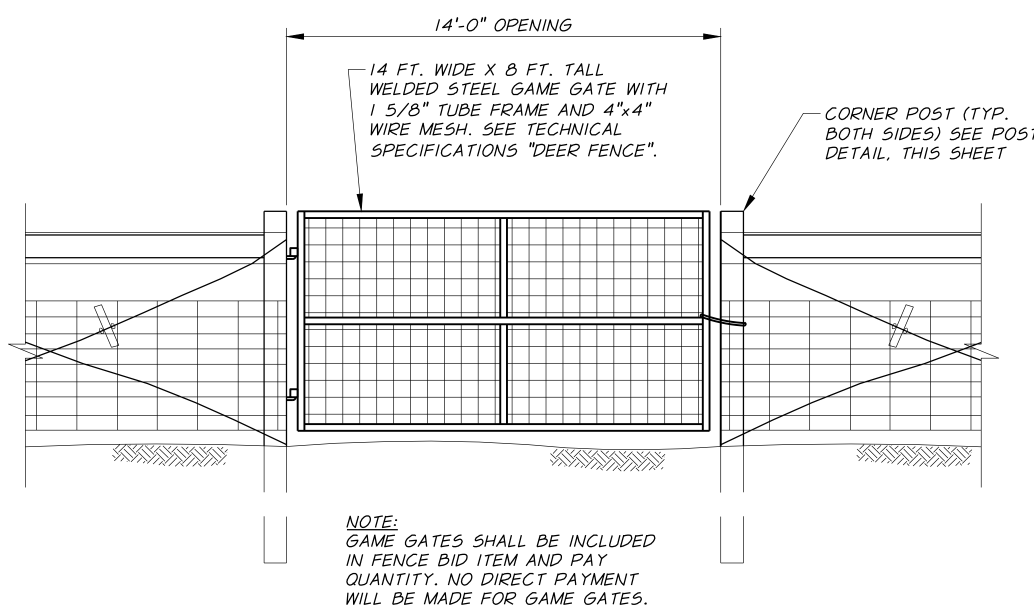

GAME GATE DETAIL

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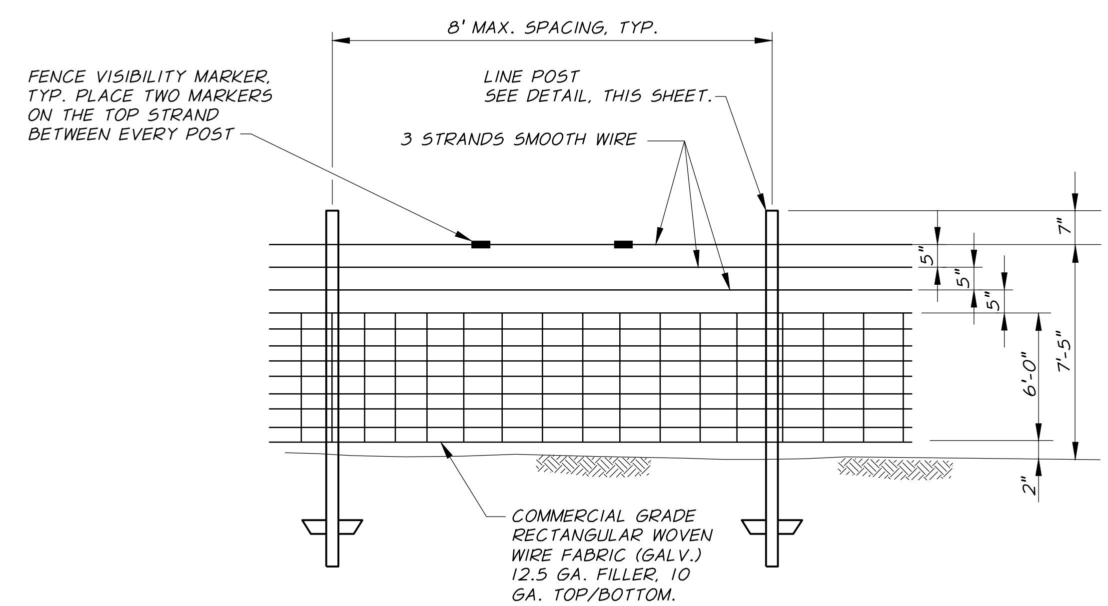

WOVEN WIRE FENCE DETAIL

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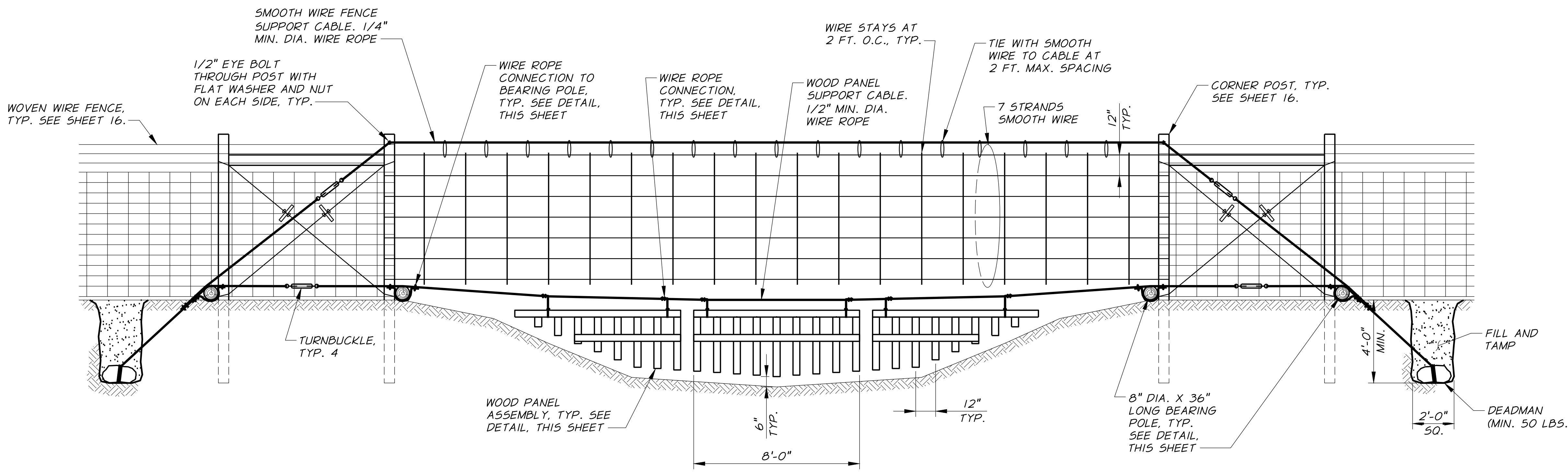
FENCE DETAILS I

SHEET
16



CHANNEL A CROSSING DETAIL

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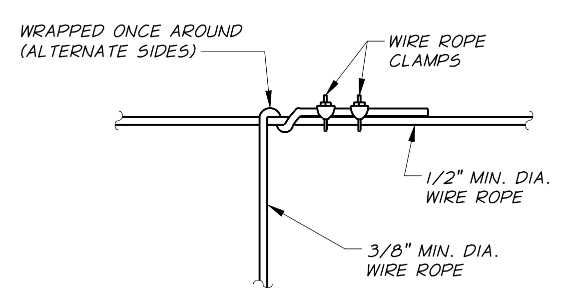
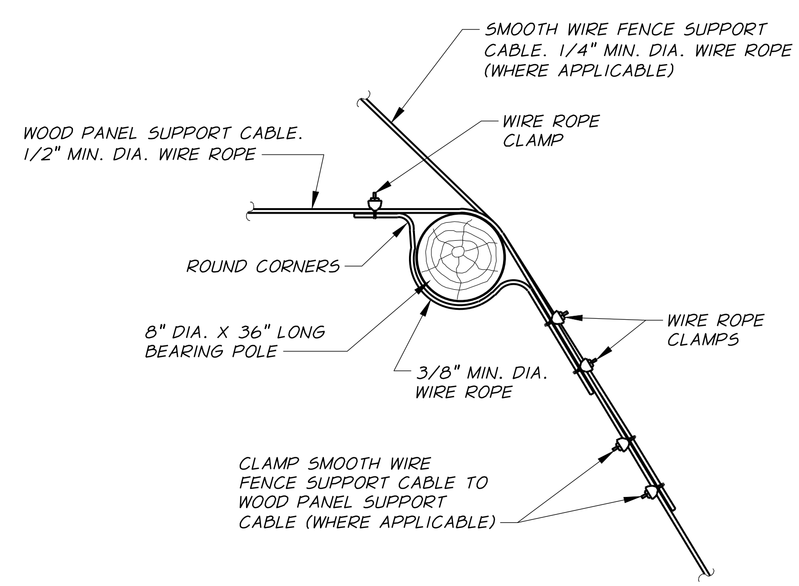


WIRE ROPE CONNECTION DETAIL

N.T.S.



WIRE ROPE CONNECTION TO BEARING POLE DETAIL

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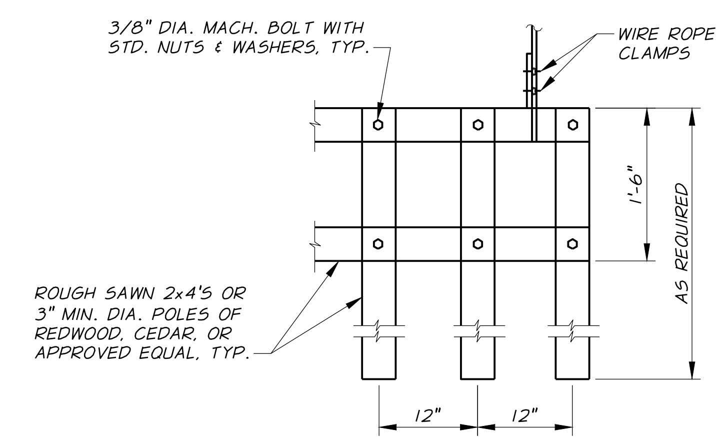

NOTE:
MODIFY WOOD PANELS AS NEEDED TO FIT EXISTING CHANNEL A

WOOD PANEL CONSTRUCTION DETAIL

N.T.S.

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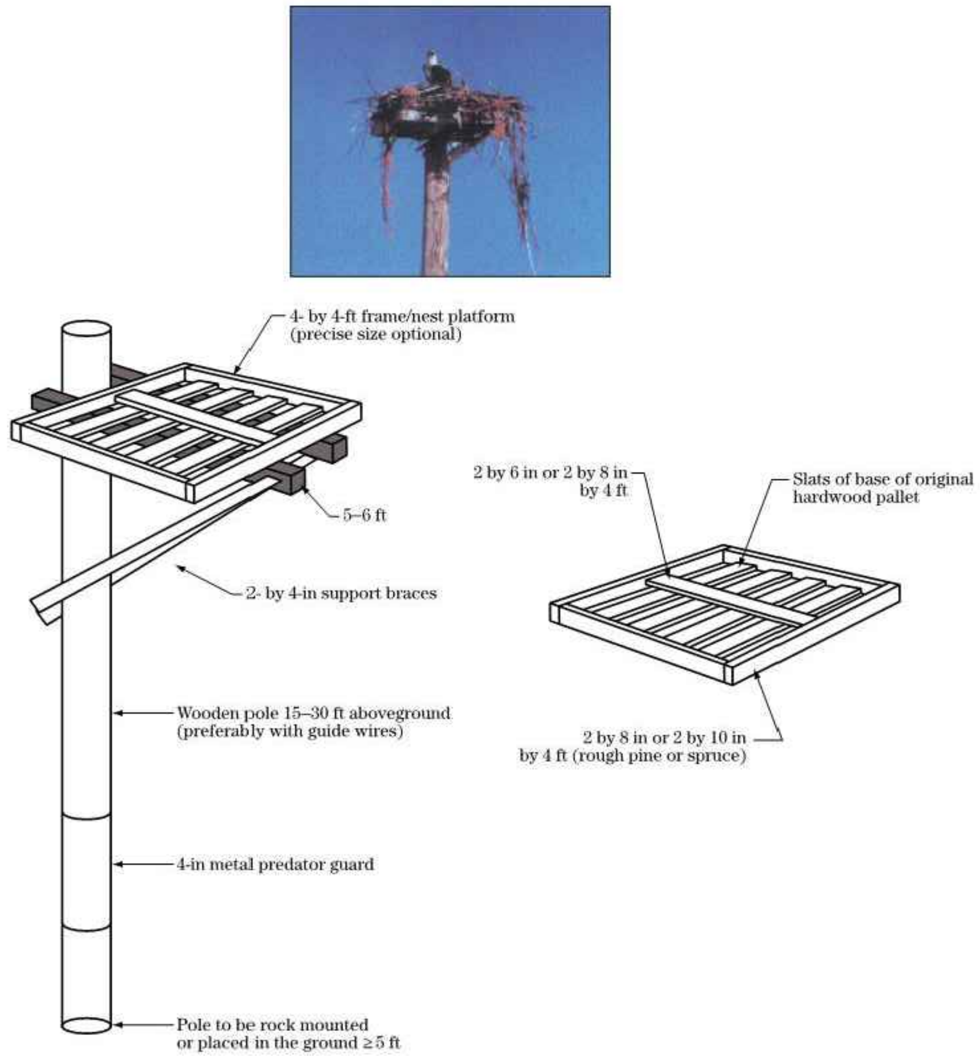
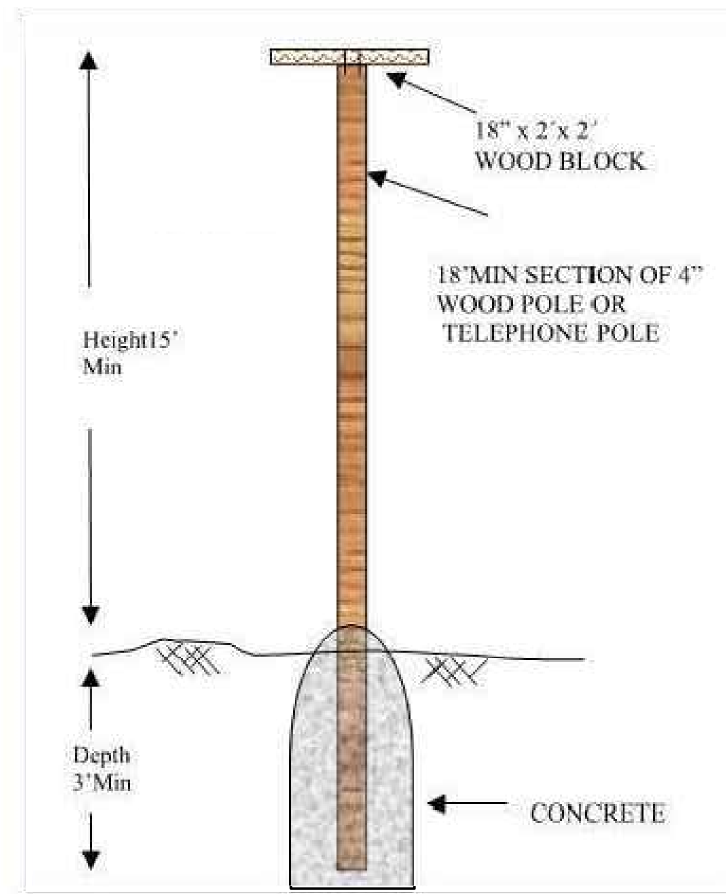
FENCE DETAILS II

SHEET
17



RAPTOR NEST DETAIL

N.T.S.



RAPTOR PERCH DETAIL

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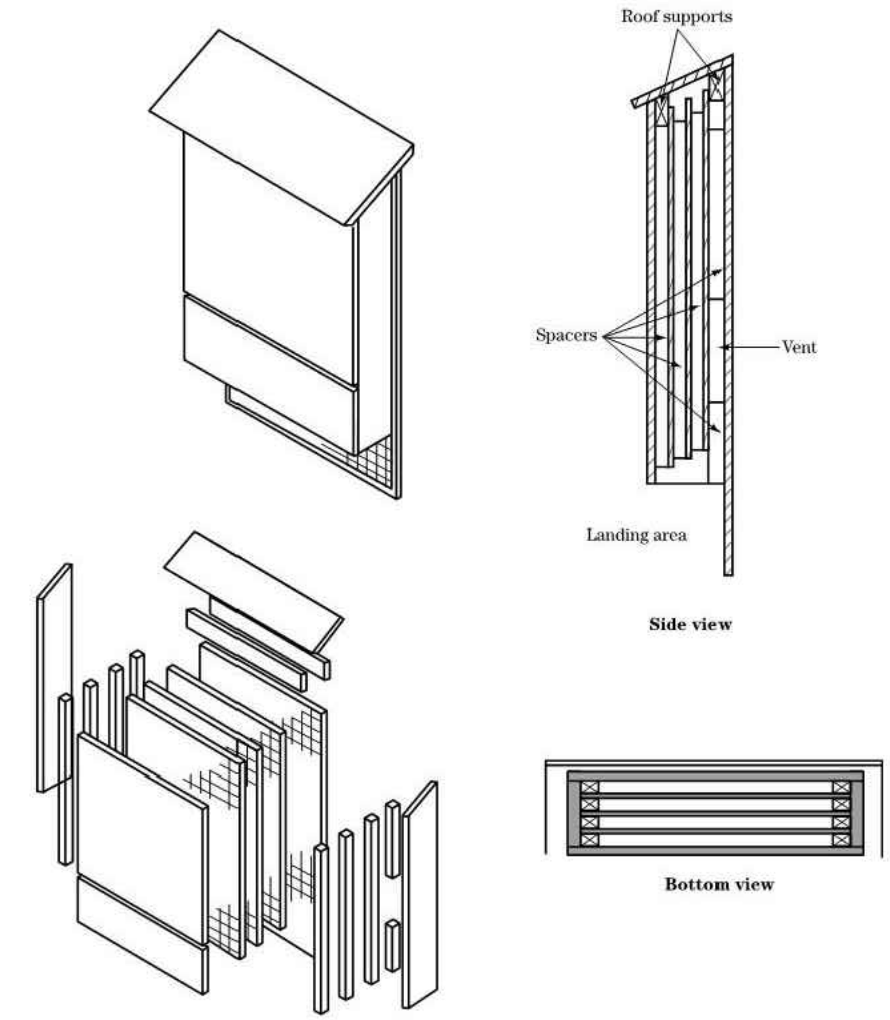

LARGE BAT HOUSE DETAIL

N.T.S.

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WETLAND MITIGATION PLAN
COLUMBIA COUNTY, OREGON

RAPTOR NEST, RAPTOR PERCH, AND BAT HOUSE DETAILS

SHEET 18

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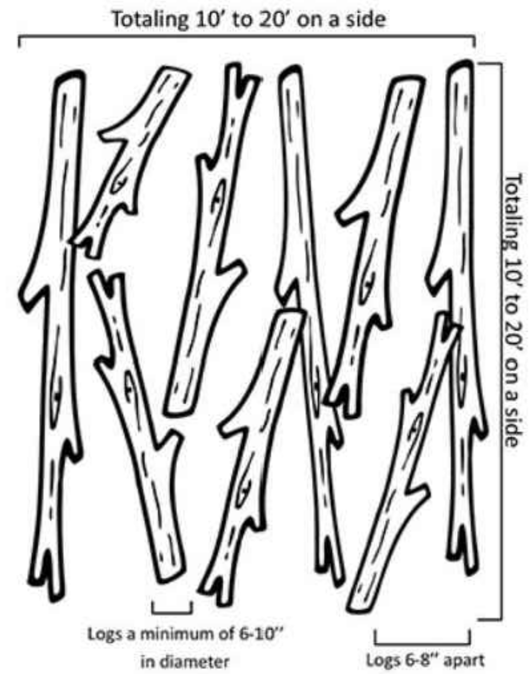

Construct a base layer

The foundation should be covered with brush, using increasingly smaller branches on top.

A second layer is laid on top of and roughly perpendicular to the first layer.

Add leafy crowns or boughs to the top of the pile.

BRUSH PILE DETAIL

N.T.S.

REVISION	BY	DATE
DESIGNED BY	A. HAMILTON	
DRAWN BY	P. RICHARDSON	
REVIEWED BY	C. HUTCHINS	

JOB NUMBER 1199-829	DATE 2023
ACAD FILE: 1199-829-060C-504DTL.dwg	

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

anderson perry & associates, inc.
engineering · surveying · natural resources

NEXT RENEWABLE FUELS OREGON, LLC
WETLAND MITIGATION PLAN
COLUMBIA COUNTY, OREGON

BRUSH PILE DETAIL

SHEET
19

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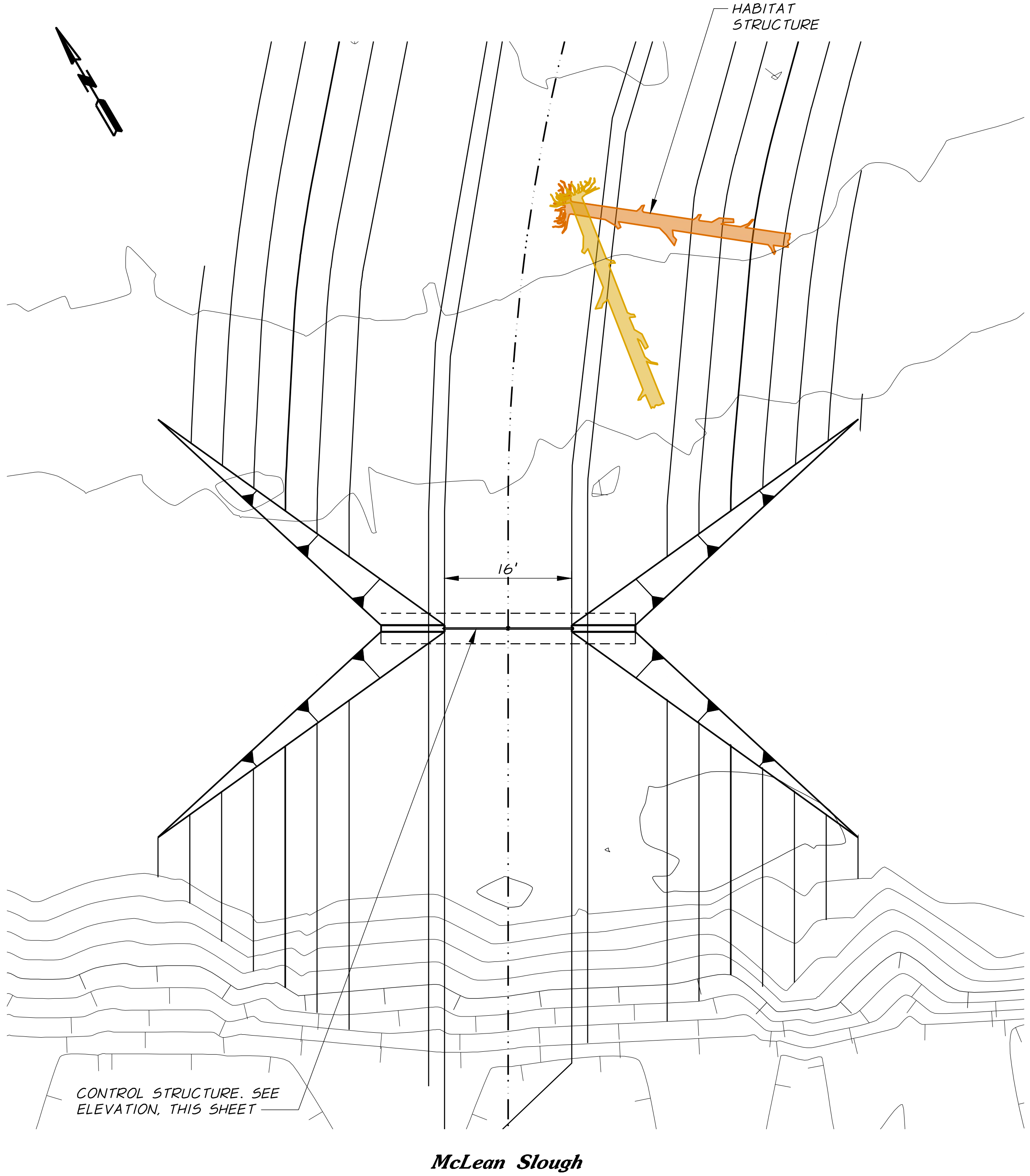
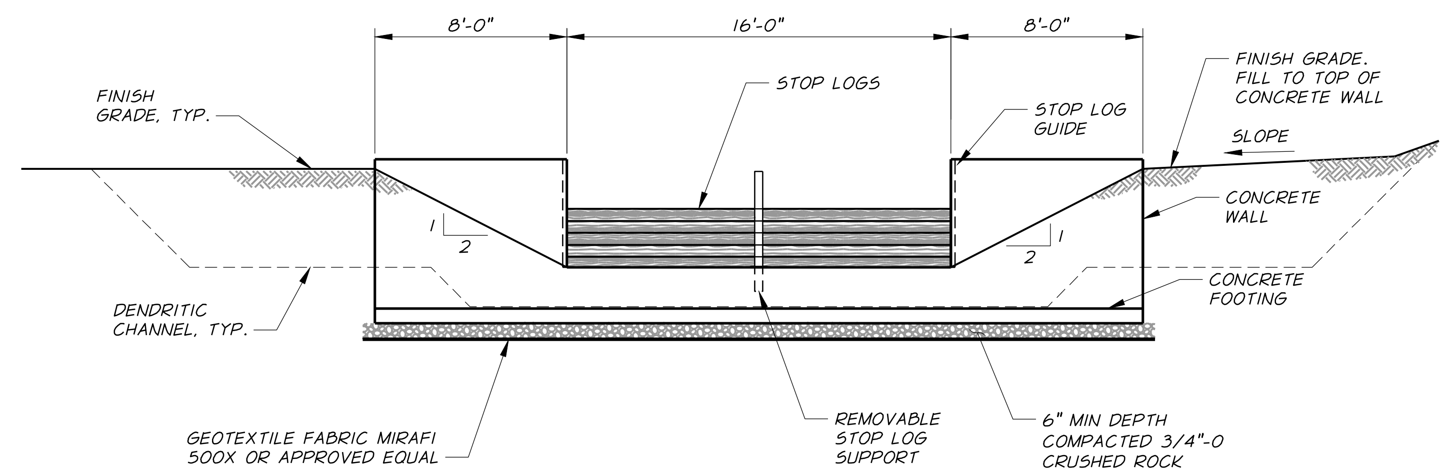


CONTROL STRUCTURE PLAN



CONTROL STRUCTURE TYPICAL ELEVATION

N.T.S.

REVISION	BY	DATE
DESIGNED BY A. HAMILTON		
DRAWN BY G. SAURBIER		
REVIEWED BY C. HUTCHINS		

SCALE IN FEET: 10 0 10 20 30

JOB NUMBER 1199-829 DATE 2023

ACAD FILE: 1199-829-060C-505DTL.dwg

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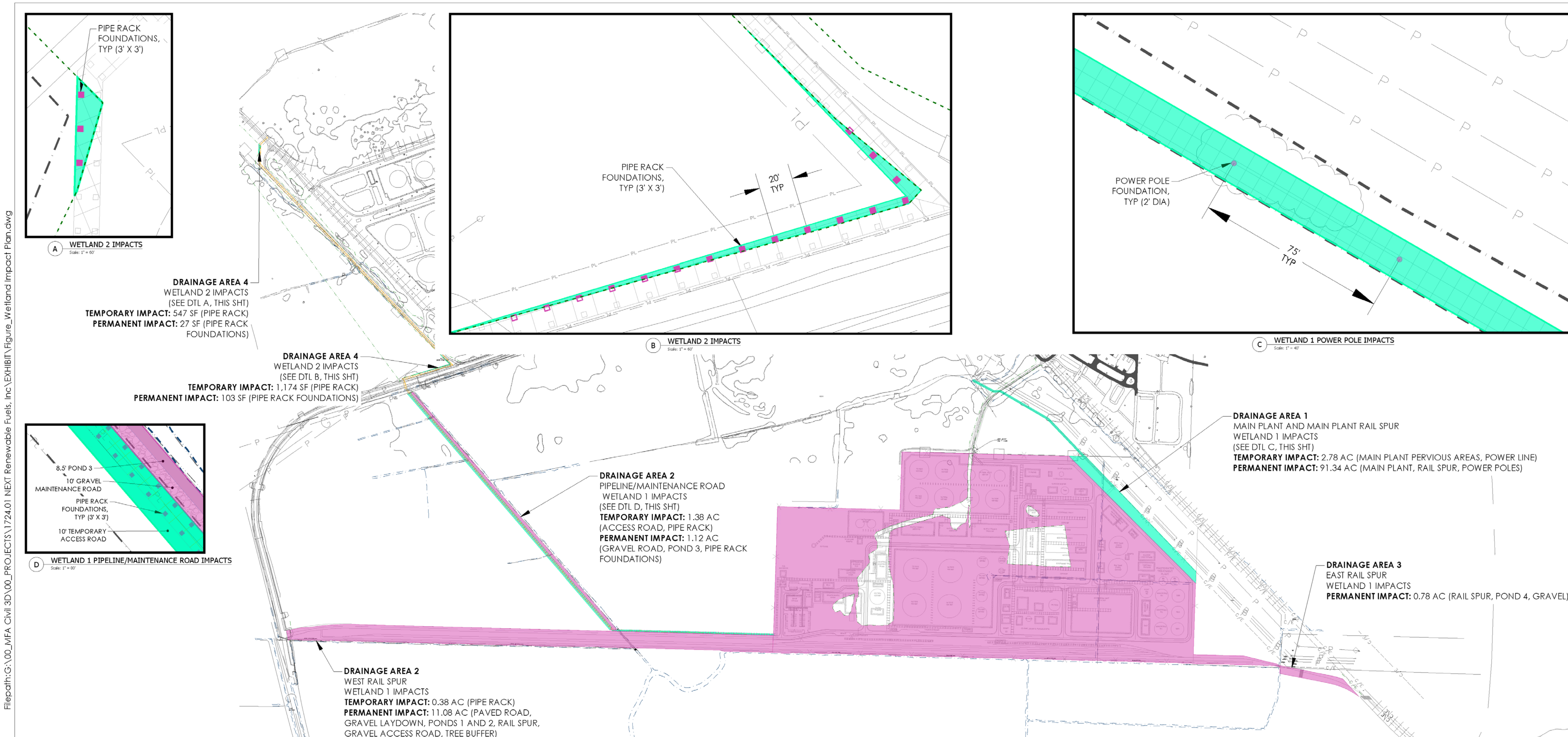
NEXT RENEWABLE FUELS OREGON, LLC
WETLAND MITIGATION PLAN
COLUMBIA COUNTY, OREGON

CONTROL STRUCTURE PLAN AND ELEVATION

SHEET 20

X:\Clients\Next Renewable Fuels\1199-829 Mitigation Site\CAD\1199-829-060C-505DTL.dwg, Layout1, 5/2/2023 11:14 AM, ahamilton

Filepath:G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\EXHIBIT\Figure_Wetland Impact Plan.dwg



LEGEND

- PROPOSED TEMPORARY WETLAND IMPACT
- PROPOSED PERMANENT WETLAND IMPACT
- WETLAND BOUNDARY
- RAIL SPUR
- EXISTING WATERWAY
- PIPE RACK

WETLAND 1 IMPACT SUMMARY

DESCRIPTION	AREA (AC)
PROPOSED TEMPORARY WETLAND IMPACT AREA	4.5
PROPOSED PERMANENT WETLAND IMPACT AREA	104.3

WETLAND 2 IMPACT SUMMARY

DESCRIPTION	AREA (AC)
PROPOSED TEMPORARY WETLAND IMPACT AREA	0.04
PROPOSED PERMANENT WETLAND IMPACT AREA	0.003

Printed by: Brian Tino

Date:2/17/2023 6:38:15 AM

MFA JOB #: M1724.01
ISSUE DATE: 1/06/2023
CHECKED: A. POLISKI
DRAWN: B. TINO

MAUL FOSTER ALONGI
3140 NE BROADWAY STREET
PORTLAND, OR 97232
PHONE: 971.544.2139
www.maulfoster.com

NEXT Renewable Fuels, Inc.

WETLAND IMPACT PLAN

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 800' 1200'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

FIGURE 1

NOTE:
DRAWING PROVIDED MAUL FOSTER ALONGI

NEXT Renewable Fuels, Inc.
Stewardship Solutions

NEXT RENEWABLE FUELS OREGON
PORT WESTWARD, OREGON
JOINT PERMIT APPLICATION

WETLAND IMPACT AREAS

FIGURE 10A

APPENDIX B
Oregon Rapid Wetland Assessment Protocol Data Sheets

Oregon Rapid Wetland Assessment (ORWAP) V.3.2.*	Cover Page: Basic Description of Assessment
Site Name:	NEXT Renewable Fuels Oregon (Wetlands 1-3)
Investigator Name:	Sue Brady
Date of Field Assessment:	9/30/2020
County:	Columbia
Nearest Town:	Clatskanie
Latitude (decimal degrees):	46.165392°
Longitude (decimal degrees):	-123.161365°
TRS, quarter/quarter section and tax lot(s):	T8N R4W Sections 16, 21, 22, 38
Approximate size of the Assessment Area (AA, in acres):	110.7
AA as percent of entire wetland (approx.). Attach sketch map if AA is smaller than the entire contiguous wetland.	50%
If delineated, DSL file number (WD #) if known:	delineation number not yet assigned
Cowardin Systems & Classes (indicate all present, based on field visit and/or aerial imagery): Systems: Palustrine =P, Riverine =R, Lacustrine =L, Estuarine =E Classes: Emergent =EM, Scrub-Shrub =SS, Forested =FO, Aquatic Bed (incl. SAV) =AB, Open Water =OW, Unconsolidated Bottom =UB, Unconsolidated Shore =US	PEM, PSS
Predominant HGM Class: Estuarine=E, Lacustrine=L, Riverine=R, S= Slope, F= Flats, D= Depressional	Flats
Soil Unit Mapped in Most of the AA:	Udipsamments, nearly level, protected
If tidal, the tidal phase during most of visit:	n/a
What percent (approximate) of the **wetland** were you able to visit?	50
What percent (approximate) of the **AA** were you able to visit?	100
Have you attended an ORWAP training session? If so, indicate approximate month & year.	Oct-11
How many wetlands have you assessed previously using ORWAP (approximate)?	20+
Comments about the site or this ORWAP assessment (attach extra page if desired):	

ORWAP V.3.2 Site Name:	**NEXT Renewable Fuels Oregon (Wetlands 1-3)**
Investigator Name:	**Sue Brady**
Date of Field Assessment:	**9/30/2020**

Scores will appear below after data are entered in worksheets OF, F, T, and S. See Manual for definitions and descriptions of how scores were computed and ratings assigned.

Normalized Scores & Ratings for this Assessment Area (AA):

Specific Functions or Values:	Function Score	Function Rating	Rating Break Proximity	Values Score	Values Rating	Rating Break Proximity	Function Score (raw)	Values Score (raw)
Water Storage & Delay (WS)	3.18	Lower		0.00	Lower		3.18	0.00
Sediment Retention & Stabilization (SR)	3.37	Lower	LM	9.05	Higher		3.67	6.90
Phosphorus Retention (PR)	5.30	Moderate		8.17	Higher		5.48	6.79
Nitrate Removal & Retention (NR)	3.10	Lower		10.00	Higher		4.43	10.00
Anadromous Fish Habitat (FA)	0.00	Lower		0.00	Lower		0.00	0.00
Resident Fish Habitat (FR)	0.00	Lower		0.00	Lower		0.00	0.00
Amphibian & Reptile Habitat (AM)	7.76	Higher		3.61	Lower		7.03	3.61
Waterbird Nesting Habitat (WBN)	7.13	Higher	MH	10.00	Higher		5.92	10.00
Waterbird Feeding Habitat (WBF)	9.23	Higher		10.00	Higher		8.33	10.00
Aquatic Invertebrate Habitat (INV)	1.79	Lower		2.60	Lower		4.01	3.09
Songbird, Raptor, Mammal Habitat (SBM)	5.18	Moderate		10.00	Higher		6.45	10.00
Water Cooling (WC)	2.31	Lower	LM	10.00	Higher		2.02	9.58
Native Plant Diversity (PD)	6.37	Moderate	MH	2.18	Lower		5.71	2.18
Pollinator Habitat (POL)	7.60	Higher	MH	3.92	Moderate		6.63	3.17
Organic Nutrient Export (OE)	5.90	Moderate					5.22	
Carbon Sequestration (CS)	5.16	Moderate					4.71	
Public Use & Recognition (PU)				3.48	Lower	LM		4.08

Other Attributes:	Score	Rating	Rating Break Proximity		
Wetland Sensitivity (SEN)	2.84	Moderate			4.83
Wetland Ecological Condition (EC)	5.02	Moderate			6.05
Wetland Stressors (STR)	6.34	Higher	MH		5.83

GROUPS	Selected Function	Function Rating	Rating Break Proximity	Values Rating	Rating Break Proximity
Hydrologic Function (WS)	Water Storage & Delay (WS)	Lower		Lower	
Water Quality Support (SR, PR, or NR)	Phosphorus Retention (PR)	Moderate		Higher	
Fish Habitat (FA or FR)	Anadromous Fish Habitat (FA)	Lower		Lower	
Aquatic Habitat (AM, WBF, or WBN)	Waterbird Nesting Habitat (WBN)	Higher	MH	Higher	
Ecosystem Support (WC, INV, PD, POL, SBM, or OE)	Pollinator Habitat (POL)	Higher	MH	Moderate	

NOTE: A score of 0 does not always mean the function or value is absent from the wetland. It usually means that this wetland has equal or less capacity than the lowest-scoring one, for that function or value, from among the 200 calibration wetlands that were assessed previously by Oregon Department of State Lands.

Date:10/1/20	Name: Sue Brady	Site: NEXT Renewable Fuels Oregon (Wetlands 1-3)	
Form OF Office Data ORWAP V. 3.2	Conduct an assessment only after reading the accompanying Manual and explanations in column E below. Answering many of the following questions requires viewing aerial imagery and maps, covering an area up to within 2 miles of the AA. **For each affirmative answer, change the 0 in the "Data" column to a "1".** Answer all items except where directed to skip to others. Questions whose cells in "Data" column have a **"W" MUST be answered for the ENTIRE wetland and bordering waters.**	For a list of functions to which each question pertains, see bracketed codes in column E. Codes for functions and their benefits are: WS= Water Storage, WC= Water Cooling, SR= Sediment Retention, PR= Phosphorus Retention, NR= Nitrate Removal, CS= Carbon Sequestration, OE= Organic Nutrient Export, INV= Aquatic Invertebrate Habitat, FA= Anadromous Fish Habitat, FR= Resident Fish Habitat, AM= Amphibians & Reptile Habitat, WBF= Feeding Waterbird Habitat, WBN= Nesting Waterbird Habitat, SBM= Songbird, Raptor, & Mammal Habitat, POL= Pollinator Habitat, PD= Native Plant Diversity, PU= Public Use & Recognition, EC= Ecological Condition, Sens= Sensitivity, STR= Stressors.	For guidance and detailed descriptions of how Excel calculates the numbers in the Scores worksheet, see the Technical Supplement and Appendix C of the Manual. For a documented rationale for each indicator, open each of the worksheet tabs at the bottom (one for each function or value) and see column H.

#	Indicators	Condition Choices	Data	Explanations, Definitions (Column E)	Cell Name	Comments
OF1	Distance to Extensive Perennial Cover (DistPerCov)	The distance from the AA edge to the edge of the closest patch or **corridor** of **perennial cover** (see definition in column E) larger than 100 acres is:		**Corridor** - is simply an elongated patch of perennial cover that is not narrower than 150 ft at any point.		
		<100 ft.	1	**Perennial cover** - is vegetation that includes wooded areas, native prairies, sagebrush, vegetated wetlands, as well as relatively unmanaged commercial lands in which the ground is disturbed less than annually, such as hayfields, lightly grazed pastures, timber harvest areas, and rangeland. It does not include water, row crops (e.g., vegetable, orchards, Christmas tree farms), lawns, residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads. [AM, WBN, PD, PDv, POL, SBM, Sens, STR]		
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to <0.5 mile.	0			
		0.5 mile to 2 miles.	0			
		> 2 miles.	0			
OF2	Distance to Tidal Waters (DistTidal)	The distance from the AA edge to the closest body of **tidal water** is:		**Tidal water** - If unclear whether a water body is tidal, check the ORWAP Map Viewer's Headtide layer (expand Hydrology), or check with local sources. Assume Columbia River is tidal east to Bonneville Dam and the Willamette River south to the Oregon City Falls. [WBF]		
		<1 mile.	1			
		1-5 miles.	0			
		>5 miles.	0			
OF3	Distance to Ponded Water (DistPond)	The distance from the AA edge to the closest (but separate) body of nontidal fresh water (wetland, pond, or lake) that is ponded all or most of the year is:		Use field observations, aerial imagery, and/or the ORWAP Map Viewer's Persistent Nontidal layer (expand Wetlands/National Wetlands Inventory). [AM,WBF,WBN,SBM,PD,Sens]		
		<100 ft.	0			
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to < 0.5 mile.	0			
		0.5 mile to 2 miles.	0			
		>2 miles.	1			
OF4	Distance to Lake (DistLake)	The distance from the AA edge to the closest (but separate) body of nontidal fresh water (wetland, pond, or lake) that is ponded during most of the year and is larger than 20 acres (about 1000 ft on a side) is:		Use field observations, aerial imagery, and/or the ORWAP Map Viewer's Persistent Nontidal layer (expand Wetlands/National Wetlands Inventory). [WBF,WBN]		
		<1 mile.	0			
		1-5 miles.	0			
		>5 miles.	1			
OF5	Distance to Herbaceous Open Land (DistOpenL)	The distance from the AA edge to the closest patch of **herbaceous openland** larger than 10 acres and in **flat terrain** is:		**Herbaceous openland** - includes both perennial and non-perennial cover. For example, it can include pasture, herbaceous wetland, meadow, prairie, ryegrass fields, row crops, herbaceous rangeland, golf courses, grassed airports, and hayfields. Do not include open water of lakes, ponds, or rivers; or unvegetated surfaces; or areas with woody vegetation. In dry parts of the state, croplands in flat areas are often irrigated and are distinctly greener in aerial images. **Flat terrain** - means slope of less than 5%. [WBF,WBN,POL]		
		<100 ft.	1			
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to < 0.5 mile.	0			
		0.5 mile to 2 miles.	0			
		>2 miles.	0			

OF6	Distance to Nearest Busy Road (DistRd)	The distance from the AA center to the nearest road with an average daytime traffic rate of at least 1 vehicle/ minute is:		Estimate this traffic rate threshold using your judgment and considering the road width, local population, distance to densely settled areas, alternate routes, and other factors. [AM,SBM,PD,PUv,STR]		
		<100 ft.	0			
		100 to <300 ft.	0			
		300 to < 0.5 mile.	0			
		0.5 to <1 miles.	1			
		1 to 2 miles.	0			
		>2 miles.	0			
OF7	Size of Largest Nearby Patch of Perennial Cover (SizePerenn)	Including the AA's vegetated area, the largest patch or corridor that is **perennial cover** and is contiguous with vegetation in the AA (i.e., not separated by roads or channels that create gaps wider than 150 ft), occupies:		**Contiguous** -Abutting, with no major physical separation that prohibits free exchange or flow of surface water (i.e., not separated by roads or channels that create gaps wider than 150 ft) **Perennial cover** - See OF1. Disqualify any patch or corridor of perennial cover where it becomes separated from the AA by a gap of >150 ft, if the gap is comprised of unvegetated land or if the corridor narrows to less than 150 ft. [AM,SBM,PD,POL,Sens,STR]		
		<.01 acre.	0			
		.01 to < 1 acre.	0			
		1 to <10 acres.	0			
		10 to <100 acres.	0			
		100 to <1000 acres.	1			
		1000 to 10,000 acres.	0			
		>10,000 acres.	0			
OF8	Wetland Type Local Uniqueness (UniqPatch)	**Select EACH** of the vegetation types below that comprise more than 10% of the AA AND less than 10% of a 0.5 mile radius around the AA. (See Column E).		This is a 2-part question: (1) if no vegetation class comprises more than 10% of the AA, answer "none of the above." (2) If a vegetation class does comprise more than 10%, determine if that vegetation class also comprises less than 10% of a 0.5 mile circle (~50 acres). [INVv,AMv,WBFv,WBNv,SBMv,PDv,POLv,Sens]		
		Herbaceous vegetation (perennial grasses, sedges, forbs; not under a woody canopy; not crops).	0			
		Unshaded shrubland (woody plants shorter than 20 ft).	0			
		Trees (woody plants taller than 20 ft).	0			
		None of above.	1			
OF9	Perennial Cover Percentage (PerCovPct)	Within a 2-mile radius of the AA center, the percentage of land that has **perennial cover** is:		**Perennial cover** - is vegetation that includes wooded areas, native prairies, sagebrush, vegetated wetlands, as well as relatively unmanaged commercial lands in which the ground is disturbed less than annually, such as hayfields, lightly grazed pastures, timber harvest areas, and rangeland. It does not include water, row crops (e.g., vegetable, orchards, Christmas tree farms), lawns, residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads. [FA,AM,SBM,POL,Sens,STR]		
		<5% of the land.	0			
		5 to <20% of the land.	0			
		20 to <60% of the land.	1			
		60 to 90% of the land.	0			
		>90% of the land.	0		PerennAll	
OF10	Forest Percentage (ForestPct)	Within a 2-mile radius of the AA center, the cumulative amount of forest (regardless of **forest patch** sizes, and including any in the AA) is:		**Forested patch** - is a land cover patch that currently has >70% cover of woody plants taller than 20 ft. May be in a plantation. [FA,SBM,STR]		
		<5% of the circle.	0			
		5 to <20%.	0			
		20 to <50%.	1			
		50 to 80%.	0			
		>80%.	0			
OF11	Herbaceous Open Land Percentage (OpenLpct)	Within a 2-mile radius of the AA center, the amount of **herbaceous openland** in **flat terrain** is:		**Herbaceous openland** - can include both perennial and non-perennial cover. For example, it can include pasture, herbaceous wetland, meadow, prairie, ryegrass fields, row crops, herbaceous rangeland, golf courses, grassed airports, and hayfields. Do not include open water of lakes, ponds, or rivers; or unvegetated surfaces; or areas with woody vegetation. **Flat terrain** - means slope of less than 5%. [WBF,WBN,POL]		
		<5% of the land.	0			
		5 to <20%.	0			
		20 to <50%.	1			
		50 to 80%.	0			
		>80%.	0			

OF12	Landscape Wetland Connectivity (ConnScapeW)	Within a 2-mile radius of the AA center:		**Corridor** - is simply an elongated patch of perennial cover that is not narrower than 150 ft at any point. **Regular traffic** - is at least 1 vehicle per hour during the daytime throughout most of the growing season. Assess this based on local knowledge, type of road, and proximity to developed areas. **Perennial** - see OF9 for definition. [WBN,SBM,Sens,STR]		
		There are NO other wetlands.	0			
		There are other wetlands (or a wetland), but NONE are connected to the AA by a **corridor** of **perennial** vegetation. The corridor must be at least 150 ft wide along its entire length and not interrupted by roads with **regular traffic.**	0			
		There are other wetlands (or a wetland), and ALL are connected to the AA by the type of corridor described.	0			
		There are other wetlands (or a wetland), and ONE or MORE (but not all) are connected to the AA by the type of corridor described.	1			
OF13	Local Wetland Connectivity (ConnLocalW)	Within a 0.5 mile radius of the AA center:		**Regular traffic** - is at least 1 vehicle per hour during the daytime throughout most of the growing season. Assess this based on local knowledge, type of road, and proximity to developed areas. **Perennial** - see OF9 for definition. IF possible, field verify [AM,WBN,SBM,PD,Sens,STR]		
		There are NO other wetlands.	0			
		There are other wetlands (or a wetland), but NONE are connected to the AA by a **corridor** of **perennial** vegetation. The corridor must be at least 150 ft wide along its entire length and not interrupted by roads with **regular traffic.**	0			
		There are other wetlands (or a wetland), and ALL are connected to the AA by the type of corridor described.	0			
		There are other wetlands (or a wetland), and ONE or MORE (but not all) are connected to the AA by the type of corridor described.	1			
OF14	Wetland Number & Diversity Uniqueness (HUCbest)	According to the ORWAP Report, this AA is located in one of the HUCs that are listed as having a large diversity, area, or number of wetlands relative to the area of the HUC. **Select All of the following that are true:**		In the ORWAP Report, under the Watershed Information section and the HUC Best table, look at the columns "Is HUC Best?" and "Greatest Criteria Met." [AM,WBF,WBN,SBM,Sens]		
		Yes, for the HUC8 watershed	1			
		Yes, for the HUC10 watershed	0			
		Yes, for the HUC12 watershed	0			
		None of above.	0			
		Data are inadequate (NWI mapping not completed in HUC).	0			
OF15	Landscape Functional Deficit (GISscore)	In the ORWAP Report, find the HUC 12 Functional Deficit table. **Select All functions below that have a notation for that HUC.**		In the ORWAP Report, under the Watershed Information section, look at the Functional Deficit table. Enter 1 for each of the listed functions that are noted. These are HUCs in which a relatively small number, or proportional area, of the wetlands are likely to be performing the named function, thus adding value to those that are. See ORWAP's Technical Supplement for explanation of how the FuncDeficit was calculated. [WSv,WCv,SRv,PRv,INVv,FAv,AMv,WBNv]		
		Water storage (WS)	0			
		Sediment retention (SR)	0			
		Nutrient transformation (NT)	0			
		Thermoregulation (WC)	0			
		Aquatic invertebrate habitat (INV)	0			
		Amphibian habitat (AM)	0			
		Fish habitat (FH)	0			
		Waterbird habitat (WB)	0			
		None of above.	1			
		No data.	0			
OF16	Conservation Designations of the AA or Local Area (ConDesig)	On the ORWAP Map Viewer, use the layers indicated below to answer. **Select All of the following that are true:**		In the ORWAP Map Viewer, use the applicable layers.		
		(a)The AA is within or connected to a stream or other water body and this stream or water body has been designated as ESH within 0.5 miles of the AA, according to the **Essential Salmonid Habitat (ESH)** layer.	0	Include areas not shown as ESH, if ODFW has confirmed they qualify as ESH. [WCv, FA, FAv]		
		(b)The AA is within or contiguous to a designated **Oregon's Greatest Wetlands,** according to the map layer of that name.	0	Oregon's Greatest Wetlands identifies the most biologically and ecologically significant wetlands in the State of Oregon. [PU]		
		(c)The AA is within an **Important Bird Area (IBA),** as officially designated, according to the map layer of that name.	1	[WBFv, WBNv]		
		None of above.	0			

OF17	Non-anadromous Fish Species of Conservation Concern (RareFR)	According to the ORWAP Report, the score for occurrences of rare non-anadromous fish species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include Miller Lake lamprey, Goose Lake lamprey, Pit sculpin, Lahontan cutthroat trout, Inland Columbia Basin redband trout, Steelhead (Snake River Basin ESU), Alvord chub, Goose Lake tui chub, Borax Lake chub, Lahontan redside, Oregon chub, Goose Lake sucker, Tahoe sucker, Warner sucker, Shortnose sucker, Lost River sucker. Note that for some of these species, only specific geographic populations are designated. [FRv] This question may need to revised after the field visit.		
		High (≥ 0.75 for maximum score, or ≥ 0.90 for this group's sum score), or there is a recent (within 5 years) onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.33 for both the maximum score this group's sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF18	Amphibian or Reptile of Conservation Concern (AmphRare)	According to the ORWAP Report, the score for occurrences of rare amphibian or reptile species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include: Black salamander, California slender salamander, Cope's giant salamander, Rocky Mountain tailed frog, Woodhouse's toad, Foothill yellow-legged frog, Northern leopard frog, Oregon spotted frog, Columbia spotted frog. [AMv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or >0.90 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.21 for maximum score AND <0.15 for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF19	Feeding (Non-breeding) Waterbird Species of Conservation Concern (RareWBF)	According to the ORWAP Report, the score for occurrences of rare **non-breeding** (feeding) waterbird species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. **Non-breeding** - mainly refers to waterbird feeding during migration and winter. California brown pelican, Aleutian cackling goose, Dusky Canada goose [WBFv] This question may need to revised after the field visit.		
		High (≥ 0.33 for maximum score, or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Low (< 0.33 for maximum score and for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF20	Nesting Waterbird Species of Conservation Concern (RareWBN)	According to the ORWAP Report, the score for occurrences of rare nesting waterbird species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include: Horned grebe, Red-necked grebe, Western grebe, Clark's grebe, American white pelican, Least bittern, Snowy egret, Trumpeter swan, White-faced ibis, Harlequin duck, Bufflehead, Yellow rail, Western snowy plover, Upland sandpiper, Franklin's gull, Marbled murrelet. [WBNv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or ≥1.00 for this group's sum score), or there is a recent breeding-season observation of any of these species onsite by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.09 for maximum score and for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species during breeding season by a qualified observer under conditions similar to what now occur.	1			
OF21	Songbird, Raptor, Mammal Species of Conservation Concern (RareSBM)	According to the ORWAP Report, the score for occurrences of rare songbird, raptor, or mammal species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include: Bald eagle, American peregrine falcon, Arctic peregrine falcon, Greater sage-grouse, Columbian sharp-tailed grouse, Yellow-billed cuckoo, Northern spotted owl, Short-eared owl, Black swift, Lewis's woodpecker, Purple martin, Northern waterthrush, Bobolink, Tricolored blackbird, Fringed myotis, Spotted bat, Townsend's big-eared bat, Pallid bat, Northern sea lion, Fisher, Sea otter, Canada lynx, Columbian white-tailed deer. [SBMv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or >1.13 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	1			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.09 for maximum score AND <0.13 for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	0			
OF22	Invertebrate Species of Conservation Concern (RareInvert)	According to the ORWAP Report, the score for occurrences of rare invertebrate species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. See the Supp_Info file's RareAnimals worksheet for list of species addressed by this question. [INVv] This question may need to revised after the field visit.		
		High (≥ 0.75 for maximum score, or for this group's sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Low (< 0.75 for maximum score AND for this group's sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			

OF23	Plant Species of Conservation Concern (RarePspp)	According to the ORWAP Report, the score for occurrences of rare wetland-indicator plant species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores.		
		High (≥ 0.75 for maximum score, or > 4.00 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0	See the Supp Info's RareWetPlants worksheet for list of species addressed by this question.		
		Intermediate (i.e., not as described above or below).	0	[PDv,POLv]		
		Low (≤ 0.12 for maximum score AND < 0.20 for sum score, but not 0 for both).	0	This question may need to revised after the field visit.		
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF24	River Proximity (RiverProx)	There is a nontidal river within 1 mile and it is adjacent to, OR downslope from, the AA (connected or not). **Enter 1, if true. If not, SKIP to OF27.**	0	**River** - as used here is a channel wider than 50 ft between its banks. In the ORWAP Map Viewer, use the National Hydrography Dataset - Flowline layer (expand Hydrology).[WSv]	NearRiver	
OF25	Floodable Property (FloodProp)	**Select ONE** of the below:		**Row crops** - do not include pasture or other perennial cover.		
		Floodplain boundaries within 1 mile downslope or downriver from the AA have not been mapped. **Enter 1 and SKIP TO OF27.**	0	In the ORWAP Map Viewer, use the Floodplain layers. Also, the Seasonal Nontidal Wetland layer (expand Wetlands/National Wetlands Inventory) may indicate some floodplain areas.		
		Floodplain boundaries within 1 mile downslope from the AA have been mapped BUT there is neither infrastructure nor **row crops** vulnerable to river flooding located within the floodplain and within that distance. **Enter 1 and SKIP TO OF27.**	0	[WSv] Supplement with field observations at multiple seasons, if possible.		
		Floodplain boundaries have been mapped AND infrastructure or **row crops** are present within 1 mile downslope or downriver and those are not protected from 100-year floods, but actual damage has not been documented.	0			
		Damage to infrastructure or row crops from river flooding has been documented within that distance.	0			
OF26	Type of Flood Damage (DamageType)	The greatest financial damage in the floodplain is (or would be) to:		**Row crops** - do not include pasture or other perennial cover. On the ORWAP Map Viewer, use the Floodplain layers [WSv]		
		Buildings, roads, bridges.	0			
		Row crops (during some years).	0			
OF27	Hydrologic Landscape (Arid)	According to the ORWAP Report, the wetland is in a hydrologic landscape unit classified as:		In the ORWAP Report, under the Location Information table, find the Hydrologic Landscape Class.		
		Arid.	0	[AM, AMv, WBNv, SBMv, OE, Sens]		
		Semi-arid.	0			
		Dry.	0			
		Moist.	0			
		Wet.	1			
		Very Wet.	0			
OF28	Input Water - Recognized Quality Issues (WQin)	According to ORWAP Map Viewer's Water Quality Streams layer and Water Quality Lakes layers, ALL of the following are true: **(a)** within 1 mile upstream from the AA edge, a water body or stream reach is labeled as being 303d, Water Quality Limited (categories 3B-5); Potential Concer; or TMDL Approved AND **(b)** the problem concerns one or more of the parameters listed below. **Select All that apply.**		Use the ORWAP Map Viewer's Water Quality Streams layer and the Water Quality Lakes layer (expand Water Quality and Quanity) and the Distance tool. Use the Identy tool to determine the reason for the listings.		
		Total suspended solids (TSS), sedimentation, or turbidity.	0			
		Phosphorus, chlorophyll-a, or algae.	1	If the AA receives both inflow and outflow from river flooding, consider the polluted water to be both "upstream" and "downstream".		
		Nitrates, ammonia, chlorophyll-a, or algae.	0			
		Petrochemicals, heavy metals (iron, manganese, lead, zinc, etc.), other toxins.	1	[SRv,PRv,INV,FA,FR,AM,WBF,WBN,STR]		
		Temperature or dissolved oxygen.	1	This may need to be verified in the field.		
		None of above, or no data. **If true, enter 1 and SKIP to OF30.**	0		NoDataWQup	
OF29	Duration of Connection Beween Problem Area & the AA (ConnecUp)	The upstream problem area mentioned above (OF28) has a surface water connection to the AA:		In the ORWAP Map Viewer, use the National Hydography Dataset (expand Hydrology) and the Persistent, Seasonal, or Saturated nontidal layers (expand Wetlands/National Wetlands Inventory) to determine duration of surface water connection.		
		For 9 or more continuous months annually.	0	[SRv,PRv,INV,FA,FR,AM,WBF,WBN,STR]		
		Intermittently (at least once annually, but for less than 9 months continually).	0	This may need to be determined or verified in the field.		
		Never (or less than annually).	1			
OF30	Downslope Water Quality Issues (ContamDown)	According to ORWAP Map Viewer's Water Quality Streams layer and Water Quality Lakes layer, ALL of the following are true: **(a)** within 1 mile downhill or downstream from the AA's edge, a water body is labeled as being 303d, Water Quality Limited (categories 3B-5); Potential Concern; or TMDL Approved AND **(b)** the problem concerns one or more of the parameters listed below. **Select All that apply.**		Use the ORWAP Map Viewer's Water Quality Streams layer and the Water Quality Lakes layer (expand Water Quality and Quanity) and the Distance tool. Use the Identy tool to determine the reason for the listings.		
		Total suspended solids (TSS), sedimentation, or turbidity.	0	[WCv,SRv,PRv,FA]		
		Phosphorus, chlorophyll-a, or algae.	1			
		Nitrates, ammonia, chlorophyll-a, or algae.	0			
		Petrochemicals, heavy metals (iron, manganese, lead, zinc, etc.), other toxins.	1			
		Temperature or dissolved oxygen.	1			
		None of above, or no data. **Enter 1 and SKIP to OF32.**	0		NoDataWQdo	
OF31	Duration of Connection Beween AA & Water Quality Problem Area (ConnDown)	The connection between the downstream problem area mentioned above (OF30) and the AA:		In the ORWAP Map Viewer, use the National Hydography Dataset (expand Hydrology) and the Persistent, Seasonal, or Saturated nontidal layers (expand Wetlands/National Wetlands Inventory) to determine duration of surface water connection.		
		Is a stream or water body that connects these areas for 9 or more continuous months annually.	1			
		Is a stream or water body that connects these areas intermittently (at least once annually, but for less than 9 months continually).	0	[WCv,SRv,PRv,FA]		

		Is a probable groundwater connection, or connection via direct runoff only (no channel connection).	0	This may need to be determined or verified in the field.		
		Never exists (a topographic ridge probably prevents all the AA's runoff and groundwater from reaching the problem area).	0			
OF32	Drinking Water Source (DEQ) (DWsource)	According to ORWAP Map Viewer's Surface Water Drinking Water Source Areas layer and the Ground Water Drinking Water Source Areas layer, the AA is within:		In the ORWAP Map Viewer, use the water source layers (expand Water Quality and Quantity). [NRv]		
		The source area for a surface-water drinking water (DW) source.	1			
		The source area for a groundwater drinking water source.	0			
		Neither of above.	0			
OF33	Groundwater Risk Designations (GWrisk)	According to ORWAP Map Viewer's Groundwater Management Areas layer and the Sole Source Aquifer layer, the AA is: **Select All that apply**		In the ORWAP Map Viewer, use the DEQ Groundwater Management Areas layer and the Sole source Aquifer layer (expand Water Quality and Quantity). [NRv]		
		Within a designated Groundwater Management Area (ODEQ).	0			
		Within a designated Sole Source Aquifer area (EPA): the North Florence Dunal Aquifer.	0			
		Neither of above.	1			
OF34	Relative Elevation in Watershed (Elev)	In the ORWAP Map Viewer, based on the Hydrologic Boundaries 4th Level (HUC 8) layer (expand Hydrology), determine if the AA is: (See Column E)		1) Consider which end of the HUC is the bottom. Where streams join, the "V" that they form on the map points towards the bottom of the HUC. 2) If the AA is closer to the HUC's outlet than to its upper end, and is closer to the river or large stream that exits at the bottom of the HUC than it is to the boundary (margin) of the HUC, then check "lower 1/3" If not near that river, check "middle 1/3". 3) If the AA is not in a 100-yr floodplain, is closer to the HUC upper end than to its outlet, and is closer to the boundary (margin) of the HUC than to the river or large stream that exits at the bottom of the HUC, then check "upper 1/3" 4) For all other conditions, check "middle 1/3". [WSv, PRv, FA, FR, WCv, OE, Sens, SRv]		
		In the upper one-third of its watershed.	0			
		In the middle one-third of its watershed.	0			
		In the lower one-third of its watershed.	1		LowerShed	
OF35	Runoff Contributing Area (RCA) - Wetland as % of (WetPctRCA)	Delimit the wetland's Runoff Contributing Area (RCA) using a topographic base map. The area of the AA's wetland is:	W	See the ORWAP Manual for specific protocol for delimiting the RCA (Section 4.1 Step 5). The RCA includes only the areas that potentially drain directly to the AA's wetland rather than to channels that flow or flood into that wetland. Exact precision in drawing the boundary is not required. [WS, WSv, SR, SRv, PR, PRv, WCv]		
		<1% of its RCA.	0			
		1 to <10% of its RCA.	0			
		10 to 100% of its RCA.	1			
		Larger than the area of its RCA. **Enter 1 and SKIP TO OF39.**	0		NoRCA	

OF36	Unvegetated % in the RCA (ImpervRCA)	The proportion of the RCA comprised of buildings, roads, parking lots, exposed bedrock, and other surface that is usually unvegetated at the time of peak annual runoff is about:	W	In the ORWAP Map Viewer, use an Aerial layer to determine the proportion of the RCA comprised of buildings, roads, parking lots, exposed bedrock, and other surfaces that are usually unvegetated at the time of peak annual runoff. [WSv,WCv,SRv,PRv,INV,FA,Sens,STR]		
		<10%.	0			
		10 to 25%.	1			
		>25%.	0			
OF37	Transport From Upslope (TransRCA)	A relatively large proportion of the precipitation that falls farther upslope in the RCA reaches this wetland quickly as indicated by the following: **(a)** RCA slopes are steep, and/or **(b)** upslope wetlands historically present have been filled or drained extensively, and/or **(c)** land cover is mostly non-forest, and/or **(d)** most RCA soils are shallow. This statement is:	W	Refer to aerial imagery and/or consult local sources. See the ORWAP Manual for instructions. [WSv,SRv,PRv,STR]		
		Mostly true.	0			
		Somewhat true.	1			
		Mostly untrue.	0			
OF38	Upslope Soil Erodibility Risk (ErodeUp)	Use the ORWAP Report or the Map Viewer to determine if the erosion hazard rating of the soil within 200 ft away and upslope of the AA is:		If the soil unit is the same as the AA, the Erosion Hazard can be obtained from the ORWAP Report's Soil Information section. If the soil unit is different than the AA, use ORWAP Map Viewer's Oregon Soil layer and see the ORWAP Manual for instructions on how to determine the erosion hazard rating. [SRv,PRv,STR]		
		Slight.	1			
		Moderate.	0			
		Severe.	0			
		Very severe.	0			
		Could not determine.	0			
OF39	Streamflow Contributing Area (SCA) - Wetland as % of (WetPctSCA)	Delimit (or visualize, for large river basins) the wetland's Streamflow Contributing Area (SCA) using a topographic base map. The area of the AA's wetland is:	W	See the ORWP Manual for specific protocol for delimiting the SCA (section 4.1, Step 6). The SCA is all upland areas that drain into streams, rivers, and lakes that feed the AA's wetland either directly or during semi-annual floods. In addition, for wetlands intercepted by a mapped stream, the SCA can be delineated automatically and its area reported at this USGS web site: https://streamstats.usgs.gov/ss/. Enter the coordinates, select Oregon, select Delineate, zoom to level 15 or finer, and click on a stream. [WS, SR, SRv, PR, PRv, WCv]		
		<1% of its SCA, or wetland is in the floodplain of a major river.	0			
		1 to <10% of its SCA.	0			
		10 to 100% of its SCA.	1			
		Larger than the area of its SCA. **Enter 1 and SKIP TO OF41.**	0		NoSCA1	
		Wetland lacks tributaries and receives no overbank water. **Enter 1 and SKIP to OF41.**	0		NoSCA	
OF40	Unvegetated % in the SCA (ImpervSCA)	The proportion of the SCA comprised of buildings, roads, parking lots, exposed bedrock, and other surface that is usually unvegetated at the time of peak annual runoff is about :	W	See the ORWAP Manual for instructions. [WCv,SRv,PRv,FA,STR]		
		<10%.	0			
		10 to 25%.	0			
		>25%.	1			
OF41	Upland Edge Shape Complexity (EdgeShape)	Most of the edge between the AA's wetland and upland is **(select one)**:	W	See ORWAP Manual for instructions and illustrations. [NR, SBM, Sens]		
		Linear: a significant proportion of the wetland's upland edge is straight, as in wetlands bounded partly or wholly by dikes or roads, or the AA is entirely surrounded by water or other wetlands.	1			
		Intermediate: Wetland's shape is (a) ovoid, or (b) mildly ragged edge, and/or (c) contains a lesser amount of artificially straight edge.	0			
		Convoluted: Wetland perimeter is many times longer than maximum width of the wetland, with many alcoves and indentations ("fingers").	0			
OF42	Zoning (Zoning)	According to ORWAP Map Viewer's Zoning layer, the dominant zoned land use designation for currently undeveloped parcels upslope from the AA and within 300 ft. of its upland edge is:		See the ORWAP Manual for instructions on how to determine the zoning designation. If information is not provided, check local zoning maps. [WSv,WCv,SRv,PRv,INVv,FAv,FRv,AMv,WBFv,WBNv,SBMv,PDv,POLv,PUv]		
		Development (Commercial, Industrial, Urban Residential, etc.), or no undeveloped parcels exist upslope from the AA.	1			
		Agriculture or Rural Residential.	0			
		Forest or Open Space, or entirely public lands.	0			
		Not zoned, or no information.	0			

OF43	Growing Degree Days (GDD)	According to ORWAP Map Viewer's Growing Degree Days layer, the long term normal Growing Degree Days category at the approximate location of the AA is:		See the ORWAP Manual for instructions on how to determine the growing degree days category. [NR, FR, AM, WBN, SBM, WCv, OE, CS, Sens]		
		<256.	0			
		256 - 1020.	0			
		1021-1785.	0			
		1786 - 2550.	1			
		2551 - 3315.	0			
		3316 - 4079.	0			
		> 4079.	0			

Date: 10/1/20		Name: Sue Brady	Site: NEXT Renewable Fuels Oregon (Wetlands 1-3)			
Form F Field Data (nontidal Wetlands) ORWAP V 3.2		Conduct an assessment only after reading the accompanying Manual and explanations in column E below. **For each affirmative answer, change the 0 in the "Data" column to a "1".** Answer all items except where directed to skip to others. Questions whose cells in "Data" column have a **"W" MUST be answered for the ENTIRE wetland and bordering waters.**	For a list of functions to which each question pertains, see bracketed codes in column E. Codes for functions and their benefits are: WS= Water Storage, WC= Water Cooling, SR= Sediment Retention, PR= Phosphorus Retention, NR= Nitrate Removal, CS= Carbon Sequestration, OE= Organic Export, INV= Invertebrates, FA= Anadromous Fish, FR= Resident Fish, AM= Amphibians, WBF= Feeding Waterbirds, WBN= Nesting Waterbirds, SBM= Songbirds, Mammals, & Raptors, POL= Pollinators, PH= Plant Habitat, PU= Public Use & Recognition, EC= Ecological Condition, Sens= Sensitivity, STR= Stressors.			For guidance and detailed descriptions of how Excel calculates the numbers in the Scores worksheet, see the Technical Supplement and Appendix C of the accompanying Manual. For a documented rationale for each indicator, open each of the worksheet tabs at the bottom (one for each function or value) and see column H.
#	**Indicators**	**Condition Choices**	**Data**	**Explanations, Definitions (Column E)**	**Cell Name**	**Comments**
F1	Tidal Wetland (Tidal)	This is a tidal wetland (either freshwater or saltwater). **If yes, GO TO worksheet " T ".** Do not enter any data here. **If nontidal, continue with F2.**		**Tidal wetland -** a wetland that receives tidal water at least once during a normal year, regardless of salinity, and dominated by emergent or woody vegetation. Tidal flooding occurs on a 6-hour cycle DURING THE TIME it is flooded by tide, which may be as infreuent as once per year. If NWI map shows the wetland with a code beginning with E (for estuarine), assume the wetland to be tidal. However, some wetlands lacking that code are also tidal.		
F2	Ponded Condition (Lentic)	At least once every 2 years, some part of the AA contains a cumulative total of >900 sq.ft. of surface water that is ponded. The water persists for >6 days and may be hidden beneath emergent vegetation or scattered in small pools. **Enter 1, if true.**	1	**Ponded -** Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). [AM,WBF,WBN]	Lentic	
Reminder: For all questions, the AA should include all persistent waters in ponds smaller than 20 acres that are **adjacent** to the AA. The AA should also include part of the water area of adjacent lakes or rivers larger than 20 acres -- specifically, the open water part adjacent to wetland vegetation and equal in width to the average width of that vegetated zone.				**Adjacent -** is used synonymously with abutting, adjoining, bordering, contiguous -- and means no upland (manmade or natural) completely separates the described features along their directly shared edge. Features joined only by a channel are not necessarily considered to be adjacent -- a large portion of their edges must match. The features do not have to be hydrologically connected in order to be considered adjacent.		
F3	Water Regime (Hydropd)	The water regime (hydroperiod) of the most permanent (usually deepest) part of the AA is: **Select only ONE.** [To meet any of the definitions other than Ephemeral, there must be >100 sq ft of surface water for the duration described, otherwise mark the type listed above it.]		In the NRCS county soil survey, the Water Features table provides information about periods of flooding, ponding, and highwater table depths. Descriptions of the soil units may include information on saturation persistence. Also consider the hydroperiod label on NWI wetland polygons. [WS, FA, FR, WBN, WBF, WC]		
		Ephemeral. Surface water in the wettest part of the AA is present for fewer than 7 consecutive days during an average growing season. Includes some of the areas mapped as Saturated Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F25.**	0		NeverWater	
		Temporary. Surface water present for 1-4 weeks consecutively during an average growing season, OR if persists for longer, it is almost entirely in scattered pools, each smaller than 1 sq.m. Dries up completely during part of most average years. Includes some of the areas mapped as Saturated Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F25.**	0		TempWet	
		Seasonal. Surface water present for 5-17 weeks (1-4 months) consecutively during an average growing season, but dries up completely during part of most average years. Includes some of the areas mapped as Seasonal Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F5.**	0		ShallowType	
		Semi-Persistent. Surface water present for more than 17 weeks (4 months) consecutively during an average growing season, but dries up completely during part of most average years. Includes some of the areas mapped as Seasonal Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F5.**	0		DeepType	
		Permanent. Does not dry up completely during most average years. Includes some of the areas mapped as Persistent Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and continue.**	1	**Permanent -** usually has significant groundwater input, higher conductivity, less annual water level fluctuation. No woody vegetation in most persistently flooded parts. Often with extensive open water and subsurface aquatic plants.	PermType	

F4	Flooded Persistently - % of AA (PermW)	Identify the parts of the AA that still contain surface water even during the **driest times of a normal year** . At that time, the percentage of the AA that still contains surface water is:		**driest times of a normal year -** i.e., when the AA's surface water is at its lowest annual level. Sites fed by unregulated streams that descend on north-facing slopes, tend to remain wet longer into the summer. Indicators of persistence may include fish, some dragonflies, beaver, and muskrat. [WS,PR,NR,CS,INV,FR,AM,WBF,WBN]		
		1 to <25% of the AA.	1			
		25 to <50% of the AA.	0			
		50 to 95% of the AA.	0			
		>95% of the AA.	0		AllPermWater	
F5	Depth Class (Predominant) (DepthDom)	When water is present in the AA, the depth most of the time in most of inundated area is: [Note: NOT necessarily the maximum spatial or annual depth]		This question is asking about the spatial median depth that occurs during most of that time, even if inundation is only seasonal or temporary. If inundation in most but not all of the AA is brief, the answer will be based on the depth of the most persistently inundated part of the AA. Include surface water in channels and ditches as well as ponded areas. In the ORWAP Manual, se the diagram in Appendix B. [WC,SR,PR,CS,OE,INV,FA,FR,WBF,WBN,PD,Sens]		
		>0 to <0.5 ft.	0			
		0.5 to < 1 ft deep.	0			
		1 to <3 ft deep.	1			
		3 to 6 ft deep.	0			
		>6 ft deep.	0			
F6	Depth Class Distribution (DepthEven)	Within the area described above, and during most of the time when surface water is present, the water area has: **Select only one.**		Estimate these proportions by considering the gradient and microtopography of the site. In the ORWAP Manual, see the diagram in Appendix B. [INV,FR,WBF,WBN,PD]		
		One depth class covering >90% of the AA's inundated area (use the classes in the question above).	1			
		One depth class covering 51-90% of the AA's inundated area (use the classes in the question above).	0			
		Neither of above. There are 3 or more depth classes and none occupy >50%.	0			
F7	Emergent Plants -- Area (EmArea)	Consider just the area that has surface water for >1 week during the growing season. Herbaceous plants (not moss, not woody) whose foliage extends above a water surface in this area (i.e., emergents) cumulatively occupy an annual maximum of:	W	If multiple small patches are separated by less than 150 ft, they may be combined when evaluating this question. [SR,PR,OE,INV,FR,WBF,WBN,SBM,PD]		
		<0.01 acre (< 400 sq.ft). **Enter 1 and SKIP TO F10,** unless only part of a wetland is being assessed.	0		NoEm	
		0.01 to < 0.10 acres (3,920 sq. ft).	0			
		0.10 to <0.50 acres (21,340 sq. ft).	0			
		0.50 to <5 acres.	0			
		5 to 50 acres.	1			
		>50 acres.	0			
F8	% Emergent Plants (EmPct)	Emergent plants occupy an annual maximum of:		[WC,SR,PR,NR,CS,OE,INV,PD,FA,FR,AM,WBF,WBN,SBM]		
		<5% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		5 to <30% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		30 to <60% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		60 to 95% of the parts of the AA that are inundated for >7 days at some time of the year.	1			
		>95% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
F9	Cattail or Tall Bulrush Cover (Cttail)	The percentage of the emergent vegetation cover in the AA that is cattail (*Typha* spp.) or tall bulrush is:		[WBN, SBM]		
		<1% of the emergent vegetation, or cattail and bulrush are absent.	0			
		1 to <25% of the emergent vegetation.	1			
		25 to 75% of the emergent vegetation.	0			
		>75%, of the emergent vegetation.	0			

F10	Water Shading by AA's Woody Vegetation - Driest (WoodyDryShade)	During an average growing season, when water levels are lowest (but surface water still occupies >400 sq ft or >1% of the AA), the percentage of the remaining surface water within the AA that is shaded by trees and/or shrubs located within the AA is:		[WC,FA,WBN,SBM]		
		<5% of the water, and fewer than 10 woody plants taller than 3 ft shade it, or all surface water is flowing.	0			
		<5% of the water, but more than 10 woody plants taller than 3 ft shade it.	0			
		5 to <25% of the water.	1			
		25 to <50% of the water.	0			
		50 to 95% of the water.	0			
		>95% of the water.	0			
F11	Open Water - Extent	During most of the growing season, the largest patch of **open water** that is in or adjacent to the AA is >1 acre and mostly deeper than 1 ft. **Enter 1, if true.**	1	**Open Water** - is surface water of any depth that contains no emergent herbaceous or woody vegetation (may contain floating-leaved or completely submersed plants). It may be partially shaded by a tree canopy.	OpenW	
F12	All **Ponded** Water as Percentage - Wettest (PondWpctWet)	When water levels are highest, during a normal year, the surface water that is **ponded** continually for >6 days occupies:		**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). [WS,WC,CS,OE,INV,AM,WBF,WBN]		
		<1% or none of the AA. Surface water is completely or nearly absent then, or is entirely flowing. **Enter 1 and SKIP TO F22.**	0		NoPond	
		1 to <5% of the AA.	0			
		5 to <30% of the AA.	1			
		30 to <70% of the AA.	0			
		70 to 95% of the AA.	0			
		>95% of the AA.	0			
F13	Ponded Open Water Area - Wettest (OWareaWet)	When water levels are highest, during a normal year, the AA's **ponded open water** occupies a cumulative area of:	W	**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). **Open water** - is surface water of any depth that contains no emergent herbaceous or wood vegetation (may contain floating-leaved or completely submersed species). It may be partially shaded by a tree canopy. [WS,WBF]		
		<0.10 acre (< 4356 sq. ft) of the AA and adjacent ponded waters. **Enter 1 and SKIP TO F16.**	0		NoPondOW	
		0.10 to <0.50 acres (21,340 sq. ft) of the AA and adjacent ponded waters.	0			
		0.50 to <1 acres of the AA and adjacent ponded waters.	0			
		1 to <5 acres of the AA and adjacent ponded waters.	1			
		5 to <50 acres of the AA and adjacent ponded waters.	0			
		50 to <640 acres (1 sq. mi) of the AA and adjacent ponded waters.	0			
		640 to <1000 acres of the AA and adjacent ponded waters.	0			
		1000 to <2500 acres of the AA and adjacent ponded waters.	0			
		>2500 acres (>4 sq.mi) of the AA and adjacent ponded waters.	0			
F14	Ponded Open Water **Distribution** - Wettest (WaterMixWet)	When water levels are highest, during a normal year, the distribution (in aerial view) of ponded open water patches larger than 0.01 acre (400 sq. ft) within the AA is (must meet both a and b criteria):		[NR,AM,WBF,WBN,PD,SBM]		
		(a) Vegetation and **open water** EACH comprise 30-70% of the AA (including its bordering waters if any) **AND (b)** There are many small patches of open water scattered widely within vegetation or many small vegetation clump "islands" scattered widely within open water. Typical (for example) of some extensive bulrush and cattail marshes.	0			
		(a) Vegetation and **open water** EACH comprise 30-70% of the AA (including its bordering waters if any) **AND (b)** There are only a few (or no) small patches of open water scattered widely within vegetation or a few small vegetation clump "islands" scattered widely within open water.	0			
		(a) Vegetation or **open water** comprise >70% of the AA (and its bordering waters) **AND (b)** There are several small patches of open water scattered within vegetation or several small vegetation clump "islands" scattered within open water.	1			
		(a) Vegetation or **open water** comprise >70% of the AA (and its bordering waters) **AND (b)** Open water is mostly in a single area (e.g., center of the wetland) and vegetation is in the rest (e.g., periphery), with almost no intermixing. (Typical of many ponds excavated for livestock watering, stormwater treatment, mineral extraction as well as many wetlands that are inundated only temporarily each year).	0			
F15	Width of Vegetated Zone - Wettest (WidthWet)	When water levels are highest, during a normal year, the width of the **vegetated wetland** that separates the largest patch of open water within or bordering the AA from the closest adjacent uplands, is predominantly: [Note: This is not asking for the maximum width.]		**Vegetated wetland** - in this case does not include underwater or floating-leaved plants, i.e., aquatic bed. In farmed wetlands that have different crops from year to year, consider vegetation condition as it probably existed during most of the past 5 years. If open water exists as many patches, use the distance between the majority of those patches and uplands. [WC,SR,PR,NR,CS,OE,AM,WBF,WBN,SBM,PD,Sens,EC]		
		<5 ft, or no vegetation between upland and open water.	0			
		5 to <30 ft.	0			
		30 to <50 ft.	0			
		50 to <100 ft.	0			
		100 to 300 ft.	0			
		> 300 ft.	1			

F16	All Ponded Water as a Percentage (Driest) (PondWpctDry)	When water levels are <u>lowest</u>, during a normal year, but surface water still occupies <u>>1,076 sq feet (100 sq meter) OR >1% of the AA</u> (whichever is more), the water that is **ponded** (either visible or concealed by vegetation) in the AA occupies:		**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). [WC,FA,FR,AM,WBN,Sens]		
		<1% or none. Surface water is completely or nearly absent then, or is entirely flowing. **Enter 1 and SKIP TO F22.**	0		NoPond2	
		1 to <5% of the AA.	1			
		5 to <30% of the AA.	0			
		30 to <70% of the AA.	0			
		70 to 95% of the AA.	0			
		>95% of the AA.	0			
F17	Ponded Open Water **Area** (Driest) (OWareaDry)	When water levels are <u>lowest</u>, during a normal year, the AA's **ponded open water** occupies a cumulative area, including adjacent ponded waters, of:	W	**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). **Open water -** is surface water of any depth that contains no emergent herbaceous or wood vegetation (may contain floating-leaved or completely submersed species). It may be partially shaded by a tree canopy. [WBN,PUv]		
		<0.10 acre (< 4356 sq. ft). **Enter 1 and SKIP TO F24.**	1		NoPondOW2	
		0.10 to <0.50 acres (21,340 sq. ft).	0			
		0.50 to <1 acres.	0			
		1- 4 acres.	0			
		5 to <50 acres.	0			
		50 to <640 acres (1 sq. mi).	0			
		640 to <1000 acres.	0			
		1000 to 2500 acres.	0			
		>2500 acres (>4 sq.mi).	0			
F18	Ponded Open Water Distribution - (Driest) (WaterMixDry)	When water levels are lowest, during a normal year, the distribution of ponded open water patches larger than 0.01 acre (400 sq. ft) within the AA is:		[NR,INV,AM,WBN]		
		(a) Vegetation <u>and</u> **open water** <u>EACH comprise 30-70%</u> of the AA (including its bordering waters if any) AND **(b)** There are <u>many small patches</u> of open water scattered widely within vegetation or many small vegetation clump "islands" scattered widely within open water. Typical (for example) of some extensive bulrush and cattail marshes.	0			
		(a) Vegetation <u>and</u> **open water** <u>EACH comprise 30-70%</u> of the AA (including its bordering waters if any) AND **(b)** There are only a <u>few (or no) small patches</u> of open water scattered widely within vegetation or a few small vegetation clump "islands" scattered widely within open water.	0			
		(a) Vegetation <u>or</u> **open water** <u>comprise >70%</u> of the AA (and its bordering waters) AND **(b)** There are <u>several small patches</u> of open water scattered within vegetation or several small vegetation clump "islands" scattered within open water.	0			
		(a) Vegetation <u>or</u> **open water** <u>comprise >70%</u> of the AA (and its bordering waters) AND **(b)** Open water is <u>mostly in a single area</u> (e.g., center of the wetland) and vegetation is in the rest (e.g., periphery), with almost no intermixing. Typical of many ponds excavated for livestock watering, stormwater treatment, mineral extraction as well as many wetlands that are inundated only temporarily each year.	0			
F19	Floating Algae & Duckweed (Algae)	At some time of the year, <u>most</u> of the AA's otherwise-unshaded water surface is covered by floating mats of algae, or small (<1 inch) floating plants such as duckweed, *Azolla*, *Wolffia*, or *Riccia*. **Enter 1, if true.**	0	This includes most nontidal wetlands labeled as Aquatic Bed (AB) on NWI maps. If wetland can be visited only during winter, it may not be possible to answer this question with much certainty unless local sources are contacted or indicators (e.g., dried remains of algae) are found.		
F20	Floating-leaved & Submerged Aquatic Vegetation (SAV)	**SAV** (submerged & floating-leaved aquatic vegetation, excluding the species listed above) occupies an annual maximum of:		**SAV -** are herbaceous plants that characteristically grow at or below the water surface, i.e., whose leaves are primarily and characteristically under or on the water surface during most of the part of the growing season when surface water is present. Some species are rooted in the sediment whereas others are not. If pond lily (*Nuphar*) is the predominant species, consider its maximum extent only during the period when surface water is present beneath the leaves. [PR,OE,INV,FR,AM,WBF,WBN]		
		none, or <5% of the water area.	0		NoSAV	
		5 to <25% of the water area.	0			
		25 to <50% of the water area.	0			
		50 to 95% of the water area.	0			
		>95% of the water area.	0			
		many SAV plants present, but impossible to select from the above categories.	0			
F21	Width of Vegetated Zone (Driest) (WidthDry)	When water levels are lowest, during a normal year, but surface water still occupies <u>>400 sq feet or >1% of the AA</u> (which ever is more), the width of the **vegetated wetland** that separates the largest patch of open water within or bordering the AA from the closest adjacent uplands, is predominantly:		Measure the width perpendicular to the open water part. **Vegetated wetland -** in this case does not include underwater or floating-leaved plants, i.e., aquatic bed. In farmed wetlands that have different crops from year to year, consider vegetation condition as it probably existed during most of the past 5 years. Note: For most sites larger than 1 acre and with persistent water, measure the width using aerial imagery rather than estimating in the field. [WBN]		
		<5 ft, or no vegetation between upland and open water.	0			
		5 to <30 ft.	0			
		30 to <50 ft.	0			
		50 to <100 ft.	0			
		100 to 300 ft.	0			
		> 300 ft.	0			

F22	Beaver (Beaver)	Use of the AA by beaver during the past 5 years is: **Select most applicable ONE.**		**Valley width -** is delimited by an abrupt increase in slope on both sides of the channel.		
		Evident from direct observation or presence of gnawed limbs, dams, tracks, dens, or lodges.	0	[AM,WBN,SBM,PD,Sens]		
		Very likely based on known occurrence in this part of the region and proximity to ALL of the following **(a)** a persistent freshwater wetland, pond, or lake, or a perennial low-gradient (<5%) channel, and **(b)** average valley width is > 150 ft and **(c)** >20% cumulative cover of aspen, cottonwood, alder, and willow in vegetated areas within 150 ft of the AA's edge. Or there is evidence of beaver just outside the AA.	0			
		Somewhat likely based on known occurrence in this part of the region and proximity to ALL of the following **(a)** a persistent freshwater wetland, pond, or lake, or a perennial low or mid-gradient (<10%) channel, and **(b)** average valley width is >50 ft, and **(c)** >20% cumulative cover of hardwood trees and shrubs in vegetated areas within 150 ft of the AA's edge.	0			
		Unlikely because site characteristics above are deficient, and/or this is an area where beaver are routinely removed. But beaver occur within 2 miles.	0			
		None. Beaver are absent from this part of the region.	0			
F23	Isolated Island (Island)	During June, the wetland contains (or is part of) an island that is isolated from the shore by water depths >3 ft. The island may be solid, or it may be a floating vegetation mat suitable for nesting waterbirds. The island must be larger than 400 sq.ft and without inhabited buildings. **Enter 1, if true.**	0	[WBF,WBN]		
F24	Ice-free (IceDura)	During most years, most of the AA's surface water (if any) does **not** freeze, or freezes for fewer than 4 continuous weeks. **Enter 1, if true.**	1	[PR,FR,WBF]		

F25	Water Fluctuation Range - Maximum (Fluctu)	The **maximum vertical fluctuation** in surface water within the AA, during a normal year is:		**maximum vertical fluctuation** - is the difference between the highest annual and lowest annual water level during an average year. Use field indicators to assess this indicator. [WS,SR,PR,NR,CS,OE,INV,AM,WBN,PD]		
		<0.5 ft or stable.	1			
		0.5 to < 1 ft.	0			
		1 to <3 ft.	0			
		3 to 6 ft.	0			
		>6 ft.	0			
F26	% Only Saturated or Seasonally Flooded (SeasPct)	Identify the parts (if any) of the AA that never contain surface water (only saturated soil) or where the water (either ponded or flowing) usually remains on the land surface <u>for less than the entire growing season</u>. The percentage of the AA containing such areas is:		If you can identify plants, use their wetland indicator status to infer the possible extent of seasonal-only inundation within a wetland. Vegetation may be patterned in concentric or parallel zones, as one moves outward & away from the deepest part of the wetland or channel. Flood marks (algal mats, adventitious roots, debris lines, ice scour, etc.) may be evident when not fully inundated. In riverine systems, the extent of this zone can be estimated by multiplying by 2 the bankful height and visualizing where that would intercept the land along the river. Also, such areas often have a larger proportion of upland and annual (vs. perennial) plant species. Although useful only as a general guide, the NRCS county soil survey descriptions of the soil units and water feature table usually includes information on flooding frequency and saturation persistence. [SR,NR,CS,OE,INV,FA,WBF,WBN,POL,SBM,PD,Sens,EC]		
		<5% of the AA, or none (i.e., all water persists for >4 months).	0		NoSeasonal	
		5 to <25% of the AA.	0			
		25 to <50% of the AA.	0			
		50 to 75% of the AA.	0			
		>75% of the AA.	1			
F27	Salinity, Alkalinity, Conductance (Salin)	The AA's surface water is mostly:		Saline or brackish conditions are commonly indicated by a prevalence of particular plant species. Consult the <u>ORWAP SuppInfo</u> file's P_Salt worksheetfor a list of these. **Brackish or saline** - conductance of >5000 µS/cm, or >3200 ppm TDS **Slightly brackish** - conductance of 500- 5000 µS/cm, or 320 - 3200 ppm TDS **Fresh** - conductance of < 500 µS/cm, or <320 ppm TDS [PR,CS,AM]		
		Brackish or saline. Plants that indicate saline conditions dominate the vegetation. Salt crust may be obvious around the perimeter and on flats.	0			
		Slightly brackish. Plants that indicate saline conditions are common. Salt crust may or may not be present along perimeter.	0			
		Fresh. [<u>Note</u>: *Assume this to be the condition unless wetland is known to be a playa or there is other contradicting evidence*].	1		FreshW	
		Unknown.	0			
F28	Fish & Waterborne Pests (FishAcc)	**Select All that apply:**		[INV,FA,FR,AM,WBF]		
		A regularly-used boat dock is present within or contiguous to the AA.	0			
		A regularly-used boat dock is not within the AA, but there is one within 300 ft. of the AA and there is a persistent surface connection between the dock and the AA.	0			
		Fish (native or stocked) are known to be present in the AA, or can access it during at least one day annually.	0			
		None of the above, and could not estimate fish presence/absence.	1			
F29	Non-native Aquatic Animals (PestAnim)	The following are known or likely to have reproducing populations in this AA, its wetland, or in water bodies within 300 ft that connect to the AA at least seasonally. **Select All that apply:**		Assume non-native fish to be present if wetland is associated with a nearby reservoir, fish pond, or perennial stream flowing through an agricultural or residential area. Assume bullfrog, nutria, and/or carp to be present if (a) the AA contains persistent water or is flooded seasonally by an adjoining body of permanent water, and (b) not a forested wetland, and (c) in western Oregon, elevation is lower than about 3000 ft. In the ORWAP_SuppInfo file, see Inverts_Exo worksheet for more complete list of non-native invertebratesf or Oregon, and WetVerts worksheet for more complete list of fish that are not native to Oregon. You may also consult: http://nas.er.usgs.gov/queries/default.aspx http://www.dfw.state.or.us/conservationstrategy/invasive_species.asp [FA,FR,AM,EC]		
		Non-native amphibians (e.g., bullfrog) or reptiles (e.g., red-ear slider).	1			
		Carp.	0			
		Non-native fish that prey on tadpoles or turtles (e.g., bass, walleye, crappie, brook trout).	0			
		Non-native invertebrates (e.g., New Zealand mudsnail, mitten crab, rusty crayfish).	0			
		Nutria.	0			
		None of above.	0			

F30	Shorebird Feeding Habitats (Shorebd)	The extent of mudflats, very shallow waters, or shortgrass meadows, within the AA, that meet the definition of **shorebird habitat** for at least 3 months during the period of late summer through the following May is:		**Shorebird habitat** - areas must have **(a)** grasses shorter than 6", or a mudflat, during any part of this period, **AND (b)** soils that either are saturated or covered with <2 inches of water during any part of this period, **AND (c)** no detectable surrounding slope (e.g., not the bottom of an incised dry channel), **AND (d)** not shaded by shrubs or trees. See photograph in Appendix A of manual. This addresses needs of most migratory sandpipers, plovers, curlews, and godwits. [WBF]		
		None, or <100 sq. ft.	0			
		100 to <1000 sq. ft. within AA.	0			
		1000 to 10,000 sq. ft. within AA.	0			
		>10,000 sq. ft. within AA.	1			
F31	Outflow Duration (OutDura)	The most persistent surface water connection (outlet channel, pipe, ditch, or overbank water exchange) between the AA and the closest stream or lake located downslope is: [Note: If the AA represents only part of a wetland, answer this according to whichever is the least permanent surface connection: the one between the AA and the rest of its wetland, OR the surface connection between the AA's wetland and a mapped stream or lake located within 300 ft downslope from this wetland].	W	The emphasis is on the connection to a mapped stream network. A larger difference in elevation between the wetland-upland boundary and the bottom of the wetland outlet (if any) indicates shorter outflow duration.		
		Persistent (>9 months/year).	1	Do not rely only on topographic maps or NWI maps to show this; inspect while in field if possible, and ask landowner. The durations given are only approximate and are for a "normal" year. The connection need not occur during the growing season. Assume that depressions with effective nearby ditches or tile drains will connect for shorter periods. [WS,WCv,SR,PR,NR,CS,OE,FA,FR,Sens]		
		Seasonal (14 days to 9 months/year, not necessarily consecutive).	0			
		Temporary (<14 days, not necessarily consecutive).	0			
		None -- no surface water flows out of the wetland except possibly during extreme events (<once per 10 years). Or, water flows only into a wetland, ditch, or lake that lacks an outlet. **Enter 1 and SKIP TO F33.**	0		NoOutlet	
F32	Outflow Confinement (Constric)	During **major runoff events**, in the places described above where surface water exits the AA, it:	W	**Major runoff events** - would include biennial high water caused by storms and/or rapid snowmelt.		
		Is **impeded** as it mostly passes through a pipe, culvert, tidegate, narrowly breached dike, berm, beaver dam, or other partial obstruction (other than natural topography).	0	**Impeded** - means causing a delay or reduction in water velocity or volume.		
		Leaves mainly through natural surface exits, not largely through artificial or temporary features which **impede** or accelerate outflow.	0	[WS,SR,PR,NR,CS,OE,Sens,STR]		
		Is exported more quickly than usual as it mostly passes through ditches or pipes intended to accelerate drainage. They may be within the AA or connected to its outlet or within 30 ft of the AA's edge.	1			
F33	Tributary or Overbank Inflow (Inflow)	At least once annually, surface water from upstream or another water body moves into the AA. It may enter directly, or as unconfined overflow from a contiguous river or lake. If it enters only via a pipe, that pipe must be fed by a mapped stream or lake further upslope. **Enter 1, if true. If false, SKIP to F36.**	0	[SRv,PRv, PD]	Inflow	
F34	Input Channel Gradient (SlopeInChan)	The gradient of the tributary with the largest inflow, averaged over the 150 ft. before it enters the AA (but excluding any portion of the distance where water travels through a pipe) is:		[SRv, PRv]		
		<1%.	0			
		1 to <3%.	0			
		3 to 6%.	0			
		>6%.	0			
F35	Throughflow Complexity (ThruFlo)	**[Skip this question if the AA lacks both an inlet and outlet.]** During peak annual flow, water entering the AA in channels encounters which of the following conditions as it travels through the AA: **Select the ONE encountered most.**		This mainly refers to surface water that moves between the inlet and outlet. Some judgment is required in assessing straight vs. indirect flow path.		
		Does not bump into many plant stems as it travels through the AA. Nearly all the water continues to travel within unvegetated (often incised) channels and has minimal contact with wetland vegetation, or through a zone of open water such as an instream pond or lake.	0	See ORWAP Manual Appendix B diagram. [WS,SR,PR,NR,OE,INV,FA,FR,WBF,WBN,PD]		
		Bumps into herbaceous vegetation but mostly remains in fairly straight channels.	0			
		Bumps into herbaceous vegetation and mostly spreads throughout, or follows a fairly indirect path (in widely meandering, multi-branched, or braided channels).	0			
		Bumps into tree trunks and/or shrub stems but mostly remains in fairly straight channels.	0			
		Bumps into tree trunks and/or shrub stems and follows a fairly indirect path (meandering, multi-branched, or braided) from entrance to exit.	0			

F36	Internal Gradient (Gradient)	The gradient from the lowest to highest point of land within the AA (**or** from outlet to inlet) is:		Wetlands with no outlet, and wetlands where most surface water is impounded on site, should be considered flat (<2%). For other wetlands, estimate gradient as the elevation difference between the inlet and outlet (if any) divided by the distance between them, or the difference between the highest and lowest points in the wetland divided by the distance between them. [WS,SR,PR,NR,CS,OE,AM,WBF,WBN]		
		<2% (internal flow is absent or barely detectable; basically flat).	1			
		2 to <6%.	0			
		6 to 10%.	0		TooSteep1	
		>10%.	0		TooSteep2	
F37	Groundwater Strength of Evidence (Groundw)	**Select first one that applies:**		[WS,WC,NR,CS,OE,INV,FA,FR,PD]		
		In the AA or its wetland: **(a)** Springs are observed, OR **(b)** Water is markedly cooler in summer and warmer in winter (e.g., later ice formation) than in other local wetlands, OR **(c)** Measurements from shallow wells indicate groundwater is discharging to the wetland, OR **(d)** Water visibly seeps into pits dug within the AA during the driest time of the year and located >30 ft from the closest surface water.	0			
		The AA's wetland: **(a)** Is very close to the base of a natural slope steeper than 15% and longer than 300 ft or is located at a geologic fault, OR **(b)** Has no persistently flowing tributary AND one or more is true: (b1) Is on a natural slope of >5%, OR (b2) Has rust deposits ("iron floc"), colored precipitates, or dispersible natural oil sheen, OR (b3) Is in an **Arid or Semi-arid hydrologic unit**.	0	**Arid or Semi-arid hydrologic unit** - See the ORWAP Report's Hydrologic Landscape Class (under Location Information).		
		The AA is not in an **Arid or Semi-arid hydrologic unit**, but has persistent ponded water, no tributary, and is not fed by wastewater, concentrated stormwater, or irrigation water, or by an adjacent river or lake.	0			
		None of above is true, OR AA contains a hot spring. Some groundwater may nonetheless discharge to or flow through the wetland.	1			
F38	Unshaded Herbaceous Vegetation (Extent) (HerbExpos)	The annual maximum areal cover of herbaceous vegetation (excluding SAV, ferns, and mosses, but including forbs & graminoids) that is not beneath a woody canopy reaches:		Do not include submersed and floating-leaved aquatics (SAV) in the category of "herbaceous vegetation", or when defining the "vegetated part" of the site. For sites larger than 10 acres, this should be determined from aerial imagery rather than estimated in the field. [WBF,WBN]		
		<5% of the vegetated part of the AA. **Enter 1 and SKIP to F42.**	0		NoHerb	
		5 to <25% of the vegetated part of the AA.	0			
		25 to <50% of the vegetated part of the AA.	0			
		50-95% of the vegetated part of the AA.	1			
		>95% of the vegetated part of the AA.	0			
F39	Forb Cover (Forb)	Within parts of the AA having herbaceous cover (excluding SAV), the areal cover of **forbs** reaches an annual maximum of:		**Forbs -** are flowering non-woody vascular plants (excludes grasses, sedges, ferns, mosses). [POL]		
		<5% of the herbaceous part of the AA.	0			
		5 to <25% of the herbaceous part of the AA.	0			
		25 to <50% of the herbaceous part of the AA.	1			
		50 to 95% of the herbaceous part of the AA.	0			
		>95% of the herbaceous part of the AA.	0			
F40	Species Dominance - Herbaceous (HerbDom)	Determine which two native herbaceous (forb, fern, and graminoid) species comprise the greatest portion of the herbaceous cover that is unshaded by a woody canopy. **Then select one:**		[INV,WBF,SBM,PD,POL,Sens,EC]		
		Those species together comprise more than half of the areal cover of native herbaceous plants at any time during the year, i.e., one dominant species or two co-dominants. **Also mark this if <20% of the vegetated cover is native species.**	1			
		Those species together comprise less than half of the areal cover of native herbaceous plants at any time during the year.	0			

F41	Invasive or Non-native - % of Vegetative Cover (Invas)	Vegetative cover (annual maximum) is:		In the ORWAP_SuppInfo, see P_Invas worksheet for list of invasives and P_Exo for non-native species list. Examples of woody invasives are Himalayan blackberry, English ivy, scotch broom, and gorse. For known distributions of invasive plants in your area see: http://inr.oregonstate.edu/orbic/invasive-species and http://www.weedmapper.org/maps.html but do not limit your answer based only on that information. Consider most crops to be non-native. [WBF,PD,POL,Sens,EC]		
		Overwhelmingly (>80% cover) non-native species AND >10% of the herbaceous cover is invasive species. (See ORWAP SuppInfo file for species designations).	0		InvasDom	
		Overwhelmingly (>80% cover) non-native species AND <10% of the herbaceous cover is invasive species; OR 50-80% of cover is non-native species regardless of invasiveness.	0			
		Mostly (50-80%) native species.	1			
		Overwhelmingly (>80%) native species.	0			
F42	Mowing, Grazing, Fire (VegCut)	There is evidence that grazing by domestic or wild animals -- or mowing (multiple times per year), plowing, herbicides, harvesting, or fire -- has **repeatedly** reduced the AA's vegetation cover (plants that normally grows taller than 4") to less than 4 inches, or has created an obvious browse line, over the following extent:		**Repeatedly** - means the condition occurred in at least half of the last 10 years. [SR,AM,WBN,SBM,PD,EC]		
		0% (No evidence of such activities).	0		NoMowGraze	
		Trace to 5% of the normally vegetated AA (grazing, mowing, or fire have occurred but vegetation height effects are mostly unnoticeable).	0			
		5 to <50% of the normally vegetated AA.	0			
		50 to 95% of the normally vegetated AA.	1			
		>95% of the normally vegetated AA.	0			
F43	Historically Lacking Trees (HistVeg)	According to the ORWAP Report, the presettlement vegetation class in the vicinity of the AA was prairie, sagebrush, or other open lands not dominated by trees. In addition, the AA is not within the biennial floodplain of a river where trees and shrubs typically dominate when conditions are unaltered. **Enter 1, if true.**	1	In the ORWAP Report's Location Information table. This question is used as a classification variable mainly to set appropriate expectations for the extent of forest cover.	HistOpenland	
F44	Moss Wetland (Moss)	The AA's ground cover is primarily a deep layer of moss, and/or soils are mainly peat or organic muck. Also, the soil remains water-saturated to within 3 inches of the surface during most of a normal year. Surface water within the AA often is absent or confined to small scattered pools or ditches. **Enter 1, if true.**	0	Includes most bogs and fens. May be a floating island. [NR,CS,OE,WBF,WBN,Sens]		
F45	Woody Extent (WoodyPct)	Within the vegetated part of the AA, woody vegetation (trees, shrubs, **robust vines**) taller than 3 ft occupies:		**Robust vines** - include Himalayan blackberry and others that are generally erect and taller than 1 ft. **Vegetated part** - should not include floating-leaved or submersed aquatics. For sites larger than 1 acre, this should be determined from aerial imagery rather than estimated only in the field. [NR,WC,CS,SBM,PD,Sens]		
		<5% of the vegetated AA, and fewer than 10 trees are present. **Enter 1 and SKIP to F51.**	0		NoWoody	
		<5% of the vegetated AA, but more than 10 trees are present.	0			
		5 to <25% of the vegetated AA.	0			
		25 to <50% of the vegetated AA.	1			
		50 to 95% of the vegetated AA.	0			
		>95% of the **vegetated part** of the AA.	0			
F46	Woody Diameter Classes (TreeDiams)	**Select All the types** that comprise >5% of the woody canopy cover in the AA or >5% of its **wooded upland edge** if any:		**Wooded upland edge**- includes woody plants located within one tree-height of the wetland-upland boundary. **DBH** is the diameter of the tree measured at 4.5 ft above the ground. [CS,SBM,POL,Sens]		
		Deciduous 1-4" diameter (DBH) and >3 ft tall.	1			
		Evergreen 1-4" diameter and >3 ft tall.	0			
		Deciduous 4-9" diameter.	1			
		Evergreen 4-9" diameter.	0			
		Deciduous 9-21" diameter.	0			
		Evergreen 9-21" diameter.	0			
		Deciduous >21" diameter.	0			
		Evergreen >21" diameter.	0			

F47	Snags (Snags)	The number of large **snags** (diameter >12 inches) in the AA plus 100 ft uphill of its edge is:		**Snags -** are standing trees at least 20 ft tall that are mainly without bark or foliage.		
		Few or none.	1	[SBM,POL]		
		Several.	0			
F48	Abovewater Wood (WoodOver)	The number of horizontal wood pieces thicker than 4 inches that are partly submerged during most of the spring or early summer, thus potentially serving as basking sites for turtles, birds, or frogs and cover for fish is:		Only the wood that is at or above the water surface is assessed because of the impracticality of assessing underwater wood accurately when using a rapid assessment method.		
		None.	1	[FA,FR,AM]		
		Few.	0			
		Several (e.g., >3 per 300 ft of channel or shoreline).	0			
F49	Downed Wood (WoodDown)	The number of downed wood pieces longer than 6 ft and with diameter >4 inches that are not submerged during most of the growing season, is:		Exclude temporary "burn piles."		
		Few or none.	1	[INV,AM,SBM,POL]		
		Several.	0			
F50	Exposed Shrub Canopy (ShrExpos)	Within the **vegetated part** of the AA, shrubs shorter than 20 ft that are not overtopped by trees occupy: Select first statement that is true.		**Vegetated part -** should not include floating-leaved or submersed aquatics.		
		<5% of the vegetated AA and <0.01 acre (400 sq ft).	0	[SBM,PD]		
		5 to <25% of the vegetated AA or the water edge (whichever is greater in early summer).	1			
		25 to <50% of the vegetated AA or the water edge (whichever is greater in early summer).	0			
		50 to 95% of the vegetated AA or the water edge (whichever is greater in early summer).	0			
		>95% of the vegetated part of the AA or the water edge (whichever is greater in early summer).	0			
F51	N Fixers (Nfix)	The percentage of the vegetated area in the AA or along its water edge (whichever has more) that contains nitrogen-fixing plants (e.g., alder, baltic rush, scotch broom, lupine, clover, alfalfa, other legumes) is:		For a more complete list, see ORWAP_SuppInfo, worksheet NFIX (includes native and non-native species). Do not include algae.		
		<1% or none.	0	[OE,INV,Sens]		
		1 to <25%.	1			
		25 to <50%.	0			
		50 to 75%.	0			
		>75%.	0			
Note for the next four questions: If the AA lacks an upland edge, evaluate based on the AA's entire perimeter and outward into whatever areas are adjacent. In many situations, these questions are best answered by measuring from aerial images.						
F52	Upland Perennial Cover - % of Perimeter (PerimPctPer)	The percentage of the AA's edge (perimeter) that is comprised of a band of upland **perennial cover** wider than 10 ft and taller than 6 inches, during most of the growing season is:		**Perennial cover** - vegetation that includes wooded areas, native prairies, sagebrush, as well as relatively unmanaged commercial lands in which the ground is disturbed less frequently than annually such as perennial ryegrass fields, hayfields, lightly grazed pastures, timber harvest areas, and rangeland.		
		<5%.	0			
		5 to <25%.	0			
		25 to <50%.	1	It does not include water, row crops (vegetable, orchards, Christmas tree farms), residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads.		
		50 to <75%.	0	[WCv,SRv,PRv,INV,FA,AM,WBF,WBN,SBM,PD,POL,POLv,Sens,STR]		
		75 to 95%.	0			
		>95%.	0			

F53	Upland Perennial Cover - Width (Buffer) (BuffWidth)	Along the greatest extent of the AA's **upland edge**, the width of **perennial cover** taller than 6 inches that extends upslope from the AA until mostly shorter or non-perennial cover is reached is: [NOTE: the width is not necessarily the maximum width. Base on vegetation that occurs most of the growing season.]		**Upland edge** - is the land within 3 ft of the wetland's perimeter that is not wetland. [WCv,SRv,PRv,INV,FA,AM,WBN,SBM,PD,POL,Sens,STR]		
		< 5 ft, or none.	0		NoUpPerCov	
		5 to <30 ft.	1			
		30 to <50 ft.	0			
		50 to <100 ft.	0			
		100 to 300 ft.	0			
		> 300 ft.	0		AllUpPerren	
F54	Upland Trees as % of All Perennial Cover (UpTreePctPer)	Within 100 f.t landward from the AA's edge (perimeter), the percentage of the upland perennial cover that is woody plants taller than 20 ft is:		Base this on the cumulative canopy width of the trees. [WSv,FA,WBF,WBN,SBM]		
		<5%, or there is no upland perennial cover along the upland edge.	0			
		5 to <25% of perennial cover.	1			
		25 to <50% of perennial cover.	0			
		50 to <75% of perennial cover.	0			
		75 to 95% of perennial cover.	0			
		>95% of perennial cover.	0			
F55	Weeds - % of Upland Edge (UpWeed)	Along the AA's edge (perimeter), the cover of invasive woody or herbaceous plants occupies: [If vegetation is so senesced that apparently-dominant edge species cannot be identified even to genus, answer "none"].		See ORWAP_SuppInfo file, worksheet P_Invas. Some of the most common invaders along upland edges of Oregon wetlands are Himalayan blackberry, knotweed, sweetbrier rose, Russian olive, English ivy, nightshade, pepperweed, medusahead, white clover, ryegrass, quackgrass, false brome, bentgrass, dandelion, oxeye daisy, pennyroyal, bull and creeping thistles, tansy ragwort, poison hemlock, and teasel. If a plant cannot be identified to species (e.g., winter conditions) but its genus contains an invasive species, assume the unidentified plant to also be invasive. [PD,STR]		
		<5%, or none.	0			
		5 to <25%.	0			
		25 to <50%.	1			
		50 to <75%.	0			
		75 to 95%.	0			
		>95%.	0			
F56	Bare Ground & Accumulated Plant Litter (Gcover)	Consider the parts of the AA that go dry during a normal year. Viewed from 6 inches above the soil surface, the condition in most of that area just before the year's longest inundation period begins is:		**Bare ground-** includes unvegetated soil, rock, sand, or mud between stems if any. Bare ground under a tree or shrub canopy should be counted. Wetlands that are dominated by annual plant species tend to have more extensive areas that are bare during the early growing season. [WS,WC,SR,PR,NR,CS,OE,INV,AM,SBM,POL,Sens,EC]		
		Little or no (<5%) **bare ground** is visible between erect stems or under canopy and there is little or no dead detached plant tisuse (thatch) remaining on top of the ground surface and ground surface is extensively blanketed by moss, lichens, graminoids with great stem densities, or plants with ground-hugging foliage.	0			
		Some (5-20%) bare ground or remaining thatch is visible. Herbaceous plants have moderate stem densities and do not closely hug the ground.	1			
		Much (20-50%) bare ground or thatch is visible. Low stem density and/or tall plants with little living ground cover during early growing season.	0			
		Mostly (>50%) bare ground or thatch.	0			
		Not applicable. All of the AA is inundated throughout most years.	0			
F57	Ground Irregularity (Girreg)	In parts of the AA that lack persistent water, the number of small pits, raised mounds, hummocks, boulders, upturned trees, animal burrows, islands, natural levees, wide soil cracks, and microdepressions is:		**Microtopography** - refers mainly to vertical relief of <3 ft and is represented only by inorganic features, except where plants have created depressions or mounds of soil. Consider the microtopography to be "few or none" if one could walk easily through most of the AA once any slash and logs are removed. Consider it to be "several" if one has to constantly look down and check balance. [WS,SR,PR,NR,INV,AM,SBM,PD,POL,EC]		
		Few or none, or the entire AA is always water-covered. Minimal **microtopography**; <1% of the AA, e.g., many flat sites having a single hydroperiod.	0			
		Intermediate.	1			
		Several (extensive micro-topography).	0			
F58	Soil Composition (SoilTex)	Based on digging into the substrate and examining the surface layer of the soil (2 inch depth) that was mapped as being predominant, its composition (excluding **duff** and living roots) is mostly:		Do not base the texture on soil maps unless the AA is inaccessible. See ORWAP Manual's protocol (Step 2 of section 5.3 and the soil chart in Appendix B). Judge which soil type is predominant only in the part of the AA that is not inundated at the time of your visit. **Duff** - is loose organic surface material, e.g., dead plant leaves and stems). Organic soils are much less common in floodplains. [WS,PR,NR,CS,OE,PD,Sens]		
		Loamy: includes silt, silt loam, loam, sandy loam.	0			
		Clayey: includes clay, clay loam, silty clay, silty clay loam, sandy clay, sandy clay loam.	1			
		Organic: includes muck, mucky peat, peat, and mucky mineral soils (blackish or grayish). Exclude live roots unless they are moss.	0			
		Coarse: includes sand, loamy sand, gravel, cobble, stones, boulders, fluvents, fluvaquents, riverwash.	0			
F59	Cliffs or Banks (Cliff)	Within 300 ft of the AA, there are elevated terrestrial features such as cliffs, bluffs, talus slopes, or unarmored stream banks that extend at least 6 ft nearly vertically, are unvegetated, and potentially contain crevices or other substrate suitable for nesting or den areas. **Enter 1, if true.**	0	[SBM,POL]		

F60	Restored or Created Wetland (NewWet)	The AA is (or is within, or contains) a "new" wetland resulting from human actions (e.g., excavation, impoundment) or other factors affecting what was upland (non-hydric) soil. Or, some part of the AA was originally a wetland, was artificially drained for many years, and has since had its water regime partly or wholly restored or rehabilitated (e.g., by ditch plugs, berms, tile breakage, non-maintenance).		Include wetlands whose area was likely expanded by road berms which impeded runoff, but do not include wetlands created by beaver dams except for the part where flooding affected uplands (not just existing wetlands and streams). Determine this using historical aerial photography, old maps, soil maps, consultation with landowners, and/or permit files as available. See ORWAP Map Viewer's Hydric Soil layer (expend Soils). Also, locations of some restoration wetlands can be found in the ORWAP Map Viewer under Restoration. Another potential source is the Conservation Registry: https://oregonexplorer.info/content/conservation-registry?topic&ptopic. [PR,NR,CS,OE,PD,Sens]	
		Yes, and constructed or restored mostly within last 3 years.	0		
		Yes, and constructed or restored mostly 3-7 years ago.	0		
		Yes, and constructed or restored mostly >7 years ago.	0		
		Yes, but time of origin or restoration unknown.	0		
		No.	1		NotNewWet
		Unknown if wetland is constructed, restored, or natural.	0		
F61	Ownership (Ownership)	Most of the AA is:		An initial indication of ownership can be found on the ORWAP Map Viewer under the Land Ownership layer (expand Land Classification). However, it is advisable to ask local sources or use local maps with higher precision. [PUv]	
		Publicly owned (municipal, county, state, federal).	0		
		Owned by non-profit conservation organization or easement holder who allows public access to this AA.	0		
		Other private ownership, including tribal. **Enter 1 and SKIP to F63.**	1		PrivateOwn
F62	Special Protected Area Designation (Desig)	The AA is part of an area designated as a Special Protected Area according to the USGS Protected Areas Database of the U.S. **Enter 1, if true.**	0	See the ORWAP Map Viewer Report under the Location Information section for "In Special Protected Area?" [PUv]	
F63	Conservation Investment (ConsInvest)	The AA is not a mitigation wetland, but public funds or community volunteer efforts have been applied to preserve, create, restore, or enhance the condition or functions of the wetland. (e.g. CRP or WRP wetlands, community projects). **Enter 1, if true. (If unknown, leave 0).**	0	Locations of some restoration wetlands can be found in the ORWAP Map Viewer under Restoration. Another potential source is the Conservation Registry: https://oregonexplorer.info/content/conservation-registry?topic&ptopic [PUv]	
F64	Compensation Wetland (MitWet)	The AA is all or part of a compensation site used explicitly to offset impacts elsewhere. **Enter 1, if true. (If unknown, leave 0).**	0	Answer to the best of your knowledge. Sources for information include the property owner, DSL, and/or the ACOE. [PUv]	
F65	Sustained Scientific Use (SciUse)	Plants, animals, or water in the AA have been monitored for >2 years, unrelated to any regulatory requirements, and data are available to the public. Or the AA is part of an area that has been designated by an agency or institution as a benchmark, reference, or status-trends monitoring area. **Enter 1, if true. (If unknown, leave 0)**	0	[PUv]	
F66	Visibility (Visibil)	The maximum percentage of the wetland that is visible from the best vantage point on public roads, public parking lots, public buildings, or public maintained trails that intersect, adjoin, or are within 300 ft of the AA is **(Select ONE):**		[WBFv,WBNv,SBMv,PUv,STR]	
		<25%.	1		
		25 - 50%.	0		
		>50%.	0		

F67	Non-consumptive Uses - Actual or Potential (RecPoten)	**Select All statements that are true** of this AA as it currently exists:		The question assumes access is allowed.		
		Walking is physically possible in >5% of the AA during most of year (e.g., free of deep water and dense shrub thickets).	1	[PUv]		
		All or part of the AA (or an area within sight of the AA and within 100 ft) would be physically accessible to people in wheelchairs (e.g., paved and flat).	0			
		Maintained roads, parking areas, or foot-trails are within 30 ft of the AA, or the AA can be accessed most of the year by boat.	0			
		Within or near the AA, there is an interpretive center, trails with interpretive signs or brochures, and/or regular guided interpretive tours.	0			
F68	Core Area 1 (VisitNo)	The percentage of the AA almost never walked or driven by humans during an average growing season probably comprises: [Note: If more than half the wetland is visible from areas within 100 ft of the AA, include visits by people to those areas that are actually walked or driven (not simply viewed from].		Judge this based on proximity to population centers, roads, trails, accessibility of the AA to the public, wetland size, usual water depth, and physical evidence of human visitation.		
		<5% and no inhabited building is within 300 ft of the AA.	0	Exclude visits that are not likely to continue and/or that are not an annual occurrence (e.g., by construction, maintenance, or monitoring crews).		
		<5% and inhabited building is within 300 ft of the AA.	1			
		5 to <50% and no inhabited building is within 300 ft of the AA.	0	[AM,WBF,WBN,SBM,PD,PUv,STR]		
		5 to <50% and inhabited building is within 300 ft of the AA.	0			
		50 to 95% with or without inhabited building nearby.	0			
		>95% of the AA with or without inhabited building nearby.	0			
F69	Core Area 2 (VisitOften)	The part of the AA visited by humans <u>almost daily for several weeks</u> during an average growing season probably comprises: [The Note in the preceding question applies here as well].		See note above.		
		<5%.	0	[AM,WBF,WBN,SBM,PD,PUv,STR]		
		5 to <50%.	1			
		50 to 95%.	0			
		>95% of the AA.	0			
F70	Consumptive Uses (Provisioning Services) (Hunt)	Recent evidence was found <u>within the AA</u> of the following potentially-sustainable consumptive uses. **Select All that apply.**		Evidence of these consumptive uses may consist of direct observation, or presence of physical evidence (e.g., recently cut stumps, fishing lures, shell cases), or might be obtained from communication with the land owner or manager.		
		Low-impact commercial timber harvest (e.g., selective thinning).	0			
		Commercial or traditional-use harvesting of native plants, their fruits, or mushrooms.	0	[FRv,WBFv,PUv]		
		Waterfowl hunting.	0			
		Fishing.	0			
		Trapping of furbearers.	0			
		None of the above.	1			
F71	Domestic Wells (Wells)	Wells or water bodies that currently provide drinking water are:		If unknow, assume this is true if there is an inhabited structure within the specified distance and the neighborhood is known to not be connected to a municipal drinking water system (e.g., is outside an urban growth boundary or other densely settled area).		
		<300 ft and downslope from the AA or at same elevation.	0			
		300 to 1500 ft and downslope or at same elevation.	1			
		>1500 ft downslope, or none downslope, or no information.	0	[NRv]		

F72	Wetland Type of Conservation Concern (RareType)	Does the AA contain, or is it part of, any of these wetland types? **Select All that apply.**	W	Consult the ORWAP Report under the Location Information table for "Rare Wetland Types." But be aware that it may not apply to the exact AA you have delimited. [PDv, Sens]		
		Mature forested wetland (anywhere): a wetland in which mean diameter of trees (d.b.h., FACW and FAC species only) exceeds 18 inches, and/or the average age of trees exceeds 80 years, or there are >5 trees/acre with diameter >32 inches.	0	To qualify, the diameter of >18 inches must be the mean measured from at least 10 trees.		
		Bog or Fen: contains a sponge-like organic soil layer which covers most of the AA and often has extensive cover of sedges and/or broad-leaved evergreen shrubs (e.g., Ledum). Often lacks tributaries, being fed mainly by groundwater and/or direct precipitation.	0			
		Playa, Salt Flat, or Alkaline Lake: a nontidal ponded water body usually having saline (salinity >1 ppt or conductivity >1000 µS) or alkaline (conductivity >2000 µS and pH >9) conditions and large seasonal water level fluctuations (if inputs-outputs unregulated). If a playa or salt flat, vegetation cover is sparse and plants typical of saline or alkaline conditions (e.g., Distichlis, Atriplex) are common.	0	See ORWAP_SuppInfo file, worksheet P_Salt for species typically occurring in tidal or saline conditions.	Playa	
		Hot spring (anywhere): a wetland where discharging groundwater in summer is >10 degrees (F) warmer than the expected water temperature.	0			
		Native wet prairie (west of the Cascade crest): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, and dominated primarily by native graminoids often including species in column E.	0	Deschampsia caespitosa, Danthonia californica, Camassia quamash, Triteleia hyacinthina, Carex densa, C. aperta, and/or C. unilateralis		
		Vernal pool (Willamette Valley): a seasonally inundated wetland, underlain by hardpan or claypan, with hummocky micro-relief, usually without a naturally-occurring inlet or outlet, and with native plant species distinctly different from those in slightly higher areas, and often including species in column E.	0	Downingia elegans, Isoetes nuttallii, Triteleia hyacinthina, Eleocharis spp., Eryngium petiolatum, Plagiobothrys figuratus, Plagiobothrys scouleri, Grindelia nana, Veronica peregrina, Lasthenia glaberrima , Cicendia quadrangularis, Kickxia elatine, Gnaphalium palustre, and/or Callitriche spp.		
		Vernal pool (Medford area): a seasonally inundated acidic wetland, underlain by hardpan, with hummocky micro-relief, usually without a naturally-occurring inlet or outlet, and having concentric rings of similar native vegetation, often including species in column E.	0	Downingia vina, Isoetes nuttalli, Pilularia americana, Triteleia hyacinthina, Eleocharis spp., Eryngium petiolatum, Plagiobothrys brachteatus, Plagiobothrys scouleri, Grindelia nana, Veronica peregrina, Alopecurus saccatus, Lasthenia californica, Deschampsia danthonioides, and/or Callitriche spp.		
		Vernal pool (Modoc basalt & Columbia Plateau): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, located on shallow basalt bedrock and often having species in column E.	0	Blennosperma nanum, Camassia quamash, Epilobium densiflorum, Callitriche marginata, Cicendia quadrangularis, Eryngium vaseyi, Psilocarphus brevissimus, and/or Sedella pumila.		
		Interdunal wetland (Coastal ecoregion): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, located between sand dunes where wind has scoured the sand down to the water table (deflation plain, blowout pond), and often with significant cover of the native species in column E.	0	Carex obnupta, Argentina egedii, Juncus lesueurii, J. nevadensis, J. falcatus, Sisyrinchium californicum, and/or Salix hookeriana		
		Ultramafic soil wetland (mainly southwestern Oregon): a low-elevation wetland, usually with a sponge-like organic soil layer, occurring in an area with exposed serpentine or peridotite rock, and/or in soils with very low Ca:Mg ratios.	0			
		None of above.	1			

Site: NEXT Renewable Fuels Oregon (Wetlands 1-3)		Name: Sue Brady		Date:10/1/20		
Form S Stresser Data ORWAP V 3.2					Data	Comments
S1	**Aberrant Timing of Water Inputs (AltTiming)**					
	*In the "Data" column, **place an X** next to any item that is likely to have caused the **timing** of water inputs (but not necessarily their volume) to shift by hours, days, or weeks, becoming either **more muted** (smaller or less frequent peaks spread over longer times, more temporal homogeneity of flow or water levels) **or more flashy** (larger or more frequent spikes but over shorter times).*					
	Control structure that regulates inflow to the AA (including tide gates), or flow regulation in tributaries, or water level in adjoining water body is regulated.					
	Irrigation runoff or seepage.				x	
	Snow storage areas that drain directly to the wetland.					
	Increased pavement and other impervious surface in the CA.					
	Straightening, ditching, dredging, and/or lining of tributary channels in the CA.				x	
	*If **any** items were checked above, then for each row of the table below, you may assign points (3, 2, or 1). However, if you believe the checked items had no measurable effect on the timing of water conditions in any part of the AA, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition, if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Spatial extent within the AA of timing shift.	>95% of AA.	5-95% of AA.	<5% of AA.	2	
	When most of the timing shift began.	<3 yrs ago.	3-9 yrs ago.	10-100 yrs ago.	1	
	Score the following 2 rows only if the altered inputs began within past 10 years, and only for the part of the AA that experiences those.					
	Input timing now vs. previously.	Shift of weeks.	Shift of days.	Shift of hours or minutes.	0	
	Flashiness or muting.	Became very flashy or controlled.	Intermediate.	Became mildly flashy or controlled.	0	
				Sum=	3	
				Final score=	0.25	
S2	**Accelerated Inputs of Nutrients (NutrLoad)**					
	*In the "Data" column, **place an X** next to any item -- occurring in either the AA or its RCA -- that is likely to have accelerated the inputs of nutrients (nitrogen, phosphorus) to the AA.*					
	Stormwater or wastewater effluent (including failing septic systems), landfills.					
	Fertilizers applied to lawns, ag lands, or other areas in the RCA.				x	
	Livestock, dogs.				x	
	Artificial drainage of upslope lands.				x	
	Other waterborne human-related nutrient sources within the RCA.					
	*If **any** items were checked above, then for each row of the table below, you may assign points. However, if you believe the checked items did not cumulatively expose the AA to significantly more nutrients, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Usual load of nutrients.	Large (e.g., feedlots, extensive residential on septic) or or 303d* for nutrients.	Moderate (e.g., grazing, light residential on septic, light agriculture).	Limited (e.g., a few animals, lawns, sewered residential).	2	
	Frequency & duration of input.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & during high runoff events mainly.	3	
	AA proximity to main sources (actual or potential).	0 - <50 ft.	50-300 ft. or in groundwater.	In other part of contributing area.	3	
				Sum=	8	
				Final score=	0.89	
S3	**Accelerated Inputs of Contaminants and/or Salts (ContamIn).**					
	*In the "Data" column, **place an X** next to any item -- occurring in either the AA or its RCA -- that is likely to have accelerated the inputs of contaminants or salts to the AA.*					
	Stormwater or wastewater effluent (including failing septic systems), landfills, snow storage areas.					
	Metals & chemical wastes from mining, shooting ranges, oil/ gas extraction, other sources.					
	Irrigation of lands, especially those with saline soils.				x	
	Oil or chemical spills (not just chronic inputs) from nearby roads.					
	Road salt.					
	Pesticides applied to lawns, ag lands, roadsides, or other areas in the RCA, but excluding spot applications for controlling non-natives in the AA.				x	
	Artificial drainage of contaminated or saline soils.					
	Erosion of contaminated soils.					
	Other contaminant sources within the RCA.					
	*If **any** items were checked above, then for each row of the table below, you may assign points. However, if you believe the checked items did not cumulatively expose the AA to significantly higher levels of contaminants and/or salts, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Usual toxicity of most toxic contaminants.	Industrial effluent or 303d* for toxics.	Wastewater treatment plant, cropland, fossil fuel extraction, pipeline, power station, managed landfill.	Low density residential or commercial.	2	
	Frequency & duration of input.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & during high runoff events mainly.	2	
	AA proximity to main sources (actual or potential).	0 - <50 ft.	50-300 ft. or in groundwater.	In other part of contributing area.	3	
	* See ORWAP Map Viewer for waters designated as 303d; see Oregon DEQ web site for reasons.			Sum=	7	
				Final score=	0.78	

S4	**Excessive Sediment Loading from Runoff Contributing Area (SedRCA).**				
	*In the "Data" column, **place an X** next to any item present in the RCA that is likely to have elevated the load of waterborne or windborne sediment reaching the AA from its RCA.*				
	Erosion from plowed fields, fill, timber harvest, dirt roads, vegetation clearing, fires.				x
	Erosion from construction, in-channel machinery in the RCA.				x
	Erosion from off-road vehicles in the RCA.				
	Erosion from livestock or foot traffic in the RCA.				x
	Stormwater or wastewater effluent.				
	Sediment from road sanding, gravel mining, other mining, oil/ gas extraction.				
	Accelerated channel downcutting or headcutting of tributaries due to altered land use.				
	Other human-related disturbances within the RCA.				
	*If **any** items were checked above, then for each row of the table below you may assign points (3, 2, or 1) in the last column that describe the combined maximum effect of those items in increasing the amount or transport of sediment into the AA. To estimate that, contrast it with the condition if checked items never occurred or were no longer present.*				
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)	
	Erosion in RCA.	Extensive evidence, high intensity*.	Potentially (based on high-intensity* land use) or scattered evidence.	Potentially (based on low-intensity* land use) with little or no direct evidence.	2
	Recentness of significant soil disturbance in the RCA.	Current & ongoing.	1-12 months ago.	>1 yr ago.	2
	Duration of sediment inputs to the AA.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & mainly during high runoff or severe wind events.	2
	AA proximity to actual or potential sources.	0 - <50 ft., or farther but on steep erodible slopes.	50-300 ft.	In other part of contributing area.	3
	* **High**-intensity= plowing, grading, excavation, erosion with or without veg removal; **low**-intensity= veg removal only with little or no apparent erosion or disturbance of soil or sediment.			Sum=	9
				Final score=	0.75

S5	**Soil or Sediment Alteration *Within the Assessment Area* (SoilDisturb).**				
	*In the "Data" column, **place an X** next to any item present in the AA that is likely to have compacted, eroded, or otherwise altered the AA's soil.*				
	Compaction from livestock, machinery, off-road vehicles, or mountain bikes, especially during wetter periods.				x
	Leveling or other grading not to the natural contour.				x
	Tillage, plowing (but excluding disking for enhancement of native plants).				x
	Fill, riprap, other armoring, excluding small amounts of upland soils containing organic amendments (compost, etc.) or small amounts of topsoil stockpiled or imported from another wetland.				
	Excavation.				x
	Dredging in or adjacent to the AA.				x
	Boat traffic in or adjacent to the AA and sufficient to cause shore erosion or stir bottom sediments.				
	Artificial water level or flow manipulations sufficient to cause erosion or stir bottom sediments.				
	*If **any** items were checked above, then for each row of the table below you may assign points (3, 2, or 1) in the last column that describe the combined maximum effect of those items in altering the AA's soils. To estimate that, contrast it with the soil condition if checked items never occurred or were no longer present.*				
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)	
	Spatial extent of altered soil.	>95% of AA or >95% of its upland edge (if any).	5-95% of AA or 5-95% of its upland edge (if any).	<5% of AA and <5% of its upland edge (if any).	2
	Recentness of significant soil alteration in AA.	Current & ongoing.	1-12 months ago.	>1 yr ago.	3
	Duration.	Long-lasting, minimal veg recovery.	Long-lasting but mostly revegetated.	Short-term, revegetated, not intense.	2
	Timing of soil alteration.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & mainly during scattered events.	2
				Sum=	9
				Final score=	0.75

Oregon Rapid Wetland Assessment (ORWAP) V.3.2.*	Cover Page: Basic Description of Assessment
Site Name:	EXT Renewable Fuels Oregon (mitigation pre-constructio
Investigator Name:	Sue Brady
Date of Field Assessment:	5/6/2021
County:	Columbia
Nearest Town:	Clatskanie
Latitude (decimal degrees):	46.162572
Longitude (decimal degrees):	-123.177233
TRS, quarter/quarter section and tax lot(s):	T8N R4W Sections 21, 27, 28, 33, 34
Approximate size of the Assessment Area (AA, in acres):	580
AA as percent of entire wetland (approx.). Attach sketch map if AA is smaller than the entire contiguous wetland.	50%
If delineated, DSL file number (WD #) if known:	delineation number not yet assigned
Cowardin Systems & Classes (indicate all present, based on field visit and/or aerial imagery): Systems: Palustrine =P, Riverine =R, Lacustrine =L, Estuarine =E Classes: Emergent =EM, Scrub-Shrub =SS, Forested =FO, Aquatic Bed (incl. SAV) =AB, Open Water =OW, Unconsolidated Bottom =UB, Unconsolidated Shore =US	PEM, PSS, PFO
Predominant HGM Class: Estuarine=E, Lacustrine=L, Riverine=R, S= Slope, F= Flats, D= Depressional	Flats
Soil Unit Mapped in Most of the AA:	Wauna-Locoda silt loams, protected
If tidal, the tidal phase during most of visit:	n/a
What percent (approximate) of the **wetland** were you able to visit?	50
What percent (approximate) of the **AA** were you able to visit?	100
Have you attended an ORWAP training session? If so, indicate approximate month & year.	Oct-11
How many wetlands have you assessed previously using ORWAP (approximate)?	20+
Comments about the site or this ORWAP assessment (attach extra page if desired):	In order to evaluate the pre-construction functions and values of the site, this assessment is for the projected condition after the existing timber plantations have been harvested.

ORWAP V.3.2 Site Name:	NEXT Renewable Fuels Oregon (mitigation pre-construction)
Investigator Name:	Sue Brady
Date of Field Assessment:	5/6/2021

Scores will appear below after data are entered in worksheets OF, F, T, and S. See Manual for definitions and descriptions of how scores were computed and ratings assigned.

Normalized Scores & Ratings for this Assessment Area (AA):

Specific Functions or Values:	Function Score	Function Rating	Rating Break Proximity	Values Score	Values Rating	Rating Break Proximity	Function Score (raw)	Values Score (raw)
Water Storage & Delay (WS)	3.13	Lower		0.00	Lower		3.13	0.00
Sediment Retention & Stabilization (SR)	3.55	Lower	LM	9.52	Higher		3.85	7.25
Phosphorus Retention (PR)	5.25	Moderate		8.02	Higher		5.43	6.67
Nitrate Removal & Retention (NR)	3.57	Lower	LM	10.00	Higher		4.81	10.00
Anadromous Fish Habitat (FA)	0.00	Lower		0.00	Lower		0.00	0.00
Resident Fish Habitat (FR)	0.00	Lower		0.00	Lower		0.00	0.00
Amphibian & Reptile Habitat (AM)	7.76	Higher		3.57	Lower		7.04	3.57
Waterbird Nesting Habitat (WBN)	7.00	Higher	MH	10.00	Higher		5.81	10.00
Waterbird Feeding Habitat (WBF)	9.00	Higher		10.00	Higher		8.12	10.00
Aquatic Invertebrate Habitat (INV)	1.78	Lower		2.58	Lower		4.01	3.07
Songbird, Raptor, Mammal Habitat (SBM)	5.00	Moderate		10.00	Higher		6.31	10.00
Water Cooling (WC)	4.21	Moderate		10.00	Higher		3.69	9.55
Native Plant Diversity (PD)	6.20	Moderate	MH	2.05	Lower		5.56	2.05
Pollinator Habitat (POL)	6.88	Moderate	MH	5.15	Moderate	MH	6.01	4.17
Organic Nutrient Export (OE)	6.05	Moderate					5.36	
Carbon Sequestration (CS)	5.89	Moderate	MH				5.21	
Public Use & Recognition (PU)				3.40	Lower	LM		4.02

Other Attributes:	Score	Rating	Rating Break Proximity		
Wetland Sensitivity (SEN)	3.46	Moderate			5.22
Wetland Ecological Condition (EC)	5.52	Moderate	MH		6.45
Wetland Stressors (STR)	6.64	Higher			6.11

GROUPS	Selected Function	Function Rating	Rating Break Proximity	Values Rating	Rating Break Proximity
Hydrologic Function (WS)	Water Storage & Delay (WS)	Lower		Lower	
Water Quality Support (SR, PR, or NR)	Phosphorus Retention (PR)	Moderate		Higher	
Fish Habitat (FA or FR)	Anadromous Fish Habitat (FA)	Lower		Lower	
Aquatic Habitat (AM, WBF, or WBN)	Waterbird Nesting Habitat (WBN)	Higher	MH	Higher	
Ecosystem Support (WC, INV, PD, POL, SBM, or OE)	Songbird, Raptor, Mammal Habitat (SBM)	Moderate		Higher	

NOTE: A score of 0 does not always mean the function or value is absent from the wetland. It usually means that this wetland has equal or less capacity than the lowest-scoring one, for that function or value, from among the 200 calibration wetlands that were assessed previously by Oregon Department of State Lands.

Date: 5/6/21	Name: Sue Brady	Site: NEXT Renewable Fuels Oregon (mitigation pre-construction)	
Form OF Office Data ORWAP V. 3.2	Conduct an assessment only after reading the accompanying Manual and explanations in column E below. Answering many of the following questions requires viewing aerial imagery and maps, covering an area up to within 2 miles of the AA. **For each affirmative answer, change the 0 in the "Data" column to a "1".** Answer all items except where directed to skip to others. Questions whose cells in "Data" column have a **"W" MUST be answered for the ENTIRE wetland and bordering waters.**	For a list of functions to which each question pertains, see bracketed codes in column E. Codes for functions and their benefits are: WS= Water Storage, WC= Water Cooling, SR= Sediment Retention, PR= Phosphorus Retention, NR= Nitrate Removal, CS= Carbon Sequestration, OE= Organic Nutrient Export, INV= Aquatic Invertebrate Habitat, FA= Anadromous Fish Habitat, FR= Resident Fish Habitat, AM= Amphibians & Reptile Habitat, WBF= Feeding Waterbird Habitat, WBN= Nesting Waterbird Habitat, SBM= Songbird, Raptor, & Mammal Habitat, POL= Pollinator Habitat, PD= Native Plant Diversity, PU= Public Use & Recognition, EC= Ecological Condition, Sens= Sensitivity, STR= Stressors.	For guidance and detailed descriptions of how Excel calculates the numbers in the Scores worksheet, see the Technical Supplement and Appendix C of the Manual. For a documented rationale for each indicator, open each of the worksheet tabs at the bottom (one for each function or value) and see column H.

#	Indicators	Condition Choices	Data	Explanations, Definitions (Column E)	Cell Name	Comments
OF1	Distance to Extensive Perennial Cover (DistPerCov)	The distance from the AA edge to the edge of the closest patch or **corridor** of **perennial cover** (see definition in column E) larger than 100 acres is:		**Corridor** - is simply an elongated patch of perennial cover that is not narrower than 150 ft at any point.		
		<100 ft.	1	**Perennial cover** - is vegetation that includes wooded areas, native prairies, sagebrush, vegetated wetlands, as well as relatively unmanaged commercial lands in which the ground is disturbed less than annually, such as hayfields, lightly grazed pastures, timber harvest areas, and rangeland. It does not include water, row crops (e.g., vegetable, orchards, Christmas tree farms), lawns, residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads. [AM, WBN, PD, PDv, POL, SBM, Sens, STR]		
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to <0.5 mile.	0			
		0.5 mile to 2 miles.	0			
		> 2 miles.	0			
OF2	Distance to Tidal Waters (DistTidal)	The distance from the AA edge to the closest body of **tidal water** is:		**Tidal water** - If unclear whether a water body is tidal, check the ORWAP Map Viewer's Headtide layer (expand Hydrology), or check with local sources. Assume Columbia River is tidal east to Bonneville Dam and the Willamette River south to the Oregon City Falls. [WBF]		
		<1 mile.	1			
		1-5 miles.	0			
		>5 miles.	0			
OF3	Distance to Ponded Water (DistPond)	The distance from the AA edge to the closest (but separate) body of nontidal fresh water (wetland, pond, or lake) that is ponded all or most of the year is:		Use field observations, aerial imagery, and/or the ORWAP Map Viewer's Persistent Nontidal layer (expand Wetlands/National Wetlands Inventory). [AM,WBF,WBN,SBM,PD,Sens]		
		<100 ft.	0			
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to < 0.5 mile.	0			
		0.5 mile to 2 miles.	0			
		>2 miles.	1			
OF4	Distance to Lake (DistLake)	The distance from the AA edge to the closest (but separate) body of nontidal fresh water (wetland, pond, or lake) that is ponded during most of the year and is larger than 20 acres (about 1000 ft on a side) is:		Use field observations, aerial imagery, and/or the ORWAP Map Viewer's Persistent Nontidal layer (expand Wetlands/National Wetlands Inventory). [WBF,WBN]		
		<1 mile.	0			
		1-5 miles.	0			
		>5 miles.	1			
OF5	Distance to Herbaceous Open Land (DistOpenL)	The distance from the AA edge to the closest patch of **herbaceous openland** larger than 10 acres and in **flat terrain** is:		**Herbaceous openland** - includes both perennial and non-perennial cover. For example, it can include pasture, herbaceous wetland, meadow, prairie, ryegrass fields, row crops, herbaceous rangeland, golf courses, grassed airports, and hayfields. Do not include open water of lakes, ponds, or rivers; or unvegetated surfaces; or areas with woody vegetation. In dry parts of the state, croplands in flat areas are often irrigated and are distinctly greener in aerial images. **Flat terrain** - means slope of less than 5%. [WBF,WBN,POL]		
		<100 ft.	1			
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to < 0.5 mile.	0			
		0.5 mile to 2 miles.	0			
		>2 miles.	0			
OF6	Distance to Nearest Busy Road (DistRd)	The distance from the AA center to the nearest road with an average daytime traffic rate of at least 1 vehicle/ minute is:		Estimate this traffic rate threshold using your judgment and considering the road width, local population, distance to densely settled areas, alternate routes, and other factors. [AM,SBM,PD,PUv,STR]		
		<100 ft.	0			
		100 to <300 ft.	0			
		300 to < 0.5 mile.	0			
		0.5 to <1 miles.	1			
		1 to 2 miles.	0			
		>2 miles.	0			
OF7	Size of Largest Nearby Patch of Perennial Cover (SizePerenn)	Including the AA's vegetated area, the largest patch or corridor that is **perennial cover** and is contiguous with vegetation in the AA (i.e., not separated by roads or channels that create gaps wider than 150 ft), occupies:		**Contiguous** -Abutting, with no major physical separation that prohibits free exchange or flow of surface water (i.e., not separated by roads or channels that create gaps wider than 150 ft) **Perennial cover** - See OF1. Disqualify any patch or corridor of perennial cover where it becomes separated from the AA by a gap of >150 ft, if the gap is comprised of unvegetated land or if the corridor narrows to less than		
		<.01 acre.	0			
		.01 to < 1 acre.	0			
		1 to <10 acres.	0			
		10 to <100 acres.	1			

		100 to <1000 acres.	0	150 ft. [AM,SBM,PD,POL,Sens,STR]		
		1000 to 10,000 acres.	0			
		>10,000 acres.	0			
OF8	Wetland Type Local Uniqueness (UniqPatch)	**Select EACH** of the vegetation types below that comprise more than 10% of the AA AND less than 10% of a 0.5 mile radius around the AA. (See Column E).		This is a 2-part question: (1) if no vegetation class comprises more than 10% of the AA, answer "none of the above." (2) If a vegetation class does comprise more than 10%, determine if that vegetation class also comprises less than 10% of a 0.5 mile circle (~50 acres). [INVv,AMv,WBFv,WBNv,SBMv,PDv,POLv,Sens]		
		Herbaceous vegetation (perennial grasses, sedges, forbs; not under a woody canopy; not crops).	0			
		Unshaded shrubland (woody plants shorter than 20 ft).	0			
		Trees (woody plants taller than 20 ft).	0			
		None of above.	1			
OF9	Perennial Cover Percentage (PerCovPct)	Within a 2-mile radius of the AA center, the percentage of land that has **perennial cover** is:		**Perennial cover** - is vegetation that includes wooded areas, native prairies, sagebrush, vegetated wetlands, as well as relatively unmanaged commercial lands in which the ground is disturbed less than annually, such as hayfields, lightly grazed pastures, timber harvest areas, and rangeland. It does not include water, row crops (e.g., vegetable, orchards, Christmas tree farms), lawns, residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads. [FA,AM,SBM,POL,Sens,STR]		
		<5% of the land.	0			
		5 to <20% of the land.	0			
		20 to <60% of the land.	1			
		60 to 90% of the land.	0			
		>90% of the land.	0		PerennAll	
OF10	Forest Percentage (ForestPct)	Within a 2-mile radius of the AA center, the cumulative amount of forest (regardless of **forest patch** sizes, and including any in the AA) is:		**Forested patch** - is a land cover patch that currently has >70% cover of woody plants taller than 20 ft. May be in a plantation. [FA,SBM,STR]		
		<5% of the circle.	0			
		5 to <20%.	0			
		20 to <50%.	1			
		50 to 80%.	0			
		>80%.	0			
OF11	Herbaceous Open Land Percentage (OpenLpct)	Within a 2-mile radius of the AA center, the amount of **herbaceous openland** in **flat terrain** is:		**Herbaceous openland** - can include both perennial and non-perennial cover. For example, it can include pasture, herbaceous wetland, meadow, prairie, ryegrass fields, row crops, herbaceous rangeland, golf courses, grassed airports, and hayfields. Do not include open water of lakes, ponds, or rivers; or unvegetated surfaces; or areas with woody vegetation. **Flat terrain** - means slope of less than 5%. [WBF,WBN,POL]		
		<5% of the land.	0			
		5 to <20%.	0			
		20 to <50%.	1			
		50 to 80%.	0			
		>80%.	0			
OF12	Landscape Wetland Connectivity (ConnScapeW)	Within a 2-mile radius of the AA center:		**Corridor** - is simply an elongated patch of perennial cover that is not narrower than 150 ft at any point. **Regular traffic** - is at least 1 vehicle per hour during the daytime throughout most of the growing season. Assess this based on local knowledge, type of road, and proximity to developed areas. **Perennial** - see OF9 for definition. [WBN,SBM,Sens,STR]		
		There are NO other wetlands.	0			
		There are other wetlands (or a wetland), but NONE are connected to the AA by a **corridor** of **perennial** vegetation. The corridor must be at least 150 ft wide along its entire length and not interrupted by roads with **regular traffic.**	0			
		There are other wetlands (or a wetland), and ALL are connected to the AA by the type of corridor described.	0			
		There are other wetlands (or a wetland), and ONE or MORE (but not all) are connected to the AA by the type of corridor described.	1			
OF13	Local Wetland Connectivity (ConnLocalW)	Within a 0.5 mile radius of the AA center:		**Regular traffic** - is at least 1 vehicle per hour during the daytime throughout most of the growing season. Assess this based on local knowledge, type of road, and proximity to developed areas. **Perennial** - see OF9 for definition. IF possible, field verify [AM,WBN,SBM,PD,Sens,STR]		
		There are NO other wetlands.	0			
		There are other wetlands (or a wetland), but NONE are connected to the AA by a **corridor** of **perennial** vegetation. The corridor must be at least 150 ft wide along its entire length and not interrupted by roads with **regular traffic.**	0			
		There are other wetlands (or a wetland), and ALL are connected to the AA by the type of corridor described.	0			
		There are other wetlands (or a wetland), and ONE or MORE (but not all) are connected to the AA by the type of corridor described.	1			
OF14	Wetland Number & Diversity Uniqueness (HUCbest)	According to the ORWAP Report, this AA is located in one of the HUCs that are listed as having a large diversity, area, or number of wetlands relative to the area of the HUC. **Select All of the following that are true:**		In the ORWAP Report, under the Watershed Information section and the HUC Best table, look at the columns "Is HUC Best?" and "Greatest Criteria Met." [AM,WBF,WBN,SBM,Sens]		
		Yes, for the HUC8 watershed	1			
		Yes, for the HUC10 watershed	0			
		Yes, for the HUC12 watershed	0			
		None of above.	0			
		Data are inadequate (NWI mapping not completed in HUC).	0			
OF15	Landscape Functional Deficit (GISscore)	In the ORWAP Report, find the HUC 12 Functional Deficit table. **Select All functions below that have a notation for that HUC.**		In the ORWAP Report, under the Watershed Information section, look at the Functional Deficit table. Enter 1 for each of the listed functions that are noted. These are HUCs in which a relatively small number, or proportional area, of the wetlands are likely to be performing the named function, thus adding value to those that are.		
		Water storage (WS)	0			
		Sediment retention (SR)	0			
		Nutrient transformation (NT)	0			

		Thermoregulation (WC)	0	See ORWAP's Technical Supplement for explanation of how the FuncDeficit was calculated. [WSv,WCv,SRv,PRv,INVv,FAv,AMv,WBNv]		
		Aquatic invertebrate habitat (INV)	0			
		Amphibian habitat (AM)	0			
		Fish habitat (FH)	0			
		Waterbird habitat (WB)	0			
		None of above.	1			
		No data.	0			
OF16	Conservation Designations of the AA or Local Area (ConDesig)	On the ORWAP Map Viewer, use the layers indicated below to answer. **Select All of the following that are true:**		In the ORWAP Map Viewer, use the applicable layers.		
		(a)The AA is within or connected to a stream or other water body and this stream or water body has been designated as ESH within 0.5 miles of the AA, according to the **Essential Salmonid Habitat (ESH)** layer.	0	Include areas not shown as ESH, if ODFW has confirmed they qualify as ESH. [WCv, FA, FAv]		
		(b)The AA is within or contiguous to a designated **Oregon's Greatest Wetlands,** according to the map layer of that name.	0	Oregon's Greatest Wetlands identifies the most biologically and ecologically significant wetlands in the State of Oregon. [PU]		
		(c)The AA is within an **Important Bird Area (IBA),** as officially designated, according to the map layer of that name.	1	[WBFv, WBNv]		
		None of above.	0			
OF17	Non-anadromous Fish Species of Conservation Concern (RareFR)	According to the ORWAP Report, the score for occurrences of rare non-anadromous fish species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp Info file for a list of species. Species include Miller Lake lamprey, Goose Lake lamprey, Pit sculpin, Lahontan cutthroat trout, Inland Columbia Basin redband trout, Steelhead (Snake River Basin ESU), Alvord chub, Goose Lake tui chub, Borax Lake chub, Lahontan redside, Oregon chub, Goose Lake sucker, Tahoe sucker, Warner sucker, Shortnose sucker, Lost River sucker. Note that for some of these species, only specific geographic populations are designated. [FRv] This question may need to revised after the field visit.		
		High (≥ 0.75 for maximum score, or ≥ 0.90 for this group's sum score), or there is a recent (within 5 years) onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.33 for both the maximum score this group's sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF18	Amphibian or Reptile of Conservation Concern (AmphRare)	According to the ORWAP Report, the score for occurrences of rare amphibian or reptile species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp Info file for a list of species. Species include: Black salamander, California slender salamander, Cope's giant salamander, Rocky Mountain tailed frog, Woodhouse's toad, Foothill yellow-legged frog, Northern leopard frog, Oregon spotted frog, Columbia spotted frog. [AMv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or >0.90 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.21 for maximum score AND <0.15 for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF19	Feeding (Non-breeding) Waterbird Species of Conservation Concern (RareWBF)	According to the ORWAP Report, the score for occurrences of rare non-breeding (feeding) waterbird species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp Info file for a list of species. **Non-breeding** - mainly refers to waterbird feeding during migration and winter. California brown pelican, Aleutian cackling goose, Dusky Canada goose [WBFv] This question may need to revised after the field visit.		
		High (≥ 0.33 for maximum score, or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Low (< 0.33 for maximum score and for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF20	Nesting Waterbird Species of Conservation Concern (RareWBN)	According to the ORWAP Report, the score for occurrences of rare nesting waterbird species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp Info file for a list of species. Species include: Horned grebe, Red-necked grebe, Western grebe, Clark's grebe, American white pelican, Least bittern, Snowy egret, Trumpeter swan, White-faced ibis, Harlequin duck, Bufflehead, Yellow rail, Western snowy plover, Upland sandpiper, Franklin's gull, Marbled murrelet. [WBNv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or ≥1.00 for this group's sum score), or there is a recent breeding-season observation of any of these species onsite by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.09 for maximum score and for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species during breeding season by a qualified observer under conditions similar to what now occur.	1			
OF21	Songbird, Raptor, Mammal Species of Conservation Concern (RareSBM)	According to the ORWAP Report, the score for occurrences of rare songbird, raptor, or mammal species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp Info file for a list of species. Species include: Bald eagle, American peregrine falcon, Arctic peregrine falcon, Greater sage-grouse, Columbian sharp-tailed grouse, Yellow-billed cuckoo, Northern spotted owl, Short-eared owl, Black swift, Lewis's woodpecker, Purple martin, Northern waterthrush, Bobolink, Tricolored blackbird, Fringed myotis, Spotted bat, Townsend's big-eared bat, Pallid bat, Northern sea lion, Fisher, Sea otter, Canada lynx, Columbian white-tailed deer. [SBMv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or >1.13 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	1			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.09 for maximum score AND <0.13 for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	0			
OF22	Invertebrate Species of Conservation Concern (RareInvert)	According to the ORWAP Report, the score for occurrences of rare invertebrate species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp Info file for a list of species. See the Supp_Info file's RareAnimals worksheet for list of species addressed by this question. [INVv] This question may need to revised after the field visit.		
		High (≥ 0.75 for maximum score, or for this group's sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Low (< 0.75 for maximum score AND for this group's sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF23	Plant Species of Conservation Concern	According to the ORWAP Report, the score for occurrences of rare wetland-indicator plant species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores.		

	(RarePspp)	High (≥ 0.75 for maximum score, or > 4.00 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0	See the Supp_Info's RareWetPlants worksheet for list of species addressed by this question.		
		Intermediate (i.e., not as described above or below).	0	[PDv,POLv]		
		Low (≤ 0.12 for maximum score AND < 0.20 for sum score, but not 0 for both).	0	This question may need to revised after the field visit.		
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF24	River Proximity (RiverProx)	There is a nontidal river within 1 mile and it is adjacent to, OR downslope from, the AA (connected or not). **Enter 1, if true. If not, SKIP to OF27.**	0	**River** - as used here is a channel wider than 50 ft between its banks. In the ORWAP Map Viewer, use the National Hydrography Dataset - Flowline layer (expand Hydrology).[WSv]	NearRiver	
OF25	Floodable Property (FloodProp)	**Select ONE** of the below:		**Row crops** - do not include pasture or other perennial cover.		
		Floodplain boundaries within 1 mile downslope or downriver from the AA have not been mapped. **Enter 1 and SKIP TO OF27.**	0	In the ORWAP Map Viewer, use the Floodplain layers. Also, the Seasonal Nontidal Wetland layer (expand Wetlands/National Wetlands Inventory) may indicate some floodplain areas.		
		Floodplain boundaries within 1 mile downslope from the AA have been mapped BUT there is neither infrastructure nor **row crops** vulnerable to river flooding located within the floodplain and within that distance. **Enter 1 and SKIP TO OF27.**	0	[WSv] Supplement with field observations at multiple seasons, if possible.		
		Floodplain boundaries have been mapped AND infrastructure or **row crops** are present within 1 mile downslope or downriver and those are not protected from 100-year floods, but actual damage has not been documented.	0			
		Damage to infrastructure or row crops from river flooding has been documented within that distance.	0			
OF26	Type of Flood Damage (DamageType)	The greatest financial damage in the floodplain is (or would be) to:		**Row crops** - do not include pasture or other perennial cover. On the ORWAP Map Viewer, use the Floodplain layers		
		Buildings, roads, bridges.	0	[WSv]		
		Row crops (during some years).	0			
OF27	Hydrologic Landscape (Arid)	According to the ORWAP Report, the wetland is in a hydrologic landscape unit classified as:		In the ORWAP Report, under the Location Information table, find the Hydrologic Landscape Class.		
		Arid.	0	[AM, AMv, WBNv, SBMv, OE, Sens]		
		Semi-arid.	0			
		Dry.	0			
		Moist.	0			
		Wet.	1			
		Very Wet.	0			
OF28	Input Water - Recognized Quality Issues (WQin)	According to ORWAP Map Viewer's Water Quality Streams layer and Water Quality Lakes layers, ALL of the following are true: **(a)** within 1 mile upstream from the AA edge, a water body or stream reach is labeled as being 303d, Water Quality Limited (categories 3B-5); Potential Concer; or TMDL Approved AND **(b)** the problem concerns one or more of the parameters listed below. **Select All that apply.**		Use the ORWAP Map Viewer's Water Quality Streams layer and the Water Quality Lakes layer (expand Water Quality and Quanity) and the Distance tool. Use the Identy tool to determine the reason for the listings.		
		Total suspended solids (TSS), sedimentation, or turbidity.	0			
		Phosphorus, chlorophyll-a, or algae.	1	If the AA receives both inflow and outflow from river flooding, consider the polluted water to be both "upstream" and "downstream".		
		Nitrates, ammonia, chlorophyll-a, or algae.	0			
		Petrochemicals, heavy metals (iron, manganese, lead, zinc, etc.), other toxins.	1	[SRv,PRv,INV,FA,FR,AM,WBF,WBN,STR]		
		Temperature or dissolved oxygen.	1	This may need to be verified in the field.		
		None of above, or no data. **If true, enter 1 and SKIP to OF30.**	0		NoDataWQup	
OF29	Duration of Connection Beween Problem Area & the AA (ConnecUp)	The upstream problem area mentioned above (OF28) has a surface water connection to the AA:		In the ORWAP Map Viewer, use the National Hydography Dataset (expand Hydrology) and the Persistent, Seasonal, or Saturated nontidal layers (expand Wetlands/National Wetlands Inventory)		
		For 9 or more continuous months annually.	0	to determine duration of surface water connection.		
		Intermittently (at least once annually, but for less than 9 months continually).	0	[SRv,PRv,INV,FA,FR,AM,WBF,WBN,STR]		
		Never (or less than annually).	1	This may need to be determined or verified in the field.		
OF30	Downslope Water Quality Issues (ContamDown)	According to ORWAP Map Viewer's Water Quality Streams layer and Water Quality Lakes layer, ALL of the following are true: **(a)** within 1 mile downhill or downstream from the AA's edge, a water body is labeled as being 303d, Water Quality Limited (categories 3B-5); Potential Concern; or TMDL Approved AND **(b)** the problem concerns one or more of the parameters listed below. **Select All that apply.**		Use the ORWAP Map Viewer's Water Quality Streams layer and the Water Quality Lakes layer (expand Water Quality and Quanity) and the Distance tool. Use the Identy tool to determine the reason for the listings.		
		Total suspended solids (TSS), sedimentation, or turbidity.	0	[WCv,SRv,PRv,FA]		
		Phosphorus, chlorophyll-a, or algae.	1			
		Nitrates, ammonia, chlorophyll-a, or algae.	0			
		Petrochemicals, heavy metals (iron, manganese, lead, zinc, etc.), other toxins.	1			
		Temperature or dissolved oxygen.	1			
		None of above, or no data. **Enter 1 and SKIP to OF32.**	0		NoDataWQdo	
OF31	Duration of Connection Beween AA & Water Quality Problem Area (ConnDown)	The connection between the downstream problem area mentioned above (OF30) and the AA:		In the ORWAP Map Viewer, use the National Hydography Dataset (expand Hydrology) and the Persistent, Seasonal, or Saturated nontidal layers (expand Wetlands/National Wetlands Inventory)		
		Is a stream or water body that connects these areas for 9 or more continuous months annually.	1	to determine duration of surface water connection.		
		Is a stream or water body that connects these areas intermittently (at least once annually, but for less than 9 months continually).	0	[WCv,SRv,PRv,FA]		
		Is a probable groundwater connection, or connection via direct runoff only (no channel connection).	0	This may need to be determined or verified in the field.		

		Never exists (a topographic ridge probably prevents all the AA's runoff and groundwater from reaching the problem area).	0			
OF32	Drinking Water Source (DEQ) (DWsource)	According to ORWAP Map Viewer's Surface Water Drinking Water Source Areas layer and the Ground Water Drinking Water Source Areas layer, the AA is within:		In the ORWAP Map Viewer, use the water source layers (expand Water Quality and Quantity). [NRv]		
		The source area for a surface-water drinking water (DW) source.	1			
		The source area for a groundwater drinking water source.	0			
		Neither of above.	0			
OF33	Groundwater Risk Designations (GWrisk)	According to ORWAP Map Viewer's Groundwater Management Areas layer and the Sole Source Aquifer layer, the AA is: **Select All that apply**		In the ORWAP Map Viewer, use the DEQ Groundwater Management Areas layer and the Sole source Aquifer layer (expand Water Quality and Quantity). [NRv]		
		Within a designated Groundwater Management Area (ODEQ).	0			
		Within a designated Sole Source Aquifer area (EPA): the North Florence Dunal Aquifer.	0			
		Neither of above.	1			
OF34	Relative Elevation in Watershed (Elev)	In the ORWAP Map Viewer, based on the Hydrologic Boundaries 4th Level (HUC 8) layer (expand Hydrology), determine if the AA is: (See Column E)		1) Consider which end of the HUC is the bottom. Where streams join, the "V" that they form on the map points towards the bottom of the HUC. 2) If the AA is closer to the HUC's outlet than to its upper end, and is closer to the river or large stream that exits at the bottom of the HUC than it is to the boundary (margin) of the HUC, then check "lower 1/3" If not near that river, check "middle 1/3". 3) If the AA is not in a 100-yr floodplain, is closer to the HUC upper end than to its outlet, and is closer to the boundary (margin) of the HUC than to the river or large stream that exits at the bottom of the HUC, then check "upper 1/3" 4) For all other conditions, check "middle 1/3". [WSv, PRv, FA, FR, WCv, OE, Sens, SRv]		
		In the upper one-third of its watershed.	0			
		In the middle one-third of its watershed.	0			
		In the lower one-third of its watershed.	1		LowerShed	
OF35	Runoff Contributing Area (RCA) - Wetland as % of (WetPctRCA)	Delimit the wetland's Runoff Contributing Area (RCA) using a topographic base map. The area of the AA's wetland is:	W	See the ORWAP Manual for specific protocol for delimiting the RCA (Section 4.1 Step 5). The RCA includes only the areas that potentially drain directly to the AA's wetland rather than to channels that flow or flood into that wetland. Exact precision in drawing the boundary is not required. [WS, WSv, SR, SRv, PR, PRv, WCv]		
		<1% of its RCA.	0			
		1 to <10% of its RCA.	0			
		10 to 100% of its RCA.	1			
		Larger than the area of its RCA. **Enter 1 and SKIP TO OF39.**	0		NoRCA	
OF36	Unvegetated % in the RCA (ImpervRCA)	The proportion of the RCA comprised of buildings, roads, parking lots, exposed bedrock, and other surface that is usually unvegetated at the time of peak annual runoff is about:	W	In the ORWAP Map Viewer, use an Aerial layer to determine the proportion of the RCA comprised of buildings, roads, parking lots, exposed bedrock, and other surfaces that are usually unvegetated at the time of peak annual runoff. [WSv,WCv,SRv,PRv,INV,FA,Sens,STR]		
		<10%.	1			
		10 to 25%.	0			
		>25%.	0			
OF37	Transport From Upslope (TransRCA)	A relatively large proportion of the precipitation that falls farther upslope in the RCA reaches this wetland quickly as indicated by the following: **(a)** RCA slopes are steep, and/or **(b)** upslope wetlands historically present have been filled or drained extensively, and/or **(c)** land cover is mostly non-forest, and/or **(d)** most RCA soils are shallow. This statement is:	W	Refer to aerial imagery and/or consult local sources. See the ORWAP Manual for instructions. [WSv,SRv,PRv,STR]		
		Mostly true.	0			
		Somewhat true.	1			
		Mostly untrue.	0			
OF38	Upslope Soil Erodibility Risk (ErodeUp)	Use the ORWAP Report or the Map Viewer to determine if the erosion hazard rating of the soil within 200 ft away and upslope of the AA is:		If the soil unit is the same as the AA, the Erosion Hazard can be obtained from the ORWAP Report's Soil Information section. If the soil unit is different than the AA, use ORWAP Map Viewer's Oregon Soil layer and see the ORWAP Manual for instructions on how to determine the erosion hazard rating. [SRv,PRv,STR]		
		Slight.	1			
		Moderate.	0			
		Severe.	0			
		Very severe.	0			
		Could not determine.	0			
OF39	Streamflow Contributing Area (SCA) - Wetland as % of (WetPctSCA)	Delimit (or visualize, for large river basins) the wetland's Streamflow Contributing Area (SCA) using a topographic base map. The area of the AA's wetland is:	W	See the ORWP Manual for specific protocol for delimiting the SCA (section 4.1, Step 6). The SCA is all upland areas that drain into streams, rivers, and lakes that feed the AA's wetland either directly or during semi-annual floods. In addition, for wetlands intercepted by a mapped stream, the SCA can be delineated automatically and its area reported at this USGS web site: https://streamstats.usgs.gov/ss/. Enter the coordinates, select Oregon, select Delineate, zoom to level 15 or finer, and click on a stream. [WS, SR, SRv, PR, PRv, WCv]		
		<1% of its SCA, or wetland is in the floodplain of a major river.	0			
		1 to <10% of its SCA.	0			
		10 to 100% of its SCA.	1			
		Larger than the area of its SCA. **Enter 1 and SKIP TO OF41.**	0		NoSCA1	
		Wetland lacks tributaries and receives no overbank water. **Enter 1 and SKIP to OF41.**	0		NoSCA	
OF40	Unvegetated % in the SCA (ImpervSCA)	The proportion of the SCA comprised of buildings, roads, parking lots, exposed bedrock, and other surface that is usually unvegetated at the time of peak annual runoff is about :	W	See the ORWAP Manual for instructions. [WCv,SRv,PRv,FA,STR]		
		<10%.	0			
		10 to 25%.	1			
		>25%.	0			
OF41	Upland Edge Shape Complexity	Most of the edge between the AA's wetland and upland is **(select one):**	W	See ORWAP Manual for instructions and illustrations.		

	Complexity (EdgeShape)	**Linear:** a significant proportion of the wetland's upland edge is straight, as in wetlands bounded partly or wholly by dikes or roads, or the AA is entirely surrounded by water or other wetlands.	1	[NR, SBM, Sens]		
		Intermediate: Wetland's shape is (a) ovoid, or (b) mildly ragged edge, and/or (c) contains a lesser amount of artificially straight edge.	0			
		Convoluted: Wetland perimeter is many times longer than maximum width of the wetland, with many alcoves and indentations ("fingers").	0			
OF42	Zoning (Zoning)	According to ORWAP Map Viewer's Zoning layer, the dominant zoned land use designation for currently undeveloped parcels upslope from the AA and within 300 ft. of its upland edge is:		See the ORWAP Manual for instructions on how to determine the zoning designation. If information is not provided, check local zoning maps.		
		Development (Commercial, Industrial, Urban Residential, etc.), or no undeveloped parcels exist upslope from the AA.	1	[WSv,WCv,SRv,PRv,INVv,FAv,FRv,AMv,WBFv,WBNv,SBMv,PDv,POLv,PUv]		
		Agriculture or Rural Residential.	0			
		Forest or Open Space, or entirely public lands.	0			
		Not zoned, or no information.	0			
OF43	Growing Degree Days (GDD)	According to ORWAP Map Viewer's Growing Degree Days layer, the long term normal Growing Degree Days category at the approximate location of the AA is:		See the ORWAP Manual for instructions on how to determine the growing degree days category.		
		<256.	0	[NR, FR, AM, WBN, SBM, WCv, OE, CS, Sens]		
		256 - 1020.	0			
		1021-1785.	0			
		1786 - 2550.	1			
		2551 - 3315.	0			
		3316 - 4079.	0			
		> 4079.	0			

Date: 5/6/21	Name: Sue Brady	Site: NEXT Renewable Fuels Oregon (mitigation pre-construction)	
Form F Field Data (nontidal Wetlands) ORWAP V 3.2	Conduct an assessment only after reading the accompanying Manual and explanations in column E below. **For each affirmative answer, change the 0 in the "Data" column to a "1".** Answer all items except where directed to skip to others. Questions whose cells in "Data" column have a **"W" MUST be answered for the ENTIRE wetland and bordering waters.**	For a list of functions to which each question pertains, see bracketed codes in column E. Codes for functions and their benefits are: WS= Water Storage, WC= Water Cooling, SR= Sediment Retention, PR= Phosphorus Retention, NR= Nitrate Removal, CS= Carbon Sequestration, OE= Organic Export, INV= Invertebrates, FA= Anadromous Fish, FR= Resident Fish, AM= Amphibians, WBF= Feeding Waterbirds, WBN= Nesting Waterbirds, SBM= Songbirds, Mammals, & Raptors, POL= Pollinators, PH= Plant Habitat, PU= Public Use & Recognition, EC= Ecological Condition, Sens= Sensitivity, STR= Stressors.	For guidance and detailed descriptions of how Excel calculates the numbers in the Scores worksheet, see the Technical Supplement and Appendix C of the accompanying Manual. For a documented rationale for each indicator, open each of the worksheet tabs at the bottom (one for each function or value) and see column H.

#	Indicators	Condition Choices	Data	Explanations, Definitions (Column E)	Cell Name	Comments
F1	Tidal Wetland (Tidal)	This is a tidal wetland (either freshwater or saltwater). **If yes, GO TO worksheet " T ".** Do not enter any data here. **If nontidal, continue with F2.**		**Tidal wetland -** a wetland that receives tidal water at least once during a normal year, regardless of salinity, and dominated by emergent or woody vegetation. Tidal flooding occurs on a 6-hour cycle DURING THE TIME it is flooded by tide, which may be as infreuent as once per year. If NWI map shows the wetland with a code beginning with E (for estuarine), assume the wetland to be tidal. However, some wetlands lacking that code are also tidal.		
F2	Ponded Condition (Lentic)	At least once every 2 years, some part of the AA contains a cumulative total of >900 sq.ft. of surface water that is ponded. The water persists for >6 days and may be hidden beneath emergent vegetation or scattered in small pools. **Enter 1, if true.**	1	**Ponded -** Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). [AM,WBF,WBN]	Lentic	
		Reminder: For all questions, the AA should include all persistent waters in ponds smaller than 20 acres that are **adjacent** to the AA. The AA should also include part of the water area of adjacent lakes or rivers larger than 20 acres -- specifically, the open water part adjacent to wetland vegetation and equal in width to the average width of that vegetated zone.		**Adjacent -** is used synonymously with abutting, adjoining, bordering, contiguous -- and means no upland (manmade or natural) completely separates the described features along their directly shared edge. Features joined only by a channel are not necessarily considered to be adjacent -- a large portion of their edges must match. The features do not have to be hydrologically connected in order to be considered adjacent.		
F3	Water Regime (Hydropd)	The water regime (hydroperiod) of the most permanent (usually deepest) part of the AA is: **Select only ONE.** [To meet any of the definitions other than Ephemeral, there must be >100 sq ft of surface water for the duration described, otherwise mark the type listed above it.]		In the NRCS county soil survey, the Water Features table provides information about periods of flooding, ponding, and highwater table depths. Descriptions of the soil units may include information on saturation persistence. Also consider the hydroperiod label on NWI wetland polygons. [WS, FA, FR, WBN, WBF, WC]		
		Ephemeral. Surface water in the wettest part of the AA is present for fewer than 7 consecutive days during an average growing season. Includes some of the areas mapped as Saturated Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F25.**	0		NeverWater	
		Temporary. Surface water present for 1-4 weeks consecutively during an average growing season, OR if persists for longer, it is almost entirely in scattered pools, each smaller than 1 sq.m. Dries up completely during part of most average years. Includes some of the areas mapped as Saturated Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F25.**	0		TempWet	
		Seasonal. Surface water present for 5-17 weeks (1-4 months) consecutively during an average growing season, but dries up completely during part of most average years. Includes some of the areas mapped as Seasonal Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F5.**	0		ShallowType	
		Semi-Persistent. Surface water present for more than 17 weeks (4 months) consecutively during an average growing season, but dries up completely during part of most average years. Includes some of the areas mapped as Seasonal Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F5.**	0		DeepType	
		Permanent. Does not dry up completely during most average years. Includes some of the areas mapped as Persistent Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and continue.**	1	**Permanent -** usually has significant groundwater input, higher conductivity, less annual water level fluctuation. No woody vegetation in most persistently flooded parts. Often with extensive open water and subsurface aquatic plants.	PermType	
F4	Flooded Persistently - % of AA (PermW)	Identify the parts of the AA that still contain surface water even during the **driest times of a normal year**. At that time, the percentage of the AA that still contains surface water is:		**driest times of a normal year -** i.e., when the AA's surface water is at its lowest annual level. Sites fed by unregulated streams that descend on north-facing slopes, tend to remain wet longer into the summer. Indicators of persistence may include fish, some dragonflies, beaver, and muskrat. [WS,PR,NR,CS,INV,FR,AM,WBF,WBN]		
		1 to <25% of the AA.	1			
		25 to <50% of the AA.	0			
		50 to 95% of the AA.	0			
		>95% of the AA.	0		AllPermWater	
F5	Depth Class (Predominant) (DepthDom)	When water is present in the AA, the depth most of the time in most of inundated area is: [Note: NOT necessarily the maximum spatial or annual depth]		This question is asking about the spatial median depth that occurs during most of that time, even if inundation is only seasonal or temporary. If inundation in most but not all of the AA is brief, the answer will be based on the depth of the most persistently inundated part of the AA. Include surface water in channels and ditches as well as ponded areas. In the ORWAP Manual, se the diagram in Appendix B. [WC,SR,PR,CS,OE,INV,FA,FR,WBF,WBN,PD,Sens]		
		>0 to <0.5 ft.	0			
		0.5 to < 1 ft deep.	0			
		1 to <3 ft deep.	1			
		3 to 6 ft deep.	0			
		>6 ft deep.	0			
F6	Depth Class Distribution (DepthEven)	Within the area described above, and during most of the time when surface water is present, the water area has: **Select only one.**		Estimate these proportions by considering the gradient and microtopography of the site.		

		One depth class covering >90% of the AA's inundated area (use the classes in the question above).	1	In the ORWAP Manual, see the diagram in Appendix B.		
		One depth class covering 51-90% of the AA's inundated area (use the classes in the question above).	0	[INV,FR,WBF,WBN,PD]		
		Neither of above. There are 3 or more depth classes and none occupy >50%.	0			
F7	Emergent Plants -- Area (EmArea)	Consider just the area that has surface water for >1 week during the growing season. Herbaceous plants (not moss, not woody) whose foliage extends above a water surface in this area (i.e., emergents) cumulatively occupy an annual maximum of:	W	If multiple small patches are separated by less than 150 ft, they may be combined when evaluating this question.		
		<0.01 acre (< 400 sq.ft). **Enter 1 and SKIP TO F10,** unless only part of a wetland is being assessed.	0	[SR,PR,OE,INV,FR,WBF,WBN,SBM,PD]	NoEm	
		0.01 to < 0.10 acres (3,920 sq. ft).	0			
		0.10 to <0.50 acres (21,340 sq. ft).	0			
		0.50 to <5 acres.	0			
		5 to 50 acres.	1			
		>50 acres.	0			
F8	% Emergent Plants (EmPct)	Emergent plants occupy an annual maximum of:		[WC,SR,PR,NR,CS,OE,INV,PD,FA,FR,AM,WBF,WBN,SBM]		
		<5% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		5 to <30% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		30 to <60% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		60 to 95% of the parts of the AA that are inundated for >7 days at some time of the year.	1			
		>95% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
F9	Cattail or Tall Bulrush Cover (Cttail)	The percentage of the emergent vegetation cover in the AA that is cattail (*Typha* spp.) or tall bulrush is:		[WBN, SBM]		
		<1% of the emergent vegetation, or cattail and bulrush are absent.	0			
		1 to <25% of the emergent vegetation.	1			
		25 to 75% of the emergent vegetation.	0			
		>75%, of the emergent vegetation.	0			
F10	Water Shading by AA's Woody Vegetation - Driest (WoodyDryShade)	During an average growing season, when water levels are lowest (but surface water still occupies >400 sq ft or >1% of the AA), the percentage of the remaining surface water within the AA that is shaded by trees and/or shrubs located within the AA is:		[WC,FA,WBN,SBM]		
		<5% of the water, and fewer than 10 woody plants taller than 3 ft shade it, or all surface water is flowing.	0			
		<5% of the water, but more than 10 woody plants taller than 3 ft shade it.	0			
		5 to <25% of the water.	1			
		25 to <50% of the water.	0			
		50 to 95% of the water.	0			
		>95% of the water.	0			
F11	Open Water - Extent	During most of the growing season, the largest patch of **open water** that is in or adjacent to the AA is >1 acre and mostly deeper than 1 ft. **Enter 1, if true.**	1	**Open Water** - is surface water of any depth that contains no emergent herbaceous or woody vegetation (may contain floating-leaved or completely submersed plants). It may be partially shaded by a tree canopy.	OpenW	
F12	All **Ponded** Water as Percentage - Wettest (PondWpctWet)	When water levels are <u>highest</u>, during a normal year, the surface water that is **ponded** continually for >6 days occupies:		**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle).		
		<1% or none of the AA. Surface water is completely or nearly absent then, or is entirely flowing. **Enter 1 and SKIP TO F22.**	0		NoPond	
		1 to <5% of the AA.	0	[WS,WC,CS,OE,INV,AM,WBF,WBN]		
		5 to <30% of the AA.	1			
		30 to <70% of the AA.	0			
		70 to 95% of the AA.	0			
		>95% of the AA.	0			
F13	Ponded Open Water Area - Wettest (OWareaWet)	When water levels are <u>highest</u>, during a normal year, the AA's **ponded open water** occupies a cumulative area of:	W	**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle).		
		<0.10 acre (< 4356 sq. ft) of the AA and adjacent ponded waters. **Enter 1 and SKIP TO F16.**	0		NoPondOW	
		0.10 to <0.50 acres (21,340 sq. ft) of the AA and adjacent ponded waters.	0	**Open water** - is surface water of any depth that contains no emergent herbaceous or wood vegetation (may contain floating-leaved or completely submersed species). It may be partially shaded by a tree canopy.		
		0.50 to <1 acres of the AA and adjacent ponded waters.	0			
		1 to <5 acres of the AA and adjacent ponded waters.	1			
		5 to <50 acres of the AA and adjacent ponded waters.	0	[WS,WBF]		
		50 to <640 acres (1 sq. mi) of the AA and adjacent ponded waters.	0			
		640 to <1000 acres of the AA and adjacent ponded waters.	0			

		1000 to <2500 acres of the AA and adjacent ponded waters.	0		
		>2500 acres (>4 sq.mi) of the AA and adjacent ponded waters.	0		
F14	Ponded Open Water **Distribution** - Wettest (WaterMixWet)	When water levels are highest, during a normal year, the distribution (in aerial view) of ponded open water patches larger than 0.01 acre (400 sq. ft) within the AA is (must meet both a and b criteria):		[NR,AM,WBF,WBN,PD,SBM]	
		(a) Vegetation and **open water** EACH comprise 30-70% of the AA (including its bordering waters if any) **AND (b)** There are many small patches of open water scattered widely within vegetation or many small vegetation clump "islands" scattered widely within open water. Typical (for example) of some extensive bulrush and cattail marshes.	0		
		(a) Vegetation and **open water** EACH comprise 30-70% of the AA (including its bordering waters if any) **AND (b)** There are only a few (or no) small patches of open water scattered widely within vegetation or a few small vegetation clump "islands" scattered widely within open water.	0		
		(a) Vegetation or **open water** comprise >70% of the AA (and its bordering waters) **AND (b)** There are several small patches of open water scattered within vegetation or several small vegetation clump "islands" scattered within open water.	1		
		(a) Vegetation or **open water** comprise >70% of the AA (and its bordering waters) **AND (b)** Open water is mostly in a single area (e.g., center of the wetland) and vegetation is in the rest (e.g., periphery), with almost no intermixing. (Typical of many ponds excavated for livestock watering, stormwater treatment, mineral extraction as well as many wetlands that are inundated only temporarily each year).	0		
F15	Width of Vegetated Zone - Wettest (WidthWet)	When water levels are highest, during a normal year, the width of the **vegetated wetland** that separates the largest patch of open water within or bordering the AA from the closest adjacent uplands, is predominantly: [Note: This is not asking for the maximum width.]		**Vegetated wetland** - in this case does not include underwater or floating-leaved plants, i.e., aquatic bed. In farmed wetlands that have different crops from year to year, consider vegetation condition as it probably existed during most of the past 5 years. If open water exists as many patches, use the distance between the majority of those patches and uplands. [WC,SR,PR,NR,CS,OE,AM,WBF,WBN,SBM,PD,Sens,EC]	
		<5 ft, or no vegetation between upland and open water.	0		
		5 to <30 ft.	0		
		30 to <50 ft.	0		
		50 to <100 ft.	0		
		100 to 300 ft.	0		
		> 300 ft.	1		
F16	All Ponded Water as a Percentage (Driest) (PondWpctDry)	When water levels are lowest, during a normal year, but surface water still occupies >1,076 sq feet (100 sq meter) OR >1% of the AA (whichever is more), the water that is **ponded** (either visible or concealed by vegetation) in the AA occupies:		**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). [WC,FA,FR,AM,WBN,Sens]	
		<1% or none. Surface water is completely or nearly absent then, or is entirely flowing. **Enter 1 and SKIP TO F22.**	0		NoPond2
		1 to <5% of the AA.	1		
		5 to <30% of the AA.	0		
		30 to <70% of the AA.	0		
		70 to 95% of the AA.	0		
		>95% of the AA.	0		
F17	Ponded Open Water **Area** (Driest) (OWareaDry)	When water levels are lowest, during a normal year, the AA's **ponded open water** occupies a cumulative area, including adjacent ponded waters, of:	W	**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). **Open water** - is surface water of any depth that contains no emergent herbaceous or wood vegetation (may contain floating-leaved or completely submersed species). It may be partially shaded by a tree canopy. [WBN,PUv]	
		<0.10 acre (< 4356 sq. ft). **Enter 1 and SKIP TO F24.**	0		NoPondOW2
		0.10 to <0.50 acres (21,340 sq. ft).	0		
		0.50 to <1 acres.	1		
		1- 4 acres.	0		
		5 to <50 acres.	0		
		50 to <640 acres (1 sq. mi).	0		
		640 to <1000 acres.	0		
		1000 to 2500 acres.	0		
		>2500 acres (>4 sq.mi).	0		
F18	Ponded Open Water Distribution - (Driest) (WaterMixDry)	When water levels are lowest, during a normal year, the distribution of ponded open water patches larger than 0.01 acre (400 sq. ft) within the AA is:		[NR,INV,AM,WBN]	
		(a) Vegetation and **open water** EACH comprise 30-70% of the AA (including its bordering waters if any) AND **(b)** There are many small patches of open water scattered widely within vegetation or many small vegetation clump "islands" scattered widely within open water. Typical (for example) of some extensive bulrush and cattail marshes.	0		
		(a) Vegetation and **open water** EACH comprise 30-70% of the AA (including its bordering waters if any) AND **(b)** There are only a few (or no) small patches of open water scattered widely within vegetation or a few small vegetation clump "islands" scattered widely within open water.	0		
		(a) Vegetation or **open water** comprise >70% of the AA (and its bordering waters) AND **(b)** There are several small patches of open water scattered within vegetation or several small vegetation clump "islands" scattered within open water.	1		

		(a) Vegetation <u>or</u> **open water** <u>comprise >70%</u> of the AA (and its bordering waters) AND **(b)** Open water is <u>mostly in a single area</u> (e.g., center of the wetland) and vegetation is in the rest (e.g., periphery), with almost no intermixing. Typical of many ponds excavated for livestock watering, stormwater treatment, mineral extraction as well as many wetlands that are inundated only temporarily each year.	0			
F19	Floating Algae & Duckweed (Algae)	At some time of the year, <u>most</u> of the AA's otherwise-unshaded water surface is covered by floating mats of algae, or small (<1 inch) floating plants such as duckweed, *Azolla* , *Wolffia* , or *Riccia* . **Enter 1, if true.**	0	This includes most nontidal wetlands labeled as Aquatic Bed (AB) on NWI maps. If wetland can be visited only during winter, it may not be possible to answer this question with much certainty unless local sources are contacted or indicators (e.g., dried remains of algae) are found.		
F20	Floating-leaved & Submerged Aquatic Vegetation (SAV)	**SAV** (submerged & floating-leaved aquatic vegetation, excluding the species listed above) occupies an annual maximum of:		**SAV** - are herbaceous plants that characteristically grow at or below the water surface, i.e., whose leaves are primarily and characteristically under or on the water surface during most of the part of the growing season when surface water is present. Some species are rooted in the sediment whereas others are not. If pond lily (*Nuphar*) is the predominant species, consider its maximum extent only during the period when surface water is present beneath the leaves. [PR,OE,INV,FR,AM,WBF,WBN]		
		none, or <5% of the water area.	1		NoSAV	
		5 to <25% of the water area.	0			
		25 to <50% of the water area.	0			
		50 to 95% of the water area.	0			
		>95% of the water area.	0			
		many SAV plants present, but impossible to select from the above categories.	0			
F21	Width of Vegetated Zone (Driest) (WidthDry)	When water levels are lowest, during a normal year, but surface water still occupies <u>>400 sq feet or >1% of the AA</u> (which ever is more), the width of the **vegetated wetland** that separates the largest patch of open water within or bordering the AA from the closest adjacent uplands, is predominantly:		Measure the width perpendicular to the open water part. **Vegetated wetland -** in this case does not include underwater or floating-leaved plants, i.e., aquatic bed. In farmed wetlands that have different crops from year to year, consider vegetation condition as it probably existed during most of the past 5 years. Note: For most sites larger than 1 acre and with persistent water, measure the width using aerial imagery rather than estimating in the field. [WBN]		
		<5 ft, or no vegetation between upland and open water.	0			
		5 to <30 ft.	0			
		30 to <50 ft.	0			
		50 to <100 ft.	0			
		100 to 300 ft.	0			
		> 300 ft.	1			
F22	Beaver (Beaver)	Use of the AA by beaver during the past 5 years is: **Select most applicable ONE.**		**Valley width** - is delimited by an abrupt increase in slope on both sides of the channel. [AM,WBN,SBM,PD,Sens]		
		Evident from direct observation or presence of gnawed limbs, dams, tracks, dens, or lodges.	1			
		<u>Very likely</u> based on known occurrence in this part of the region and <u>proximity to ALL of the following</u> **(a)** a persistent freshwater wetland, pond, or lake, or a perennial low-gradient (<5%) channel, and **(b)** average valley width is > 150 ft and **(c)** >20% cumulative cover of aspen, cottonwood, alder, and willow in vegetated areas within 150 ft of the AA's edge. Or there is evidence of beaver just outside the AA.	0			
		<u>Somewhat likely</u> based on known occurrence in this part of the region and <u>proximity to ALL of the following</u> **(a)** a persistent freshwater wetland, pond, or lake, or a perennial low or mid-gradient (<10%) channel, and **(b)** average valley width is >50 ft, and **(c)** >20% cumulative cover of hardwood trees and shrubs in vegetated areas within 150 ft of the AA's edge.	0			
		<u>Unlikely</u> because site characteristics above are deficient, and/or this is an area where beaver are routinely removed. But beaver occur within 2 miles.	0			
		<u>None</u>. Beaver are absent from this part of the region.	0			
F23	Isolated Island (Island)	During June, the wetland contains (or is part of) an island that is isolated from the shore by water depths >3 ft. The island may be solid, or it may be a floating vegetation mat suitable for nesting waterbirds. The island must be larger than 400 sq.ft and without inhabited buildings. **Enter 1, if true.**	0	[WBF,WBN]		
F24	Ice-free (IceDura)	During most years, most of the AA's surface water (if any) does **not** freeze, or freezes for fewer than 4 continuous weeks. **Enter 1, if true.**	1	[PR,FR,WBF]		
F25	Water Fluctuation Range - Maximum (Fluctu)	The **maximum vertical fluctuation** in surface water within the AA, during a normal year is:		**maximum vertical fluctuation** - is the difference between the highest annual and lowest annual water level during an average year. Use field indicators to assess this indicator. [WS,SR,PR,NR,CS,OE,INV,AM,WBN,PD]		
		<0.5 ft or stable.	0			
		0.5 to < 1 ft.	1			
		1 to <3 ft.	0			
		3 to 6 ft.	0			
		>6 ft.	0			
F26	% Only Saturated or Seasonally Flooded (SeasPct)	Identify the parts (if any) of the AA that never contain surface water (only saturated soil) or where the water (either ponded or flowing) usually remains on the land surface <u>for less than the entire growing season</u>. The percentage of the AA containing such areas is:		If you can identify plants, use their wetland indicator status to infer the possible extent of seasonal-only inundation within a wetland. Vegetation may be patterned in concentric or parallel zones, as one moves outward & away from the deepest part of the wetland or channel. Flood marks (algal mats, adventitious roots, debris lines, ice scour, etc.) may be evident when not fully inundated. In riverine systems, the extent of this zone can be estimated by multiplying by 2 the bankful height and visualizing where that would intercept the land along the river. Also, such areas often have a larger proportion of upland and annual (vs. perennial) plant species. Although useful only as a general guide, the NRCS county soil survey descriptions of the soil units and water feature table		
		<5% of the AA, or none (i.e., all water persists for >4 months).	0		NoSeasonal	
		5 to <25% of the AA.	0			
		25 to <50% of the AA.	0			

		50 to 75% of the AA.	0	general guide, the NRCS county soil survey descriptions of the soil units and water feature table usually includes information on flooding frequency and saturation persistence.	
		>75% of the AA.	1	[SR,NR,CS,OE,INV,FA,WBF,WBN,POL,SBM,PD,Sens,EC]	
F27	Salinity, Alkalinity, Conductance (Salin)	The AA's surface water is mostly:		Saline or brackish conditions are commonly indicated by a prevalence of particular plant species. Consult the ORWAP SuppInfo file's P_Salt worksheetfor a list of these.	
		Brackish or saline. Plants that indicate saline conditions dominate the vegetation. Salt crust may be obvious around the perimeter and on flats.	0	**Brackish or saline** - conductance of >5000 µS/cm, or >3200 ppm TDS	
		Slightly brackish. Plants that indicate saline conditions are common. Salt crust may or may not be present along perimeter.	0	**Slightly brackish** - conductance of 500- 5000 µS/cm, or 320 - 3200 ppm TDS	
		Fresh. [Note: *Assume this to be the condition unless wetland is known to be a playa or there is other contradicting evidence*].	1	**Fresh** - conductance of < 500 µS/cm, or <320 ppm TDS	FreshW
		Unknown.	0	[PR,CS,AM]	
F28	Fish & Waterborne Pests (FishAcc)	**Select All that apply:**		[INV,FA,FR,AM,WBF]	
		A regularly-used boat dock is present within or contiguous to the AA.	0		
		A regularly-used boat dock is not within the AA, but there is one within 300 ft. of the AA and there is a persistent surface connection between the dock and the AA.	0		
		Fish (native or stocked) are known to be present in the AA, or can access it during at least one day annually.	0		
		None of the above, and could not estimate fish presence/absence.	1		
F29	Non-native Aquatic Animals (PestAnim)	The following are known or likely to have reproducing populations in this AA, its wetland, or in water bodies within 300 ft that connect to the AA at least seasonally. **Select All that apply:**		Assume non-native fish to be present if wetland is associated with a nearby reservoir, fish pond, or perennial stream flowing through an agricultural or residential area. Assume bullfrog, nutria, and/or carp to be present if (a) the AA contains persistent water or is flooded seasonally by an adjoining body of permanent water, and (b) not a forested wetland, and (c) in western Oregon, elevation is lower than about 3000 ft. In the ORWAP_SuppInfo file, see Inverts_Exo worksheet for more complete list of non-native invertebratesf or Oregon, and WetVerts worksheet for more complete list of fish that are not native to Oregon.	
		Non-native amphibians (e.g., bullfrog) or reptiles (e.g., red-ear slider).	1		
		Carp.	0		
		Non-native fish that prey on tadpoles or turtles (e.g., bass, walleye, crappie, brook trout).	0		
		Non-native invertebrates (e.g., New Zealand mudsnail, mitten crab, rusty crayfish).	0	You may also consult: http://nas.er.usgs.gov/queries/default.aspx	
		Nutria.	0	http://www.dfw.state.or.us/conservationstrategy/invasive_species.asp	
		None of above.	0	[FA,FR,AM,EC]	
F30	Shorebird Feeding Habitats (Shorebd)	The extent of mudflats, very shallow waters, or shortgrass meadows, within the AA, that meet the definition of **shorebird habitat** for at least 3 months during the period of late summer through the following May is:		**Shorebird habitat** - areas must have **(a)** grasses shorter than 6", or a mudflat, during any part of this period, **AND (b)** soils that either are saturated or covered with <2 inches of water during any part of this period, **AND (c)** no detectable surrounding slope (e.g., not the bottom of an incised dry channel), **AND (d)** not shaded by shrubs or trees. See photograph in Appendix A of manual. This addresses needs of most migratory sandpipers, plovers, curlews, and godwits.	
		None, or <100 sq. ft.	0		
		100 to <1000 sq. ft. within AA.	0		
		1000 to 10,000 sq. ft. within AA.	1	[WBF]	
		>10,000 sq. ft. within AA.	0		
F31	Outflow Duration (OutDura)	The most persistent surface water connection (outlet channel, pipe, ditch, or overbank water exchange) between the AA and the closest stream or lake located downslope is: [Note: If the AA represents only part of a wetland, answer this according to whichever is the least permanent surface connection: the one between the AA and the rest of its wetland, OR the surface connection between the AA's wetland and a mapped stream or lake located within 300 ft downslope from this wetland].	W	The emphasis is on the connection to a mapped stream network. A larger difference in elevation between the wetland-upland boundary and the bottom of the wetland outlet (if any) indicates shorter outflow duration.	
		Persistent (>9 months/year).	1	Do not rely only on topographic maps or NWI maps to show this; inspect while in field if possible, and ask landowner. The durations given are only approximate and are for a "normal" year.	
		Seasonal (14 days to 9 months/year, not necessarily consecutive).	0	The connection need not occur during the growing season. Assume that depressions with	
		Temporary (<14 days, not necessarily consecutive).	0	effective nearby ditches or tile drains will connect for shorter periods.	
		None -- no surface water flows out of the wetland except possibly during extreme events (<once per 10 years). Or, water flows only into a wetland, ditch, or lake that lacks an outlet. **Enter 1 and SKIP TO F33.**	0	[WS,WCv,SR,PR,NR,CS,OE,FA,FR,Sens]	NoOutlet
F32	Outflow Confinement (Constric)	During **major runoff events**, in the places described above where surface water exits the AA, it:	W	**Major runoff events** - would include biennial high water caused by storms and/or rapid snowmelt.	
		Is **impeded** as it mostly passes through a pipe, culvert, tidegate, narrowly breached dike, berm, beaver dam, or other partial obstruction (other than natural topography).	0	**Impeded** - means causing a delay or reduction in water velocity or volume.	
		Leaves mainly through natural surface exits, not largely through artificial or temporary features which **impede** or accelerate outflow.	0	[WS,SR,PR,NR,CS,OE,Sens,STR]	
		Is exported more quickly than usual as it mostly passes through ditches or pipes intended to accelerate drainage. They may be within the AA or connected to its outlet or within 30 ft of the AA's edge.	1		
F33	Tributary or Overbank Inflow (Inflow)	At least once annually, surface water from upstream or another water body moves into the AA. It may enter directly, or as unconfined overflow from a contiguous river or lake. If it enters only via a pipe, that pipe must be fed by a mapped stream or lake further upslope. **Enter 1, if true. If false, SKIP to F36.**	0	[SRv,PRv, PD]	Inflow
F34	Input Channel Gradient (SlopeInChan)	The gradient of the tributary with the largest inflow, averaged over the 150 ft. before it enters the AA (but excluding any portion of the distance where water travels through a pipe) is:		[SRv, PRv]	
		<1%.	0		
		1 to <3%.	0		
		3 to 6%.	0		

		>6%.	0			
F35	Throughflow Complexity (ThruFlo)	**[Skip this question if the AA lacks both an inlet and outlet.]** During peak annual flow, water entering the AA in channels encounters which of the following conditions as it travels through the AA: **Select the ONE encountered most.**		This mainly refers to surface water that moves between the inlet and outlet. Some judgment is required in assessing straight vs. indirect flow path.		
		Does not bump into many plant stems as it travels through the AA. Nearly all the water continues to travel within unvegetated (often incised) channels and has minimal contact with wetland vegetation, or through a zone of open water such as an instream pond or lake.	0	See ORWAP Manual Appendix B diagram. [WS,SR,PR,NR,OE,INV,FA,FR,WBF,WBN,PD]		
		Bumps into herbaceous vegetation but mostly remains in fairly straight channels.	0			
		Bumps into herbaceous vegetation and mostly spreads throughout, or follows a fairly indirect path (in widely meandering, multi-branched, or braided channels).	0			
		Bumps into tree trunks and/or shrub stems but mostly remains in fairly straight channels.	0			
		Bumps into tree trunks and/or shrub stems and follows a fairly indirect path (meandering, multi-branched, or braided) from entrance to exit.	0			
F36	Internal Gradient (Gradient)	The gradient from the lowest to highest point of land within the AA (**or** from outlet to inlet) is:		Wetlands with no outlet, and wetlands where most surface water is impounded on site, should be considered flat (<2%). For other wetlands, estimate gradient as the elevation difference between the inlet and outlet (if any) divided by the distance between them, or the difference between the highest and lowest points in the wetland divided by the distance between them. [WS,SR,PR,NR,CS,OE,AM,WBF,WBN]		
		<2% (internal flow is absent or barely detectable; basically flat).	1			
		2 to <6%.	0			
		6 to 10%.	0		TooSteep1	
		>10%.	0		TooSteep2	
F37	Groundwater Strength of Evidence (Groundw)	**Select first one that applies:**		[WS,WC,NR,CS,OE,INV,FA,FR,PD]		
		In the AA or its wetland: **(a)** Springs are observed, OR **(b)** Water is markedly cooler in summer and warmer in winter (e.g., later ice formation) than in other local wetlands, OR **(c)** Measurements from shallow wells indicate groundwater is discharging to the wetland, OR **(d)** Water visibly seeps into pits dug within the AA during the driest time of the year and located >30 ft from the closest surface water.	0			
		The AA's wetland: **(a)** Is very close to the base of a natural slope steeper than 15% and longer than 300 ft or is located at a geologic fault, OR **(b)** Has no persistently flowing tributary AND one or more is true: (b1) Is on a natural slope of >5%, OR (b2) Has rust deposits ("iron floc"), colored precipitates, or dispersible natural oil sheen, OR (b3) Is in an **Arid or Semi-arid hydrologic unit**.	0	**Arid or Semi-arid hydrologic unit** - See the ORWAP Report's Hydrologic Landscape Class (under Location Information).		
		The AA is not in an **Arid or Semi-arid hydrologic unit**, but has persistent ponded water, no tributary, and is not fed by wastewater, concentrated stormwater, or irrigation water, or by an adjacent river or lake.	1			
		None of above is true, OR AA contains a hot spring. Some groundwater may nonetheless discharge to or flow through the wetland.	0			
F38	Unshaded Herbaceous Vegetation (Extent) (HerbExpos)	The annual maximum areal cover of herbaceous vegetation (excluding SAV, ferns, and mosses, but including forbs & graminoids) that is not beneath a woody canopy reaches:		Do not include submersed and floating-leaved aquatics (SAV) in the category of "herbaceous vegetation", or when defining the "vegetated part" of the site.		
		<5% of the vegetated part of the AA. **Enter 1 and SKIP to F42.**	0	For sites larger than 10 acres, this should be determined from aerial imagery rather than estimated in the field.	NoHerb	
		5 to <25% of the vegetated part of the AA.	0			
		25 to <50% of the vegetated part of the AA.	0			
		50-95% of the vegetated part of the AA.	1	[WBF,WBN]		
		>95% of the vegetated part of the AA.	0			
F39	Forb Cover (Forb)	Within parts of the AA having herbaceous cover (excluding SAV), the areal cover of **forbs** reaches an annual maximum of:		**Forbs -** are flowering non-woody vascular plants (excludes grasses, sedges, ferns, mosses).		
		<5% of the herbaceous part of the AA.	0	[POL]		
		5 to <25% of the herbaceous part of the AA.	1			
		25 to <50% of the herbaceous part of the AA.	0			
		50 to 95% of the herbaceous part of the AA.	0			
		>95% of the herbaceous part of the AA.	0			
F40	Species Dominance - Herbaceous (HerbDom)	Determine which two native herbaceous (forb, fern, and graminoid) species comprise the greatest portion of the herbaceous cover that is unshaded by a woody canopy. **Then select one:**		[INV,WBF,SBM,PD,POL,Sens,EC]		
		Those species together comprise more than half of the areal cover of native herbaceous plants at any time during the year, i.e., one dominant species or two co-dominants. **Also mark this if <20% of the vegetated cover is native species.**	1			

		Those species together comprise less than half of the areal cover of native herbaceous plants at any time during the year.	0			
F41	Invasive or Non-native - % of Vegetative Cover (Invas)	Vegetative cover (annual maximum) is:		In the ORWAP_SuppInfo, see P_Invas worksheet for list of invasives and P_Exo for non-native species list. Examples of woody invasives are Himalayan blackberry, English ivy, scotch broom, and gorse. For known distributions of invasive plants in your area see: http://inr.oregonstate.edu/orbic/invasive-species and http://www.weedmapper.org/maps.html but do not limit your answer based only on that information. Consider most crops to be non-native. [WBF,PD,POL,Sens,EC]		
		Overwhelmingly (>80% cover) non-native species AND >10% of the herbaceous cover is invasive species. (See ORWAP SuppInfo file for species designations).	0		InvasDom	
		Overwhelmingly (>80% cover) non-native species AND <10% of the herbaceous cover is invasive species; OR 50-80% of cover is non-native species regardless of invasiveness.	0			
		Mostly (50-80%) native species.	1			
		Overwhelmingly (>80%) native species.	0			
F42	Mowing, Grazing, Fire (VegCut)	There is evidence that grazing by domestic or wild animals -- or mowing (multiple times per year), plowing, herbicides, harvesting, or fire -- has **repeatedly** reduced the AA's vegetation cover (plants that normally grows taller than 4") to less than 4 inches, or has created an obvious browse line, over the following extent:		**Repeatedly** - means the condition occurred in at least half of the last 10 years. [SR,AM,WBN,SBM,PD,EC]		
		0% (No evidence of such activities).	0		NoMowGraze	
		Trace to 5% of the normally vegetated AA (grazing, mowing, or fire have occurred but vegetation height effects are mostly unnoticeable).	0			
		5 to <50% of the normally vegetated AA.	0			
		50 to 95% of the normally vegetated AA.	1			
		>95% of the normally vegetated AA.	0			
F43	Historically Lacking Trees (HistVeg)	According to the ORWAP Report, the presettlement vegetation class in the vicinity of the AA was prairie, sagebrush, or other open lands not dominated by trees. In addition, the AA is not within the biennial floodplain of a river where trees and shrubs typically dominate when conditions are unaltered. **Enter 1, if true.**	1	In the ORWAP Report's Location Information table. This question is used as a classification variable mainly to set appropriate expectations for the extent of forest cover.	HistOpenland	
F44	Moss Wetland (Moss)	The AA's ground cover is primarily a deep layer of moss, and/or soils are mainly peat or organic muck. Also, the soil remains water-saturated to within 3 inches of the surface during most of a normal year. Surface water within the AA often is absent or confined to small scattered pools or ditches. **Enter 1, if true.**	0	Includes most bogs and fens. May be a floating island. [NR,CS,OE,WBF,WBN,Sens]		
F45	Woody Extent (WoodyPct)	Within the vegetated part of the AA, woody vegetation (trees, shrubs, **robust vines**) taller than 3 ft occupies:		**Robust vines** - include Himalayan blackberry and others that are generally erect and taller than 1 ft. **Vegetated part** - should not include floating-leaved or submersed aquatics. For sites larger than 1 acre, this should be determined from aerial imagery rather than estimated only in the field. [NR,WC,CS,SBM,PD,Sens]		
		<5% of the vegetated AA, and fewer than 10 trees are present. **Enter 1 and SKIP to F51.**	1		NoWoody	
		<5% of the vegetated AA, but more than 10 trees are present.	0			
		5 to <25% of the vegetated AA.	0			
		25 to <50% of the vegetated AA.	0			
		50 to 95% of the vegetated AA.	0			
		>95% of the **vegetated part** of the AA.	0			
F46	Woody Diameter Classes (TreeDiams)	**Select All the types** that comprise >5% of the woody canopy cover in the AA or >5% of its **wooded upland edge** if any:		**Wooded upland edge**- includes woody plants located within one tree-height of the wetland-upland boundary. **DBH** is the diameter of the tree measured at 4.5 ft above the ground. [CS,SBM,POL,Sens]		
		Deciduous 1-4" diameter (DBH) and >3 ft tall.	0			
		Evergreen 1-4" diameter and >3 ft tall.	0			
		Deciduous 4-9" diameter.	0			
		Evergreen 4-9" diameter.	0			
		Deciduous 9-21" diameter.	0			
		Evergreen 9-21" diameter.	0			
		Deciduous >21" diameter.	0			
		Evergreen >21" diameter.	0			
F47	Snags (Snags)	The number of large **snags** (diameter >12 inches) in the AA plus 100 ft uphill of its edge is:		**Snags -** are standing trees at least 20 ft tall that are mainly without bark or foliage. [SBM,POL]		
		Few or none.	0			
		Several.	0			
F48	Abovewater Wood (WoodOver)	The number of horizontal wood pieces thicker than 4 inches that are partly submerged during most of the spring or early summer, thus potentially serving as basking sites for turtles, birds, or frogs and cover for fish is:		Only the wood that is at or above the water surface is assessed because of the impracticality of assessing underwater wood accurately when using a rapid assessment method. [FA,FR,AM]		
		None.	0			
		Few.	0			
		Several (e.g., >3 per 300 ft of channel or shoreline).	0			
F49	Downed Wood (WoodDown)	The number of downed wood pieces longer than 6 ft and with diameter >4 inches that are not submerged during most of the growing season, is:		Exclude temporary "burn piles." [INV,AM,SBM,POL]		
		Few or none.	0			
		Several.	0			

F50	Exposed Shrub Canopy (ShrExpos)	Within the **vegetated part** of the AA, shrubs shorter than 20 ft that are not overtopped by trees occupy: Select first statement that is true.		**Vegetated part** - should not include floating-leaved or submersed aquatics. [SBM,PD]		
		<5% of the vegetated AA and <0.01 acre (400 sq ft).	0			
		5 to <25% of the vegetated AA or the water edge (whichever is greater in early summer).	0			
		25 to <50% of the vegetated AA or the water edge (whichever is greater in early summer).	0			
		50 to 95% of the vegetated AA or the water edge (whichever is greater in early summer).	0			
		>95% of the vegetated part of the AA or the water edge (whichever is greater in early summer).	0			
F51	N Fixers (Nfix)	The percentage of the vegetated area in the AA or along its water edge (whichever has more) that contains nitrogen-fixing plants (e.g., alder, baltic rush, scotch broom, lupine, clover, alfalfa, other legumes) is:		For a more complete list, see ORWAP_SuppInfo, worksheet NFIX (includes native and non-native species). Do not include algae. [OE,INV,Sens]		
		<1% or none.	0			
		1 to <25%.	1			
		25 to <50%.	0			
		50 to 75%.	0			
		>75%.	0			
Note for the next four questions: If the AA lacks an upland edge, evaluate based on the AA's entire perimeter and outward into whatever areas are adjacent. In many situations, these questions are best answered by measuring from aerial images.						
F52	Upland Perennial Cover - % of Perimeter (PerimPctPer)	The percentage of the AA's edge (perimeter) that is comprised of a band of upland **perennial cover** wider than 10 ft and taller than 6 inches, during most of the growing season is:		**Perennial cover** - vegetation that includes wooded areas, native prairies, sagebrush, as well as relatively unmanaged commercial lands in which the ground is disturbed less frequently than annually such as perennial ryegrass fields, hayfields, lightly grazed pastures, timber harvest areas, and rangeland. It does not include water, row crops (vegetable, orchards, Christmas tree farms), residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads. [WCv,SRv,PRv,INV,FA,AM,WBF,WBN,SBM,PD,POL,POLv,Sens,STR]		
		<5%.	1			
		5 to <25%.	0			
		25 to <50%.	0			
		50 to <75%.	0			
		75 to 95%.	0			
		>95%.	0			
F53	Upland Perennial Cover - Width (Buffer) (BuffWidth)	Along the greatest extent of the AA's **upland edge**, the width of **perennial cover** taller than 6 inches that extends upslope from the AA until mostly shorter or non-perennial cover is reached is: [NOTE: the width is not necessarily the maximum width. Base on vegetation that occurs most of the growing season.]		**Upland edge** - is the land within 3 ft of the wetland's perimeter that is not wetland. [WCv,SRv,PRv,INV,FA,AM,WBN,SBM,PD,POL,Sens,STR]		
		< 5 ft, or none.	1		NoUpPerCov	
		5 to <30 ft.	0			
		30 to <50 ft.	0			
		50 to <100 ft.	0			
		100 to 300 ft.	0			
		> 300 ft.	0		AllUpPerren	
F54	Upland Trees as % of All Perennial Cover (UpTreePctPer)	Within 100 f.t landward from the AA's edge (perimeter), the percentage of the upland perennial cover that is woody plants taller than 20 ft is:		Base this on the cumulative canopy width of the trees. [WSv,FA,WBF,WBN,SBM]		
		<5%, or there is no upland perennial cover along the upland edge.	1			
		5 to <25% of perennial cover.	0			
		25 to <50% of perennial cover.	0			
		50 to <75% of perennial cover.	0			
		75 to 95% of perennial cover.	0			
		>95% of perennial cover.	0			
F55	Weeds - % of Upland Edge (UpWeed)	Along the AA's edge (perimeter), the cover of invasive woody or herbaceous plants occupies: [If vegetation is so senesced that apparently-dominant edge species cannot be identified even to genus, answer "none"].		See ORWAP_SuppInfo file, worksheet P_Invas. Some of the most common invaders along upland edges of Oregon wetlands are Himalayan blackberry, knotweed, sweetbrier rose, Russian olive, English ivy, nightshade, pepperweed, medusahead, white clover, ryegrass, quackgrass, false brome, bentgrass, dandelion, oxeye daisy, pennyroyal, bull and creeping thistles, tansy ragwort, poison hemlock, and teasel. If a plant cannot be identified to species (e.g., winter conditions) but its genus contains an invasive species, assume the unidentified plant to also be invasive. [PD,STR]		
		<5%, or none.	0			
		5 to <25%.	0			
		25 to <50%.	1			
		50 to <75%.	0			
		75 to 95%.	0			
		>95%.	0			
F56	Bare Ground & Accumulated Plant Litter	Consider the parts of the AA that go dry during a normal year. Viewed from 6 inches above the soil surface, the condition in most of that area just before the year's longest inundation period begins is:		**Bare ground**- includes unvegetated soil, rock, sand, or mud between stems if any. Bare ground under a tree or shrub canopy should be counted.		

	(Gcover)	Little or no (<5%) **bare ground** is visible between erect stems or under canopy and there is little or no dead detached plant tisuse (thatch) remaining on top of the ground surface and ground surface is extensively blanketed by moss, lichens, graminoids with great stem densities, or plants with ground-hugging foliage.	0	Wetlands that are dominated by annual plant species tend to have more extensive areas that are bare during the early growing season. [WS,WC,SR,PR,NR,CS,OE,INV,AM,SBM,POL,Sens,EC]		
		Some (5-20%) bare ground or remaining thatch is visible. Herbaceous plants have moderate stem densities and do not closely hug the ground.	1			
		Much (20-50%) bare ground or thatch is visible. Low stem density and/or tall plants with little living ground cover during early growing season.	0			
		Mostly (>50%) bare ground or thatch.	0			
		Not applicable. All of the AA is inundated throughout most years.	0			
F57	Ground Irregularity (Girreg)	In parts of the AA that lack persistent water, the number of small pits, raised mounds, hummocks, boulders, upturned trees, animal burrows, islands, natural levees, wide soil cracks, and microdepressions is:		**Microtopography** - refers mainly to vertical relief of <3 ft and is represented only by inorganic features, except where plants have created depressions or mounds of soil. Consider the microtopography to be "few or none" if one could walk easily through most of the AA once any slash and logs are removed. Consider it to be "several" if one has to constantly look down and check balance. [WS,SR,PR,NR,INV,AM,SBM,PD,POL,EC]		
		Few or none, or the entire AA is always water-covered. Minimal **microtopography**; <1% of the AA, e.g., many flat sites having a single hydroperiod.	0			
		Intermediate.	1			
		Several (extensive micro-topography).	0			
F58	Soil Composition (SoilTex)	Based on digging into the substrate and examining the surface layer of the soil (2 inch depth) that was mapped as being predominant, its composition (excluding **duff** and living roots) is mostly:		Do not base the texture on soil maps unless the AA is inaccessible. See ORWAP Manual's protocol (Step 2 of section 5.3 and the soil chart in Appendix B). Judge which soil type is predominant only in the part of the AA that is not inundated at the time of your visit. **Duff** - is loose organic surface material, e.g., dead plant leaves and stems). Organic soils are much less common in floodplains. [WS,PR,NR,CS,OE,PD,Sens]		
		Loamy: includes silt, silt loam, loam, sandy loam.	0			
		Clayey: includes clay, clay loam, silty clay, silty clay loam, sandy clay, sandy clay loam.	1			
		Organic: includes muck, mucky peat, peat, and mucky mineral soils (blackish or grayish). Exclude live roots unless they are moss.	0			
		Coarse: includes sand, loamy sand, gravel, cobble, stones, boulders, fluvents, fluvaquents, riverwash.	0			
F59	Cliffs or Banks (Cliff)	Within 300 ft of the AA, there are elevated terrestrial features such as cliffs, bluffs, talus slopes, or unarmored stream banks that extend at least 6 ft nearly vertically, are unvegetated, and potentially contain crevices or other substrate suitable for nesting or den areas. **Enter 1, if true.**	0	[SBM,POL]		
F60	Restored or Created Wetland (NewWet)	The AA is (or is within, or contains) a "new" wetland resulting from human actions (e.g., excavation, impoundment) or other factors affecting what was upland (non-hydric) soil. Or, some part of the AA was originally a wetland, was artificially drained for many years, and has since had its water regime partly or wholly restored or rehabilitated (e.g., by ditch plugs, berms, tile breakage, non-maintenance).		Include wetlands whose area was likely expanded by road berms which impeded runoff, but do not include wetlands created by beaver dams except for the part where flooding affected uplands (not just existing wetlands and streams). Determine this using historical aerial photography, old maps, soil maps, consultation with landowners, and/or permit files as available. See ORWAP Map Viewer's Hydric Soil layer (expend Soils). Also, locations of some restoration wetlands can be found in the ORWAP Map Viewer under Restoration. Another potential source is the Conservation Registry: https://oregonexplorer.info/content/conservation-registry?topic&ptopic. [PR,NR,CS,OE,PD,Sens]		
		Yes, and constructed or restored mostly within last 3 years.	0			
		Yes, and constructed or restored mostly 3-7 years ago.	0			
		Yes, and constructed or restored mostly >7 years ago.	0			
		Yes, but time of origin or restoration unknown.	0			
		No.	1		NotNewWet	
		Unknown if wetland is constructed, restored, or natural.	0			
F61	Ownership (Ownership)	Most of the AA is:		An initial indication of ownership can be found on the ORWAP Map Viewer under the Land Ownership layer (expand Land Classification). However, it is advisable to ask local sources or use local maps with higher precision. [PUv]		
		Publicly owned (municipal, county, state, federal).	0			
		Owned by non-profit conservation organization or easement holder who allows public access to this AA.	0			
		Other private ownership, including tribal. **Enter 1 and SKIP to F63.**	1		PrivateOwn	
F62	Special Protected Area Designation (Desig)	The AA is part of an area designated as a Special Protected Area according to the USGS Protected Areas Database of the U.S. **Enter 1, if true.**	0	See the ORWAP Map Viewer Report under the Location Information section for "In Special Protected Area?" [PUv]		
F63	Conservation Investment (ConsInvest)	The AA is not a mitigation wetland, but public funds or community volunteer efforts have been applied to preserve, create, restore, or enhance the condition or functions of the wetland. (e.g. CRP or WRP wetlands, community projects). **Enter 1, if true. (If unknown, leave 0).**	0	Locations of some restoration wetlands can be found in the ORWAP Map Viewer under Restoration. Another potential source is the Conservation Registry: https://oregonexplorer.info/content/conservation-registry?topic&ptopic [PUv]		
F64	Compensation Wetland (MitWet)	The AA is all or part of a compensation site used explicitly to offset impacts elsewhere. **Enter 1, if true. (If unknown, leave 0).**	0	Answer to the best of your knowledge. Sources for information include the property owner, DSL, and/or the ACOE. [PUv]		
F65	Sustained Scientific Use (SciUse)	Plants, animals, or water in the AA have been monitored for >2 years, unrelated to any regulatory requirements, and data are available to the public. Or the AA is part of an area that has been designated by an agency or institution as a benchmark, reference, or status-trends monitoring area. **Enter 1, if true. (If unknown, leave 0)**	0	[PUv]		
F66	Visibility (Visibil)	The maximum percentage of the wetland that is visible from the best vantage point on public roads, public parking lots, public buildings, or public maintained trails that intersect, adjoin, or are within 300 ft of the AA is **(Select ONE):**		[WBFv,WBNv,SBMv,PUv,STR]		
		<25%.	1			
		25 - 50%.	0			
		>50%.	0			

F67	Non-consumptive Uses - Actual or Potential (RecPoten)	**Select All statements that are true** of this AA as it currently exists:		The question assumes access is allowed. [PUv]		
		Walking is physically possible in >5% of the AA during most of year (e.g., free of deep water and dense shrub thickets).	1			
		All or part of the AA (or an area within sight of the AA and within 100 ft) would be physically accessible to people in wheelchairs (e.g., paved and flat).	0			
		Maintained roads, parking areas, or foot-trails are within 30 ft of the AA, or the AA can be accessed most of the year by boat.	1			
		Within or near the AA, there is an interpretive center, trails with interpretive signs or brochures, and/or regular guided interpretive tours.	0			
F68	Core Area 1 (VisitNo)	The percentage of the AA almost never walked or driven by humans during an average growing season probably comprises: [Note: If more than half the wetland is visible from areas within 100 ft of the AA, include visits by people to those areas that are actually walked or driven (not simply viewed from].		Judge this based on proximity to population centers, roads, trails, accessibility of the AA to the public, wetland size, usual water depth, and physical evidence of human visitation. Exclude visits that are not likely to continue and/or that are not an annual occurrence (e.g., by construction, maintenance, or monitoring crews). [AM,WBF,WBN,SBM,PD,PUv,STR]		
		<5% and no inhabited building is within 300 ft of the AA.	0			
		<5% and inhabited building is within 300 ft of the AA.	0			
		5 to <50% and no inhabited building is within 300 ft of the AA.	0			
		5 to <50% and inhabited building is within 300 ft of the AA.	0			
		50 to 95% with or without inhabited building nearby.	1			
		>95% of the AA with or without inhabited building nearby.	0			
F69	Core Area 2 (VisitOften)	The part of the AA visited by humans <u>almost daily for several weeks</u> during an average growing season probably comprises: [The Note in the preceding question applies here as well].		See note above. [AM,WBF,WBN,SBM,PD,PUv,STR]		
		<5%.	0			
		5 to <50%.	1			
		50 to 95%.	0			
		>95% of the AA.	0			
F70	Consumptive Uses (Provisioning Services) (Hunt)	Recent evidence was found <u>within the AA</u> of the following potentially-sustainable consumptive uses. **Select All that apply.**		Evidence of these consumptive uses may consist of direct observation, or presence of physical evidence (e.g., recently cut stumps, fishing lures, shell cases), or might be obtained from communication with the land owner or manager. [FRv,WBFv,PUv]		
		Low-impact commercial timber harvest (e.g., selective thinning).	0			
		Commercial or traditional-use harvesting of native plants, their fruits, or mushrooms.	0			
		Waterfowl hunting.	0			
		Fishing.	0			
		Trapping of furbearers.	0			
		None of the above.	1			
F71	Domestic Wells (Wells)	Wells or water bodies that currently provide drinking water are:		If unknow, assume this is true if there is an inhabited structure within the specified distance and the neighborhood is known to not be connected to a municipal drinking water system (e.g., is outside an urban growth boundary or other densely settled area). [NRv]		
		<300 ft and downslope from the AA or at same elevation.	0			
		300 to 1500 ft and downslope or at same elevation.	1			
		>1500 ft downslope, or none downslope, or no information.	0			
F72	Wetland Type of Conservation Concern (RareType)	Does the AA contain, or is it part of, any of these wetland types? **Select All that apply.**	W	Consult the <u>ORWAP Report</u> under the Location Information table for "Rare Wetland Types." But be aware that it may not apply to the exact AA you have delimited. [PDv, Sens]		
		<u>Mature forested wetland</u> (anywhere): a wetland in which mean diameter of trees (d.b.h., FACW and FAC species only) exceeds 18 inches, <u>and/or</u> the average age of trees exceeds 80 years, <u>or</u> there are >5 trees/acre with diameter >32 inches.	0	To qualify, the diameter of >18 inches must be the mean measured from at least 10 trees.		
		<u>Bog or Fen:</u> contains a sponge-like organic soil layer which covers most of the AA and often has extensive cover of sedges <u>and/or</u> broad-leaved evergreen shrubs (e.g., Ledum). Often lacks tributaries, being fed mainly by groundwater and/or direct precipitation.	0			
		<u>Playa, Salt Flat, or Alkaline Lake</u>: a nontidal ponded water body usually having saline (salinity >1 ppt or conductivity >1000 µS) or alkaline (conductivity >2000 µS and pH >9) conditions and large seasonal water level fluctuations (if inputs-outputs unregulated). If a playa or salt flat, vegetation cover is sparse and plants typical of saline or alkaline conditions (e.g., Distichlis, Atriplex) are common.	0	See <u>ORWAP_SuppInfo</u> file, worksheet P_Salt for species typically occurring in tidal or saline conditions.	Playa	
		<u>Hot spring</u> (anywhere): a wetland where discharging groundwater in summer is >10 degrees (F) warmer than the expected water temperature.	0			
		<u>Native wet prairie</u> (west of the Cascade crest): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, and dominated primarily by native graminoids often including species in column E.	0	Deschampsia caespitosa, Danthonia californica, Camassia quamash, Triteleia hyacinthina, Carex densa, C. aperta, and/or C. unilateralis		
		<u>Vernal pool (Willamette Valley)</u>: a seasonally inundated wetland, underlain by hardpan or claypan, with hummocky micro-relief, usually without a naturally-occurring inlet or outlet, and with native plant species distinctly different from those in slightly higher areas, and often including species in column E.	0	Downingia elegans, Isoetes nuttallii, Triteleia hyacinthina, Eleocharis spp., Eryngium petiolatum, Plagiobothrys figuratus, Plagiobothrys scouleri, Grindelia nana, Veronica peregrina, Lasthenia glaberrima , Cicendia quadrangularis, Kickxia elatine, Gnaphalium palustre, and/or Callitriche spp.		

		Vernal pool (Medford area): a seasonally inundated acidic wetland, underlain by hardpan, with hummocky micro-relief, usually without a naturally-occurring inlet or outlet, and having concentric rings of similar native vegetation, often including species in column E.	0	Downingia vina, Isoetes nuttalli, Pilularia americana, Triteleia hyacinthina, Eleocharis spp., Eryngium petiolatum, Plagiobothrys brachteatus, Plagiobothrys scouleri, Grindelia nana, Veronica peregrina, Alopecurus saccatus, Lasthenia californica, Deschampsia danthonioides, and/or Callitriche spp.		
		Vernal pool (Modoc basalt & Columbia Plateau): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, located on shallow basalt bedrock and often having species in column E.	0	Blennosperma nanum, Camassia quamash, Epilobium densiflorum, Callitriche marginata, Cicendia quadrangularis, Eryngium vaseyi, Psilocarphus brevissimus, and/or Sedella pumila.		
		Interdunal wetland (Coastal ecoregion): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, located between sand dunes where wind has scoured the sand down to the water table (deflation plain, blowout pond), and often with significant cover of the native species in column E.	0	Carex obnupta, Argentina egedii, Juncus lesueurii, J. nevadensis, J. falcatus, Sisyrinchium californicum, and/or Salix hookeriana		
		Ultramafic soil wetland (mainly southwestern Oregon): a low-elevation wetland, usually with a sponge-like organic soil layer, occurring in an area with exposed serpentine or peridotite rock, and/or in soils with very low Ca:Mg ratios.	0			
		None of above.	1			

Site: NEXT Renewable Fuels Oregon (mitigation pre-construction)	Name: Sue Brady	Date: 5/6/21

Form S
Stresser Data
ORWAP V 3.2

					Data	Comments
S1	**Aberrant Timing of Water Inputs (AltTiming)**					
	*In the "Data" column, **place an X** next to any item that is likely to have caused the **timing** of water inputs (but not necessarily their volume) to shift by hours, days, or weeks, becoming either **more muted** (smaller or less frequent peaks spread over longer times, more temporal homogeneity of flow or water levels) **or more flashy** (larger or more frequent spikes but over shorter times).*					
	Control structure that regulates inflow to the AA (including tide gates), or flow regulation in tributaries, or water level in adjoining water body is regulated.					
	Irrigation runoff or seepage.				x	
	Snow storage areas that drain directly to the wetland.					
	Increased pavement and other impervious surface in the CA.					
	Straightening, ditching, dredging, and/or lining of tributary channels in the CA.				x	
	*If **any** items were checked above, then for each row of the table below, you may assign points (3, 2, or 1). However, if you believe the checked items had no measurable effect on the timing of water conditions in any part of the AA, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition, if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Spatial extent within the AA of timing shift.	>95% of AA.	5-95% of AA.	<5% of AA.	3	
	When most of the timing shift began.	<3 yrs ago.	3-9 yrs ago.	10-100 yrs ago.	1	
	Score the following 2 rows only if the altered inputs began within past 10 years, and only for the part of the AA that experiences those.					
	Input timing now vs. previously.	Shift of weeks.	Shift of days.	Shift of hours or minutes.	0	
	Flashiness or muting.	Became very flashy or controlled.	Intermediate.	Became mildly flashy or controlled.	0	
				Sum=	4	
				Final score=	0.33	
S2	**Accelerated Inputs of Nutrients (NutrLoad)**					
	*In the "Data" column, **place an X** next to any item -- occurring in either the AA or its RCA -- that is likely to have accelerated the inputs of nutrients (nitrogen, phosphorus) to the AA.*					
	Stormwater or wastewater effluent (including failing septic systems), landfills.					
	Fertilizers applied to lawns, ag lands, or other areas in the RCA.				x	
	Livestock, dogs.				x	
	Artificial drainage of upslope lands.				x	
	Other waterborne human-related nutrient sources within the RCA.					
	*If **any** items were checked above, then for each row of the table below, you may assign points. However, if you believe the checked items did not cumulatively expose the AA to significantly more nutrients, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Usual load of nutrients.	Large (e.g., feedlots, extensive residential on septic) or or 303d* for nutrients.	Moderate (e.g., grazing, light residential on septic, light agriculture).	Limited (e.g., a few animals, lawns, sewered residential).	2	
	Frequency & duration of input.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & during high runoff events mainly.	2	
	AA proximity to main sources (actual or potential).	0 - <50 ft.	50-300 ft. or in groundwater.	In other part of contributing area.	3	
				Sum=	7	
				Final score=	0.78	
S3	**Accelerated Inputs of Contaminants and/or Salts (ContamIn).**					
	*In the "Data" column, **place an X** next to any item -- occurring in either the AA or its RCA -- that is likely to have accelerated the inputs of contaminants or salts to the AA.*					
	Stormwater or wastewater effluent (including failing septic systems), landfills, snow storage areas.					
	Metals & chemical wastes from mining, shooting ranges, oil/ gas extraction, other sources.					
	Irrigation of lands, especially those with saline soils.				x	
	Oil or chemical spills (not just chronic inputs) from nearby roads.					
	Road salt.					
	Pesticides applied to lawns, ag lands, roadsides, or other areas in the RCA, but excluding spot applications for controlling non-natives in the AA.				x	
	Artificial drainage of contaminated or saline soils.					
	Erosion of contaminated soils.					
	Other contaminant sources within the RCA.					
	*If **any** items were checked above, then for each row of the table below, you may assign points. However, if you believe the checked items did not cumulatively expose the AA to significantly higher levels of contaminants and/or salts, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Usual toxicity of most toxic contaminants.	Industrial effluent or 303d* for toxics.	Wastewater treatment plant, cropland, fossil fuel extraction, pipeline, power station, managed landfill.	Low density residential or commercial.	1	
	Frequency & duration of input.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & during high runoff events mainly.	2	
	AA proximity to main sources (actual or potential).	0 - <50 ft.	50-300 ft. or in groundwater.	In other part of contributing area.	3	
	* See ORWAP Map Viewer for waters designated as 303d; see Oregon DEQ web site for reasons.			Sum=	6	
				Final score=	0.67	
S4	**Excessive Sediment Loading from Runoff Contributing Area (SedRCA).**					
	*In the "Data" column, **place an X** next to any item present in the RCA that is likely to have elevated the load of waterborne or windborne sediment reaching the AA from its RCA.*					
	Erosion from plowed fields, fill, timber harvest, dirt roads, vegetation clearing, fires.				x	
	Erosion from construction, in-channel machinery in the RCA.				x	
	Erosion from off-road vehicles in the RCA.					
	Erosion from livestock or foot traffic in the RCA.				x	
	Stormwater or wastewater effluent.					
	Sediment from road sanding, gravel mining, other mining, oil/ gas extraction.					
	Accelerated channel downcutting or headcutting of tributaries due to altered land use.					
	Other human-related disturbances within the RCA.					
	*If **any** items were checked above, then for each row of the table below you may assign points (3, 2, or 1) in the last column that describe the combined maximum effect of those items in increasing the amount or transport of sediment into the AA. To estimate that, contrast it with the condition if checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Erosion in RCA.	Extensive evidence, high intensity*.	Potentially (based on high-intensity* land use) or scattered evidence.	Potentially (based on low-intensity* land use) with little or no direct evidence.	2	
	Recentness of significant soil disturbance in the RCA.	Current & ongoing.	1-12 months ago.	>1 yr ago.	3	
	Duration of sediment inputs to the AA.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & mainly during high runoff or severe wind events.	2	

AA proximity to actual or potential sources.	0 - <50 ft., or farther but on steep erodible slopes.	50-300 ft.	In other part of contributing area.	3
* **High**-intensity= plowing, grading, excavation, erosion with or without veg removal; **low**-intensity= veg removal only with little or no apparent erosion or disturbance of soil or sediment.			Sum=	10
			Final score=	0.83

S5 **Soil or Sediment Alteration *Within the Assessment Area* (SoilDisturb).**

*In the "Data" column, **place an X** next to any item present in the AA that is likely to have compacted, eroded, or otherwise altered the AA's soil.*	
Compaction from livestock, machinery, off-road vehicles, or mountain bikes, especially during wetter periods.	x
Leveling or other grading not to the natural contour.	x
Tillage, plowing (but excluding disking for enhancement of native plants).	x
Fill, riprap, other armoring, excluding small amounts of upland soils containing organic amendments (compost, etc.) or small amounts of topsoil stockpiled or imported from another wetland.	
Excavation.	x
Dredging in or adjacent to the AA.	x
Boat traffic in or adjacent to the AA and sufficient to cause shore erosion or stir bottom sediments.	
Artificial water level or flow manipulations sufficient to cause erosion or stir bottom sediments.	

*If **any** items were checked above, then for each row of the table below you may assign points (3, 2, or 1) in the last column that describe the combined maximum effect of those items in altering the AA's soils. To estimate that, contrast it with the soil condition if checked items never occurred or were no longer present.*

	Severe (3 pts)	Medium (2 pts)	Mild (1 pt)	
Spatial extent of altered soil.	>95% of AA or >95% of its upland edge (if any).	5-95% of AA or 5-95% of its upland edge (if any).	<5% of AA and <5% of its upland edge (if any).	2
Recentness of significant soil alteration in AA.	Current & ongoing.	1-12 months ago.	>1 yr ago.	2
Duration.	Long-lasting, minimal veg recovery.	Long-lasting but mostly revegetated.	Short-term, revegetated, not intense.	3
Timing of soil alteration.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & mainly during scattered events.	1
			Sum=	8
			Final score=	0.67

Oregon Rapid Wetland Assessment (ORWAP) V.3.2.*	Cover Page: Basic Description of Assessment
Site Name:	EXT Renewable Fuels Oregon (mitigation post-constructio
Investigator Name:	Sue Brady
Date of Field Assessment:	5/6/2021
County:	Columbia
Nearest Town:	Clatskanie
Latitude (decimal degrees):	46.147935
Longitude (decimal degrees):	-123.175378
TRS, quarter/quarter section and tax lot(s):	T8N R4W Sections 21, 27, 28, 33, 34
Approximate size of the Assessment Area (AA, in acres):	580
AA as percent of entire wetland (approx.). Attach sketch map if AA is smaller than the entire contiguous wetland.	50%
If delineated, DSL file number (WD #) if known:	delineation number not yet assigned
Cowardin Systems & Classes (indicate all present, based on field visit and/or aerial imagery): Systems: Palustrine =P, Riverine =R, Lacustrine =L, Estuarine =E Classes: Emergent =EM, Scrub-Shrub =SS, Forested =FO, Aquatic Bed (incl. SAV) =AB, Open Water =OW, Unconsolidated Bottom =UB, Unconsolidated Shore =US	PEM, PSS, PFO
Predominant HGM Class: Estuarine=E, Lacustrine=L, Riverine=R, S= Slope, F= Flats, D= Depressional	Flats
Soil Unit Mapped in Most of the AA:	Wauna-Locoda silt loams, protected
If tidal, the tidal phase during most of visit:	n/a
What percent (approximate) of the **wetland** were you able to visit?	50
What percent (approximate) of the **AA** were you able to visit?	100
Have you attended an ORWAP training session? If so, indicate approximate month & year.	Oct-11
How many wetlands have you assessed previously using ORWAP (approximate)?	20+
Comments about the site or this ORWAP assessment (attach extra page if desired):	This assessment is for the projected condition after the mitigation site has been constructed.

ORWAP V.3.2 Site Name:	NEXT Renewable Fuels Oregon (mitigation post-construction)
Investigator Name:	Sue Brady
Date of Field Assessment:	5/6/2021

Scores will appear below after data are entered in worksheets OF, F, T, and S. See Manual for definitions and descriptions of how scores were computed and ratings assigned.

Normalized Scores & Ratings for this Assessment Area (AA):

Specific Functions or Values:	Function Score	Function Rating	Rating Break Proximity	Values Score	Values Rating	Rating Break Proximity	Function Score (raw)	Values Score (raw)
Water Storage & Delay (WS)	3.49	Lower		0.00	Lower		3.49	0.00
Sediment Retention & Stabilization (SR)	5.06	Moderate		9.33	Higher		5.28	7.11
Phosphorus Retention (PR)	5.39	Moderate		7.79	Higher		5.57	6.47
Nitrate Removal & Retention (NR)	4.79	Moderate		10.00	Higher		5.79	10.00
Anadromous Fish Habitat (FA)	0.00	Lower		0.00	Lower		0.00	0.00
Resident Fish Habitat (FR)	0.00	Lower		0.00	Lower		0.00	0.00
Amphibian & Reptile Habitat (AM)	7.90	Higher		3.63	Lower		7.16	3.63
Waterbird Nesting Habitat (WBN)	7.71	Higher		10.00	Higher		6.40	10.00
Waterbird Feeding Habitat (WBF)	9.40	Higher		10.00	Higher		8.48	10.00
Aquatic Invertebrate Habitat (INV)	4.11	Moderate	LM	2.67	Lower		5.45	3.16
Songbird, Raptor, Mammal Habitat (SBM)	6.65	Higher	MH	10.00	Higher		7.53	10.00
Water Cooling (WC)	4.08	Moderate		9.96	Higher		3.57	9.49
Native Plant Diversity (PD)	7.46	Higher		2.38	Lower		6.69	2.38
Pollinator Habitat (POL)	7.76	Higher	MH	4.54	Moderate		6.78	3.67
Organic Nutrient Export (OE)	6.03	Moderate					5.34	
Carbon Sequestration (CS)	5.94	Moderate	MH				5.24	
Public Use & Recognition (PU)				5.46	Moderate			5.79

Other Attributes:	Score	Rating	Rating Break Proximity		
Wetland Sensitivity (SEN)	3.64	Moderate			5.34
Wetland Ecological Condition (EC)	6.63	Higher			7.33
Wetland Stressors (STR)	5.37	Moderate	MH		4.94

GROUPS	Selected Function	Function Rating	Rating Break Proximity	Values Rating	Rating Break Proximity
Hydrologic Function (WS)	Water Storage & Delay (WS)	Lower		Lower	
Water Quality Support (SR, PR, or NR)	Sediment Retention & Stabilization (SR)	Moderate		Higher	
Fish Habitat (FA or FR)	Anadromous Fish Habitat (FA)	Lower		Lower	
Aquatic Habitat (AM, WBF, or WBN)	Waterbird Nesting Habitat (WBN)	Higher		Higher	
Ecosystem Support (WC, INV, PD, POL, SBM, or OE)	Songbird, Raptor, Mammal Habitat (SBM)	Higher	MH	Higher	

NOTE: A score of 0 does not always mean the function or value is absent from the wetland. It usually means that this wetland has equal or less capacity than the lowest-scoring one, for that function or value, from among the 200 calibration wetlands that were assessed previously by Oregon Department of State Lands.

Date: 5/6/21	Name: Sue Brady	Site: NEXT Renewable Fuels Oregon (mitigation post-construction)	
Form OF Office Data ORWAP V. 3.2	Conduct an assessment only after reading the accompanying Manual and explanations in column E below. Answering many of the following questions requires viewing aerial imagery and maps, covering an area up to within 2 miles of the AA. **For each affirmative answer, change the 0 in the "Data" column to a "1".** Answer all items except where directed to skip to others. Questions whose cells in "Data" column have a **"W" MUST be answered for the ENTIRE wetland and bordering waters.**	For a list of functions to which each question pertains, see bracketed codes in column E. Codes for functions and their benefits are: WS= Water Storage, WC= Water Cooling, SR= Sediment Retention, PR= Phosphorus Retention, NR= Nitrate Removal, CS= Carbon Sequestration, OE= Organic Nutrient Export, INV= Aquatic Invertebrate Habitat, FA= Anadromous Fish Habitat, FR= Resident Fish Habitat, AM= Amphibians & Reptile Habitat, WBF= Feeding Waterbird Habitat, WBN= Nesting Waterbird Habitat, SBM= Songbird, Raptor, & Mammal Habitat, POL= Pollinator Habitat, PD= Native Plant Diversity, PU= Public Use & Recognition, EC= Ecological Condition, Sens= Sensitivity, STR= Stressors.	For guidance and detailed descriptions of how Excel calculates the numbers in the Scores worksheet, see the Technical Supplement and Appendix C of the Manual. For a documented rationale for each indicator, open each of the worksheet tabs at the bottom (one for each function or value) and see column H.

#	Indicators	Condition Choices	Data	Explanations, Definitions (Column E)	Cell Name	Comments
OF1	Distance to Extensive Perennial Cover (DistPerCov)	The distance from the AA edge to the edge of the closest patch or **corridor** of **perennial cover** (see definition in column E) larger than 100 acres is:		**Corridor** - is simply an elongated patch of perennial cover that is not narrower than 150 ft at any point.		
		<100 ft.	1	**Perennial cover** - is vegetation that includes wooded areas, native prairies, sagebrush, vegetated wetlands, as well as relatively unmanaged commercial lands in which the ground is disturbed less than annually, such as hayfields, lightly grazed pastures, timber harvest areas, and rangeland. It does not include water, row crops (e.g., vegetable, orchards, Christmas tree farms), lawns, residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads. [AM, WBN, PD, PDv, POL, SBM, Sens, STR]		
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to <0.5 mile.	0			
		0.5 mile to 2 miles.	0			
		> 2 miles.	0			
OF2	Distance to Tidal Waters (DistTidal)	The distance from the AA edge to the closest body of **tidal water** is:		**Tidal water** - If unclear whether a water body is tidal, check the ORWAP Map Viewer's Headtide layer (expand Hydrology), or check with local sources. Assume Columbia River is tidal east to Bonneville Dam and the Willamette River south to the Oregon City Falls. [WBF]		
		<1 mile.	1			
		1-5 miles.	0			
		>5 miles.	0			
OF3	Distance to Ponded Water (DistPond)	The distance from the AA edge to the closest (but separate) body of nontidal fresh water (wetland, pond, or lake) that is ponded all or most of the year is:		Use field observations, aerial imagery, and/or the ORWAP Map Viewer's Persistent Nontidal layer (expand Wetlands/National Wetlands Inventory). [AM,WBF,WBN,SBM,PD,Sens]		
		<100 ft.	0			
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to < 0.5 mile.	0			
		0.5 mile to 2 miles.	0			
		>2 miles.	1			
OF4	Distance to Lake (DistLake)	The distance from the AA edge to the closest (but separate) body of nontidal fresh water (wetland, pond, or lake) that is ponded during most of the year and is larger than 20 acres (about 1000 ft on a side) is:		Use field observations, aerial imagery, and/or the ORWAP Map Viewer's Persistent Nontidal layer (expand Wetlands/National Wetlands Inventory). [WBF,WBN]		
		<1 mile.	0			
		1-5 miles.	0			
		>5 miles.	1			
OF5	Distance to Herbaceous Open Land (DistOpenL)	The distance from the AA edge to the closest patch of **herbaceous openland** larger than 10 acres and in **flat terrain** is:		**Herbaceous openland** - includes both perennial and non-perennial cover. For example, it can include pasture, herbaceous wetland, meadow, prairie, ryegrass fields, row crops, herbaceous rangeland, golf courses, grassed airports, and hayfields. Do not include open water of lakes, ponds, or rivers; or unvegetated surfaces; or areas with woody vegetation. In dry parts of the state, croplands in flat areas are often irrigated and are distinctly greener in aerial images. **Flat terrain** - means slope of less than 5%. [WBF,WBN,POL]		
		<100 ft.	1			
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to < 0.5 mile.	0			
		0.5 mile to 2 miles.	0			
		>2 miles.	0			

OF6	Distance to Nearest Busy Road (DistRd)	The distance from the AA center to the nearest road with an average daytime traffic rate of at least 1 vehicle/ minute is:		Estimate this traffic rate threshold using your judgment and considering the road width, local population, distance to densely settled areas, alternate routes, and other factors. [AM,SBM,PD,PUv,STR]		
		<100 ft.	0			
		100 to <300 ft.	0			
		300 to < 0.5 mile.	0			
		0.5 to <1 miles.	1			
		1 to 2 miles.	0			
		>2 miles.	0			
OF7	Size of Largest Nearby Patch of Perennial Cover (SizePerenn)	Including the AA's vegetated area, the largest patch or corridor that is **perennial cover** and is contiguous with vegetation in the AA (i.e., not separated by roads or channels that create gaps wider than 150 ft), occupies:		**Contiguous** -Abutting, with no major physical separation that prohibits free exchange or flow of surface water (i.e., not separated by roads or channels that create gaps wider than 150 ft) **Perennial cover** - See OF1. Disqualify any patch or corridor of perennial cover where it becomes separated from the AA by a gap of >150 ft, if the gap is comprised of unvegetated land or if the corridor narrows to less than 150 ft. [AM,SBM,PD,POL,Sens,STR]		
		<.01 acre.	0			
		.01 to < 1 acre.	0			
		1 to <10 acres.	0			
		10 to <100 acres.	1			
		100 to <1000 acres.	0			
		1000 to 10,000 acres.	0			
		>10,000 acres.	0			
OF8	Wetland Type Local Uniqueness (UniqPatch)	**Select EACH** of the vegetation types below that comprise more than 10% of the AA AND less than 10% of a 0.5 mile radius around the AA. (See Column E).		This is a 2-part question: (1) If no vegetation class comprises more than 10% of the AA, answer "none of the above." (2) If a vegetation class does comprise more than 10%, determine if that vegetation class also comprises less than 10% of a 0.5 mile circle (~50 acres). [INVv,AMv,WBFv,WBNv,SBMv,PDv,POLv,Sens]		
		Herbaceous vegetation (perennial grasses, sedges, forbs; not under a woody canopy; not crops).	0			
		Unshaded shrubland (woody plants shorter than 20 ft).	0			
		Trees (woody plants taller than 20 ft).	0			
		None of above.	1			
OF9	Perennial Cover Percentage (PerCovPct)	Within a 2-mile radius of the AA center, the percentage of land that has **perennial cover** is:		**Perennial cover** - is vegetation that includes wooded areas, native prairies, sagebrush, vegetated wetlands, as well as relatively unmanaged commercial lands in which the ground is disturbed less than annually, such as hayfields, lightly grazed pastures, timber harvest areas, and rangeland. It does not include water, row crops (e.g., vegetable, orchards, Christmas tree farms), lawns, residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads. [FA,AM,SBM,POL,Sens,STR]		
		<5% of the land.	0			
		5 to <20% of the land.	0			
		20 to <60% of the land.	1			
		60 to 90% of the land.	0			
		>90% of the land.	0		PerennAll	
OF10	Forest Percentage (ForestPct)	Within a 2-mile radius of the AA center, the cumulative amount of forest (regardless of **forest patch** sizes, and including any in the AA) is:		**Forested patch** - is a land cover patch that currently has >70% cover of woody plants taller than 20 ft. May be in a plantation. [FA,SBM,STR]		
		<5% of the circle.	0			
		5 to <20%.	0			
		20 to <50%.	11			
		50 to 80%.	0			
		>80%.	0			
OF11	Herbaceous Open Land Percentage (OpenLpct)	Within a 2-mile radius of the AA center, the amount of **herbaceous openland** in **flat terrain** is:		**Herbaceous openland** - can include both perennial and non-perennial cover. For example, it can include pasture, herbaceous wetland, meadow, prairie, ryegrass fields, row crops, herbaceous rangeland, golf courses, grassed airports, and hayfields. Do not include open water of lakes, ponds, or rivers; or unvegetated surfaces; or areas with woody vegetation. **Flat terrain** - means slope of less than 5%. [WBF,WBN,POL]		
		<5% of the land.	0			
		5 to <20%.	0			
		20 to <50%.	1			
		50 to 80%.	0			
		>80%.	0			

OF12	Landscape Wetland Connectivity (ConnScapeW)	Within a 2-mile radius of the AA center:		**Corridor** - is simply an elongated patch of perennial cover that is not narrower than 150 ft at any point.		
		There are NO other wetlands.	0	**Regular traffic** - is at least 1 vehicle per hour during the daytime throughout most of the growing season. Assess this based on local knowledge, type of road, and proximity to developed areas.		
		There are other wetlands (or a wetland), but NONE are connected to the AA by a **corridor** of **perennial** vegetation. The corridor must be at least 150 ft wide along its entire length and not interrupted by roads with **regular traffic.**	0			
		There are other wetlands (or a wetland), and ALL are connected to the AA by the type of corridor described.	0	**Perennial** - see OF9 for definition. [WBN,SBM,Sens,STR]		
		There are other wetlands (or a wetland), and ONE or MORE (but not all) are connected to the AA by the type of corridor described.	1			
OF13	Local Wetland Connectivity (ConnLocalW)	Within a 0.5 mile radius of the AA center:		**Regular traffic** - is at least 1 vehicle per hour during the daytime throughout most of the growing season. Assess this based on local knowledge, type of road, and proximity to developed areas.		
		There are NO other wetlands.	0			
		There are other wetlands (or a wetland), but NONE are connected to the AA by a **corridor** of **perennial** vegetation. The corridor must be at least 150 ft wide along its entire length and not interrupted by roads with **regular traffic.**	0	**Perennial** - see OF9 for definition. IF possible, field verify		
		There are other wetlands (or a wetland), and ALL are connected to the AA by the type of corridor described.	0	[AM,WBN,SBM,PD,Sens,STR]		
		There are other wetlands (or a wetland), and ONE or MORE (but not all) are connected to the AA by the type of corridor described.	1			
OF14	Wetland Number & Diversity Uniqueness (HUCbest)	According to the ORWAP Report, this AA is located in one of the HUCs that are listed as having a large diversity, area, or number of wetlands relative to the area of the HUC. **Select All of the following that are true:**		In the ORWAP Report, under the Watershed Information section and the HUC Best table, look at the columns "Is HUC Best?" and "Greatest Criteria Met."		
		Yes, for the HUC8 watershed	1	[AM,WBF,WBN,SBM,Sens]		
		Yes, for the HUC10 watershed	0			
		Yes, for the HUC12 watershed	0			
		None of above.	0			
		Data are inadequate (NWI mapping not completed in HUC).	0			
OF15	Landscape Functional Deficit (GISscore)	In the ORWAP Report, find the HUC 12 Functional Deficit table. **Select All functions below that have a notation for that HUC.**		In the ORWAP Report, under the Watershed Information section, look at the Functional Deficit table. Enter 1 for each of the listed functions that are noted.		
		Water storage (WS)	0	These are HUCs in which a relatively small number, or proportional area, of the wetlands are likely to be performing the named function, thus adding value to those that are.		
		Sediment retention (SR)	0			
		Nutrient transformation (NT)	0	See ORWAP's Technical Supplement for explanation of how the FuncDeficit was calculated.		
		Thermoregulation (WC)	0			
		Aquatic invertebrate habitat (INV)	0	[WSv,WCv,SRv,PRv,INVv,FAv,AMv,WBNv]		
		Amphibian habitat (AM)	0			
		Fish habitat (FH)	0			
		Waterbird habitat (WB)	0			
		None of above.	1			
		No data.	0			
OF16	Conservation Designations of the AA or Local Area (ConDesig)	On the ORWAP Map Viewer, use the layers indicated below to answer. **Select All of the following that are true:**		In the ORWAP Map Viewer, use the applicable layers.		
		(a)The AA is within or connected to a stream or other water body and this stream or water body has been designated as ESH within 0.5 miles of the AA, according to the **Essential Salmonid Habitat (ESH)** layer.	0	Include areas not shown as ESH, if ODFW has confirmed they qualify as ESH. [WCv, FA, FAv]		
		(b)The AA is within or contiguous to a designated **Oregon's Greatest Wetlands,** according to the map layer of that name.	0	Oregon's Greatest Wetlands identifies the most biologically and ecologically significant wetlands in the State of Oregon. [PU]		
		(c)The AA is within an **Important Bird Area (IBA),** as officially designated, according to the map layer of that name.	1	[WBFv, WBNv]		
		None of above.	0			

OF17	Non-anadromous Fish Species of Conservation Concern (RareFR)	According to the ORWAP Report, the score for occurrences of rare non-anadromous fish species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include Miller Lake lamprey, Goose Lake lamprey, Pit sculpin, Lahontan cutthroat trout, Inland Columbia Basin redband trout, Steelhead (Snake River Basin ESU), Alvord chub, Goose Lake tui chub, Borax Lake chub, Lahontan redside, Oregon chub, Goose Lake sucker, Tahoe sucker, Warner sucker, Shortnose sucker, Lost River sucker. Note that for some of these species, only specific geographic populations are designated. [FRv] This question may need to revised after the field visit.		
		High (≥ 0.75 for maximum score, or ≥ 0.90 for this group's sum score), or there is a recent (within 5 years) onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.33 for both the maximum score this group's sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF18	Amphibian or Reptile of Conservation Concern (AmphRare)	According to the ORWAP Report, the score for occurrences of rare amphibian or reptile species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include: Black salamander, California slender salamander, Cope's giant salamander, Rocky Mountain tailed frog, Woodhouse's toad, Foothill yellow-legged frog, Northern leopard frog, Oregon spotted frog, Columbia spotted frog. [AMv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or >0.90 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.21 for maximum score AND <0.15 for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF19	Feeding (Non-breeding) Waterbird Species of Conservation Concern (RareWBF)	According to the ORWAP Report, the score for occurrences of rare **non-breeding** (feeding) waterbird species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. **Non-breeding** - mainly refers to waterbird feeding during migration and winter. California brown pelican, Aleutian cackling goose, Dusky Canada goose [WBFv] This question may need to revised after the field visit.		
		High (≥ 0.33 for maximum score, or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Low (< 0.33 for maximum score and for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF20	Nesting Waterbird Species of Conservation Concern (RareWBN)	According to the ORWAP Report, the score for occurrences of rare nesting waterbird species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include: Horned grebe, Red-necked grebe, Western grebe, Clark's grebe, American white pelican, Least bittern, Snowy egret, Trumpeter swan, White-faced ibis, Harlequin duck, Bufflehead, Yellow rail, Western snowy plover, Upland sandpiper, Franklin's gull, Marbled murrelet. [WBNv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or ≥1.00 for this group's sum score), or there is a recent breeding-season observation of any of these species onsite by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.09 for maximum score and for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species during breeding season by a qualified observer under conditions similar to what now occur.	1			
OF21	Songbird, Raptor, Mammal Species of Conservation Concern (RareSBM)	According to the ORWAP Report, the score for occurrences of rare songbird, raptor, or mammal species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include: Bald eagle, American peregrine falcon, Arctic peregrine falcon, Greater sage-grouse, Columbian sharp-tailed grouse, Yellow-billed cuckoo, Northern spotted owl, Short-eared owl, Black swift, Lewis's woodpecker, Purple martin, Northern waterthrush, Bobolink, Tricolored blackbird, Fringed myotis, Spotted bat, Townsend's big-eared bat, Pallid bat, Northern sea lion, Fisher, Sea otter, Canada lynx, Columbian white-tailed deer. [SBMv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or >1.13 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	1			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.09 for maximum score AND <0.13 for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	0			
OF22	Invertebrate Species of Conservation Concern (RareInvert)	According to the ORWAP Report, the score for occurrences of rare invertebrate species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. See the Supp_Info file's RareAnimals worksheet for list of species addressed by this question. [INVv] This question may need to revised after the field visit.		
		High (≥ 0.75 for maximum score, or for this group's sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Low (< 0.75 for maximum score AND for this group's sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			

OF23	Plant Species of Conservation Concern (RarePspp)	According to the ORWAP Report, the score for occurrences of rare wetland-indicator plant species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores.		
		High (≥ 0.75 for maximum score, or > 4.00 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0	See the Supp Info's RareWetPlants worksheet for list of species addressed by this question.		
		Intermediate (i.e., not as described above or below).	0	[PDv,POLv]		
		Low (≤ 0.12 for maximum score AND < 0.20 for sum score, but not 0 for both).	0	This question may need to revised after the field visit.		
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF24	River Proximity (RiverProx)	There is a nontidal river within 1 mile and it is adjacent to, OR downslope from, the AA (connected or not). **Enter 1, if true. If not, SKIP to OF27.**	0	**River** - as used here is a channel wider than 50 ft between its banks. In the ORWAP Map Viewer, use the National Hydrography Dataset - Flowline layer (expand Hydrology).[WSv]	NearRiver	
OF25	Floodable Property (FloodProp)	**Select ONE** of the below:		**Row crops** - do not include pasture or other perennial cover.		
		Floodplain boundaries within 1 mile downslope or downriver from the AA have not been mapped. **Enter 1 and SKIP TO OF27.**	0	In the ORWAP Map Viewer, use the Floodplain layers. Also, the Seasonal Nontidal Wetland layer (expand Wetlands/National Wetlands Inventory) may indicate some floodplain areas.		
		Floodplain boundaries within 1 mile downslope from the AA have been mapped BUT there is neither infrastructure nor **row crops** vulnerable to river flooding located within the floodplain and within that distance. **Enter 1 and SKIP TO OF27.**	0	[WSv] Supplement with field observations at multiple seasons, if possible.		
		Floodplain boundaries have been mapped AND infrastructure or **row crops** are present within 1 mile downslope or downriver and those are not protected from 100-year floods, but actual damage has not been documented.	0			
		Damage to infrastructure or row crops from river flooding has been documented within that distance.	0			
OF26	Type of Flood Damage (DamageType)	The greatest financial damage in the floodplain is (or would be) to:		**Row crops** - do not include pasture or other perennial cover. On the ORWAP Map Viewer, use the Floodplain layers		
		Buildings, roads, bridges.	0	[WSv]		
		Row crops (during some years).	0			
OF27	Hydrologic Landscape (Arid)	According to the ORWAP Report, the wetland is in a hydrologic landscape unit classified as:		In the ORWAP Report, under the Location Information table, find the Hydrologic Landscape Class.		
		Arid.	0	[AM, AMv, WBNv, SBMv, OE, Sens]		
		Semi-arid.	0			
		Dry.	0			
		Moist.	0			
		Wet.	1			
		Very Wet.	0			
OF28	Input Water - Recognized Quality Issues (WQin)	According to ORWAP Map Viewer's Water Quality Streams layer and Water Quality Lakes layers, ALL of the following are true: **(a)** within 1 mile upstream from the AA edge, a water body or stream reach is labeled as being 303d, Water Quality Limited (categories 3B-5); Potential Concer; or TMDL Approved AND **(b)** the problem concerns one or more of the parameters listed below. **Select All that apply.**		Use the ORWAP Map Viewer's Water Quality Streams layer and the Water Quality Lakes layer (expand Water Quality and Quanity) and the Distance tool. Use the Identy tool to determine the reason for the listings.		
		Total suspended solids (TSS), sedimentation, or turbidity.	0	If the AA receives both inflow and outflow from river flooding, consider the polluted water to be both "upstream" and "downstream".		
		Phosphorus, chlorophyll-a, or algae.	1			
		Nitrates, ammonia, chlorophyll-a, or algae.	0			
		Petrochemicals, heavy metals (iron, manganese, lead, zinc, etc.), other toxins.	1	[SRv,PRv,INV,FA,FR,AM,WBF,WBN,STR]		
		Temperature or dissolved oxygen.	1	This may need to be verified in the field.		
		None of above, or no data. **If true, enter 1 and SKIP to OF30.**	0		NoDataWQup	
OF29	Duration of Connection Beween Problem Area & the AA (ConnecUp)	The upstream problem area mentioned above (OF28) has a surface water connection to the AA:		In the ORWAP Map Viewer, use the National Hydography Dataset (expand Hydrology) and the Persistent, Seasonal, or Saturated nontidal layers (expand Wetlands/National Wetlands Inventory) to determine duration of surface water connection.		
		For 9 or more continuous months annually.	0	[SRv,PRv,INV,FA,FR,AM,WBF,WBN,STR]		
		Intermittently (at least once annually, but for less than 9 months continually).	0	This may need to be determined or verified in the field.		
		Never (or less than annually).	1			
OF30	Downslope Water Quality Issues (ContamDown)	According to ORWAP Map Viewer's Water Quality Streams layer and Water Quality Lakes layer, ALL of the following are true: **(a)** within 1 mile downhill or downstream from the AA's edge, a water body is labeled as being 303d, Water Quality Limited (categories 3B-5); Potential Concern; or TMDL Approved AND **(b)** the problem concerns one or more of the parameters listed below. **Select All that apply.**		Use the ORWAP Map Viewer's Water Quality Streams layer and the Water Quality Lakes layer (expand Water Quality and Quanity) and the Distance tool. Use the Identy tool to determine the reason for the listings.		
		Total suspended solids (TSS), sedimentation, or turbidity.	0	[WCv,SRv,PRv,FA]		
		Phosphorus, chlorophyll-a, or algae.	1			
		Nitrates, ammonia, chlorophyll-a, or algae.	0			
		Petrochemicals, heavy metals (iron, manganese, lead, zinc, etc.), other toxins.	1			
		Temperature or dissolved oxygen.	1			
		None of above, or no data. **Enter 1 and SKIP to OF32.**	0		NoDataWQdo	
OF31	Duration of Connection Beween AA & Water Quality Problem Area (ConnDown)	The connection between the downstream problem area mentioned above (OF30) and the AA:		In the ORWAP Map Viewer, use the National Hydography Dataset (expand Hydrology) and the Persistent, Seasonal, or Saturated nontidal layers (expand Wetlands/National Wetlands Inventory) to determine duration of surface water connection.		
		Is a stream or water body that connects these areas for 9 or more continuous months annually.	1			
		Is a stream or water body that connects these areas intermittently (at least once annually, but for less than 9 months continually).	0	[WCv,SRv,PRv,FA]		

		Is a probable groundwater connection, or connection via direct runoff only (no channel connection).	0	This may need to be determined or verified in the field.		
		Never exists (a topographic ridge probably prevents all the AA's runoff and groundwater from reaching the problem area).	0			
OF32	Drinking Water Source (DEQ) (DWsource)	According to ORWAP Map Viewer's Surface Water Drinking Water Source Areas layer and the Ground Water Drinking Water Source Areas layer, the AA is within:		In the ORWAP Map Viewer, use the water source layers (expand Water Quality and Quantity). [NRv]		
		The source area for a surface-water drinking water (DW) source.	1			
		The source area for a groundwater drinking water source.	0			
		Neither of above.	0			
OF33	Groundwater Risk Designations (GWrisk)	According to ORWAP Map Viewer's Groundwater Management Areas layer and the Sole Source Aquifer layer, the AA is: **Select All that apply**		In the ORWAP Map Viewer, use the DEQ Groundwater Management Areas layer and the Sole source Aquifer layer (expand Water Quality and Quantity). [NRv]		
		Within a designated Groundwater Management Area (ODEQ).	0			
		Within a designated Sole Source Aquifer area (EPA): the North Florence Dunal Aquifer.	0			
		Neither of above.	1			
OF34	Relative Elevation in Watershed (Elev)	In the ORWAP Map Viewer, based on the Hydrologic Boundaries 4th Level (HUC 8) layer (expand Hydrology), determine if the AA is: (See Column E)		1) Consider which end of the HUC is the bottom. Where streams join, the "V" that they form on the map points towards the bottom of the HUC. 2) If the AA is closer to the HUC's outlet than to its upper end, and is closer to the river or large stream that exits at the bottom of the HUC than it is to the boundary (margin) of the HUC, then check "lower 1/3" If not near that river, check "middle 1/3". 3) If the AA is not in a 100-yr floodplain, is closer to the HUC upper end than to its outlet, and is closer to the boundary (margin) of the HUC than to the river or large stream that exits at the bottom of the HUC, then check "upper 1/3" 4) For all other conditions, check "middle 1/3". [WSv, PRv, FA, FR, WCv, OE, Sens, SRv]		
		In the upper one-third of its watershed.	0			
		In the middle one-third of its watershed.	0			
		In the lower one-third of its watershed.	1		LowerShed	
OF35	Runoff Contributing Area (RCA) - Wetland as % of (WetPctRCA)	Delimit the wetland's Runoff Contributing Area (RCA) using a topographic base map. The area of the AA's wetland is:	W	See the ORWAP Manual for specific protocol for delimiting the RCA (Section 4.1 Step 5). The RCA includes only the areas that potentially drain directly to the AA's wetland rather than to channels that flow or flood into that wetland. Exact precision in drawing the boundary is not required. [WS, WSv, SR, SRv, PR, PRv, WCv]		
		<1% of its RCA.	0			
		1 to <10% of its RCA.	0			
		10 to 100% of its RCA.	1			
		Larger than the area of its RCA. **Enter 1 and SKIP TO OF39.**	0		NoRCA	

OF36	Unvegetated % in the RCA (ImpervRCA)	The proportion of the RCA comprised of buildings, roads, parking lots, exposed bedrock, and other surface that is usually unvegetated at the time of peak annual runoff is about:	W	In the ORWAP Map Viewer, use an Aerial layer to determine the proportion of the RCA comprised of buildings, roads, parking lots, exposed bedrock, and other surfaces that are usually unvegetated at the time of peak annual runoff. [WSv,WCv,SRv,PRv,INV,FA,Sens,STR]		
		<10%.	1			
		10 to 25%.	0			
		>25%.	0			
OF37	Transport From Upslope (TransRCA)	A relatively large proportion of the precipitation that falls farther upslope in the RCA reaches this wetland quickly as indicated by the following: **(a)** RCA slopes are steep, <u>and/or</u> **(b)** upslope wetlands historically present have been filled or drained extensively, <u>and/or</u> **(c)** land cover is mostly non-forest, <u>and/or</u> **(d)** most RCA soils are shallow. This statement is:	W	Refer to aerial imagery and/or consult local sources. See the ORWAP Manual for instructions. [WSv,SRv,PRv,STR]		
		Mostly true.	0			
		Somewhat true.	1			
		Mostly untrue.	0			
OF38	Upslope Soil Erodibility Risk (ErodeUp)	Use the ORWAP Report or the Map Viewer to determine if the erosion hazard rating of the soil within 200 ft away and upslope of the AA is:		If the soil unit is the same as the AA, the Erosion Hazard can be obtained from the ORWAP Report's Soil Information section. If the soil unit is different than the AA, use ORWAP Map Viewer's Oregon Soil layer and see the ORWAP Manual for instructions on how to determine the erosion hazard rating. [SRv,PRv,STR]		
		Slight.	1			
		Moderate.	0			
		Severe.	0			
		Very severe.	0			
		Could not determine.	0			
OF39	Streamflow Contributing Area (SCA) - Wetland as % of (WetPctSCA)	Delimit (or visualize, for large river basins) the wetland's Streamflow Contributing Area (SCA) using a topographic base map. The area of the AA's wetland is:	W	See the ORWP Manual for specific protocol for delimiting the SCA (section 4.1, Step 6). The SCA is all upland areas that drain into streams, rivers, and lakes that feed the AA's wetland either directly or during semi-annual floods. In addition, for wetlands intercepted by a mapped stream, the SCA can be delineated automatically and its area reported at this USGS web site: https://streamstats.usgs.gov/ss/. Enter the coordinates, select Oregon, select Delineate, zoom to level 15 or finer, and click on a stream. [WS, SR, SRv, PR, PRv, WCv]		
		<1% of its SCA, or wetland is in the floodplain of a major river.	0			
		1 to <10% of its SCA.	0			
		10 to 100% of its SCA.	1			
		Larger than the area of its SCA. **Enter 1 and SKIP TO OF41.**	0		NoSCA1	
		Wetland lacks tributaries and receives no overbank water. **Enter 1 and SKIP to OF41.**	0		NoSCA	
OF40	Unvegetated % in the SCA (ImpervSCA)	The proportion of the SCA comprised of buildings, roads, parking lots, exposed bedrock, and other surface that is usually unvegetated at the time of peak annual runoff is about :	W	See the ORWAP Manual for instructions. [WCv,SRv,PRv,FA,STR]		
		<10%.	0			
		10 to 25%.	1			
		>25%.	0			
OF41	Upland Edge Shape Complexity (EdgeShape)	Most of the edge between the AA's wetland and upland is **(select one)**:	W	See ORWAP Manual for instructions and illustrations. [NR, SBM, Sens]		
		Linear: a significant proportion of the wetland's upland edge is straight, as in wetlands bounded partly or wholly by dikes or roads, or the AA is entirely surrounded by water or other wetlands.	1			
		Intermediate: Wetland's shape is (a) ovoid, or (b) mildly ragged edge, and/or (c) contains a lesser amount of artificially straight edge.	0			
		Convoluted: Wetland perimeter is many times longer than maximum width of the wetland, with many alcoves and indentations ("fingers").	0			
OF42	Zoning (Zoning)	According to ORWAP Map Viewer's Zoning layer, the dominant zoned land use designation for currently undeveloped parcels upslope from the AA and within 300 ft. of its upland edge is:		See the ORWAP Manual for instructions on how to determine the zoning designation. If information is not provided, check local zoning maps. [WSv,WCv,SRv,PRv,INVv,FAv,FRv,AMv,WBFv,WBNv,SBMv,PDv,POLv,PUv]		
		Development (Commercial, Industrial, Urban Residential, etc.), or no undeveloped parcels exist upslope from the AA.	1			
		Agriculture or Rural Residential.	0			
		Forest or Open Space, or entirely public lands.	0			
		Not zoned, or no information.	0			

OF43	Growing Degree Days (GDD)	According to ORWAP Map Viewer's Growing Degree Days layer, the long term normal Growing Degree Days category at the approximate location of the AA is:		See the ORWAP Manual for instructions on how to determine the growing degree days category. [NR, FR, AM, WBN, SBM, WCv, OE, CS, Sens]		
		<256.	0			
		256 - 1020.	0			
		1021-1785.	0			
		1786 - 2550.	1			
		2551 - 3315.	0			
		3316 - 4079.	0			
		> 4079.	0			

Date: 5/6/21	Name: Sue Brady	Site: NEXT Renewable Fuels Oregon (mitigation post-construction)	
Form F Field Data (nontidal Wetlands) ORWAP V 3.2	Conduct an assessment only after reading the accompanying Manual and explanations in column E below. **For each affirmative answer, change the 0 in the "Data" column to a "1".** Answer all items except where directed to skip to others. Questions whose cells in "Data" column have a **"W" MUST be answered for the ENTIRE wetland and bordering waters.**	For a list of functions to which each question pertains, see bracketed codes in column E. Codes for functions and their benefits are: WS= Water Storage, WC= Water Cooling, SR= Sediment Retention, PR= Phosphorus Retention, NR= Nitrate Removal, CS= Carbon Sequestration, OE= Organic Export, INV= Invertebrates, FA= Anadromous Fish, FR= Resident Fish, AM= Amphibians, WBF= Feeding Waterbirds, WBN= Nesting Waterbirds, SBM= Songbirds, Mammals, & Raptors, POL= Pollinators, PH= Plant Habitat, PU= Public Use & Recognition, EC= Ecological Condition, Sens= Sensitivity, STR= Stressors.	For guidance and detailed descriptions of how Excel calculates the numbers in the Scores worksheet, see the Technical Supplement and Appendix C of the accompanying Manual. For a documented rationale for each indicator, open each of the worksheet tabs at the bottom (one for each function or value) and see column H.

#	Indicators	Condition Choices	Data	Explanations, Definitions (Column E)	Cell Name	Comments
F1	Tidal Wetland (Tidal)	This is a tidal wetland (either freshwater or saltwater). **If yes, GO TO worksheet " T ".** Do not enter any data here. **If nontidal, continue with F2.**		**Tidal wetland -** a wetland that receives tidal water at least once during a normal year, regardless of salinity, and dominated by emergent or woody vegetation. Tidal flooding occurs on a 6-hour cycle DURING THE TIME it is flooded by tide, which may be as infreuent as once per year. If NWI map shows the wetland with a code beginning with E (for estuarine), assume the wetland to be tidal. However, some wetlands lacking that code are also tidal.		
F2	Ponded Condition (Lentic)	At least once every 2 years, some part of the AA contains a cumulative total of >900 sq.ft. of surface water that is ponded. The water persists for >6 days and may be hidden beneath emergent vegetation or scattered in small pools. **Enter 1, if true.**	1	**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). [AM,WBF,WBN]	Lentic	
		Reminder: For all questions, the AA should include all persistent waters in ponds smaller than 20 acres that are **adjacent** to the AA. The AA should also include part of the water area of adjacent lakes or rivers larger than 20 acres -- specifically, the open water part adjacent to wetland vegetation and equal in width to the average width of that vegetated zone.		**Adjacent** - is used synonymously with abutting, adjoining, bordering, contiguous -- and means no upland (manmade or natural) completely separates the described features along their directly shared edge. Features joined only by a channel are not necessarily considered to be adjacent -- a large portion of their edges must match. The features do not have to be hydrologically connected in order to be considered adjacent.		
F3	Water Regime (Hydropd)	The water regime (hydroperiod) of the most permanent (usually deepest) part of the AA is: **Select only ONE.** [To meet any of the definitions other than Ephemeral, there must be >100 sq ft of surface water for the duration described, otherwise mark the type listed above it.]		In the NRCS county soil survey, the Water Features table provides information about periods of flooding, ponding, and highwater table depths. Descriptions of the soil units may include information on saturation persistence. Also consider the hydroperiod label on NWI wetland polygons. [WS, FA, FR, WBN, WBF, WC]		
		Ephemeral. Surface water in the wettest part of the AA is present for fewer than 7 consecutive days during an average growing season. Includes some of the areas mapped as Saturated Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F25.**	0		NeverWater	
		Temporary. Surface water present for 1-4 weeks consecutively during an average growing season, OR if persists for longer, it is almost entirely in scattered pools, each smaller than 1 sq.m. Dries up completely during part of most average years. Includes some of the areas mapped as Saturated Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F25.**	0		TempWet	
		Seasonal. Surface water present for 5-17 weeks (1-4 months) consecutively during an average growing season, but dries up completely during part of most average years. Includes some of the areas mapped as Seasonal Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F5.**	0		ShallowType	
		Semi-Persistent. Surface water present for more than 17 weeks (4 months) consecutively during an average growing season, but dries up completely during part of most average years. Includes some of the areas mapped as Seasonal Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F5.**	0		DeepType	
		Permanent. Does not dry up completely during most average years. Includes some of the areas mapped as Persistent Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and continue.**	1	**Permanent -** usually has significant groundwater input, higher conductivity, less annual water level fluctuation. No woody vegetation in most persistently flooded parts. Often with extensive open water and subsurface aquatic plants.	PermType	
F4	Flooded Persistently - % of AA (PermW)	Identify the parts of the AA that still contain surface water even during the **driest times of a normal year**. At that time, the percentage of the AA that still contains surface water is:		**driest times of a normal year -** i.e., when the AA's surface water is at its lowest annual level. Sites fed by unregulated streams that descend on north-facing slopes, tend to remain wet longer into the summer. Indicators of persistence may include fish, some dragonflies, beaver, and muskrat. [WS,PR,NR,CS,INV,FR,AM,WBF,WBN]		
		1 to <25% of the AA.	1			
		25 to <50% of the AA.	0			
		50 to 95% of the AA.	0			
		>95% of the AA.	0		AllPermWater	
F5	Depth Class (Predominant) (DepthDom)	When water is present in the AA, the depth most of the time in most of inundated area is: [Note: NOT necessarily the maximum spatial or annual depth]		This question is asking about the spatial median depth that occurs during most of that time, even if inundation is only seasonal or temporary. If inundation in most but not all of the AA is brief, the answer will be based on the depth of the most persistently inundated part of the AA. Include surface water in channels and ditches as well as ponded areas. In the ORWAP Manual, se the diagram in Appendix B. [WC,SR,PR,CS,OE,INV,FA,FR,WBF,WBN,PD,Sens]		
		>0 to <0.5 ft.	0			
		0.5 to < 1 ft deep.	0			
		1 to <3 ft deep.	1			
		3 to 6 ft deep.	0			
		>6 ft deep.	0			
F6	Depth Class Distribution (DepthEven)	Within the area described above, and during most of the time when surface water is present, the water area has: **Select only one.**		Estimate these proportions by considering the gradient and microtopography of the site.		

		One depth class covering >90% of the AA's inundated area (use the classes in the question above).	0	In the ORWAP Manual, see the diagram in Appendix B.		
		One depth class covering 51-90% of the AA's inundated area (use the classes in the question above).	1	[INV,FR,WBF,WBN,PD]		
		Neither of above. There are 3 or more depth classes and none occupy >50%.	0			
F7	Emergent Plants -- Area (EmArea)	Consider just the area that has surface water for >1 week during the growing season. Herbaceous plants (not moss, not woody) whose foliage extends above a water surface in this area (i.e., emergents) cumulatively occupy an annual maximum of:	W	If multiple small patches are separated by less than 150 ft, they may be combined when evaluating this question.		
		<0.01 acre (< 400 sq.ft). **Enter 1 and SKIP TO F10,** unless only part of a wetland is being assessed.	0	[SR,PR,OE,INV,FR,WBF,WBN,SBM,PD]	NoEm	
		0.01 to < 0.10 acres (3,920 sq. ft).	0			
		0.10 to <0.50 acres (21,340 sq. ft).	0			
		0.50 to <5 acres.	0			
		5 to 50 acres.	0			
		>50 acres.	1			
F8	% Emergent Plants (EmPct)	Emergent plants occupy an annual maximum of:		[WC,SR,PR,NR,CS,OE,INV,PD,FA,FR,AM,WBF,WBN,SBM]		
		<5% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		5 to <30% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		30 to <60% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		60 to 95% of the parts of the AA that are inundated for >7 days at some time of the year.	1			
		>95% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
F9	Cattail or Tall Bulrush Cover (Cttail)	The percentage of the emergent vegetation cover in the AA that is cattail (*Typha* spp.) or tall bulrush is:		[WBN, SBM]		
		<1% of the emergent vegetation, or cattail and bulrush are absent.	0			
		1 to <25% of the emergent vegetation.	0			
		25 to 75% of the emergent vegetation.	1			
		>75%, of the emergent vegetation.	0			
F10	Water Shading by AA's Woody Vegetation - Driest (WoodyDryShade)	During an average growing season, when water levels are lowest (but surface water still occupies >400 sq ft or >1% of the AA), the percentage of the remaining surface water within the AA that is shaded by trees and/or shrubs located within the AA is:		[WC,FA,WBN,SBM]		
		<5% of the water, and fewer than 10 woody plants taller than 3 ft shade it, or all surface water is flowing.	0			
		<5% of the water, but more than 10 woody plants taller than 3 ft shade it.	0			
		5 to <25% of the water.	0			
		25 to <50% of the water.	1			
		50 to 95% of the water.	0			
		>95% of the water.	0			
F11	Open Water - Extent	During most of the growing season, the largest patch of **open water** that is in or adjacent to the AA is >1 acre and mostly deeper than 1 ft. **Enter 1, if true.**	1	**Open Water** - is surface water of any depth that contains no emergent herbaceous or woody vegetation (may contain floating-leaved or completely submersed plants). It may be partially	OpenW	
F12	All **Ponded** Water as Percentage - Wettest (PondWpctWet)	When water levels are highest, during a normal year, the surface water that is **ponded** continually for >6 days occupies:		**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle).		
		<1% or none of the AA. Surface water is completely or nearly absent then, or is entirely flowing. **Enter 1 and SKIP TO F22.**	0		NoPond	
		1 to <5% of the AA.	0	[WS,WC,CS,OE,INV,AM,WBF,WBN]		
		5 to <30% of the AA.	1			
		30 to <70% of the AA.	0			
		70 to 95% of the AA.	0			
		>95% of the AA.	0			
F13	Ponded Open Water Area - Wettest (OWareaWet)	When water levels are highest, during a normal year, the AA's **ponded open water** occupies a cumulative area of:	W	**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle).		
		<0.10 acre (< 4356 sq. ft) of the AA and adjacent ponded waters. **Enter 1 and SKIP TO F16.**	0		NoPondOW	
		0.10 to <0.50 acres (21,340 sq. ft) of the AA and adjacent ponded waters.	0	**Open water -** is surface water of any depth that contains no emergent herbaceous or wood vegetation (may contain floating-leaved or completely submersed species). It may be partially shaded by a tree canopy.		
		0.50 to <1 acres of the AA and adjacent ponded waters.	0			
		1 to <5 acres of the AA and adjacent ponded waters.	0			
		5 to <50 acres of the AA and adjacent ponded waters.	1			
		50 to <640 acres (1 sq. mi) of the AA and adjacent ponded waters.	0	[WS,WBF]		
		640 to <1000 acres of the AA and adjacent ponded waters.	0			
		1000 to <2500 acres of the AA and adjacent ponded waters.	0			

		>2500 acres (>4 sq.mi) of the AA and adjacent ponded waters.	0		
F14	Ponded Open Water **Distribution** - Wettest (WaterMixWet)	When water levels are <u>highest</u>, during a normal year, the distribution (in aerial view) of ponded open water patches larger than 0.01 acre (400 sq. ft) within the AA is (must meet both a and b criteria):		[NR,AM,WBF,WBN,PD,SBM]	
		(a) Vegetation <u>and</u> **open water** <u>EACH comprise 30-70%</u> of the AA (including its bordering waters if any) **AND (b)** There are <u>many</u> small patches of open water scattered widely within vegetation or <u>many</u> small vegetation clump "islands" scattered widely within open water. Typical (for example) of some extensive bulrush and cattail marshes.	0		
		(a) Vegetation <u>and</u> **open water** <u>EACH comprise 30-70%</u> of the AA (including its bordering waters if any) **AND (b)** There are only **a** <u>few (or no)</u> small patches of open water scattered widely within vegetation or a <u>few</u> small vegetation clump "islands" scattered widely within open water.	0		
		(a) Vegetation <u>or</u> **open water** <u>comprise >70%</u> of the AA (and its bordering waters) **AND (b)** There are <u>several small patches</u> of open water scattered within vegetation or <u>several</u> small vegetation clump "islands" scattered within open water.	1		
		(a) Vegetation <u>or</u> **open water** <u>comprise >70%</u> of the AA (and its bordering waters) **AND (b)** Open water is <u>mostly in a single area</u> (e.g., center of the wetland) and vegetation is in the rest (e.g., periphery), with almost no intermixing. (Typical of many ponds excavated for livestock watering, stormwater treatment, mineral extraction as well as many wetlands that are inundated only temporarily each year).	0		
F15	Width of Vegetated Zone - Wettest (WidthWet)	When water levels are <u>highest</u>, during a normal year, the width of the **vegetated wetland** that separates the largest patch of open water within or bordering the AA from the closest adjacent uplands, is predominantly: [Note: This is not asking for the maximum width.]		**Vegetated wetland** - in this case does not include underwater or floating-leaved plants, i.e., aquatic bed. In farmed wetlands that have different crops from year to year, consider vegetation condition as it probably existed during most of the past 5 years. If open water exists as many patches, use the distance between the majority of those patches and uplands. [WC,SR,PR,NR,CS,OE,AM,WBF,WBN,SBM,PD,Sens,EC]	
		<5 ft, or no vegetation between upland and open water.	0		
		5 to <30 ft.	0		
		30 to <50 ft.	0		
		50 to <100 ft.	0		
		100 to 300 ft.	0		
		> 300 ft.	1		
F16	All Ponded Water as a Percentage (Driest) (PondWpctDry)	When water levels are <u>lowest</u>, during a normal year, but surface water still occupies <u>>1,076 sq feet (100 sq meter) OR >1% of the AA</u> (whichever is more), the water that is **ponded** (either visible or concealed by vegetation) in the AA occupies:		**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). [WC,FA,FR,AM,WBN,Sens]	
		<1% or none. Surface water is completely or nearly absent then, or is entirely flowing. **Enter 1 and SKIP TO F22.**	0		NoPond2
		1 to <5% of the AA.	0		
		5 to <30% of the AA.	1		
		30 to <70% of the AA.	0		
		70 to 95% of the AA.	0		
		>95% of the AA.	0		
F17	Ponded Open Water **Area** (Driest) (OWareaDry)	When water levels are <u>lowest</u>, during a normal year, the AA's **ponded open water** occupies a cumulative area, including adjacent ponded waters, of:	W	**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). **Open water** - is surface water of any depth that contains no emergent herbaceous or wood vegetation (may contain floating-leaved or completely submersed species). It may be partially shaded by a tree canopy. [WBN,PUv]	
		<0.10 acre (< 4356 sq. ft). **Enter 1 and SKIP TO F24.**	0		NoPondOW2
		0.10 to <0.50 acres (21,340 sq. ft).	0		
		0.50 to <1 acres.	0		
		1- 4 acres.	0		
		5 to <50 acres.	1		
		50 to <640 acres (1 sq. mi).	0		
		640 to <1000 acres.	0		
		1000 to 2500 acres.	0		
		>2500 acres (>4 sq.mi).	0		
F18	Ponded Open Water Distribution - (Driest) (WaterMixDry)	When water levels are lowest, during a normal year, the distribution of ponded open water patches larger than 0.01 acre (400 sq. ft) within the AA is:		[NR,INV,AM,WBN]	
		(a) Vegetation <u>and</u> **open water** <u>EACH comprise 30-70%</u> of the AA (including its bordering waters if any) AND **(b)** There are <u>many small patches</u> of open water scattered widely within vegetation or many small vegetation clump "islands" scattered widely within open water. Typical (for example) of some extensive bulrush and cattail marshes.	0		
		(a) Vegetation <u>and</u> **open water** <u>EACH comprise 30-70%</u> of the AA (including its bordering waters if any) AND **(b)** There are only a <u>few (or no) small patches</u> of open water scattered widely within vegetation or a few small vegetation clump "islands" scattered widely within open water.	0		
		(a) Vegetation <u>or</u> **open water** <u>comprise >70%</u> of the AA (and its bordering waters) AND **(b)** There are <u>several small patches</u> of open water scattered within vegetation or several small vegetation clump "islands" scattered within open water.	1		

		(a) Vegetation or **open water** comprise >70% of the AA (and its bordering waters) AND **(b)** Open water is mostly in a single area (e.g., center of the wetland) and vegetation is in the rest (e.g., periphery), with almost no intermixing. Typical of many ponds excavated for livestock watering, stormwater treatment, mineral extraction as well as many wetlands that are inundated only temporarily each year.	0			
F19	Floating Algae & Duckweed (Algae)	At some time of the year, most of the AA's otherwise-unshaded water surface is covered by floating mats of algae, or small (<1 inch) floating plants such as duckweed, *Azolla*, *Wolffia*, or *Riccia*. **Enter 1, if true.**	0	This includes most nontidal wetlands labeled as Aquatic Bed (AB) on NWI maps. If wetland can be visited only during winter, it may not be possible to answer this question with much certainty unless local sources are contacted or indicators (e.g., dried remains of algae) are found.		
F20	Floating-leaved & Submerged Aquatic Vegetation (SAV)	**SAV** (submerged & floating-leaved aquatic vegetation, excluding the species listed above) occupies an annual maximum of:		**SAV** - are herbaceous plants that characteristically grow at or below the water surface, i.e., whose leaves are primarily and characteristically under or on the water surface during most of the part of the growing season when surface water is present. Some species are rooted in the sediment whereas others are not. If pond lily (*Nuphar*) is the predominant species, consider its maximum extent only during the period when surface water is present beneath the leaves. [PR,OE,INV,FR,AM,WBF,WBN]		
		none, or <5% of the water area.	0		NoSAV	
		5 to <25% of the water area.	0			
		25 to <50% of the water area.	1			
		50 to 95% of the water area.	0			
		>95% of the water area.	0			
		many SAV plants present, but impossible to select from the above categories.	0			
F21	Width of Vegetated Zone (Driest) (WidthDry)	When water levels are lowest, during a normal year, but surface water still occupies >400 sq feet or >1% of the AA (which ever is more), the width of the **vegetated wetland** that separates the largest patch of open water within or bordering the AA from the closest adjacent uplands, is predominantly:		Measure the width perpendicular to the open water part. **Vegetated wetland -** in this case does not include underwater or floating-leaved plants, i.e., aquatic bed. In farmed wetlands that have different crops from year to year, consider vegetation condition as it probably existed during most of the past 5 years. Note: For most sites larger than 1 acre and with persistent water, measure the width using aerial imagery rather than estimating in the field. [WBN]		
		<5 ft, or no vegetation between upland and open water.	0			
		5 to <30 ft.	0			
		30 to <50 ft.	0			
		50 to <100 ft.	0			
		100 to 300 ft.	0			
		> 300 ft.	1			
F22	Beaver (Beaver)	Use of the AA by beaver during the past 5 years is: **Select most applicable ONE.**		**Valley width -** is delimited by an abrupt increase in slope on both sides of the channel. [AM,WBN,SBM,PD,Sens]		
		Evident from direct observation or presence of gnawed limbs, dams, tracks, dens, or lodges.	1			
		Very likely based on known occurrence in this part of the region and proximity to ALL of the following **(a)** a persistent freshwater wetland, pond, or lake, or a perennial low-gradient (<5%) channel, and **(b)** average valley width is > 150 ft and **(c)** >20% cumulative cover of aspen, cottonwood, alder, and willow in vegetated areas within 150 ft of the AA's edge. Or there is evidence of beaver just outside the AA.	0			
		Somewhat likely based on known occurrence in this part of the region and proximity to ALL of the following **(a)** a persistent freshwater wetland, pond, or lake, or a perennial low or mid-gradient (<10%) channel, and **(b)** average valley width is >50 ft, and **(c)** >20% cumulative cover of hardwood trees and shrubs in vegetated areas within 150 ft of the AA's edge.	0			
		Unlikely because site characteristics above are deficient, and/or this is an area where beaver are routinely removed. But beaver occur within 2 miles.	0			
		None. Beaver are absent from this part of the region.	0			
F23	Isolated Island (Island)	During June, the wetland contains (or is part of) an island that is isolated from the shore by water depths >3 ft. The island may be solid, or it may be a floating vegetation mat suitable for nesting waterbirds. The island must be larger than 400 sq.ft and without inhabited buildings. **Enter 1, if true.**	0	[WBF,WBN]		
F24	Ice-free (IceDura)	During most years, most of the AA's surface water (if any) does **not** freeze, or freezes for fewer than 4 continuous weeks. **Enter 1, if true.**	1	[PR,FR,WBF]		
F25	Water Fluctuation Range - Maximum (Fluctu)	The **maximum vertical fluctuation** in surface water within the AA, during a normal year is:		**maximum vertical fluctuation -** is the difference between the highest annual and lowest annual water level during an average year. Use field indicators to assess this indicator. [WS,SR,PR,NR,CS,OE,INV,AM,WBN,PD]		
		<0.5 ft or stable.	0			
		0.5 to < 1 ft.	0			
		1 to <3 ft.	1			
		3 to 6 ft.	0			
		>6 ft.	0			
F26	% Only Saturated or Seasonally Flooded (SeasPct)	Identify the parts (if any) of the AA that never contain surface water (only saturated soil) or where the water (either ponded or flowing) usually remains on the land surface for less than the entire growing season. The percentage of the AA containing such areas is:		If you can identify plants, use their wetland indicator status to infer the possible extent of seasonal-only inundation within a wetland. Vegetation may be patterned in concentric or parallel zones, as one moves outward & away from the deepest part of the wetland or channel. Flood marks (algal mats, adventitious roots, debris lines, ice scour, etc.) may be evident when not fully inundated. In riverine systems, the extent of this zone can be estimated by multiplying by 2 the bankful height and visualizing where that would intercept the land along the river. Also, such areas often have a larger proportion of upland and annual (vs. perennial) plant species. Although useful only as a general guide, the NRCS county soil survey descriptions of the soil units and water feature table		
		<5% of the AA, or none (i.e., all water persists for >4 months).	0		NoSeasonal	
		5 to <25% of the AA.	0			
		25 to <50% of the AA.	0			

		50 to 75% of the AA.	1	general guide, the NRCS county soil survey descriptions of the soil units and water feature table usually includes information on flooding frequency and saturation persistence. [SR,NR,CS,OE,INV,FA,WBF,WBN,POL,SBM,PD,Sens,EC]	
		>75% of the AA.	0		
F27	Salinity, Alkalinity, Conductance (Salin)	The AA's surface water is mostly:		Saline or brackish conditions are commonly indicated by a prevalence of particular plant species. Consult the ORWAP SuppInfo file's P_Salt worksheetfor a list of these.	
		Brackish or saline. Plants that indicate saline conditions dominate the vegetation. Salt crust may be obvious around the perimeter and on flats.	0	**Brackish or saline** - conductance of >5000 µS/cm, or >3200 ppm TDS	
		Slightly brackish. Plants that indicate saline conditions are common. Salt crust may or may not be present along perimeter.	0	**Slightly brackish** - conductance of 500- 5000 µS/cm, or 320 - 3200 ppm TDS	
		Fresh. [Note: *Assume this to be the condition unless wetland is known to be a playa or there is other contradicting evidence]*.	1	**Fresh** - conductance of < 500 µS/cm, or <320 ppm TDS	FreshW
		Unknown.	0	[PR,CS,AM]	
F28	Fish & Waterborne Pests (FishAcc)	**Select All that apply:**		[INV,FA,FR,AM,WBF]	
		A regularly-used boat dock is present within or contiguous to the AA.	0		
		A regularly-used boat dock is not within the AA, but there is one within 300 ft. of the AA and there is a persistent surface connection between the dock and the AA.	0		
		Fish (native or stocked) are known to be present in the AA, or can access it during at least one day annually.	0		
		None of the above, and could not estimate fish presence/absence.	1		
F29	Non-native Aquatic Animals (PestAnim)	The following are known or likely to have reproducing populations in this AA, its wetland, or in water bodies within 300 ft that connect to the AA at least seasonally. **Select All that apply:**		Assume non-native fish to be present if wetland is associated with a nearby reservoir, fish pond, or perennial stream flowing through an agricultural or residential area. Assume bullfrog, nutria, and/or carp to be present if (a) the AA contains persistent water or is flooded seasonally by an adjoining body of permanent water, and (b) not a forested wetland, and (c) in western Oregon, elevation is lower than about 3000 ft. In the ORWAP_SuppInfo file, see Inverts_Exo worksheet for more complete list of non-native invertebratesf or Oregon, and WetVerts worksheet for more complete list of fish that are not native to Oregon. You may also consult: http://nas.er.usgs.gov/queries/default.aspx http://www.dfw.state.or.us/conservationstrategy/invasive_species.asp [FA,FR,AM,EC]	
		Non-native amphibians (e.g., bullfrog) or reptiles (e.g., red-ear slider).	1		
		Carp.	0		
		Non-native fish that prey on tadpoles or turtles (e.g., bass, walleye, crappie, brook trout).	0		
		Non-native invertebrates (e.g., New Zealand mudsnail, mitten crab, rusty crayfish).	0		
		Nutria.	0		
		None of above.	0		
F30	Shorebird Feeding Habitats (Shorebd)	The extent of mudflats, very shallow waters, or shortgrass meadows, within the AA, that meet the definition of **shorebird habitat** for at least 3 months during the period of late summer through the following May is:		**Shorebird habitat** - areas must have **(a)** grasses shorter than 6", or a mudflat, during any part of this period, **AND (b)** soils that either are saturated or covered with <2 inches of water during any part of this period, **AND (c)** no detectable surrounding slope (e.g., not the bottom of an incised dry channel), **AND (d)** not shaded by shrubs or trees. See photograph in Appendix A of manual. This addresses needs of most migratory sandpipers, plovers, curlews, and godwits. [WBF]	
		None, or <100 sq. ft.	0		
		100 to <1000 sq. ft. within AA.	0		
		1000 to 10,000 sq. ft. within AA.	1		
		>10,000 sq. ft. within AA.	0		
F31	Outflow Duration (OutDura)	The most persistent surface water connection (outlet channel, pipe, ditch, or overbank water exchange) between the AA and the closest stream or lake located downslope is: [Note: If the AA represents only part of a wetland, answer this according to whichever is the least permanent surface connection: the one between the AA and the rest of its wetland, OR the surface connection between the AA's wetland and a mapped stream or lake located within 300 ft downslope from this wetland].	W	The emphasis is on the connection to a mapped stream network. A larger difference in elevation between the wetland-upland boundary and the bottom of the wetland outlet (if any) indicates shorter outflow duration.	
		Persistent (>9 months/year).	1	Do not rely only on topographic maps or NWI maps to show this; inspect while in field if possible, and ask landowner. The durations given are only approximate and are for a "normal" year.	
		Seasonal (14 days to 9 months/year, not necessarily consecutive).	0	The connection need not occur during the growing season. Assume that depressions with effective nearby ditches or tile drains will connect for shorter periods.	
		Temporary (<14 days, not necessarily consecutive).	0		
		None -- no surface water flows out of the wetland except possibly during extreme events (<once per 10 years). Or, water flows only into a wetland, ditch, or lake that lacks an outlet. **Enter 1 and SKIP TO F33.**	0	[WS,WCv,SR,PR,NR,CS,OE,FA,FR,Sens]	NoOutlet
F32	Outflow Confinement (Constric)	During **major runoff events**, in the places described above where surface water exits the AA, it:	W	**Major runoff events** - would include biennial high water caused by storms and/or rapid snowmelt.	
		Is **impeded** as it mostly passes through a pipe, culvert, tidegate, narrowly breached dike, berm, beaver dam, or other partial obstruction (other than natural topography).	0	**Impeded** - means causing a delay or reduction in water velocity or volume.	
		Leaves mainly through natural surface exits, not largely through artificial or temporary features which **impede** or accelerate outflow.	1	[WS,SR,PR,NR,CS,OE,Sens,STR]	
		Is exported more quickly than usual as it mostly passes through ditches or pipes intended to accelerate drainage. They may be within the AA or connected to its outlet or within 30 ft of the AA's edge.	0		
F33	Tributary or Overbank Inflow (Inflow)	At least once annually, surface water from upstream or another water body moves into the AA. It may enter directly, or as unconfined overflow from a contiguous river or lake. If it enters only via a pipe, that pipe must be fed by a mapped stream or lake further upslope. **Enter 1, if true. If false, SKIP to F36.**	0	[SRv,PRv, PD]	Inflow
F34	Input Channel Gradient (SlopeInChan)	The gradient of the tributary with the largest inflow, averaged over the 150 ft. before it enters the AA (but excluding any portion of the distance where water travels through a pipe) is:		[SRv, PRv]	
		<1%.	0		
		1 to <3%.	0		
		3 to 6%.	0		

		>6%.	0		
F35	Throughflow Complexity (ThruFlo)	**[Skip this question if the AA lacks both an inlet and outlet.]** During peak annual flow, water entering the AA in channels encounters which of the following conditions as it travels through the AA: **Select the ONE encountered most.**		This mainly refers to surface water that moves between the inlet and outlet. Some judgment is required in assessing straight vs. indirect flow path. See ORWAP Manual Appendix B diagram. [WS,SR,PR,NR,OE,INV,FA,FR,WBF,WBN,PD]	
		Does not bump into many plant stems as it travels through the AA. Nearly all the water continues to travel within unvegetated (often incised) channels and has minimal contact with wetland vegetation, or through a zone of open water such as an instream pond or lake.	0		
		Bumps into herbaceous vegetation but mostly remains in fairly straight channels.	0		
		Bumps into herbaceous vegetation and mostly spreads throughout, or follows a fairly indirect path (in widely meandering, multi-branched, or braided channels).	0		
		Bumps into tree trunks and/or shrub stems but mostly remains in fairly straight channels.	0		
		Bumps into tree trunks and/or shrub stems and follows a fairly indirect path (meandering, multi-branched, or braided) from entrance to exit.	0		
F36	Internal Gradient (Gradient)	The gradient from the lowest to highest point of land within the AA (**or** from outlet to inlet) is:		Wetlands with no outlet, and wetlands where most surface water is impounded on site, should be considered flat (<2%). For other wetlands, estimate gradient as the elevation difference between the inlet and outlet (if any) divided by the distance between them, or the difference between the highest and lowest points in the wetland divided by the distance between them. [WS,SR,PR,NR,CS,OE,AM,WBF,WBN]	
		<2% (internal flow is absent or barely detectable; basically flat).	1		
		2 to <6%.	0		
		6 to 10%.	0		TooSteep1
		>10%.	0		TooSteep2
F37	Groundwater Strength of Evidence (Groundw)	**Select first one that applies:**		[WS,WC,NR,CS,OE,INV,FA,FR,PD]	
		In the AA or its wetland: **(a)** Springs are observed, OR **(b)** Water is markedly cooler in summer and warmer in winter (e.g., later ice formation) than in other local wetlands, OR **(c)** Measurements from shallow wells indicate groundwater is discharging to the wetland, OR **(d)** Water visibly seeps into pits dug within the AA during the driest time of the year and located >30 ft from the closest surface water.	0		
		The AA's wetland: **(a)** Is very close to the base of a natural slope steeper than 15% and longer than 300 ft or is located at a geologic fault, OR **(b)** Has no persistently flowing tributary AND one or more is true: (b1) Is on a natural slope of >5%, OR (b2) Has rust deposits ("iron floc"), colored precipitates, or dispersible natural oil sheen, OR (b3) Is in an **Arid or Semi-arid hydrologic unit**.	0	**Arid or Semi-arid hydrologic unit** - See the ORWAP Report's Hydrologic Landscape Class (under Location Information).	
		The AA is not in an **Arid or Semi-arid hydrologic unit**, but has persistent ponded water, no tributary, and is not fed by wastewater, concentrated stormwater, or irrigation water, or by an adjacent river or lake.	1		
		None of above is true, OR AA contains a hot spring. Some groundwater may nonetheless discharge to or flow through the wetland.	0		
F38	Unshaded Herbaceous Vegetation (Extent) (HerbExpos)	The annual maximum areal cover of herbaceous vegetation (excluding SAV, ferns, and mosses, but including forbs & graminoids) that is not beneath a woody canopy reaches:		Do not include submersed and floating-leaved aquatics (SAV) in the category of "herbaceous vegetation", or when defining the "vegetated part" of the site. For sites larger than 10 acres, this should be determined from aerial imagery rather than estimated in the field. [WBF,WBN]	
		<5% of the vegetated part of the AA. **Enter 1 and SKIP to F42.**	0		NoHerb
		5 to <25% of the vegetated part of the AA.	0		
		25 to <50% of the vegetated part of the AA.	0		
		50-95% of the vegetated part of the AA.	1		
		>95% of the vegetated part of the AA.	0		
F39	Forb Cover (Forb)	Within parts of the AA having herbaceous cover (excluding SAV), the areal cover of **forbs** reaches an annual maximum of:		**Forbs -** are flowering non-woody vascular plants (excludes grasses, sedges, ferns, mosses). [POL]	
		<5% of the herbaceous part of the AA.	0		
		5 to <25% of the herbaceous part of the AA.	0		
		25 to <50% of the herbaceous part of the AA.	1		
		50 to 95% of the herbaceous part of the AA.	0		
		>95% of the herbaceous part of the AA.	0		
F40	Species Dominance - Herbaceous (HerbDom)	Determine which two native herbaceous (forb, fern, and graminoid) species comprise the greatest portion of the herbaceous cover that is unshaded by a woody canopy. **Then select one:**		[INV,WBF,SBM,PD,POL,Sens,EC]	
		Those species together comprise more than half of the areal cover of native herbaceous plants at any time during the year, i.e., one dominant species or two co-dominants. **Also mark this if <20% of the vegetated cover is native species.**	0		

		Those species together comprise less than half of the areal cover of native herbaceous plants at any time during the year.	1			
F41	Invasive or Non-native - % of Vegetative Cover (Invas)	Vegetative cover (annual maximum) is:		In the ORWAP_SuppInfo, see P_Invas worksheet for list of invasives and P_Exo for non-native species list. Examples of woody invasives are Himalayan blackberry, English ivy, scotch broom, and gorse. For known distributions of invasive plants in your area see: http://inr.oregonstate.edu/orbic/invasive-species and http://www.weedmapper.org/maps.html but do not limit your answer based only on that information. Consider most crops to be non-native. [WBF,PD,POL,Sens,EC]		
		Overwhelmingly (>80% cover) non-native species AND >10% of the herbaceous cover is invasive species. (See ORWAP SuppInfo file for species designations).	0		InvasDom	
		Overwhelmingly (>80% cover) non-native species AND <10% of the herbaceous cover is invasive species; OR 50-80% of cover is non-native species regardless of invasiveness.	0			
		Mostly (50-80%) native species.	0			
		Overwhelmingly (>80%) native species.	1			
F42	Mowing, Grazing, Fire (VegCut)	There is evidence that grazing by domestic or wild animals -- or mowing (multiple times per year), plowing, herbicides, harvesting, or fire -- has **repeatedly** reduced the AA's vegetation cover (plants that normally grows taller than 4") to less than 4 inches, or has created an obvious browse line, over the following extent:		**Repeatedly** - means the condition occurred in at least half of the last 10 years. [SR,AM,WBN,SBM,PD,EC]		
		0% (No evidence of such activities).	1		NoMowGraze	
		Trace to 5% of the normally vegetated AA (grazing, mowing, or fire have occurred but vegetation height effects are mostly unnoticeable).	0			
		5 to <50% of the normally vegetated AA.	0			
		50 to 95% of the normally vegetated AA.	0			
		>95% of the normally vegetated AA.	0			
F43	Historically Lacking Trees (HistVeg)	According to the ORWAP Report, the presettlement vegetation class in the vicinity of the AA was prairie, sagebrush, or other open lands not dominated by trees. In addition, the AA is not within the biennial floodplain of a river where trees and shrubs typically dominate when conditions are unaltered. **Enter 1, if true.**	1	In the ORWAP Report's Location Information table. This question is used as a classification variable mainly to set appropriate expectations for the extent of forest cover.	HistOpenland	
F44	Moss Wetland (Moss)	The AA's ground cover is primarily a deep layer of moss, and/or soils are mainly peat or organic muck. Also, the soil remains water-saturated to within 3 inches of the surface during most of a normal year. Surface water within the AA often is absent or confined to small scattered pools or ditches. **Enter 1, if true.**	0	Includes most bogs and fens. May be a floating island. [NR,CS,OE,WBF,WBN,Sens]		
F45	Woody Extent (WoodyPct)	Within the vegetated part of the AA, woody vegetation (trees, shrubs, **robust vines**) taller than 3 ft occupies:		**Robust vines** - include Himalayan blackberry and others that are generally erect and taller than 1 ft. **Vegetated part** - should not include floating-leaved or submersed aquatics. For sites larger than 1 acre, this should be determined from aerial imagery rather than estimated only in the field. [NR,WC,CS,SBM,PD,Sens]		
		<5% of the vegetated AA, and fewer than 10 trees are present. **Enter 1 and SKIP to F51.**	0		NoWoody	
		<5% of the vegetated AA, but more than 10 trees are present.	0			
		5 to <25% of the vegetated AA.	0			
		25 to <50% of the vegetated AA.	1			
		50 to 95% of the vegetated AA.	0			
		>95% of the **vegetated part** of the AA.	0			
F46	Woody Diameter Classes (TreeDiams)	**Select All the types** that comprise >5% of the woody canopy cover in the AA or >5% of its **wooded upland edge** if any:		**Wooded upland edge**- includes woody plants located within one tree-height of the wetland-upland boundary. **DBH** is the diameter of the tree measured at 4.5 ft above the ground. [CS,SBM,POL,Sens]		
		Deciduous 1-4" diameter (DBH) and >3 ft tall.	1			
		Evergreen 1-4" diameter and >3 ft tall.	0			
		Deciduous 4-9" diameter.	1			
		Evergreen 4-9" diameter.	0			
		Deciduous 9-21" diameter.	1			
		Evergreen 9-21" diameter.	0			
		Deciduous >21" diameter.	0			
		Evergreen >21" diameter.	0			
F47	Snags (Snags)	The number of large **snags** (diameter >12 inches) in the AA plus 100 ft uphill of its edge is:		**Snags** - are standing trees at least 20 ft tall that are mainly without bark or foliage. [SBM,POL]		
		Few or none.	0			
		Several.	1			
F48	Abovewater Wood (WoodOver)	The number of horizontal wood pieces thicker than 4 inches that are partly submerged during most of the spring or early summer, thus potentially serving as basking sites for turtles, birds, or frogs and cover for fish is:		Only the wood that is at or above the water surface is assessed because of the impracticality of assessing underwater wood accurately when using a rapid assessment method. [FA,FR,AM]		
		None.	0			
		Few.	0			
		Several (e.g., >3 per 300 ft of channel or shoreline).	1			
F49	Downed Wood (WoodDown)	The number of downed wood pieces longer than 6 ft and with diameter >4 inches that are not submerged during most of the growing season, is:		Exclude temporary "burn piles." [INV,AM,SBM,POL]		
		Few or none.	0			
		Several.	1			

F50	Exposed Shrub Canopy (ShrExpos)	Within the **vegetated part** of the AA, shrubs shorter than 20 ft that are not overtopped by trees occupy: Select first statement that is true.		**Vegetated part** - should not include floating-leaved or submersed aquatics. [SBM,PD]		
		<5% of the vegetated AA and <0.01 acre (400 sq ft).	0			
		5 to <25% of the vegetated AA or the water edge (whichever is greater in early summer).	0			
		25 to <50% of the vegetated AA or the water edge (whichever is greater in early summer).	1			
		50 to 95% of the vegetated AA or the water edge (whichever is greater in early summer).	0			
		>95% of the vegetated part of the AA or the water edge (whichever is greater in early summer).	0			
F51	N Fixers (Nfix)	The percentage of the vegetated area in the AA <u>or</u> along its water edge (whichever has more) that contains nitrogen-fixing plants (e.g., alder, baltic rush, scotch broom, lupine, clover, alfalfa, other legumes) is:		For a more complete list, see <u>ORWAP_SuppInfo</u>, worksheet NFIX (includes native and non-native species). Do not include algae. [OE,INV,Sens]		
		<1% or none.	0			
		1 to <25%.	0			
		25 to <50%.	1			
		50 to 75%.	0			
		>75%.	0			
<u>Note</u> for the next four questions: If the AA lacks an upland edge, evaluate based on the AA's <u>entire perimeter</u> and outward into whatever areas are adjacent. In many situations, these questions are best answered by measuring from aerial images.						
F52	Upland Perennial Cover - % of Perimeter (PerimPctPer)	The percentage of the AA's <u>edge (perimeter)</u> that is comprised of a band of upland **perennial cover** wider than 10 ft and taller than 6 inches, during most of the growing season is:		**Perennial cover** - vegetation that includes wooded areas, native prairies, sagebrush, as well as relatively unmanaged commercial lands in which the ground is disturbed less frequently than annually such as perennial ryegrass fields, hayfields, lightly grazed pastures, timber harvest areas, and rangeland. It <u>does not</u> include water, row crops (vegetable, orchards, Christmas tree farms), residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads. [WCv,SRv,PRv,INV,FA,AM,WBF,WBN,SBM,PD,POL,POLv,Sens,STR]		
		<5%.	0			
		5 to <25%.	1			
		25 to <50%.	0			
		50 to <75%.	0			
		75 to 95%.	0			
		>95%.	0			
F53	Upland Perennial Cover - Width (Buffer) (BuffWidth)	Along the greatest extent of the AA's **<u>upland edge</u>**, the width of **perennial cover** taller than 6 inches that extends upslope from the AA until mostly shorter or non-perennial cover is reached is: [NOTE: the width is not necessarily the maximum width. Base on vegetation that occurs most of the growing season.]		**Upland edge** - is the land within 3 ft of the wetland's perimeter that is not wetland. [WCv,SRv,PRv,INV,FA,AM,WBN,SBM,PD,POL,Sens,STR]		
		< 5 ft, or none.	1		NoUpPerCov	
		5 to <30 ft.	0			
		30 to <50 ft.	0			
		50 to <100 ft.	0			
		100 to 300 ft.	0			
		> 300 ft.	0		AllUpPerren	
F54	Upland Trees as % of All Perennial Cover (UpTreePctPer)	Within 100 f.t landward from the AA's <u>edge (perimeter)</u>, the percentage of the upland perennial cover that is woody plants taller than 20 ft is:		Base this on the cumulative canopy width of the trees. [WSv,FA,WBF,WBN,SBM]		
		<5%, or there is no upland perennial cover along the upland edge.	0			
		5 to <25% of perennial cover.	1			
		25 to <50% of perennial cover.	0			
		50 to <75% of perennial cover.	0			
		75 to 95% of perennial cover.	0			
		>95% of perennial cover.	0			
F55	Weeds - % of Upland Edge (UpWeed)	Along the AA's <u>edge (perimeter)</u>, the cover of invasive woody or herbaceous plants occupies: [If vegetation is so senesced that apparently-dominant edge species cannot be identified even to genus, answer "none"].		See <u>ORWAP_SuppInfo file</u>, worksheet P_Invas. Some of the most common invaders along upland edges of Oregon wetlands are Himalayan blackberry, knotweed, sweetbrier rose, Russian olive, English ivy, nightshade, pepperweed, medusahead, white clover, ryegrass, quackgrass, false brome, bentgrass, dandelion, oxeye daisy, pennyroyal, bull and creeping thistles, tansy ragwort, poison hemlock, and teasel. If a plant cannot be identified to species (e.g., winter conditions) but its genus contains an invasive species, assume the unidentified plant to also be invasive. [PD,STR]		
		<5%, or none.	0			
		5 to <25%.	1			
		25 to <50%.	0			
		50 to <75%.	0			
		75 to 95%.	0			
		>95%.	0			
F56	Bare Ground & Accumulated Plant Litter	Consider the parts of the AA that go dry during a normal year. Viewed from <u>6 inches above the soil surface</u>, the condition in most of that area just before the year's longest inundation period begins is:		**Bare ground-** includes unvegetated soil, rock, sand, or mud between stems if any. Bare ground under a tree or shrub canopy should be counted.		

	(Gcover)	Little or no (<5%) **bare ground** is visible between erect stems or under canopy and there is little or no dead detached plant tisuse (thatch) remaining on top of the ground surface and ground surface is extensively blanketed by moss, lichens, graminoids with great stem densities, or plants with ground-hugging foliage.	0	Wetlands that are dominated by annual plant species tend to have more extensive areas that are bare during the early growing season.		
		Some (5-20%) bare ground or remaining thatch is visible. Herbaceous plants have moderate stem densities and do not closely hug the ground.	1	[WS,WC,SR,PR,NR,CS,OE,INV,AM,SBM,POL,Sens,EC]		
		Much (20-50%) bare ground or thatch is visible. Low stem density and/or tall plants with little living ground cover during early growing season.	0			
		Mostly (>50%) bare ground or thatch.	0			
		Not applicable. All of the AA is inundated throughout most years.	0			
F57	Ground Irregularity (Girreg)	In parts of the AA that lack persistent water, the number of small pits, raised mounds, hummocks, boulders, upturned trees, animal burrows, islands, natural levees, wide soil cracks, and microdepressions is:		**Microtopography** - refers mainly to vertical relief of <3 ft and is represented only by inorganic features, except where plants have created depressions or mounds of soil.		
		Few or none, or the entire AA is always water-covered. Minimal **microtopography**; <1% of the AA, e.g., many flat sites having a single hydroperiod.	0	Consider the microtopography to be "few or none" if one could walk easily through most of the AA once any slash and logs are removed. Consider it to be "several" if one has to constantly look down and check balance.		
		Intermediate.	1			
		Several (extensive micro-topography).	0	[WS,SR,PR,NR,INV,AM,SBM,PD,POL,EC]		
F58	Soil Composition (SoilTex)	Based on digging into the substrate and examining the surface layer of the soil (2 inch depth) that was mapped as being predominant, its composition (excluding **duff** and living roots) is mostly:		Do not base the texture on soil maps unless the AA is inaccessible. See ORWAP Manual's protocol (Step 2 of section 5.3 and the soil chart in Appendix B).		
		Loamy: includes silt, silt loam, loam, sandy loam.	0	Judge which soil type is predominant only in the part of the AA that is not inundated at the time of your visit.		
		Clayey: includes clay, clay loam, silty clay, silty clay loam, sandy clay, sandy clay loam.	1			
		Organic: includes muck, mucky peat, peat, and mucky mineral soils (blackish or grayish). Exclude live roots unless they are moss.	0	**Duff** - is loose organic surface material, e.g., dead plant leaves and stems). Organic soils are much less common in floodplains.		
		Coarse: includes sand, loamy sand, gravel, cobble, stones, boulders, fluvents, fluvaquents, riverwash.	0	[WS,PR,NR,CS,OE,PD,Sens]		
F59	Cliffs or Banks (Cliff)	Within 300 ft of the AA, there are elevated terrestrial features such as cliffs, bluffs, talus slopes, or unarmored stream banks that extend at least 6 ft nearly vertically, are unvegetated, and potentially contain crevices or other substrate suitable for nesting or den areas. **Enter 1, if true.**	0	[SBM,POL]		
F60	Restored or Created Wetland (NewWet)	The AA is (or is within, or contains) a "new" wetland resulting from human actions (e.g., excavation, impoundment) or other factors affecting what was upland (non-hydric) soil. Or, some part of the AA was originally a wetland, was artificially drained for many years, and has since had its water regime partly or wholly restored or rehabilitated (e.g., by ditch plugs, berms, tile breakage, non-maintenance).		Include wetlands whose area was likely expanded by road berms which impeded runoff, but do not include wetlands created by beaver dams except for the part where flooding affected uplands (not just existing wetlands and streams). Determine this using historical aerial photography, old maps, soil maps, consultation with landowners, and/or permit files as available.		
		Yes, and constructed or restored mostly within last 3 years.	1	See ORWAP Map Viewer's Hydric Soil layer (expend Soils). Also, locations of some restoration wetlands can be found in the ORWAP Map Viewer under Restoration.		
		Yes, and constructed or restored mostly 3-7 years ago.	0	Another potential source is the Conservation Registry:		
		Yes, and constructed or restored mostly >7 years ago.	0	https://oregonexplorer.info/content/conservation-registry?topic&ptopic.		
		Yes, but time of origin or restoration unknown.	0			
		No.	0	[PR,NR,CS,OE,PD,Sens]	NotNewWet	
		Unknown if wetland is constructed, restored, or natural.	0			
F61	Ownership (Ownership)	Most of the AA is:		An initial indication of ownership can be found on the ORWAP Map Viewer under the Land Ownership layer (expand Land Classification). However, it is advisable to ask local sources or use local maps with higher precision.		
		Publicly owned (municipal, county, state, federal).	0	[PUv]		
		Owned by non-profit conservation organization or easement holder who allows public access to this AA.	0			
		Other private ownership, including tribal. **Enter 1 and SKIP to F63.**	1		PrivateOwn	
F62	Special Protected Area Designation (Desig)	The AA is part of an area designated as a Special Protected Area according to the USGS Protected Areas Database of the U.S. **Enter 1, if true.**	0	See the ORWAP Map Viewer Report under the Location Information section for "In Special Protected Area?" [PUv]		
F63	Conservation Investment (ConsInvest)	The AA is not a mitigation wetland, but public funds or community volunteer efforts have been applied to preserve, create, restore, or enhance the condition or functions of the wetland. (e.g. CRP or WRP wetlands, community projects). **Enter 1, if true. (If unknown, leave 0).**	0	Locations of some restoration wetlands can be found in the ORWAP Map Viewer under Restoration. Another potential source is the Conservation Registry: https://oregonexplorer.info/content/conservation-registry?topic&ptopic [PUv]		
F64	Compensation Wetland (MitWet)	The AA is all or part of a compensation site used explicitly to offset impacts elsewhere. **Enter 1, if true. (If unknown, leave 0).**	1	Answer to the best of your knowledge. Sources for information include the property owner, DSL, and/or the ACOE. [PUv]		
F65	Sustained Scientific Use (SciUse)	Plants, animals, or water in the AA have been monitored for >2 years, unrelated to any regulatory requirements, and data are available to the public. Or the AA is part of an area that has been designated by an agency or institution as a benchmark, reference, or status-trends monitoring area. **Enter 1, if true. (If unknown, leave 0)**	0	[PUv]		
F66	Visibility (Visibil)	The maximum percentage of the wetland that is visible from the best vantage point on public roads, public parking lots, public buildings, or public maintained trails that intersect, adjoin, or are within 300 ft of the AA is **(Select ONE):**		[WBFv,WBNv,SBMv,PUv,STR]		
		<25%.	0			
		25 - 50%.	1			
		>50%.	0			

F67	Non-consumptive Uses - Actual or Potential (RecPoten)	**Select All statements that are true** of this AA as it currently exists:		The question assumes access is allowed.		
		Walking is physically possible in >5% of the AA during most of year (e.g., free of deep water and dense shrub thickets).	1	[PUv]		
		All or part of the AA (or an area within sight of the AA and within 100 ft) would be physically accessible to people in wheelchairs (e.g., paved and flat).	0			
		Maintained roads, parking areas, or foot-trails are within 30 ft of the AA, or the AA can be accessed most of the year by boat.	1			
		Within or near the AA, there is an interpretive center, trails with interpretive signs or brochures, and/or regular guided interpretive tours.	0			
F68	Core Area 1 (VisitNo)	The percentage of the AA almost never walked or driven by humans during an average growing season probably comprises: [Note: If more than half the wetland is visible from areas within 100 ft of the AA, include visits by people to those areas that are actually walked or driven (not simply viewed from].		Judge this based on proximity to population centers, roads, trails, accessibility of the AA to the public, wetland size, usual water depth, and physical evidence of human visitation.		
		<5% and no inhabited building is within 300 ft of the AA.	0	Exclude visits that are not likely to continue and/or that are not an annual occurrence (e.g., by construction, maintenance, or monitoring crews).		
		<5% and inhabited building is within 300 ft of the AA.	0			
		5 to <50% and no inhabited building is within 300 ft of the AA.	0	[AM,WBF,WBN,SBM,PD,PUv,STR]		
		5 to <50% and inhabited building is within 300 ft of the AA.	0			
		50 to 95% with or without inhabited building nearby.	1			
		>95% of the AA with or without inhabited building nearby.	0			
F69	Core Area 2 (VisitOften)	The part of the AA visited by humans <u>almost daily for several weeks</u> during an average growing season probably comprises: [The Note in the preceding question applies here as well].		See note above.		
		<5%.	0	[AM,WBF,WBN,SBM,PD,PUv,STR]		
		5 to <50%.	1			
		50 to 95%.	0			
		>95% of the AA.	0			
F70	Consumptive Uses (Provisioning Services) (Hunt)	Recent evidence was found <u>within the AA</u> of the following potentially-sustainable consumptive uses. **Select All that apply.**		Evidence of these consumptive uses may consist of direct observation, or presence of physical evidence (e.g., recently cut stumps, fishing lures, shell cases), or might be obtained from communication with the land owner or manager.		
		Low-impact commercial timber harvest (e.g., selective thinning).	0			
		Commercial or traditional-use harvesting of native plants, their fruits, or mushrooms.	0	[FRv,WBFv,PUv]		
		Waterfowl hunting.	0			
		Fishing.	0			
		Trapping of furbearers.	0			
		None of the above.	1			
F71	Domestic Wells (Wells)	Wells or water bodies that currently provide drinking water are:		If unknow, assume this is true if there is an inhabited structure within the specified distance and the neighborhood is known to not be connected to a municipal drinking water system (e.g., is outside an urban growth boundary or other densely settled area).		
		<300 ft and downslope from the AA or at same elevation.	0			
		300 to 1500 ft and downslope or at same elevation.	1			
		>1500 ft downslope, or none downslope, or no information.	0	[NRv]		
F72	Wetland Type of Conservation Concern (RareType)	Does the AA contain, or is it part of, any of these wetland types? **Select All that apply.**	W	Consult the <u>ORWAP Report</u> under the Location Information table for "Rare Wetland Types." But be aware that it may not apply to the exact AA you have delimited. [PDv, Sens]		
		<u>Mature forested wetland</u> (anywhere): a wetland in which mean diameter of trees (d.b.h., FACW and FAC species only) exceeds 18 inches, <u>and/or</u> the average age of trees exceeds 80 years, <u>or</u> there are >5 trees/acre with diameter >32 inches.	0	To qualify, the diameter of >18 inches must be the mean measured from at least 10 trees.		
		<u>Bog or Fen:</u> contains a sponge-like organic soil layer which covers most of the AA and often has extensive cover of sedges <u>and/or</u> broad-leaved evergreen shrubs (e.g., Ledum). Often lacks tributaries, being fed mainly by groundwater and/or direct precipitation.	0			
		<u>Playa, Salt Flat, or Alkaline Lake</u>: a nontidal ponded water body usually having saline (salinity >1 ppt or conductivity >1000 µS) or alkaline (conductivity >2000 µS and pH >9) conditions and large seasonal water level fluctuations (if inputs-outputs unregulated). If a playa or salt flat, vegetation cover is sparse and plants typical of saline or alkaline conditions (e.g., Distichlis, Atriplex) are common.	0	See <u>ORWAP_SuppInfo</u> file, worksheet P_Salt for species typically occurring in tidal or saline conditions.	Playa	
		<u>Hot spring</u> (anywhere): a wetland where discharging groundwater in summer is >10 degrees (F) warmer than the expected water temperature.	0			
		<u>Native wet prairie</u> (west of the Cascade crest): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, and dominated primarily by native graminoids often including species in column E.	0	Deschampsia caespitosa, Danthonia californica, Camassia quamash, Triteleia hyacinthina, Carex densa, C. aperta, and/or C. unilateralis		
		<u>Vernal pool (Willamette Valley)</u>: a seasonally inundated wetland, underlain by hardpan or claypan, with hummocky micro-relief, usually without a naturally-occurring inlet or outlet, and with native plant species distinctly different from those in slightly higher areas, and often including species in column E.	0	Downingia elegans, Isoetes nuttallii, Triteleia hyacinthina, Eleocharis spp., Eryngium petiolatum, Plagiobothrys figuratus, Plagiobothrys scouleri, Grindelia nana, Veronica peregrina, Lasthenia glaberrima , Cicendia quadrangularis, Kickxia elatine, Gnaphalium palustre, and/or Callitriche spp.		

		Vernal pool (Medford area): a seasonally inundated acidic wetland, underlain by hardpan, with hummocky micro-relief, usually without a naturally-occurring inlet or outlet, and having concentric rings of similar native vegetation, often including species in column E.	0	Downingia vina, Isoetes nuttalli, Pilularia americana, Triteleia hyacinthina, Eleocharis spp., Eryngium petiolatum, Plagiobothrys brachteatus, Plagiobothrys scouleri, Grindelia nana, Veronica peregrina, Alopecurus saccatus, Lasthenia californica, Deschampsia danthonioides, and/or Callitriche spp.		
		Vernal pool (Modoc basalt & Columbia Plateau): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, located on shallow basalt bedrock and often having species in column E.	0	Blennosperma nanum, Camassia quamash, Epilobium densiflorum, Callitriche marginata, Cicendia quadrangularis, Eryngium vaseyi, Psilocarphus brevissimus, and/or Sedella pumila.		
		Interdunal wetland (Coastal ecoregion): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, located between sand dunes where wind has scoured the sand down to the water table (deflation plain, blowout pond), and often with significant cover of the native species in column E.	0	Carex obnupta, Argentina egedii, Juncus lesueurii, J. nevadensis, J. falcatus, Sisyrinchium californicum, and/or Salix hookeriana		
		Ultramafic soil wetland (mainly southwestern Oregon): a low-elevation wetland, usually with a sponge-like organic soil layer, occurring in an area with exposed serpentine or peridotite rock, and/or in soils with very low Ca:Mg ratios.	0			
		None of above.	1			

Site: NEXT Renewable Fuels Oregon (mitigation post-construction)	Name: Sue Brady	Date: 5/6/21

Form S
Stresser Data
ORWAP V 3.2

					Data	Comments
S1	**Aberrant Timing of Water Inputs (AltTiming)**					
	*In the "Data" column, **place an X** next to any item that is likely to have caused the **timing** of water inputs (but not necessarily their volume) to shift by hours, days, or weeks, becoming either **more muted** (smaller or less frequent peaks spread over longer times, more temporal homogeneity of flow or water levels) **or more flashy** (larger or more frequent spikes but over shorter times).*					
	Control structure that regulates inflow to the AA (including tide gates), or flow regulation in tributaries, or water level in adjoining water body is regulated.					
	Irrigation runoff or seepage.				x	
	Snow storage areas that drain directly to the wetland.					
	Increased pavement and other impervious surface in the CA.					
	Straightening, ditching, dredging, and/or lining of tributary channels in the CA.				x	
	*If **any** items were checked above, then for each row of the table below, you may assign points (3, 2, or 1). However, if you believe the checked items had no measurable effect on the timing of water conditions in any part of the AA, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition, if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Spatial extent within the AA of timing shift.	>95% of AA.	5-95% of AA.	<5% of AA.	3	
	When most of the timing shift began.	<3 yrs ago.	3-9 yrs ago.	10-100 yrs ago.	1	
	Score the following 2 rows only if the altered inputs began within past 10 years, and only for the part of the AA that experiences those.					
	Input timing now vs. previously.	Shift of weeks.	Shift of days.	Shift of hours or minutes.	0	
	Flashiness or muting.	Became very flashy or controlled.	Intermediate.	Became mildly flashy or controlled.	0	
				Sum=	4	
				Final score=	0.33	
S2	**Accelerated Inputs of Nutrients (NutrLoad)**					
	*In the "Data" column, **place an X** next to any item -- occurring in either the AA or its RCA -- that is likely to have accelerated the inputs of nutrients (nitrogen, phosphorus) to the AA.*					
	Stormwater or wastewater effluent (including failing septic systems), landfills.					
	Fertilizers applied to lawns, ag lands, or other areas in the RCA.				x	
	Livestock, dogs.				x	
	Artificial drainage of upslope lands.				x	
	Other waterborne human-related nutrient sources within the RCA.					
	*If **any** items were checked above, then for each row of the table below, you may assign points. However, if you believe the checked items did not cumulatively expose the AA to significantly more nutrients, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Usual load of nutrients.	Large (e.g., feedlots, extensive residential on septic) or or 303d* for nutrients.	Moderate (e.g., grazing, light residential on septic, light agriculture).	Limited (e.g., a few animals, lawns, sewered residential).	2	
	Frequency & duration of input.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & during high runoff events mainly.	2	
	AA proximity to main sources (actual or potential).	0 - <50 ft.	50-300 ft. or in groundwater.	In other part of contributing area.	2	
				Sum=	6	
				Final score=	0.67	
S3	**Accelerated Inputs of Contaminants and/or Salts (ContamIn).**					
	*In the "Data" column, **place an X** next to any item -- occurring in either the AA or its RCA -- that is likely to have accelerated the inputs of contaminants or salts to the AA.*					
	Stormwater or wastewater effluent (including failing septic systems), landfills, snow storage areas.					
	Metals & chemical wastes from mining, shooting ranges, oil/ gas extraction, other sources.					
	Irrigation of lands, especially those with saline soils.				x	
	Oil or chemical spills (not just chronic inputs) from nearby roads.					
	Road salt.					
	Pesticides applied to lawns, ag lands, roadsides, or other areas in the RCA, but excluding spot applications for controlling non-natives in the AA.				x	
	Artificial drainage of contaminated or saline soils.					
	Erosion of contaminated soils.					
	Other contaminant sources within the RCA.					
	*If **any** items were checked above, then for each row of the table below, you may assign points. However, if you believe the checked items did not cumulatively expose the AA to significantly higher levels of contaminants and/or salts, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Usual toxicity of most toxic contaminants.	Industrial effluent or 303d* for toxics.	Wastewater treatment plant, cropland, fossil fuel extraction, pipeline, power station, managed landfill.	Low density residential or commercial.	1	
	Frequency & duration of input.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & during high runoff events mainly.	2	
	AA proximity to main sources (actual or potential).	0 - <50 ft.	50-300 ft. or in groundwater.	In other part of contributing area.	2	
	* See ORWAP Map Viewer for waters designated as 303d; see Oregon DEQ web site for reasons.			Sum=	5	
				Final score=	0.56	

S4	**Excessive Sediment Loading from Runoff Contributing Area (SedRCA).**	
	*In the "Data" column, **place an X** next to any item present in the RCA that is likely to have elevated the load of waterborne or windborne sediment reaching the AA from its RCA.*	
	Erosion from plowed fields, fill, timber harvest, dirt roads, vegetation clearing, fires.	x
	Erosion from construction, in-channel machinery in the RCA.	x
	Erosion from off-road vehicles in the RCA.	
	Erosion from livestock or foot traffic in the RCA.	x
	Stormwater or wastewater effluent.	
	Sediment from road sanding, gravel mining, other mining, oil/ gas extraction.	
	Accelerated channel downcutting or headcutting of tributaries due to altered land use.	
	Other human-related disturbances within the RCA.	
	*If **any** items were checked above, then for each row of the table below you may assign points (3, 2, or 1) in the last column that describe the combined maximum effect of those items in increasing the amount or transport of sediment into the AA. To estimate that, contrast it with the condition if checked items never occurred or were no longer present.*	

	Severe (3 pts)	Medium (2 pts)	Mild (1 pt)	
Erosion in RCA.	Extensive evidence, high intensity*.	Potentially (based on high-intensity* land use) or scattered evidence.	Potentially (based on low-intensity* land use) with little or no direct evidence.	2
Recentness of significant soil disturbance in the RCA.	Current & ongoing.	1-12 months ago.	>1 yr ago.	3
Duration of sediment inputs to the AA.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & mainly during high runoff or severe wind events.	2
AA proximity to actual or potential sources.	0 - <50 ft., or farther but on steep erodible slopes.	50-300 ft.	In other part of contributing area.	3
* **High**-intensity= plowing, grading, excavation, erosion with or without veg removal; **low**-intensity= veg removal only with little or no apparent erosion or disturbance of soil or sediment.			Sum=	10
			Final score=	0.83

S5	**Soil or Sediment Alteration *Within the Assessment Area* (SoilDisturb).**	
	*In the "Data" column, **place an X** next to any item present in the AA that is likely to have compacted, eroded, or otherwise altered the AA's soil.*	
	Compaction from livestock, machinery, off-road vehicles, or mountain bikes, especially during wetter periods.	x
	Leveling or other grading not to the natural contour.	x
	Tillage, plowing (but excluding disking for enhancement of native plants).	x
	Fill, riprap, other armoring, excluding small amounts of upland soils containing organic amendments (compost, etc.) or small amounts of topsoil stockpiled or imported from another wetland.	
	Excavation.	x
	Dredging in or adjacent to the AA.	x
	Boat traffic in or adjacent to the AA and sufficient to cause shore erosion or stir bottom sediments.	
	Artificial water level or flow manipulations sufficient to cause erosion or stir bottom sediments.	
	*If **any** items were checked above, then for each row of the table below you may assign points (3, 2, or 1) in the last column that describe the combined maximum effect of those items in altering the AA's soils. To estimate that, contrast it with the soil condition if checked items never occurred or were no longer present.*	

	Severe (3 pts)	Medium (2 pts)	Mild (1 pt)	
Spatial extent of altered soil.	>95% of AA or >95% of its upland edge (if any).	5-95% of AA or 5-95% of its upland edge (if any).	<5% of AA and <5% of its upland edge (if any).	3
Recentness of significant soil alteration in AA.	Current & ongoing.	1-12 months ago.	>1 yr ago.	2
Duration.	Long-lasting, minimal veg recovery.	Long-lasting but mostly revegetated.	Short-term, revegetated, not intense.	2
Timing of soil alteration.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & mainly during scattered events.	1
			Sum=	8
			Final score=	0.67

OREGON EXPLORER

Oregon Rapid Wetland Assessment Protocol (ORWAP) Report

Report Generated: October 28, 2020 02:02 PM

Assessment Area: 178 Acres

Location Map

Location Information

Latitude	46.1667679158424	Longitude	-123.163463650944
Elevation	11 ft	Annual precipitation	53 in
Watershed (HUC12)		Lower Beaver Creek-Frontal Columbia River (170800030407)	
Presettlement Vegetation Class		Marsh/Wetland	
Rare Wetland Type(s)		None	
Hydrologic Landscape Class		Wet	
In Special Protected Area?		No	

View Salinity Maps (pdf)

Soil Information

Soil Name	Udipsamments, nearly level, protected
Soil Symbol	61
Hydric Rating	Yes
Hydric Percent	97
Percent Area	82.9%
Erosion Hazard	Slight

Dom. Cond. Non-irrigated Capability Class	Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Soil Name	Wauna-Locoda silt loams, protected
Soil Symbol	68
Hydric Rating	Yes
Hydric Percent	94
Percent Area	8.5%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Soil Name	Wauna silt loam, protected
Soil Symbol	66
Hydric Rating	Yes
Hydric Percent	98
Percent Area	3.1%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Soil Name	Crims silt loam, protected
Soil Symbol	15
Hydric Rating	Yes
Hydric Percent	99
Percent Area	2.6%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Soil Name	Locoda silt loam, protected
Soil Symbol	29
Hydric Rating	Yes

Hydric Percent	97
Percent Area	1.4%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Soil Name	Crims silt loam, protected
Soil Symbol	15
Hydric Rating	Yes
Hydric Percent	99
Percent Area	1.3%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Soil Name	Wauna silt loam, protected
Soil Symbol	66
Hydric Rating	Yes
Hydric Percent	98
Percent Area	0.1%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Soil Name	Crims silt loam, protected
Soil Symbol	15
Hydric Rating	Yes
Hydric Percent	99
Percent Area	0.1%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Watershed Information

HUC Best

HUC Code	HUC Name	Is HUC Best?	Greatest Criteria met	FW, s/f, lg (Acres)	FW, em, lg (Acres)	EST, em, lg (Acres)	EST, s/f, lg (Acres)
HUC8: 17080003	Lower Columbia-Clatskanie	Yes	proportional	330.6	784.6	57.6	0
HUC10: 1708000304	n/a	No	n/a	n/a	n/a	n/a	n/a
HUC12: 170800030407	Lower Beaver Creek-Frontal Columbia River	No	n/a	n/a	n/a	n/a	n/a

[abbreviations: FW- freshwater (wetland); em- Emergent; lg- largest; s/f- Shrub/Forested; EST- Estuarine (wetland)

HUC 12 Functional Deficit

HUC Code	HUC Name	WS	SR	NT	WC	INV	AM	FH	WB
HUC12: 170800030407	Lower Beaver Creek-Frontal Columbia River								

[abbreviations: WS= Water Storage, SR= Sediment Retention, NT= Nutrient Retention (PR or NR), WC= Water Cooling (Thermoregulation), INV= Invertebrate Habitat, AM= Amphibian Habitat, FH= Fish Habitat (FA or FR), WB= Waterbird Habitat (WBF or WBN)]

Rare Species Scores

Rare Species Type	Maximum score	Sum Score	Rating
Non-anadromous Fish Species	0	0	None
Amphibian & Reptile Species	0	0	None
Feeding Waterbirds	0	0	None
Nesting Waterbirds	0	0	None
Songbirds, Raptors, and Mammals	0	0	None
Invertebrate Species	0	0	None
Plant Species	0	0	None

Scores have taken into account several factors for each rare species record contained in the official database of the Oregon Biodiversity Information Center (ORBIC): (a) the regional rarity of the species, (b) their proximity to the point of interest, and (c) the "certainty" that ORBIC assigns to each of those records.

Element of Occurrence (Rare Species)

View wildlife list for Lower Beaver Creek-Frontal Columbia River (170800030407)

Within Assessment Area	No EO Records
Within 1 mile	No EO Records
In HUC12 watershed	4 EO Records

Element of Occurrence Record(s) in HUC12

1 Chinook salmon (Lower Columbia River ESU, fall run) [2 occurences]
Oncorhynchus tshawytscha pop. 22
ORBIC State Status: S2
ORBIC Global Status: G5T2Q
ODFW Strategy Species: Yes

2 Steelhead (Southwest Washington ESU, winter run) [1 occurences]
Oncorhynchus mykiss pop. 35
ORBIC State Status: S2
ORBIC Global Status: G5T3Q
ODFW Strategy Species: Yes

3 Coho salmon (Lower Columbia River ESU) [1 occurences]
Oncorhynchus kisutch pop. 1
ORBIC State Status: S2
ORBIC Global Status: G5T2Q
ODFW Strategy Species: No

• HUC Best: Oregon watersheds (HUC8, HUC10, HUC12) with greatest type diversity, proportional area, or density of wetlands according to available National Wetland Inventory maps.

"Type diversity" is the number of unique NWI codes in the watershed (e.g., PEMA, PEMC, PEMCx) and excluded types that have no vegetation component (e.g., PUBH, R3US2).

"Density" is the number of vegetated NWI polygons divided by the acreage of the watershed; many of these polygons may be contiguous with each other, forming a single wetland.

"Proportional Area" is the proportion of the watershed's total area occupied by vegetated wetlands as mapped by NWI.

• The digital maps used to determine this do not show many wetlands or cover the entire state. Data were compiled only from watersheds that have been at least 90% mapped by NWI (see worksheets for HUC8, 10, and 12). Data were received in November 2008 from ORBIC.

• METHODS: The above 3 metrics can be strongly correlated with watershed size and with each other. To minimize that bias, the rankings of the residuals from a regression analysis were used, rather than simply the top-ranking watersheds, to identify the most "important" watersheds for each metric at each scale. That is, the watersheds were identified that were in the top 5% in terms of variety of mapped wetland types for watersheds of that size, the largest area of mapped wetlands as a proportion of the watershed area for watersheds of that size, and/or the greatest number of mapped wetland polygons for watersheds with that much wetland area.

• Global rank. ORBIC participates in an international system for ranking rare, threatened and endangered species throughout the world. The system was developed by The Nature Conservancy and is now maintained by NatureServe in cooperation with Heritage Programs or Conservation Data Centers (CDCs) in all 50 states, in 4 Canadian provinces, and in 13 Latin American countries. The ranking is a 1-5 scale, primarily based on the number of known occurrences, but also including threats, sensitivity, area occupied, and other biological factors. In this book, the ranks occupy two lines. The top line is the Global Rank and begins with a "G". If the taxon has a trinomial (a subspecies, variety or recognized race), this is followed by a "T" rank indicator. A "Q" at the end of this line indicates the taxon has taxonomic questions. The second line is the State Rank and begins with the letter "S". The ranks are summarized as follows: 1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences; 2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences; 3 = Rare, uncommon or threatened, but not immediately imperiled, typically with 21-100 occurrences; 4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences; 5 = Demonstrably widespread, abundant, and secure; H = Historical Occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered; X = Presumed extirpated or extinct; U = Unknown rank; ? = Not yet ranked, or assigned rank is uncertain.

• This report contains both centroid-based and polygon-based data. The Location Information and Watershed Information sections of the report contain centroid based data (determined by the center point of the polygon), while the remaining sections are polygon-based (determined from the entire polygon).

Oregon Rapid Wetland Assessment Protocol (ORWAP) Report

Report Generated: July 13, 2021 06:45 PM

Assessment Area: 576 Acres

Location Map

Location Information

Latitude	46.1485710776345	Longitude	-123.173400905364
Elevation	12 ft	Annual precipitation	53 in
Watershed (HUC12)		Lower Beaver Creek-Frontal Columbia River (170800030407)	
Presettlement Vegetation Class		Marsh/Wetland	
Rare Wetland Type(s)		None	
Hydrologic Landscape Class		Wet	
In Special Protected Area?		No	

View Salinity Maps (pdf)

Soil Information

Soil Name	Wauna silt loam, protected
Soil Symbol	66
Hydric Rating	Yes
Hydric Percent	98
Percent Area	55.6%
Erosion Hazard	Slight

Dom. Cond. Non-irrigated Capability Class	Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Soil Name	Crims silt loam, protected
Soil Symbol	15
Hydric Rating	Yes
Hydric Percent	99
Percent Area	15.8%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Soil Name	Wauna-Locoda silt loams, protected
Soil Symbol	68
Hydric Rating	Yes
Hydric Percent	94
Percent Area	14.3%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Soil Name	Crims silt loam, protected
Soil Symbol	15
Hydric Rating	Yes
Hydric Percent	99
Percent Area	7%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Soil Name	Crims silt loam, protected
Soil Symbol	15
Hydric Rating	Yes

Hydric Percent	99
Percent Area	3.7%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Soil Name	Locoda silt loam, protected
Soil Symbol	29
Hydric Rating	Yes
Hydric Percent	97
Percent Area	1.3%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Soil Name	Water
Soil Symbol	W
Hydric Rating	Unranked
Hydric Percent	0
Percent Area	1.3%
Erosion Hazard	Not rated
Dom. Cond. Non-irrigated Capability Class	n/a

Soil Name	Water
Soil Symbol	W
Hydric Rating	Unranked
Hydric Percent	0
Percent Area	1%
Erosion Hazard	Not rated
Dom. Cond. Non-irrigated Capability Class	n/a

Soil Name	Crims silt loam, protected
Soil Symbol	15
Hydric Rating	Yes
Hydric Percent	99
Percent Area	0%
Erosion Hazard	Slight
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Watershed Information

HUC Best

HUC Code	HUC Name	Is HUC Best?	Greatest Criteria met	FW, s/f, lg (Acres)	FW, em, lg (Acres)	EST, em, lg (Acres)	EST, s/f, lg (Acres)
HUC8: 17080003	Lower Columbia-Clatskanie	Yes	proportional	330.6	784.6	57.6	0
HUC10: 1708000304	n/a	No	n/a	n/a	n/a	n/a	n/a
HUC12: 170800030407	Lower Beaver Creek-Frontal Columbia River	No	n/a	n/a	n/a	n/a	n/a

[abbreviations: FW- freshwater (wetland); em- Emergent; lg- largest; s/f- Shrub/Forested; EST- Estuarine (wetland)

HUC 12 Functional Deficit

HUC Code	HUC Name	WS	SR	NT	WC	INV	AM	FH	WB
HUC12: 170800030407	Lower Beaver Creek-Frontal Columbia River								

[abbreviations: WS= Water Storage, SR= Sediment Retention, NT= Nutrient Retention (PR or NR), WC= Water Cooling (Thermoregulation), INV= Invertebrate Habitat, AM= Amphibian Habitat, FH= Fish Habitat (FA or FR), WB= Waterbird Habitat (WBF or WBN)]

Rare Species Scores

Rare Species Type	Maximum score	Sum Score	Rating
Non-anadromous Fish Species	0	0	None
Amphibian & Reptile Species	0	0	None
Feeding Waterbirds	0	0	None
Nesting Waterbirds	0	0	None
Songbirds, Raptors, and Mammals	0	0	None
Invertebrate Species	0	0	None
Plant Species	0	0	None

Scores have taken into account several factors for each rare species record contained in the official database of the Oregon Biodiversity Information Center (ORBIC): (a) the regional rarity of the species, (b) their proximity to the point of interest, and (c) the “certainty” that ORBIC assigns to each of those records.

Element of Occurrence (Rare Species)

View wildlife list for Lower Beaver Creek-Frontal Columbia River (170800030407)

Within Assessment Area	No EO Records
Within 1 mile	3 EO Records
In HUC12 watershed	4 EO Records

Element of Occurrence Record(s) in HUC12

1 Chinook salmon (Lower Columbia River ESU, fall run) [2 occurences]
Oncorhynchus tshawytscha pop. 22
ORBIC State Status: S2
ORBIC Global Status: G5T2Q
ODFW Strategy Species: Yes

2 Steelhead (Southwest Washington ESU, winter run) [1 occurences]
Oncorhynchus mykiss pop. 35
ORBIC State Status: S2
ORBIC Global Status: G5T3Q
ODFW Strategy Species: Yes

3 Coho salmon (Lower Columbia River ESU) [1 occurences]
Oncorhynchus kisutch pop. 1
ORBIC State Status: S2
ORBIC Global Status: G5T2Q
ODFW Strategy Species: No

• HUC Best: Oregon watersheds (HUC8, HUC10, HUC12) with greatest type diversity, proportional area, or density of wetlands according to available National Wetland Inventory maps.

"Type diversity" is the number of unique NWI codes in the watershed (e.g., PEMA, PEMC, PEMCx) and excluded types that have no vegetation component (e.g., PUBH, R3US2).

"Density" is the number of vegetated NWI polygons divided by the acreage of the watershed; many of these polygons may be contiguous with each other, forming a single wetland.

"Proportional Area" is the proportion of the watershed's total area occupied by vegetated wetlands as mapped by NWI.

• The digital maps used to determine this do not show many wetlands or cover the entire state. Data were compiled only from watersheds that have been at least 90% mapped by NWI (see worksheets for HUC8, 10, and 12). Data were received in November 2008 from ORBIC.

• METHODS: The above 3 metrics can be strongly correlated with watershed size and with each other. To minimize that bias, the rankings of the residuals from a regression analysis were used, rather than simply the top-ranking watersheds, to identify the most "important" watersheds for each metric at each scale. That is, the watersheds were identified that were in the top 5% in terms of variety of mapped wetland types for watersheds of that size, the largest area of mapped wetlands as a proportion of the watershed area for watersheds of that size, and/or the greatest number of mapped wetland polygons for watersheds with that much wetland area.

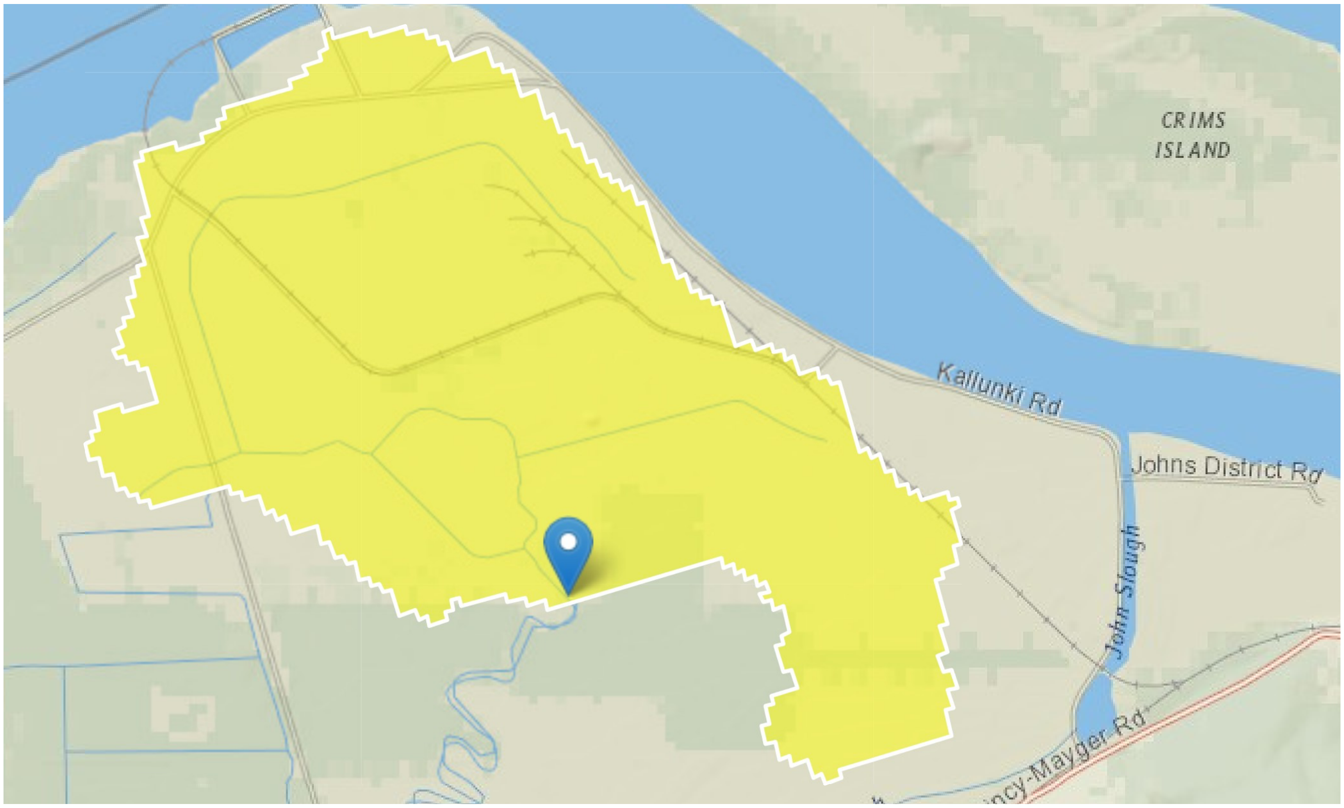
• Global rank. ORBIC participates in an international system for ranking rare, threatened and endangered species throughout the world. The system was developed by The Nature Conservancy and is now maintained by NatureServe in cooperation with Heritage Programs or Conservation Data Centers (CDCs) in all 50 states, in 4 Canadian provinces, and in 13 Latin American countries. The ranking is a 1-5 scale, primarily based on the number of known occurrences, but also including threats, sensitivity, area occupied, and other biological factors. In this book, the ranks occupy two lines. The top line is the Global Rank and begins with a "G". If the taxon has a trinomial (a subspecies, variety or recognized race), this is followed by a "T" rank indicator. A "Q" at the end of this line indicates the taxon has taxonomic questions. The second line is the State Rank and begins with the letter "S". The ranks are summarized as follows: 1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences; 2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences; 3 = Rare, uncommon or threatened, but not immediately imperiled, typically with 21-100 occurrences; 4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences; 5 = Demonstrably widespread, abundant, and secure; H = Historical Occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered; X = Presumed extirpated or extinct; U = Unknown rank; ? = Not yet ranked, or assigned rank is uncertain.

• This report contains both centroid-based and polygon-based data. The Location Information and Watershed Information sections of the report contain centroid based data (determined by the center point of the polygon), while the remaining sections are polygon-based (determined from the entire polygon).

• The rare species results in this report are based on a subset of the ORBIC rare species dataset. The ORWAP tool only reports on rare species that meet the following criteria: wetland habitat species that are tracked by ORBIC, excluding historical or extirpated sites or those with low mapping accuracy. More information about specific sites and additional species can be obtained from ORBIC through data requests, see https://inr.oregonstate.edu/orbic/data-requests for details.

StreamStats Report

Region ID: OR
Workspace ID: OR20201130170107032000
Clicked Point (Latitude, Longitude): 46.16418, -123.16980
Time: 2020-11-30 09:01:25 -0800



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.41	square miles

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

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Application Version: 4.4.0

APPENDIX C
Adjacent Property Owners

TAX MAP	TAX LOT	PROPERTY OWNER
T8NR4W21	500	Port of Columbia County P.O. Box 190 Columbia City, Oregon 97018
	600	Port of Columbia County P.O. Box 190 Columbia City, Oregon 97018
T8NR4W22	400	Port of Columbia County P.O. Box 190 Columbia City, Oregon 97018
	900	Gary and Constance M. Leinonen 79859 Kola Road Clatskanie, Oregon 97016
T8NR4W27	500	Brian E. Cicerchi 9181 N.W. Sharp Road Prineville, Oregon 97754
	600	Brian E. Cicerchi 9181 N.W. Sharp Road Prineville, Oregon 97754
	1100	Warren Seely 18865 Hermo Road Clatskanie, Oregon 97016
	1200	Warren Seely 18865 Hermo Road Clatskanie, Oregon 97016
	1400	Trung M. Huynh and Wendy J. Schmidt 19396 Hermo Road Clatskanie, Oregon 97016
	1500	Trung M. Huynh and Wendy J. Schmidt 19396 Hermo Road Clatskanie, Oregon 97016
T8NR4W27A0	200	Gary and Constance M. Leinonen 79859 Kola Road Clatskanie, Oregon 97016
	400	Densie D. Stram-Youngblood P.O. Box 1256 Clatskanie, Oregon 97016
	500	Debra L. Smiley 79711 Kola Road Clatskanie, Oregon 97016
	700	Beaver Drainage Improvement Company P.O. Box 201 Clatskanie, Oregon 97016
T8NR4W28	100	Michael P. Seely 18865 Hermo Road Clatskanie, Oregon 97016

TAX MAP	TAX LOT	PROPERTY OWNER
T8NR4W28	200	Lower Columbia River Tree Farm, LLC 1500 S.W. First Street, No. 1150 Portland, Oregon 97231
	300	Lower Columbia River Tree Farm, LLC 1500 S.W. First Street, No. 1150 Portland, Oregon 97231
	400	Dan M. and Lynn C. Green 79426 Collins Road Clatskanie, Oregon 97016
	1000	Michael P. Seely 18865 Hermo Road Clatskanie, Oregon 97016
	1100	Dan M. and Lynn C. Green 79426 Collins Road Clatskanie, Oregon 97016
	1200	Tyler Brame 76885 Maple Lane Clatskanie, Oregon 97016
	1300	Tyler Brame 76885 Maple Lane Clatskanie, Oregon 97016
T8NR4W33	200	Warren C. Seely 19069 Beaver Dike Road Clatskanie, Oregon 97016
	201	Warren C. Seely 19069 Beaver Dike Road Clatskanie, Oregon 97016
	300	Hazze, LLC 78802 Rantala Road Clatskanie, Oregon 97016
	901	Michael P. Seely 18865 Hermo Road Clatskanie, Oregon 97016
T8NR4W34	100	Curtis A. Ollila 19459 Beaver Dike Road Clatskanie, Oregon 97016
	200	Wayne and Lois Horness Trust 19381 Beaver Dike Road Clatskanie, Oregon 97016
	400	Ross B. and Christine W. Barkhurst Living Trust 151 N. Nemah Road W. South Bend, Washington 98586-0074
T8NR4W34C0	100	Randy E Anderson 19157 Kallio Road Clatskanie, Oregon 97016

APPENDIX E

Post-construction Storm Water Management Plan

POST- CONSTRUCTION STORMWATER MANAGEMENT PLAN

PORT WESTWARD INDUSTRIAL PARK
NEXT RENEWABLE FUELS FACILITY

Prepared for

NEXT RENEWABLE FUELS, OREGON, INC.

January 30, 2023
Project No. M1724.01.001

Prepared by
Maul Foster & Alongi, Inc.
109 East 13th Street, Vancouver, WA 98660

MAUL
FOSTER
ALONGI

POST-CONSTRUCTION STORMWATER MANAGEMENT PLAN

PORT WESTWARD INDUSTRIAL PARK
NEXT RENEWABLE FUELS FACILITY

The material and data in this plan were prepared under the supervision and direction of the undersigned.

MAUL FOSTER & ALONGI, INC.

Anna Poliski

Anna Poliski, EIT
Staff Engineer

Brian Tino, PE
Project Engineer

CONTENTS

TABLES AND ILLUSTRATIONS

TABLES

ACRONYMS AND ABBREVIATIONS

cfs	cubic feet per second
County	Columbia County
BMP	Best Management Practices
DEQ	Oregon Department of Environmental Quality
East Rail Spur	rail spur located southeast of the Main Plant
Main Plant	the proposed NEXT Renewables renewable diesel production facility
Main Plant Rail Spur	portion of the rail yard south and southeast of the Main Plant
MFA	Maul Foster & Alongi, Inc.
NEXT Renewables	NEXT Renewable Fuels, Oregon, Inc.
NPDES	National Pollutant Discharge Elimination System
1200-Z Permit	NPDES Stormwater Discharge Permit No. 1200-Z issued by the DEQ
Pipeline/Maintenance Road	an aboveground pipeline and associated gravel maintenance road located northwest of Drainage Area 1
Port	Port of Columbia County
site	property located in Port Westward Industrial Park between Kallunki Road and Hermo Road, Clatskanie, Oregon
SECO	Columbia County's Stormwater and Erosion Control Ordinance
SLOPES	Standard Local Operating Procedures for Endangered Species
Waterways A - C	existing lateral ditches along Waterway D
Waterway D	an existing ditch located adjacent to the proposed pipeline and maintenance road
Waterway F	an existing ditch located on the west side of Drainage Area 3 and conveys runoff from the surrounding areas
Waterway G	an existing ditch located south of the proposed West Rail Spur area
West Rail Spur	a paved road, gravel laydown area, and rail yard located west of the Main Plant

1 PROJECT OVERVIEW

Maul Foster & Alongi, Inc. (MFA) has prepared this Post-Construction Stormwater Management Plan (SWMP) on behalf of NEXT Renewable Fuels, Oregon, Inc. (NEXT Renewables) to describe the post-construction stormwater management system and best management practices (BMPs) for the proposed NEXT Renewables facility at the Port of Columbia County (Port) Port Westward Industrial Park near Clatskanie, Oregon (the site).

1.1 Site Location

The site is located in the Port Westward Industrial Park between Kallunki Road and Hermo Road approximately 7 miles north of Clatskanie, Oregon (see Figure 1). The site is bounded by the Columbia River and Port properties on the north and by the McLean Slough on the south. The site is bordered to the west by undeveloped land and Hermo Road and to the east by undeveloped land followed by the Bradbury Slough.

1.2 Existing Site Conditions

The site currently is approximately 122.5 acres, which consists of primarily agricultural and open land and approximately 0.7 acres of gravel roads. A network of ditches (see Waterways in Figure 2) crosses the site and conveys stormwater to McLean Slough near the southwest corner of the site (see attached Drawings).

The site soils primarily consist of the Udipsamments and silt loam soils, which generally have the following drainage characteristics:

- Udipsamments: sandy, well-drained soils, hydrologic soil group A
- Wauna-Lacoda silt loam: loamy, poorly drained soils, hydrologic soil group C
- Wauna silt loam: loamy, poorly drained soils, hydrologic soil group C

The site-specific soil survey, including a soil map, is provided in Appendix A of this SWMP.

A geotechnical report was prepared in 2001 for a prior development opportunity at the site. The subsurface investigation located the groundwater between 2 feet to 4 feet belowground surface. Based on this finding, infiltration is not expected to be a feasible discharge option for the site runoff. The geotechnical report is provided in Appendix B of this SWMP.

1.3 Proposed Site Description

The proposed NEXT Renewables renewable fuel production facility (the Main Plant) will be used for renewable fuel refining, processing, and storage. The proposed development also includes construction of buildings, parking, utilities, concrete equipment pads, paved drive aisles, paved parking areas, aboveground pipe racks, fuel storage tanks and tank containment structures, paved and gravel roadways, rail spurs and gravel laydown areas. An overview of the site features, including the Main Plant layout and the stormwater discharge points is shown on Figure 2. A description of the proposed stormwater system is provided in the following sections and depicted on the attached Drawings.

The pre-development and post-development pervious and impervious areas are summarized in Table 1-1 below:

Table 1-1
Pre-Developed and Post-Developed Site Conditions

Area	Pre-Development		Post-Development	
	Pervious (acres)	Impervious (acres)	Pervious (acres)	Impervious (acres)
Drainage Area 1	107.8	0.7	44.3	64.2
Drainage Area 2	12.2	0.0	3.9	8.3
Drainage Area 3	0.8	0.0	0.7	0.1
Drainage Area 4	1.0	0.0	1.0	0.0

1.3.1 Drainage Area 1

Drainage Area 1 is approximately 108.5 acres and consists of the Main Plant and a portion of the rail yard south and southeast of the Main Plant (referred to as the Main Plant Rail Spur), located in the northeast portion of the site. 102 acres of the 108.5 acres in Drainage Area 1 will be disturbed during construction. Existing stormwater management systems will be maintained in the areas that will not be disturbed or altered.

Stormwater runoff from the Main Plant will be routed to the on-site wastewater treatment facility for treatment and discharged to the Port's outfall to the Columbia River. The treated wastewater discharges will be covered under the Port's National Pollutant Discharge Elimination System Wastewater Discharge Permit (NPDES Permit, DEQ File No.111746).

Runoff from remaining impervious surfaces within the Main Plant footprint and runoff from the Main Plant Rail Spur Area will be routed to an on-site treatment system prior to being pumped to Discharge Point 001 (see Figure 2). The design of stormwater treatment BMPs is discussed in Section 4 of this SWMP.

1.3.2 Drainage Area 2

Drainage Area 2 is approximately 12.2 acres and consists of two distinct areas: a paved road, gravel laydown area, and rail yard located west of the Main Plant (referred to as the West Rail Spur) and an aboveground pipeline and associated gravel maintenance road located northwest of Drainage Area 1 (referred to as the Pipeline/Maintenance Road). Stormwater runoff from the West Rail Spur is collected in a series of catch basins and conveyed via gravity piping into one of two proposed stormwater ponds located south of the proposed paved road (see Ponds 1 and 2, Figure 2). The ponds provide detention to meet the County's flow-control requirements, as well as treatment via sedimentation and biofiltration. Pond outlets have been equipped with a downturned elbow to trap floatables, including oil sheen, in the ponds. The pond outlets are routed to a manhole (see Manhole MH-DP002, Figure 2) that may be used to sample stormwater consistent with a future National Pollutant Discharge Elimination System (NPDES) Industrial Stormwater Discharge Permit No. 1200-Z (1200-Z Permit) that will be issued to cover the industrial stormwater discharges from the site.

An existing ditch (see Waterway G, Figure 2) located south of the proposed West Rail Spur area conveys off-site stormwater from the surrounding areas to McLean Slough. The existing Waterway G will remain in place to maintain existing drainage conditions for the areas outside of the site boundary.

Site runoff from the Pipeline/Maintenance Road area in the northwest portion of the site sheet flows into a pond (Pond 3) that runs parallel to the maintenance road and is conveyed via gravity pipe to MH-DP002, where it combines with the treated stormwater from the proposed Ponds 1 and 2 prior to discharging into the McLean Slough via Discharge Point 002 (see Figure 2). Pond 3 provides detention to meet the County's flow-control requirements, as well as treatment via sedimentation and biofiltration. The pond outlet has been equipped with a downturned elbow to trap floatables, including oil sheen, in the pond.

An existing ditch (see Waterway D, Figure 2) located adjacent to the proposed pipeline and maintenance road conveys off-site stormwater from the surrounding wetlands to McLean Slough via a culvert that crosses under the West Rail Spur and discharges downstream of MH-DP002. The existing Waterway D will remain in place and runoff from existing lateral ditches (Waterways A – C) will be routed into the ditch via culverts installed under the pipeline and maintenance road. The existing Waterway D will be maintained and isolated from site runoff generated in this area. The culvert will be sized during final design when more information about the wetland drainage conditions becomes available (wetland water levels will be monitored over the next year to evaluate seasonal fluctuations).

1.3.3 Drainage Area 3

Drainage Area 3 is approximately 0.8 acre and consists of a rail spur located southeast of the Main Plant (East Rail Spur). A gravel road in this area provides access to the adjacent property. Stormwater runoff from the East Rail Spur is collected in a catch basin and conveyed via gravity piping into a pond located along the southwest boundary of this drainage area (see Pond 4, Figure 2). This pond provides detention to meet the County's flow-control requirements, as well as treatment via sedimentation and biofiltration. The Pond 4 outlet consists of a grated catch basin (CB-DP003), equipped with a downturned elbow to trap floatables including oil sheen in the pond. The Pond 4 catch basin may be used to sample stormwater consistent with a future 1200-Z Permit that will be issued to cover the industrial stormwater discharges from the site.

An existing ditch (see Waterway F, Figure 2) runs south and then west through the property on the west side of Drainage Area 3 and conveys runoff from the surrounding areas. Runoff from this ditch will be conveyed via a new culvert under the proposed rail tracks to maintain the existing drainage. Treated industrial runoff from the proposed Pond 4 will discharge to the existing Waterway F via Discharge Point 003 (see Figure 2) and will then be conveyed west to McLean Slough.

The design criteria used to design the proposed stormwater treatment BMPs are included in Section 4 of this SWMP.

1.3.4 Drainage Area 4

Drainage Area 4 is approximately one acre and consists of a proposed aboveground pipeline located northwest of Hermo Road. An existing maintenance road runs parallel to the aboveground pipeline and will remain in place to facilitate maintenance access to the pipeline and other Port properties.

An existing ditch runs parallel to the proposed aboveground pipeline and conveys off-site runoff from the surrounding areas. Stormwater from this ditch discharges to Waterway D via Discharge Point 004 (see Figure 2). Impervious surfaces will not increase in Drainage Area 4 and stormwater runoff will continue to be managed through the existing ditches; therefore, post-construction stormwater management is not further discussed in this SWMP.

1.4 Receiving Waters

Stormwater and process wastewater generated at the Main Plant are conveyed to and treated via the on-site wastewater treatment system. The comingled stormwater and process wastewater streams are considered and regulated as wastewater and will discharge to the Bradbury Slough and the Columbia River via the Port's pump station and outfall (Discharge Point 001).

Ponds 1, 2, and 3 will discharge to McLean Slough via Discharge Point 002.

Pond 4 will discharge to the Waterway F and McLean Slough via Discharge Point 003.

The existing ditch in Drainage Area 4 will continue to discharge to Waterway D and McLean Slough via Discharge Point 004.

The latitude and longitude of the discharge points are as follows:

- Discharge Point 001: 46.168600°N and 123.161950°W
- Discharge Point 002: 46.164137°N and 123.162208°W
- Discharge Point 003: 46.164147°N and 123.152285°W
- Discharge Point 004 : 46.172119°N and 123.181221°W

2 STORMWATER MANAGEMENT STANDARDS

The development of the NEXT Renewables facility will include wetland fill and mitigation; therefore, the Joint Permit Application (No. 63077 RF) and the related design documents, including this SWMP, are subject to Standard Local Operating Procedures for Endangered Species (SLOPES) V regulations (USACE 2014). Sections 2.1 through 2.4 outline the applicable design standards for the project. The water quality and flow control measures were also designed consistent with the requirements of the Columbia County (the County) Stormwater and Erosion Control Ordinance No. 2001-10 adopted November 28, 2001 (SECO). If the SECO and SLOPES design standards differed, the more conservative criteria was used to design the proposed stormwater flow control and treatment facilities.

Additionally, the site will be required to meet the requirements of the 1200-Z Permit that will be issued by the DEQ for industrial stormwater discharges from the NEXT Renewables facility. The proposed site will be classified under Standard Industrial Code 2869 Industrial Organic Chemicals, Not Elsewhere Classified.

2.1 Water Quality Treatment

From the SECO:

- Section 1.C.18: "Water quality storm" means the rainfall from a six-month 24-hour storm. SECO defines this water quality storm as equal to approximately 64 percent of rainfall from the two-year 24-hour storm or 0.83 inches for the entire county.
- Section III.B.2.a.i: Stormwater and runoff from parking lots, driveways, and other exposed traffic areas shall be treated using one of the following treatment methods: biofiltration swales, vegetative filter strips, or alternative treatment methods.

From SLOPES V:

- **Section 36.e:** All stormwater quality treatment practices and facilities will be designed to accept and fully treat the volume of water equal to 50 percent of the cumulative rainfall from the two-year 24-hour storm for that site. The SLOPES V water quality storm depth for the site was calculated to be 1.4 inches, based on a two-year 24-hour storm depth of 2.8 inches obtained from Appendix E of the SECO using the rainfall depths for Clatskanie.
- **Section 36.f:** Use low impact development practices to infiltrate or evaporate runoff to the maximum extent feasible. For runoff that cannot be infiltrated or evaporated and therefore will discharge into surface or subsurface waters, apply one or more of the following specific primary treatment practices, supplemented with appropriate soil amendments:
    - Bioretention cell
    - Bioslope, also known as an "ecology embankment"
    - Bioswale
    - Constructed wetlands
    - Infiltration pond
    - Media filter devices with demonstrated effectiveness
  - Porous pavement, with no soil amendments and appropriate maintenance

From the *Post-Construction Stormwater Management Plan Submission Guidelines* (DEQ 2022):

- **Section E.1.1:** Multiply the two-year 24-hour precipitation by the appropriate water quality design storm factor: 0.5 for the rest of the state. If the results are less than 0.7 inch, use 0.7 inch. The DEQ SWMP water quality storm depth for the site was calculated to be 1.4 inches, based on a two-year 24-hour storm depth of 2.8 inches obtained from Appendix E of the SECO using the rainfall depths for Clatskanie.

2.2 Runoff Control and Water Quantity

From the SECO :

- **Section III.B.2.b.i:** Runoff from the development site shall be controlled such that the following criteria are met:
  - The peak flows for the ten and 100-year, 24-hour design storms after development does not exceed the respective predevelopment peak flows.
  - The peak flow for the two-year, 24-hr design storm after development does not exceed one-half the predevelopment peak flow for the two-year storm.

From SLOPES V:

- **Section 36.c.iii:** Water quantity treatment (retention or detention facilities), unless the outfall discharges directly into a major water body (e.g., mainstem Columbia River, Willamette River (downstream of Eugene), large lakes, reservoir, ocean, or estuary). Retention or detention facilities must limit discharge to match predeveloped discharge rates (i.e., the discharge rate of the site based on its natural groundcover and grade before any development occurred) using a continuous simulation for flows between 50 percent of the two-year event and the ten-year flow event (annual series).

2.3 Storm Conveyance Design

From the SECO:

- **Section II.E.1:** Conveyance systems shall be designed to carry runoff from the 25-year storm where the contributing drainage area is less than 40 acres and the 100-year storm where the contributing drainage area exceeds 40 acres.

From SLOPES V:

- **Section 36.g:** When conveyance is necessary to discharge treated stormwater directly into surface water or a wetland, the following requirements apply:
  - Maintain natural drainage patterns.
  - To the maximum extent feasible, ensure that water quality treatment for contributing impervious area runoff is completed before commingling with off-site runoff for conveyance.

– Prevent erosion of the flow path from the project to the receiving water and, if necessary, provide a discharge facility made entirely of manufactured elements (e.g., pipes, ditches, discharge facility protection) that extends at least to ordinary high water (OHW).

2.4 Design Storms

For water quality treatment, the SLOPES V and DEQ SWMP design storms are equivalent and exceed the SECO design storm. Therefore, the water quality design storm of 1.4 inches (over 24 hours) was used to size stormwater treatment BMPs using the rainfall depths for Clatskanie based on Appendix E of the SECO. The design storms are summarized in the following table.

Table 2-1: Design Storms

Storm Event	Water Quality	2-year, 24-hour	5-year, 24-hour	10-year, 24-hour	25-year, 24-hour	100-year, 24-hour
Rainfall Depth	1.4 inches	2.8 inches	3.4 inches	3.9 inches	4.5 inches	5.4 inches

Groundwater at the site is estimated to be between 2 and 4 feet below existing ground surface. High groundwater limits the infiltration capacity and the proposed stormwater facilities were designed with the assumption that infiltration is negligible. Proposed ponds were designed with a shallow depth to avoid the need for a liner and minimize groundwater intrusion into the ponds. Liners can negatively impact the pond vegetation, make maintenance more difficult and expensive and are subject to buoyancy; therefore, a liner is not recommended at this time. Groundwater elevations will be further studied, and the pond design may be refined during the final design phase to minimize groundwater intrusion, if needed.

2.5 Hydrologic Model

The hydrologic conditions were modeled using HydroCAD software 10.0 and utilized the Soil Conservation Service method and the Natural Resource Conservation Service Type IA, 24-hour storm hydrograph. The HydroCAD model output report is included in Appendix C.

2.5.1 Hydrologic Design Factors

The drainage areas contributing to Discharge Points 002 and 003 were calculated using a scaled Autodesk Civil3D site plan and proposed facility development provided by NEXT Renewables. The hydrologic curve numbers used to model the various surface covers proposed for the site are outlined in Table 2-2 below.

Table 2-2: Runoff Curve Numbers

Surface Coverage	Runoff Curve Number
Pavement and Building Roofs	98
Gravel Roads and Laydown Areas	92
Railroad Ballast and Tracks	78

Surface Coverage	Runoff Curve Number
Proposed Landscaping	78
Existing Grass or Vegetated Field	78
Stormwater Ponds	100

3 POTENTIAL POLLUTANTS OF CONCERN

Generally, potential pollutants in stormwater at the site are associated with vehicle traffic, material loading/unloading, and transport of biodiesel products via pipe rack and cargo train cars. The potential pollutants are listed below:

- Leaks or spills of biodiesel, motor oil, gasoline, diesel, antifreeze, and hydraulic fluids from equipment and vehicles are a potential source of oil sheen and oxygen demand in stormwater.
- Vehicle and equipment brake pads are a potential source of copper in stormwater.
- Vehicle and equipment tires are a potential source of zinc and 6PPD-quinone (6PPD-q) in stormwater.[1]
- Galvanized surfaces are a potential source of zinc in stormwater.
- Gravel areas are a potential source of suspended solids in stormwater.
- Decaying vegetation and soil erosion are potential sources of suspended solids and nutrients in stormwater.

4 STORMWATER TREATMENT

Runoff water quality treatment and flow (stormwater quantity) control will be provided via detention and settling/biofiltration ponds as outlined in this section.

4.1 Drainage Area 1

The design of the Drainage Area 1 stormwater conveyance, flow control and treatment system is outlined in detail in the *Wastewater-Storm Water Design Basis* document that is included in Appendix D of this SWMP. This design was completed by others, but the design is summarized in the following sections for the sake of completion.

[1] 6PPD-q is not currently regulated via stormwater discharge permits; however, it is considered to be an "emerging pollutant" and is addressed in this SWMP.

4.1.1 Stormwater Treatment

Stormwater runoff from the process areas of the Main Plant and adjacent Main Plant Rail Spur will be detained in the Process Wastewater System, combined with wastewater and routed to the wastewater treatment system. Stormwater from the non-process areas of the Main Plant will be detained in the Stormwater System and combined with pretreated wastewater and process area stormwater. The combined flow will be treated as process water and routed to a filtration system for final polishing prior to discharge.

The Main Plant stormwater conveyance and treatment system were designed to detain and treat the 100-year, 24-hour storm. The wastewater treatment system was designed to remove a wide range of pollutants, including but not limited to oils and greases, suspended solids, heavy metals, nutrients and 6PPD-q. Additional design information is included in Appendix D. The stormwater detention system will detain peak flows and provide treatment via sedimentation. Treated effluent will be discharged to the Port's outfall to the Columbia River via Discharge Point 001, consistent with the Port's NPDES permit.

In addition to stormwater treatment in Drainage Area 1, consistent with County requirements, a ten-foot wide tree buffer totaling 1.1 acres will be planted south of the proposed Main Plant Rail Spur along the southern boundary of the site and will gently slope towards the existing Waterway F.

4.1.2 Conveyance System

Conveyance piping was sized to convey the 100-year, 24-hour storm consistent with the SECO standards for drainage areas that exceed 40 acres.

4.1.3 Flow Control

Since the Main Plant will discharge to the Port's outfall to the Columbia River, and direct discharges to the Columbia River are exempt from flow control requirements. Flow control will be based on the available capacity in the Port's conveyance system, including the pump station and outfall. Flow control in Drainage Area 1 is achieved through detention and controlled discharge from the treatment system and is discussed in detail in the *Wastewater-Storm Water Design Basis* document that is included in Appendix D of this SWMP.

4.2 Drainage Areas 2 and 3

The following sections describe the design of stormwater treatment and detention facilities in Drainage Areas 2 and 3. The hydrologic model output report showing the design calculations is included in Appendix C. The treatment and detention facilities are depicted on the attached Drawings and Figure 2.

4.2.1 Stormwater Treatment

The proposed aboveground pipeline within Drainage Area 2 includes the construction of a compacted gravel roadway and concrete footings for the pipe rack. Runoff from the pipe rack and roadway will be routed into Pond 3 that will run parallel to the maintenance road and will then be conveyed via gravity flow to MH-DP002, located upstream of Discharge Point 002. The vegetated pond will treat stormwater via sedimentation and biofiltration.

Runoff from the paved access road, gravel laydown area, and rail areas west of the Main Plant (West Rail Spur) will sheet flow to a series of catch basins and will then be conveyed via gravity flow to Pond 1 that extends east from Hermo Road for approximately 2,684 feet. Each catch basin will be equipped with an oil trapping outlet and sump to trap oil sheen and sediment in the sump. Runoff from the Main Plant Rail Spur will sheet flow to a series of catch basins and will be conveyed via gravity flow to Pond 2 that extends from the Main Plant westward for approximately 1,064 feet. The vegetated ponds will provide sedimentation and biofiltration prior to discharging to MH-DP002, located within an earth berm between Ponds 1 and 2. Pond outlets will be equipped with downturned elbows to trap oil sheen and other floatables in the ponds. Absorbent socks or booms will be used to remove sheen, if any, from the water surface in the pond. Stormwater will discharge from the manhole to McLean Slough south of the site boundary.

Runoff from the rail area southeast of the Main Plant (East Rail Spur) will sheet flow to a catch basin and will then be conveyed via gravity flow to Pond 4 located in the southwest portion of Drainage Area 3 adjacent to the existing Waterway F. The catch basin will be equipped with an oil trapping outlet and sump to trap oil sheen and sediment in the sump. The vegetated pond will provide sedimentation and biofiltration. The catch basin will include a sump and oil trapping outlet to trap oil sheen and sediment in the sump. The pond outlet will be equipped with a downturned elbow to trap oil sheen and other floatables in the pond. Absorbent socks or booms will be used to remove sheen, if any, from the water surface in the pond.

The ponds will be planted with native vegetation suitable for water quality facilities. An example of the seed mix that may be used for the upper slopes of the ponds is the <u>ProTime Seeds Mix 498 (Native Riparian Zone 2 Mix)</u> suitable for riparian slopes of water quality facilities. The lower side slopes and pond bottom will be vegetated to enhance sedimentation with biofiltration. An example of the seed mix that may be used at the bottom and lower side slopes of the ponds is the <u>ProTime Seed Mix 440 (Native Biofilter Mix)</u>.

These vegetation specifications are subject to change during the final design phase, as the vegetation may be customized to better match the existing native wetland vegetation in the surrounding areas or the vegetation in the proposed wetland mitigation areas. All proposed planting will utilize native species and be selected based on the level of inundation expected (upper side slope versus lower slope and bottom).

The site soils will be tested for cation exchange capacity and organic content and other parameters to determine whether they can support plant life and treat stormwater without soil amendments or use of imported soils.

Soils that meet the specifications of a high performance bioretention soil mix[2], as defined in the Washington State Department of Ecology (Ecology) Stormwater Management Manual for Western Washington, will be utilized in the stormwater ponds to enhance biofiltration and reduce concentrations of heavy metals, nutrients and 6PPD-q in stormwater discharged from the site. Bioretention soils have been shown to effectively remove these pollutants[3].

The ponds were sized to detain peak flow rates generated by storms up to the 100-year, 24-hour storm. Post-development flow rates were matched to the pre-development flows as outlined in Section 2. Due to the flow control requirements, the ponds will treat flows that include and significantly exceed the SLOPES water quality design flow. Live storage volumes in the ponds were calculated using the distance from the outlet elevations to the top of the ponds. Dead/sediment storage volumes in the ponds were calculated using the distance from the bottom of the ponds to the outlets. The following summarizes the pond dimensions:

- **Pond 1**
  - Total volume: 102,300 cubic ft (ft^3)
  - Live storage: 87,700 ft^3
  - Dead/sediment storage: 14,600 ft^3
- **Pond 2**
  - Total volume: 49,400 ft^3
  - Live storage: 42,400 ft^3
  - Dead/sediment storage: 7,000 ft^3
- **Pond 3**
  - Total volume: 22,400 ft^3
  - Live storage: 16,200 ft^3
  - Dead/sediment storage: 6,200 ft^3
- **Pond 4**
  - Total volume: 8,100 ft^3
  - Live storage: 4,600 ft^3
  - Dead/sediment storage: 3,500 ft^3

[2] Ecology. 2021. *Guidance on using new high performance bioretention soil mixes*. Washington Department of Ecology. Publication 21-10-023. May.

[3] Ecology. 2022. *Stormwater Treatment of Tire Contaminants Best Management Practices Effectiveness*. Washington Department of Ecology.

The existing Waterway G extends east through the center of the site beginning at Hermo Road and conveys stormwater to McLean Slough. Consistent with County requirements, this ditch will remain in place to maintain existing drainage conditions for the surrounding area. Additionally, a ten-foot wide tree buffer totaling 1.2 acres will be planted south of the proposed Ponds 1 and 2 along the southern boundary of the site and will gently slope towards the existing Waterway G.

4.2.2 Conveyance System

Conveyance piping was sized to convey the 100-year, 24-hour storm consistent with the SECO standards for drainage areas that exceed 40 acres. Consistent with the SLOPES requirements, existing drainage patterns and conveyance ditches were preserved to the extent practicable, industrial stormwater conveyance and treatment facilities were separated from off-site flows and receiving water bodies, and discharges to surface waters were protected from erosion using rip rap to dissipate energy.

The attached HydroCAD model includes conveyance piping; however, it should be noted that each pipe and catch basin was not modeled separately. Since many of the rail spur catch basins drain a similar size area, the largest area was modeled to size the pipe that will discharge to the vegetated ponds and the same pipe size was used for all catch basins in the rail spur. Pond outlet pipes were modeled as an outlet feature in the pond node (rather than a separate node). More detailed models of the conveyance system will be developed during the final design phase and will be designed consistent with the applicable SECO and SLOPES design standards.

4.2.3 Flow Control

Tables 4-1 and 4-2 below summarize the Drainage Area 2 and Drainage Area 3 pre- and post-development peak flow rates. Consistent with the SECO flow control standards, the maximum post-development peak flow rates do not exceed 50 percent of the 2-year storm, or the 10-year and the 100-year storm pre-development peak flow rates (see Appendix C for the HydroCAD output report showing pre- and post-development peak flow rates).

Table 4-1: Drainage Area 2 Flow Control Summary

Storm Event	Pre-development Peak Flow Rate (cfs)	Maximum Post-development Peak Flow Rate (cfs)
2-yr	2.07	0.86
10-yr	4.44	1.56
100-yr	8.16	2.62

Table 4-2: Drainage Area 3 Flow Control Summary

Storm Event	Pre-development Peak Flow Rate (cfs)	Maximum Post-development Peak Flow Rate (cfs)
2-yr	0.16	0.06
10-yr	0.33	0.14
100-yr	0.59	0.30

4.3 Drainage Area 4

Impervious surface areas will not increase in Drainage Area 4. The ground surface under the pipeline will be restored and remain vegetated and pervious to maintain existing drainage conditions. Therefore, additional stormwater flow control and treatment measures are not required.

5 OPERATIONS AND MAINTENANCE GUIDELINES

Maintenance of the proposed stormwater system will be the responsibility of NEXT Renewables. The stormwater system will be inspected monthly consistent with future 1200-Z Permit requirements to evaluate the need for maintenance. The following summarizes typical maintenance requirements:

- **Drainage Area 2 and 3 Ponds:** vegetation pruning, debris removal, sediment removal, sheen absorption using absorbent booms and boom removal/replacement, replanting dead vegetation, and irrigation during plant establishment period
- **Main Plant Stormwater Tanks:** debris removal, sediment removal, sheen absorption using absorbent booms and boom removal/replacement
- **Manholes:** periodic inspection and sediment/sheen removal
- **Catch Basins:** periodic inspection and sediment/sheen removal

The Operations and Maintenance (O&M) Manual for the Drainage Area 2 and Drainage Area 3 stormwater treatment measures is included in Appendix E. This O&M Manual will be updated and refined during the final design phase and updated as needed thereafter.

An O&M Manual for the Main Plant (Drainage Area 1) wastewater and stormwater treatment system will be developed during the final design phase and updated as needed thereafter.

LIMITATIONS

The services undertaken in completing this SWMP were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This SWMP is solely for the use and information of our client unless otherwise noted. Any reliance on this SWMP by a third party is at such party's sole risk.

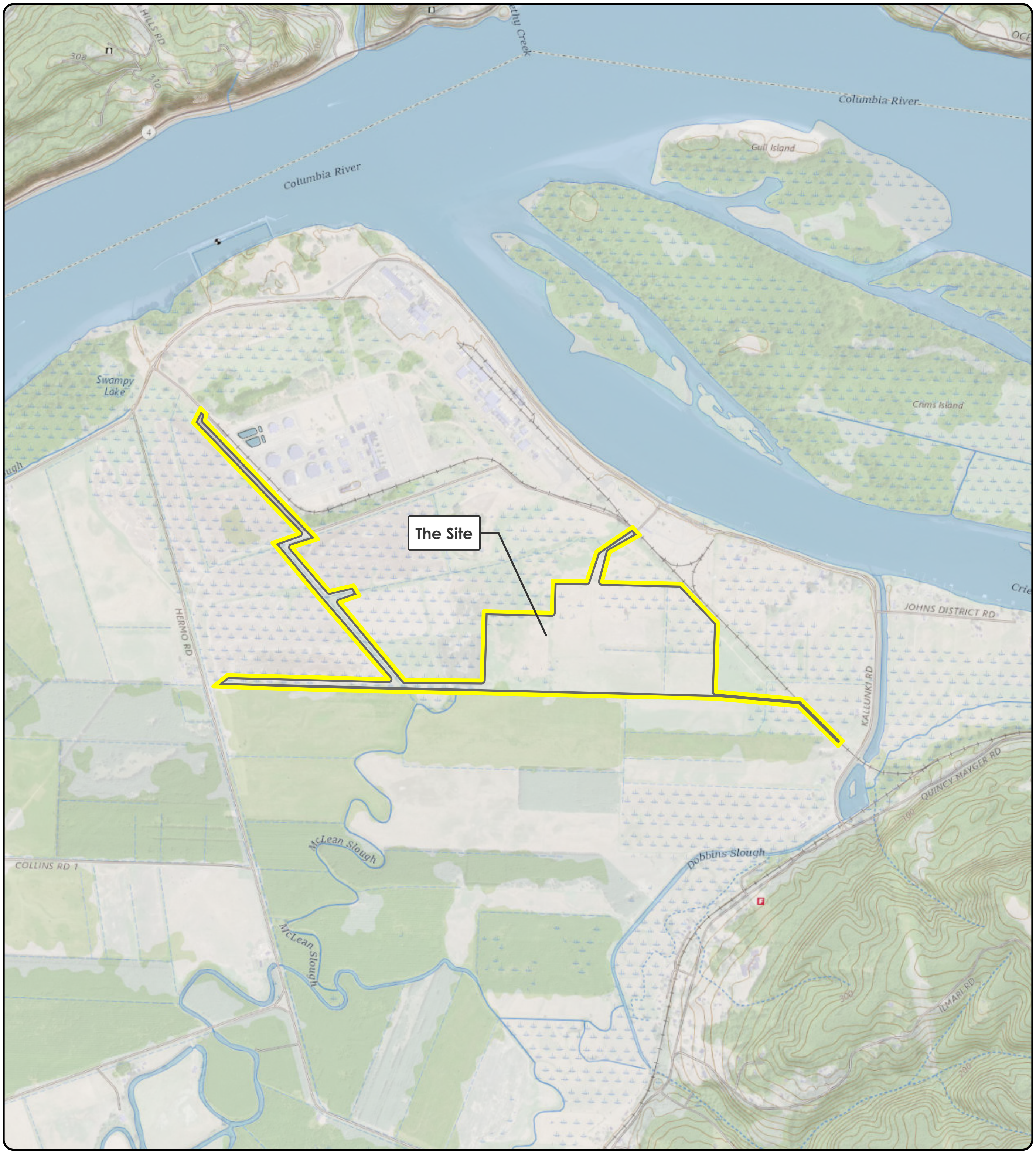
Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this SWMP.

REFERENCES

DEQ. 2022. *Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines.* Oregon Department of Environmental Quality: Portland, OR. October

USACE. 2014. William W. Stelle, Jr. National Oceanic and Atmospheric Administration National Marine Fisheries Services. *Reinitiation of the Endangered Species Act Section 7 Programmatic Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Revisions to Standard Local Operating Procedures for Endangered Species to Administer Maintenance or Improvement of Stormwater, Transportation or Utility Actions Authorized or Carried Out by the U.S. Army Corps of Engineers in Oregon (SLOPES for Stormwater, Transportation or Utilities).* NWR-2013-10411. Letter to Shawn H. Zinszer and Joyce Casey, U.S. Army Corps of Engineers. March 14.

FIGURES



Notes
U.S. Geological Survey 7.5-minute topographic quadrangle (2021): Oak Point.
Township 8 north, range 4 west, sections 21-23.

Legend

Site Boundary

Figure 1
Site Location

NEXT Renewable Fuels, Inc.
Port Westward, OR

0 1,000 2,000
Feet

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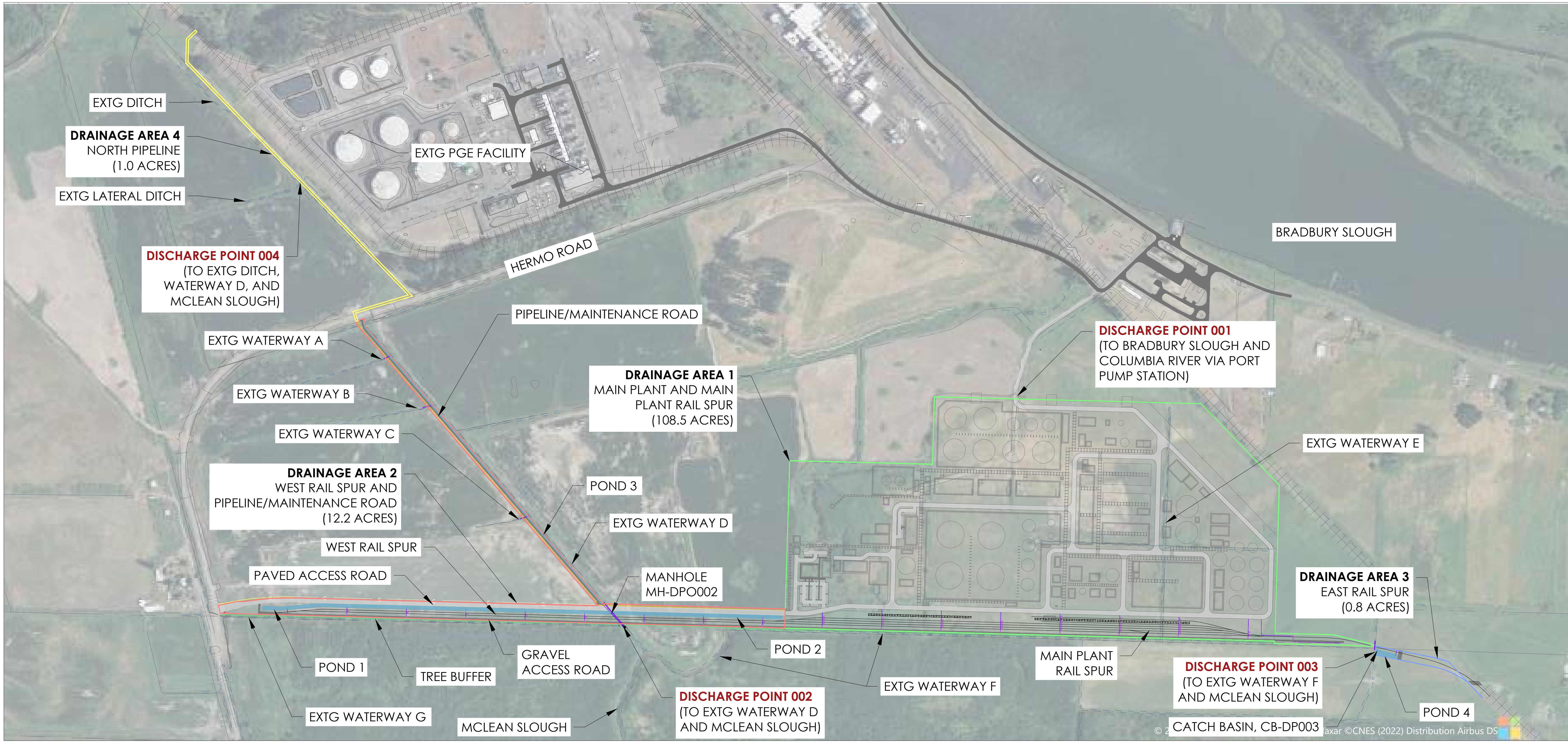
Project: M1724.01.004



LEGEND

- STORMWATER POND
- PAVED ROAD
- GRAVEL
- TREE BUFFER
- DRAINAGE AREA BOUNDARY
- RAIL SPUR
- PIPE RACK
- STORM PIPE
- CATCH BASIN
- EXISTING WATERWAY/DITCH

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NEXT Renewable Fuels, Inc.

SITE LAYOUT

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 700' 1400'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

FIGURE 2

DRAWINGS

NEXT RENEWABLE FUELS OREGON

PREPARED FOR:

NEXT RENEWABLE FUELS, INC.

LOCATED IN SEC. 16, T. 8 N., R. 4 W., W.M., COLUMBIA COUNTY, CLATSKANIE, OR

PROJECT CONTACTS

CLIENT
NEXT RENEWABLE FUELS, INC.
11767 KATY FREEWAY, SUITE 705
HOUSTON, TX 77079
P: 281-884-3680
CHRISTOPHER EFIRD
CHRIS@NEXTRENEWABLES.COM

CIVIL ENGINEER
MAUL, FOSTER & ALONGI, INC.
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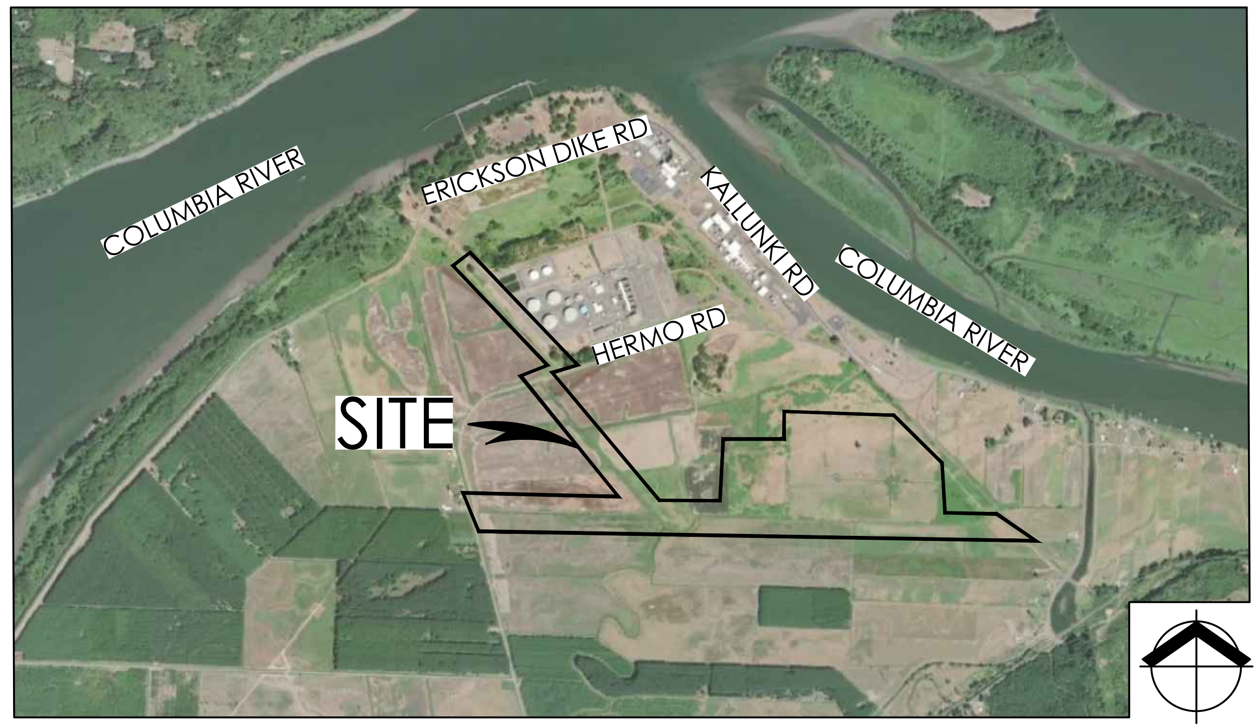
P: 971-544-2139
BROOKE HARMON, PE
BHARMON@MAULFOSTER.COM

SURVEYOR
DAVE MILLS SURVEYING
BEAVERTON, OR 97008
P: 503-330-8646

PROJECT SUMMARY

SITE ADDRESS:
LOCATED IN THE PORT WESTWARD INDUSTRIAL PARK
BETWEEN KALLUNKI ROAD AND HERMO ROAD
COLUMBIA COUNTY
CLATSKANIE, OREGON

WORK DESCRIPTION:
NEXT RENEWABLE FUELS OREGON, LLC (NEXT) PROPOSES TO BUILD A RENEWABLE FUELS FACILITY TO SUPPLY RENEWABLE FUELS TO WEST COAST MARKETS.



VICINITY MAP

NOT TO SCALE

GENERAL NOTES

1. SURVEY PERFORMED BY DAVE MILLS SURVEYING IN 2020.
2. HORIZONTAL DATUM: OREGON STATE PLANE COORDINATE SYSTEM NORTH ZONE, NAD 83/91. ELEVATION DATUM: NGVD 29/47.

SHEET INDEX

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NEXT Renewable Fuels, Inc.

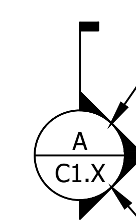
COVER SHEET

NEXT RENEWABLE FUELS OREGON
NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

COVER SHEET C0.0

SYMBOL EXIST.	SYMBOL PROP.	DESCRIPTION
		GAS METER
		GAS VALVE
		PAD-MOUNTED TRANSFORMER
P		POWER VAULT
		TRANSMISSION TOWER
		UTILITY POLE
		UTILITY POLE ANCHOR
		TELEPHONE RISER
T		TELEPHONE VAULT
		LIGHT POLE
		SAN. SEWER CLEAN OUT
	S	SAN. SEWER MANHOLE
CB		STORM DRAIN CATCH BASIN
		STORM DRAIN CULVERT
	D	STORM DRAIN MANHOLE
		DRY WELL
		AREA DRAIN
		STORM CLEANOUT
		STORM WATER FLOW ARROW
27		PROPOSED GRADE MAJOR CONTOUR (5.0' INTERVAL)
27		PROPOSED GRADE MINOR CONTOUR (1.0' INTERVAL)
		PROPOSED STORM DRAIN PIPE
		PROPOSED WATER PIPE
		PROPOSED SANITARY SEWER PIPE
		PROPOSED AC PAVEMENT
		PROPOSED CONCRETE SURFACING
		PROPOSED GRAVEL SURFACING
		PROPOSED BUILDING
X X		PROPOSED FENCE LINE
		PROPOSED ROAD CENTERLINE
		PROPOSED RIGHT-OF-WAY
PL		PROPOSED PROPERTY LINE
SF		PROPOSED SEDIMENT FENCE
		PROPOSED ABOVE GROUND PIPE RACK
		PROPOSED TREE BUFFER
		PROPOSED STORMWATER POND

SYMBOL	DESCRIPTION
27	EXISTING GRADE MAJOR CONTOUR
27	EXISTING GRADE MINOR CONTOUR
SD_x	EXISTING STORM DRAIN PIPE
W_x	EXISTING WATER PIPE
SS_x	EXISTING SANITARY SEWER PIPE
	EXISTING AC PAVEMENT
	EXISTING CONCRETE SURFACING
	EXISTING GRAVEL SURFACING
	EXISTING BUILDING
	EXISTING WETLAND BOUDARY
	EXISTING FENCE LINE
	EXISTING ROAD CENTERLINE
	EXISTING RIGHT-OF-WAY
PL	EXISTING PROPERTY LINE
OHW	EXISTING ORDINARY HIGH WATER MARK
E_x	EXISTING UNDERGROUND POWER
T	EXISTING UNDERGROUND TELEPHONE
G	EXISTING UNDERGROUND GAS
	INLET PROTECTION
	CONSTRUCTION ENTRANCE



TYPICAL SECTION CALLOUT

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NEXT Renewable Fuels, Inc.

MASTER LEGEND

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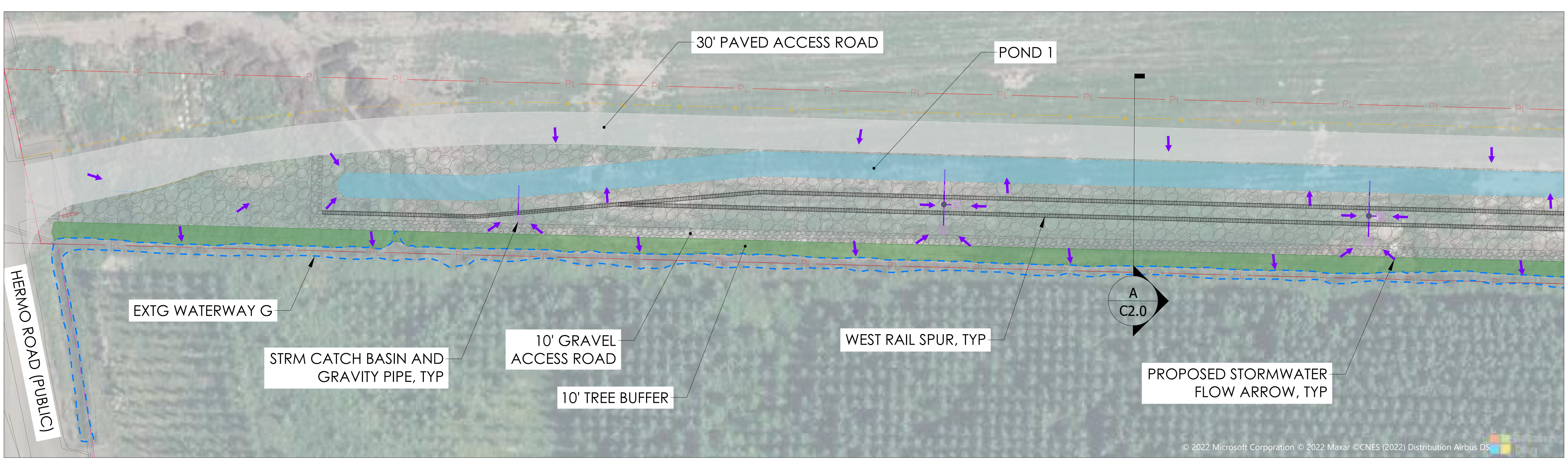

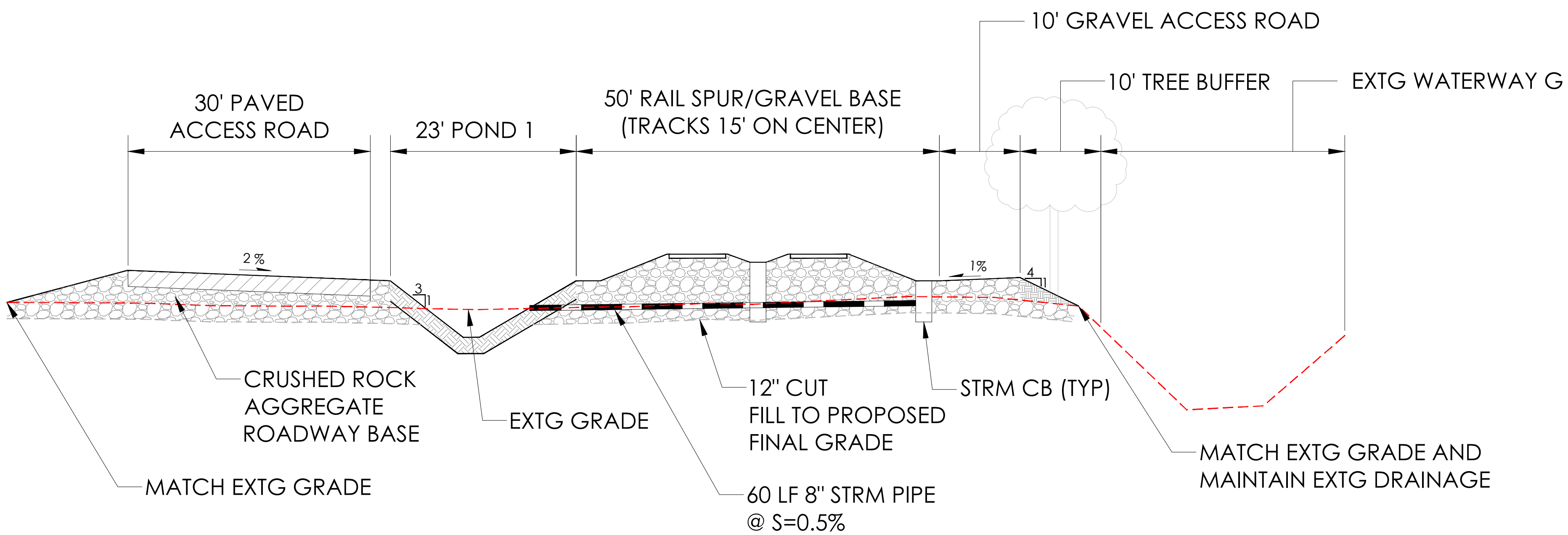

A WEST RAIL SPUR TYPICAL SECTION

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SITE LOCATION KEY

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WEST RAIL SPUR PLAN AND SECTION I

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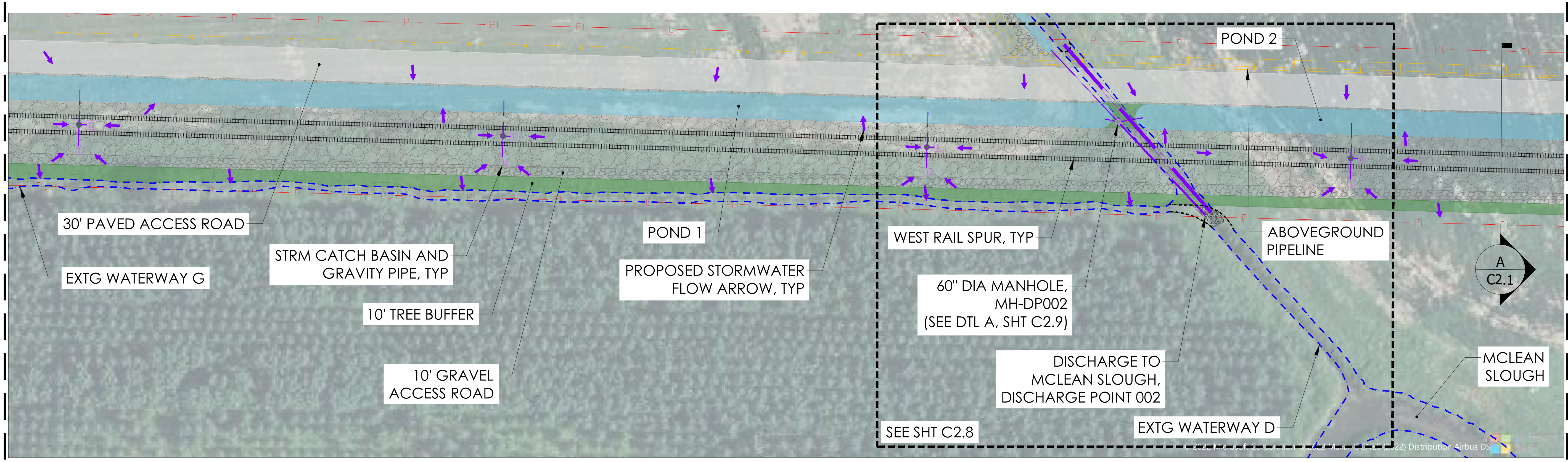

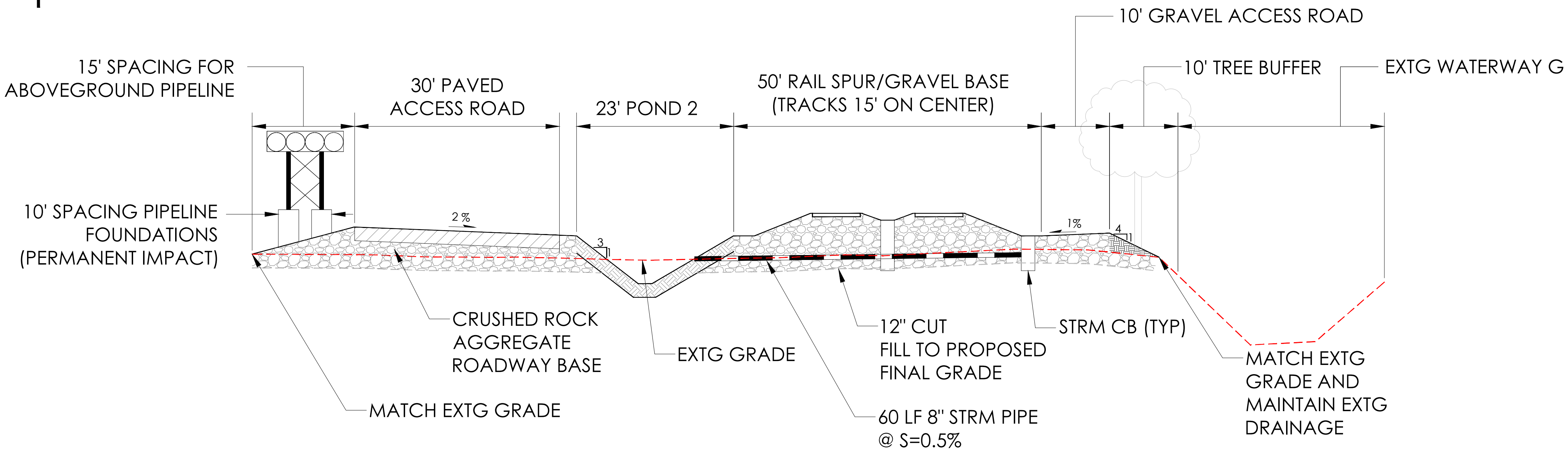

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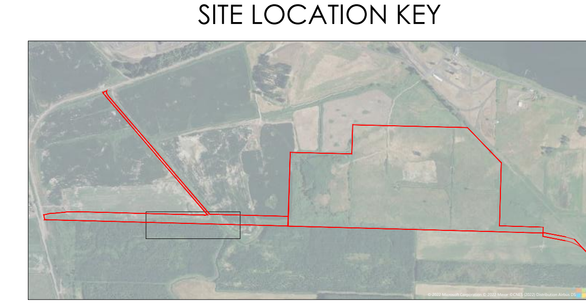

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WEST RAIL SPUR PLAN AND SECTION II

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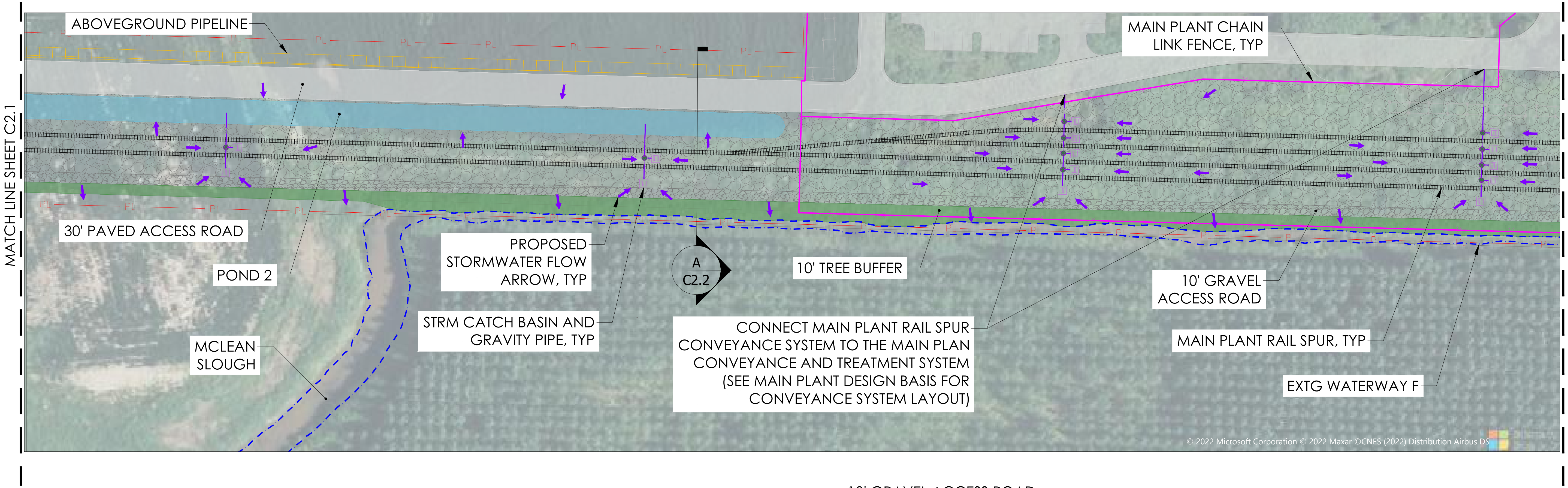

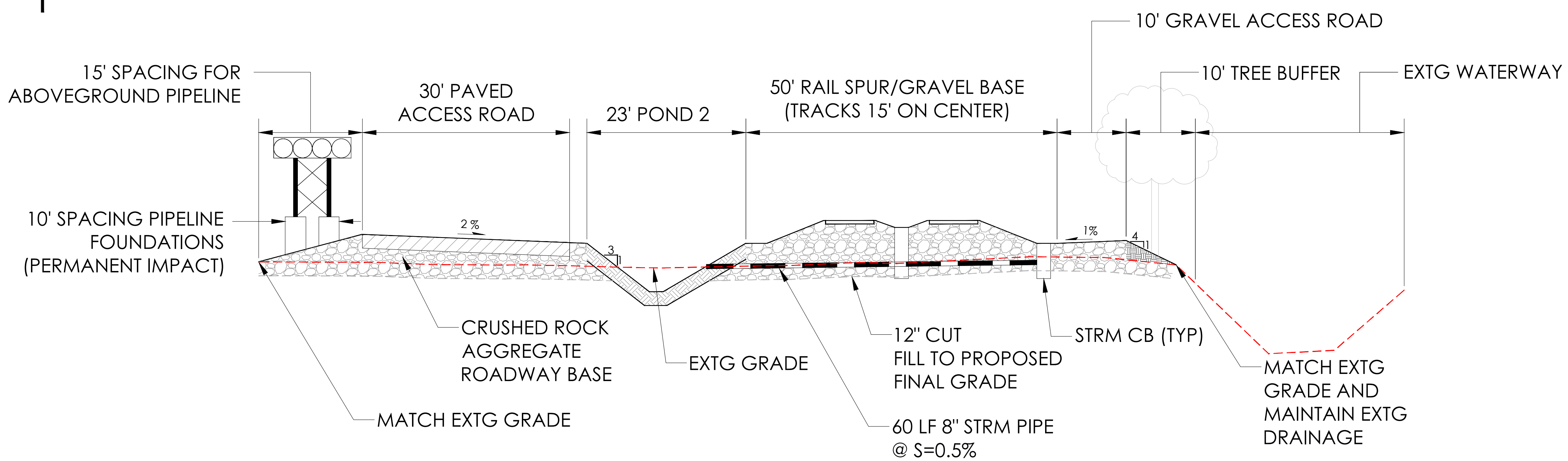

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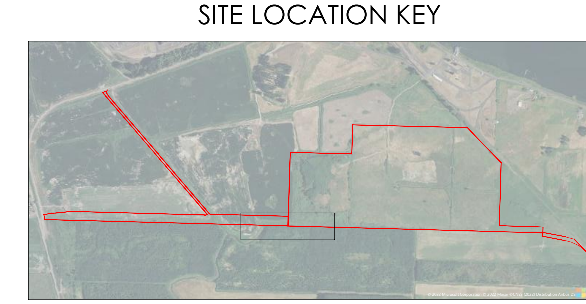

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WEST RAIL SPUR PLAN AND SECTION III

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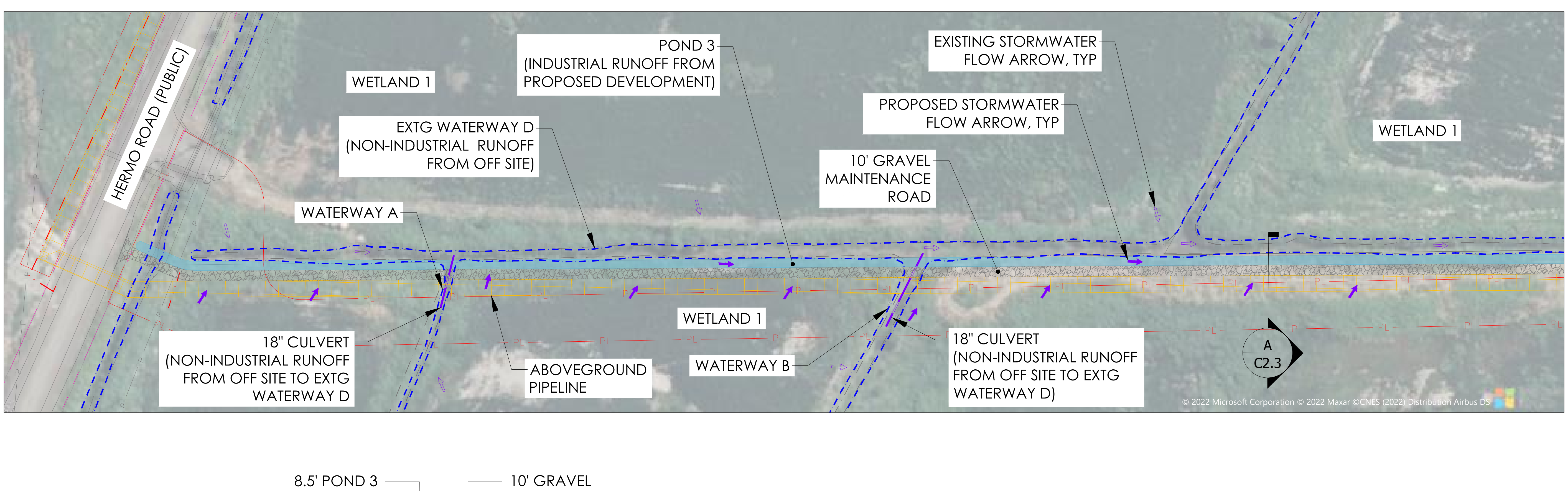

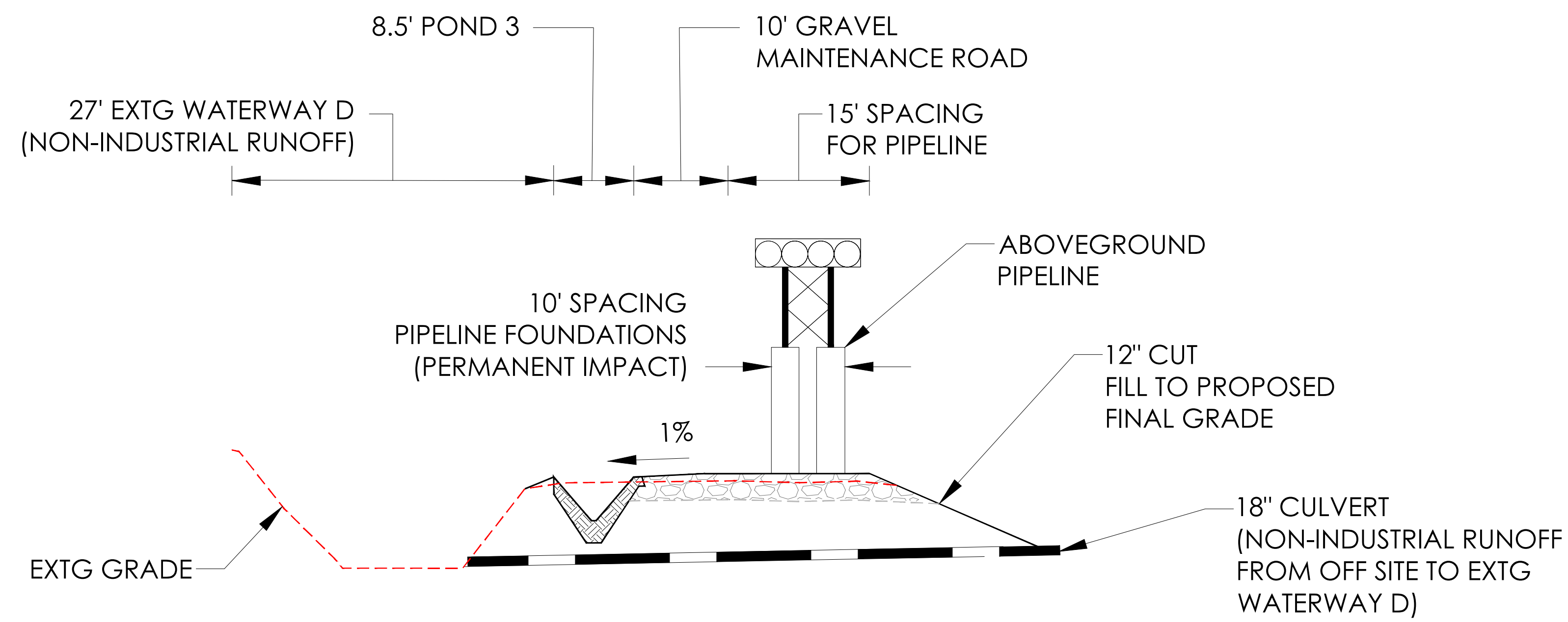

A PIPELINE/MAINTENANCE ROAD TYPICAL SECTION

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PIPELINE/MAINTENANCE ROAD PLAN AND SECTION I

NEXT RENEWABLE FUELS OREGON

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PORT WESTWARD, OREGON

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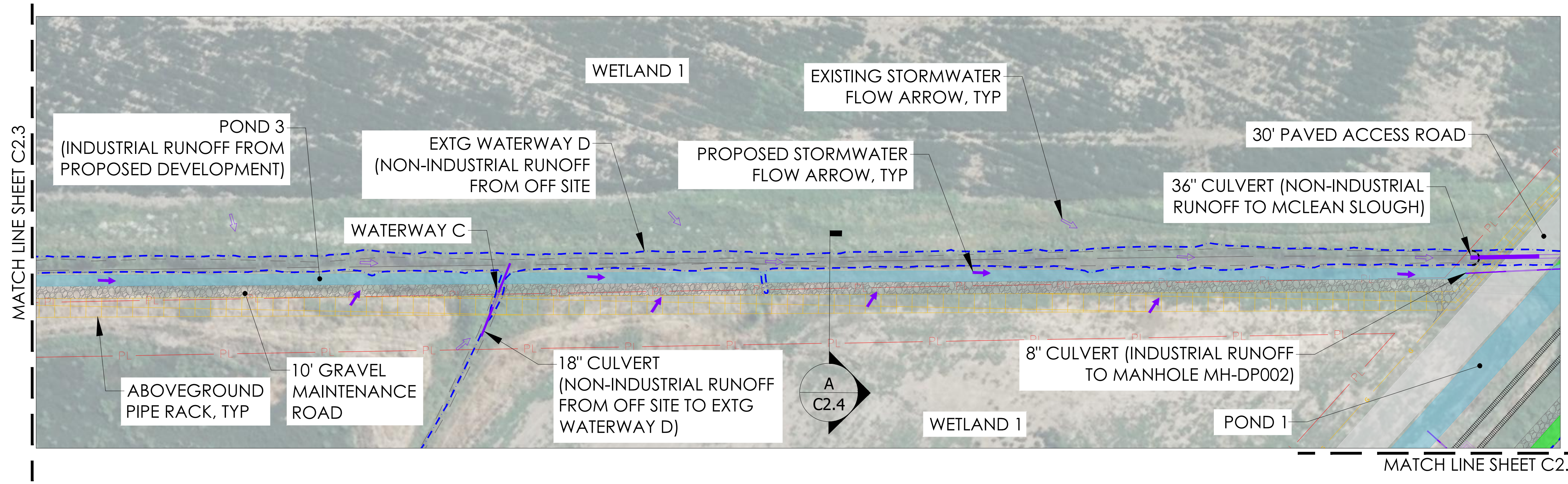
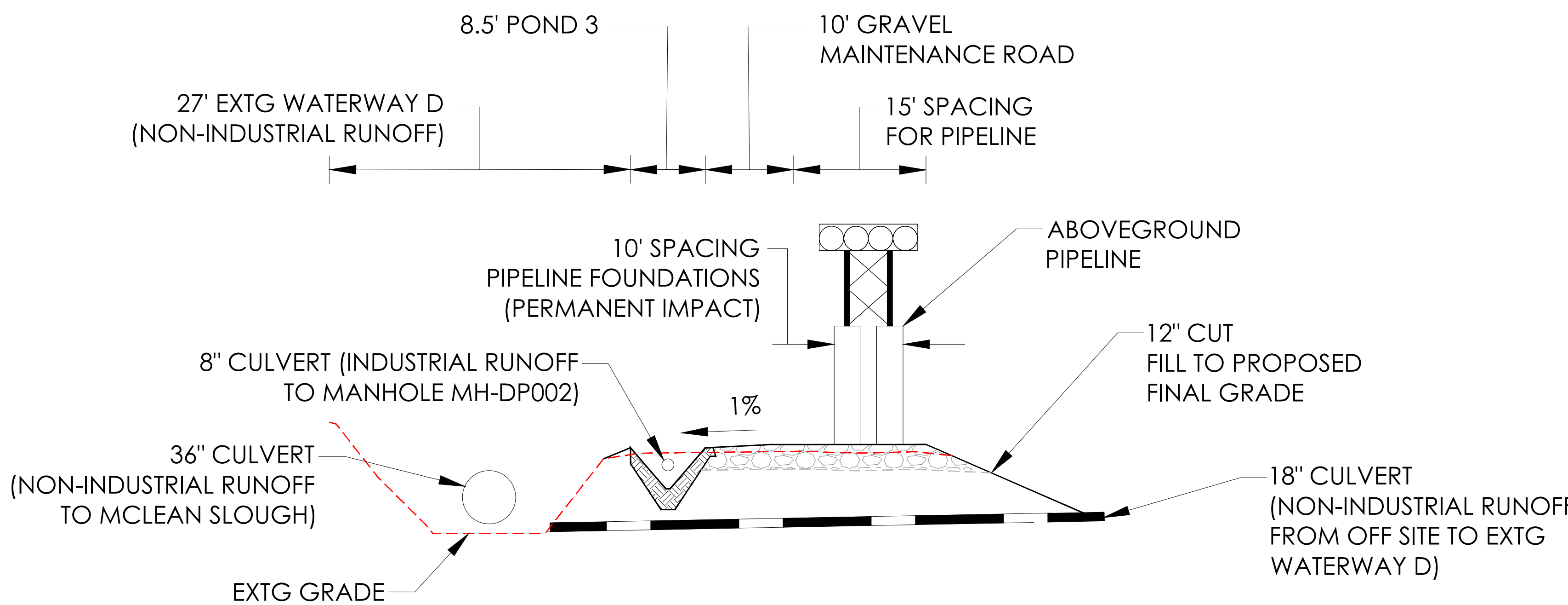
EXHIBIT C2.3

Filepath: G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\PLANS\C2.3 2.4 PIPELINE MAINTENANCE ROAD.dwg

Printed by: Brian Tino

Date: 12/9/2022 5:02:49 PM





A PIPELINE/MAINTENANCE ROAD TYPICAL SECTION

NOT TO SCALE

SITE LOCATION KEY

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PHONE: 971.544.2139
www.maulfoster.com

NEXT Renewable Fuels, Inc.

PIPELINE/MAINTENANCE ROAD PLAN AND SECTION II

NEXT RENEWABLE FUELS OREGON

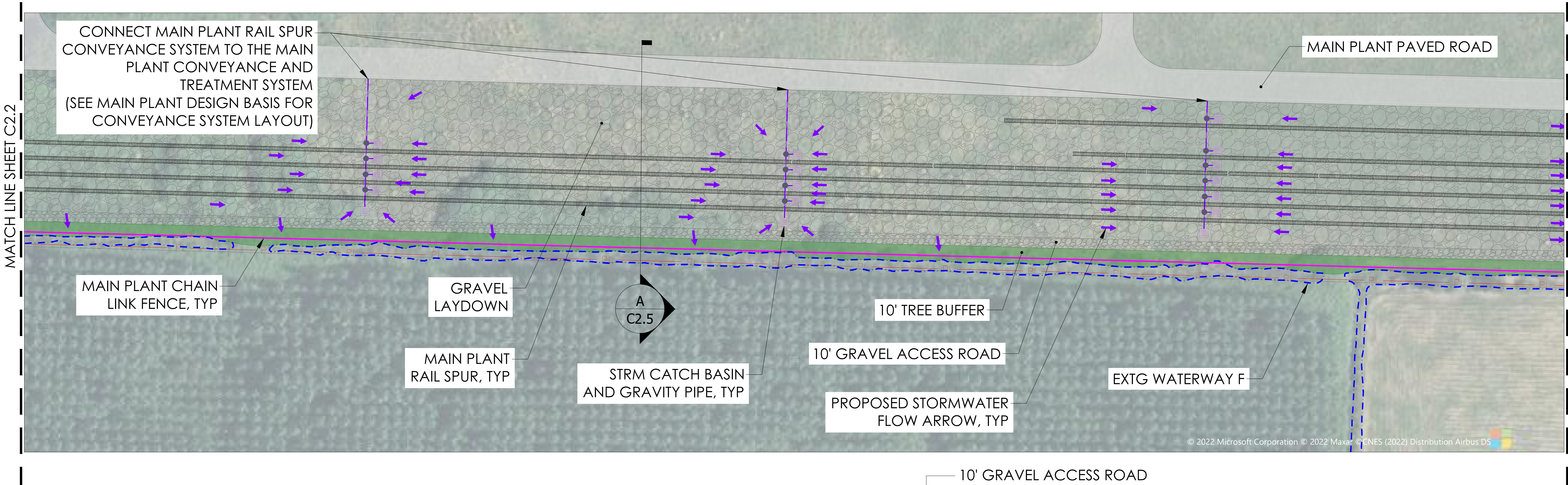
NEXT RENEWABLE FUELS, INC.

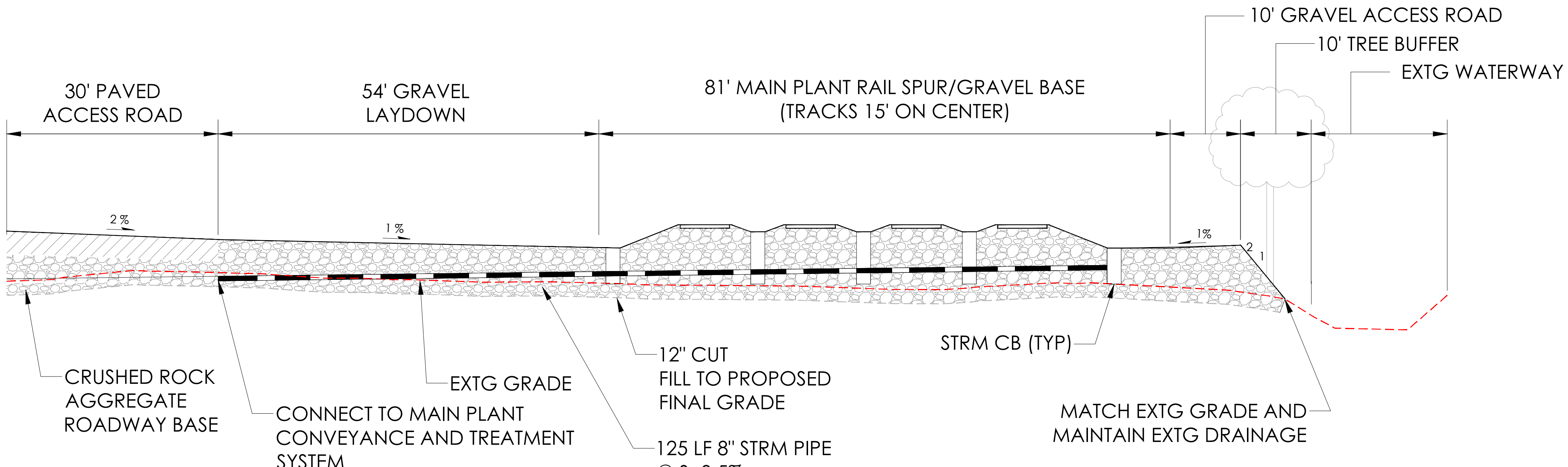
PORT WESTWARD, OREGON

0 100' 200'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

EXHIBIT C2.4



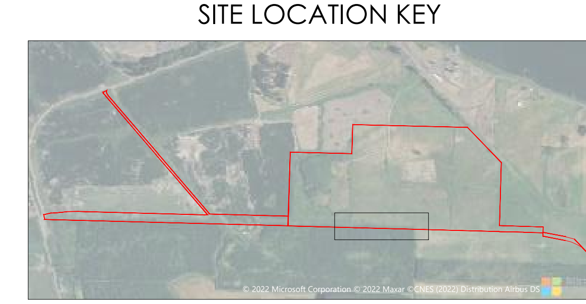


A

MAIN PLANT RAIL SPUR TYPICAL SECTION

NOT TO SCALE

SITE LOCATION KEY



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NEXT Renewable Fuels, Inc.

MAIN PLANT RAIL SPUR PLAN AND SECTION I

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 100' 200'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

EXHIBIT C2.5

Filepath:G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\PLANS\C2.5 2.6 2.7 MAIN PLANT-EAST RAIL SPUR.dwg

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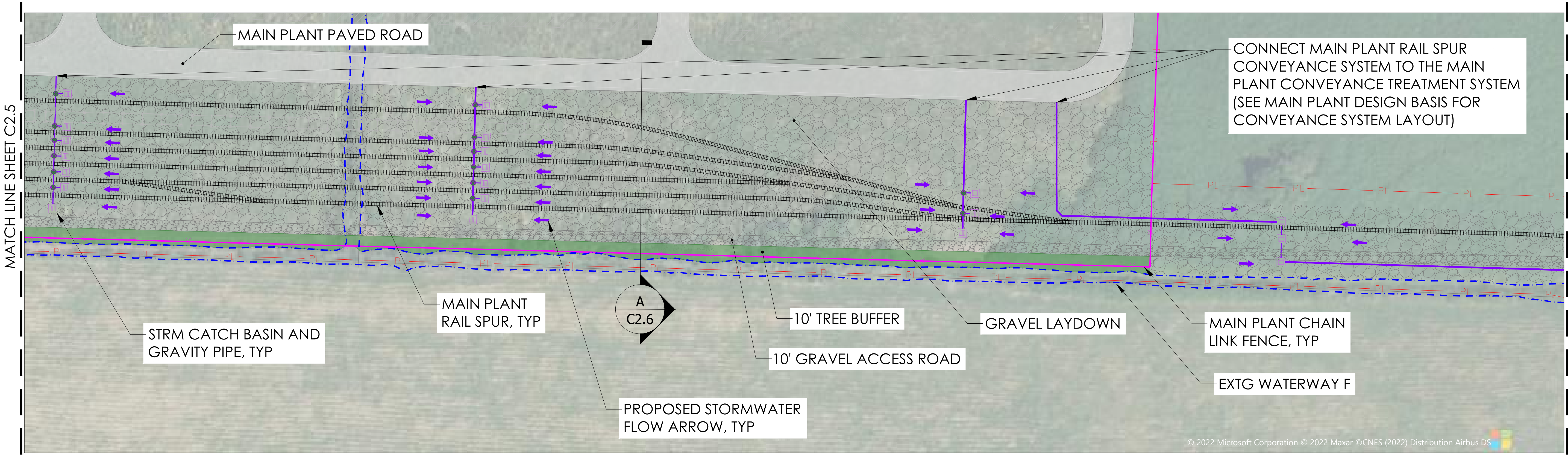

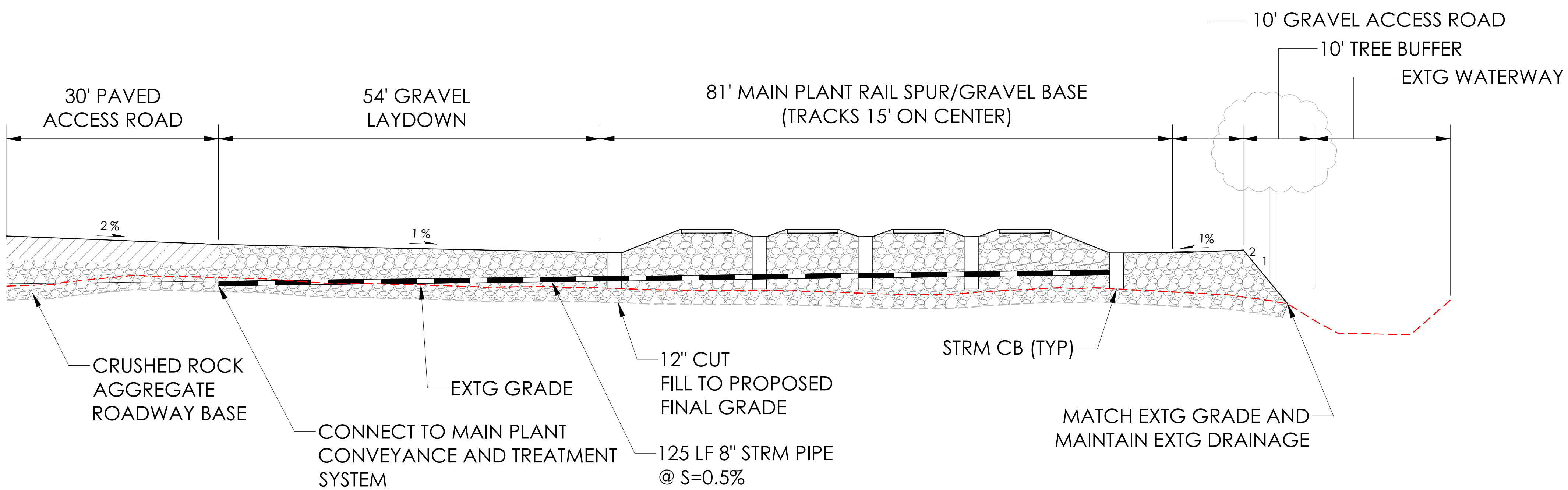

A

MAIN PLANT RAIL SPUR TYPICAL SECTION

NOT TO SCALE

SITE LOCATION KEY

PERMIT DOCUMENT

MFA JOB #: M1724.01
ISSUE DATE: 12/09/2022
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NEXT Renewable Fuels, Inc.

MAIN PLANT RAIL SPUR PLAN AND SECTION II

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 100' 200'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

EXHIBIT
C2.6

Filepath:G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\PLANS\C2.5 2.6 2.7 MAIN PLANT-EAST RAIL SPUR.dwg
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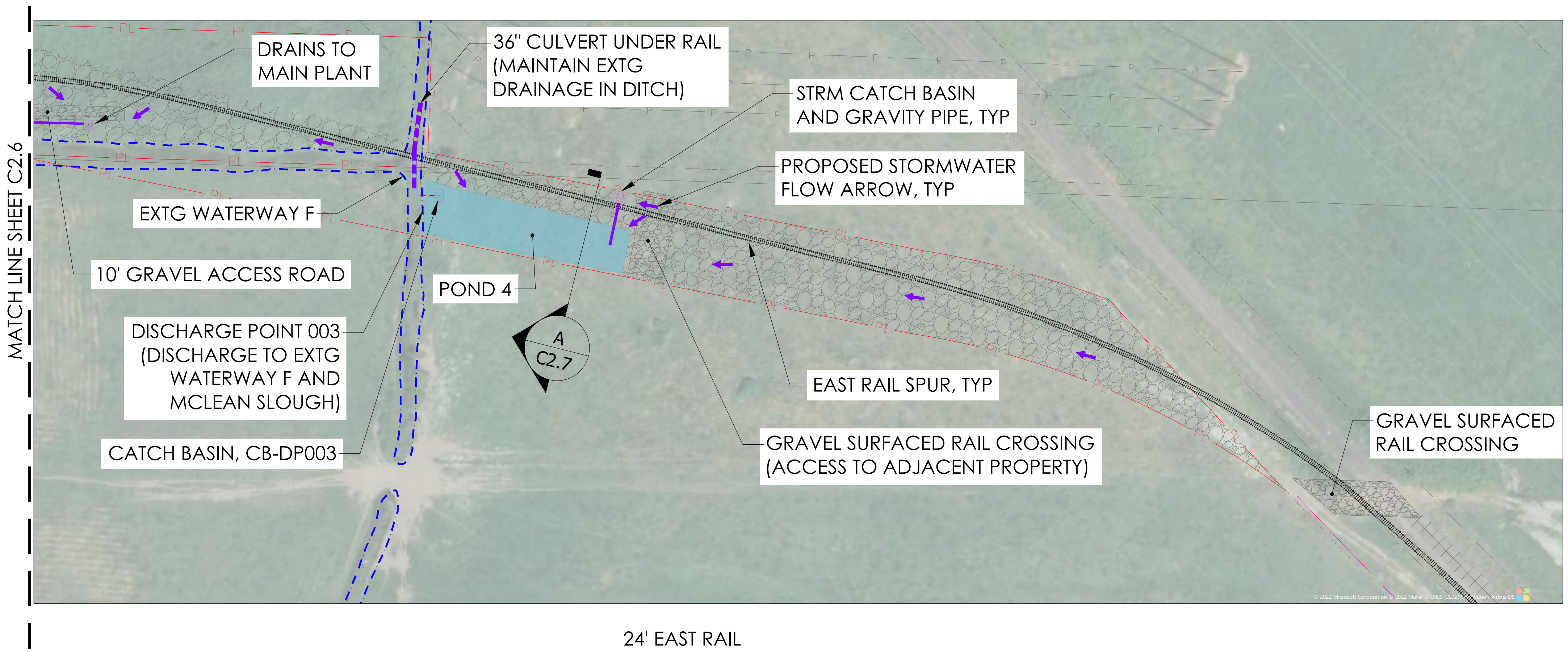

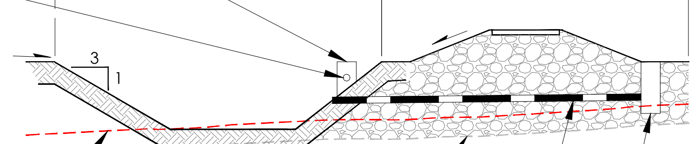

A EAST RAIL SPUR TYPICAL SECTION

NOT TO SCALE

SITE LOCATION KEY

PERMIT DOCUMENT

MFA JOB #: M1724.01
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NEXT Renewable Fuels, Inc.

EAST RAIL SPUR PLAN AND SECTION

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 100' 200'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

EXHIBIT C2.7

Filepath:G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\PLANS\C2.5 2.6 2.7 MAIN PLANT-EAST RAIL SPUR.dwg

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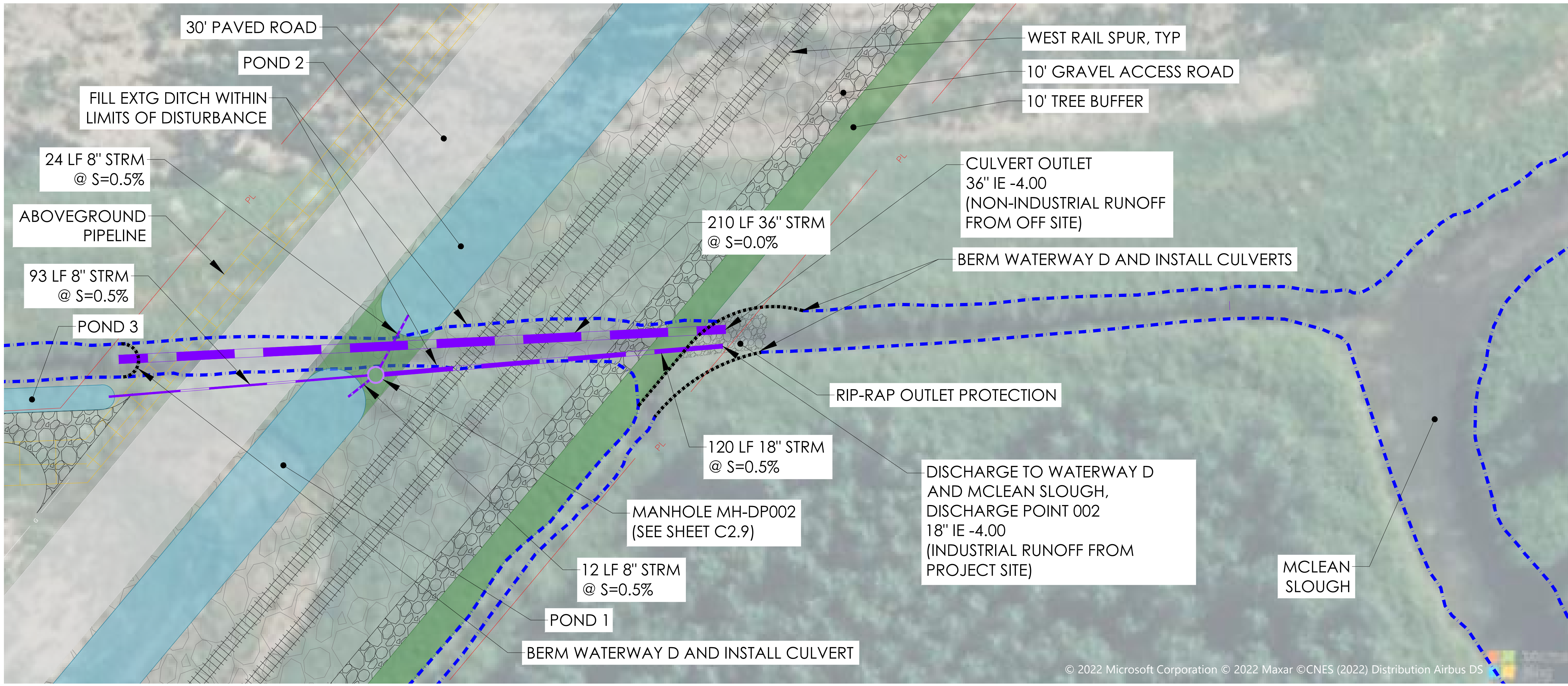
Date:1/19/2023 12:19:21 PM



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Date: 12/9/2022 5:46:19 PM

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NEXT Renewable Fuels, Inc.

DISCHARGE POINT 002 PLAN

NEXT RENEWABLE FUELS OREGON

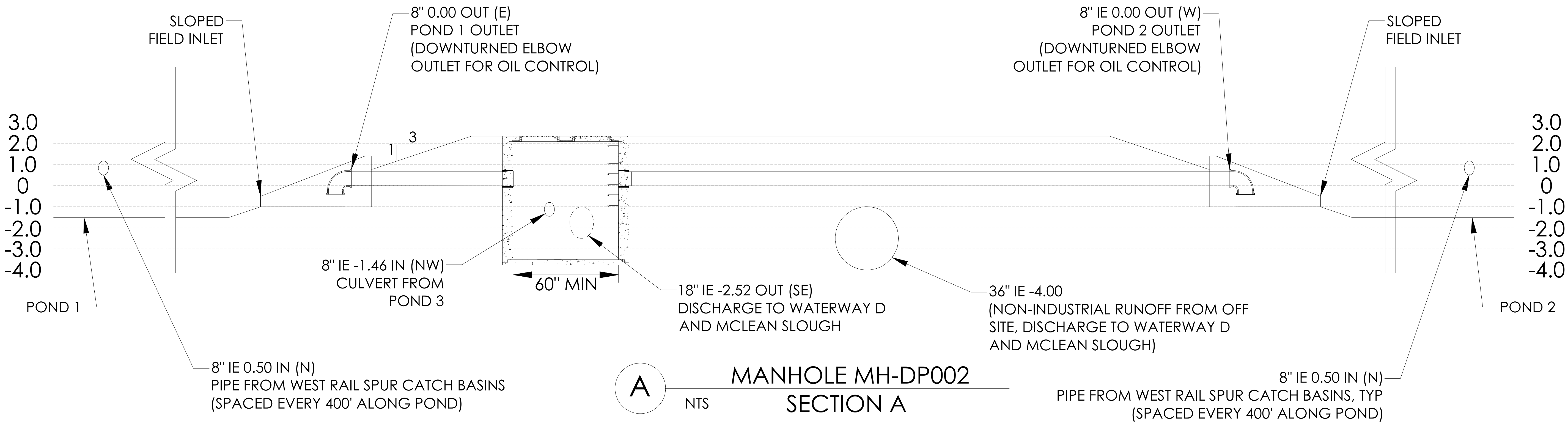
NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

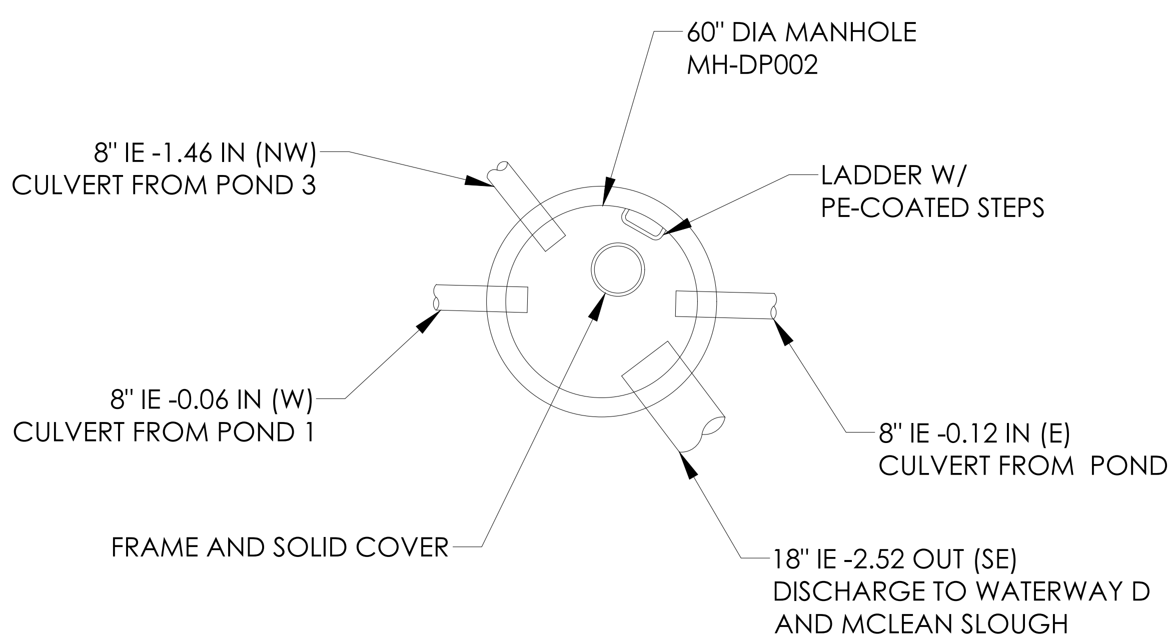
0 20' 40'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

EXHIBIT C2.8



A MANHOLE MH-DP002
NTS SECTION A



B MANHOLE MH-DP002 ENLARGED PLAN
NTS

PERMIT DOCUMENT

Filepath:G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\PLANS\C2.9 MH-DP002 MANHOLE DETAILS.dwg
Printed by: Brian Tino
Date:12/9/2022 5:52:05 PM

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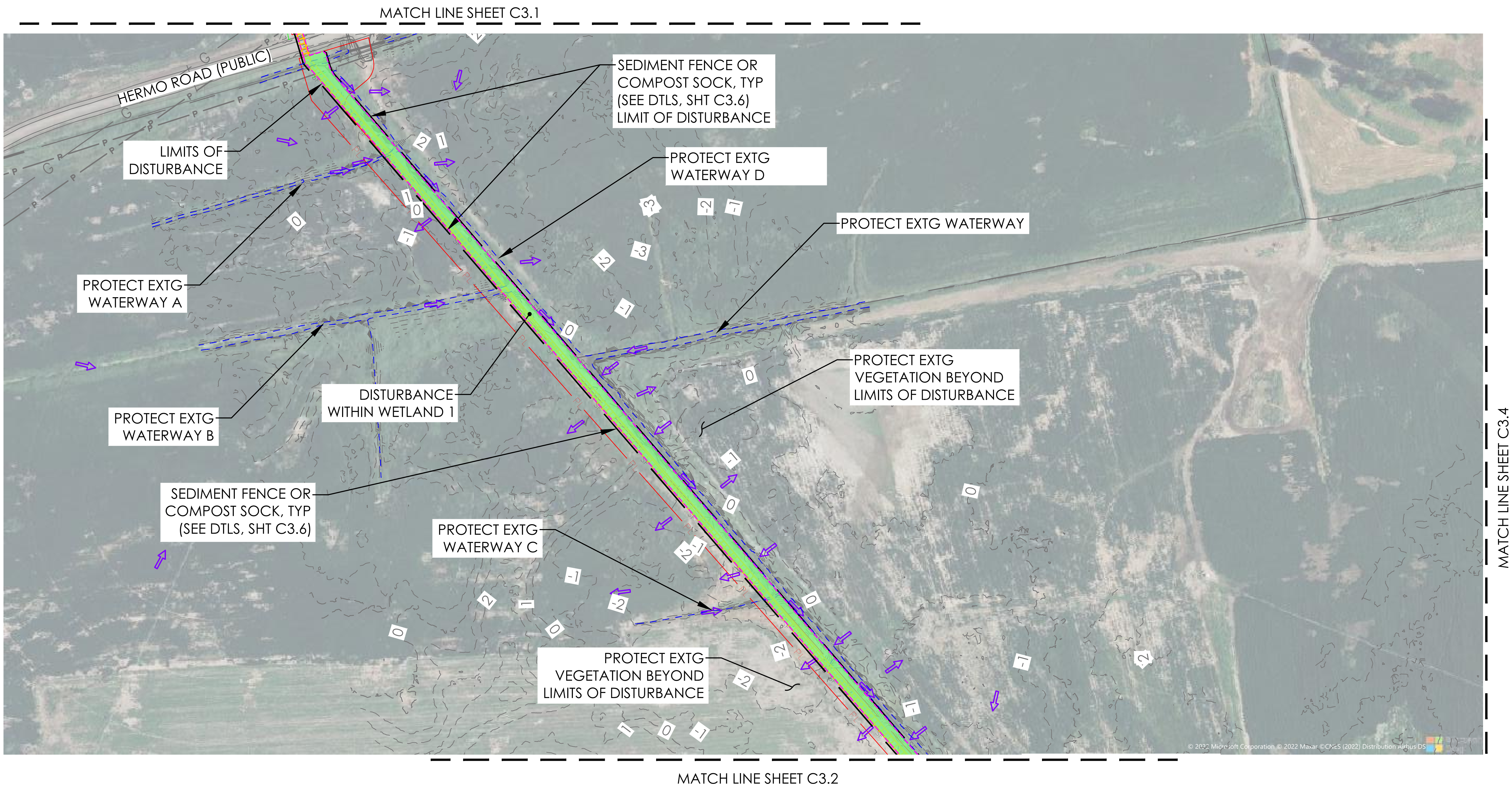
NEXT Renewable Fuels, Inc.

MANHOLE MH-DP002 DETAILS

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

EXHIBIT
C2.9



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ISSUE DATE:	12/09/2022
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NEXT Renewable Fuels, Inc.

PIPELINE/MAINTENANCE RD ESCP I

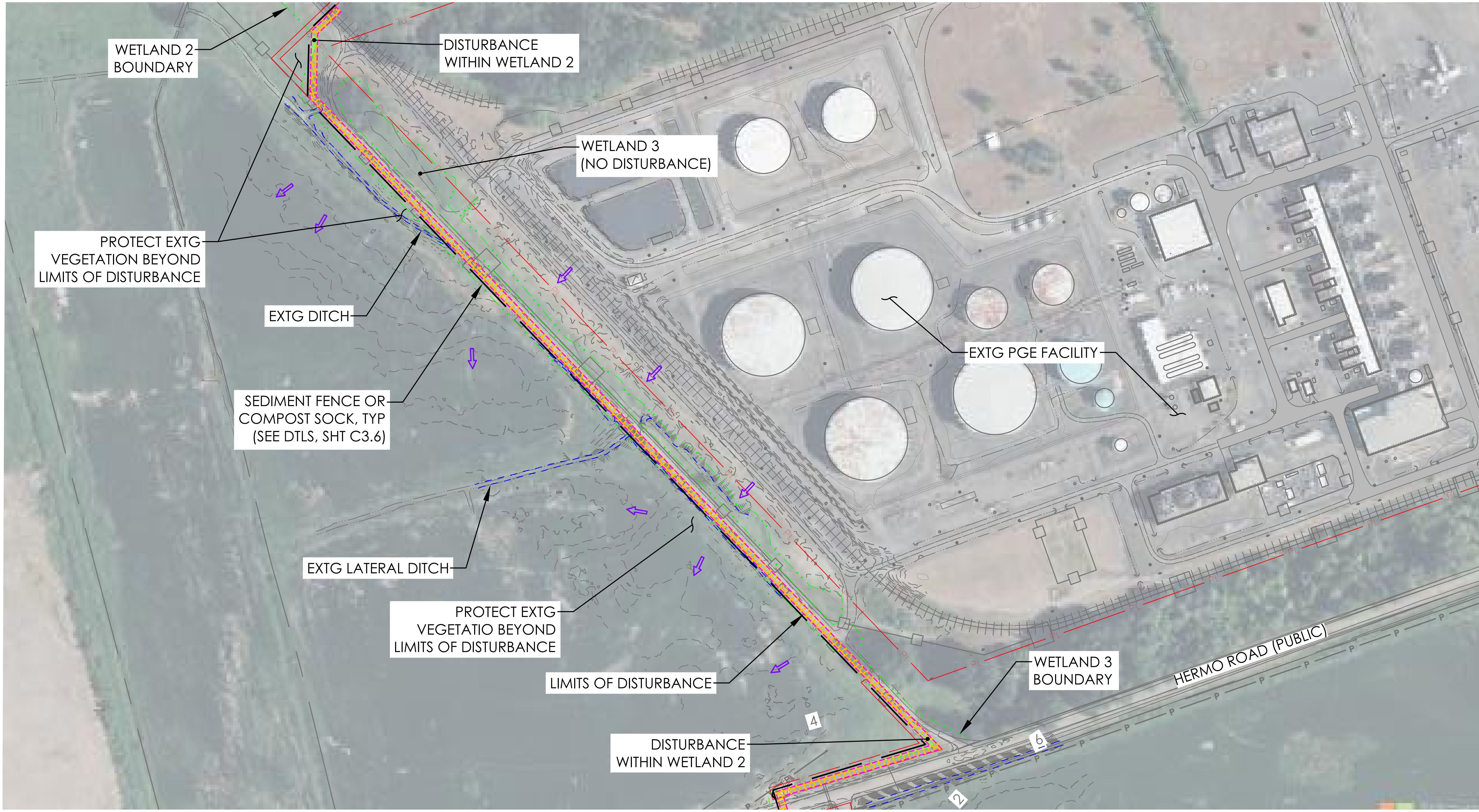
NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 250' 500'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

EXHIBIT
C3.0



MATCH LINE SHEET C3.0

PERMIT DOCUMENT

Filepath:G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\PLANS\EROSION CONTROL\C3.0 3.1 PIPELINE MAINTENANCE RD ESCP I.dwg

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NEXT Renewable Fuels, Inc.

PIPELINE/MAINTENANCE RD ESCP II

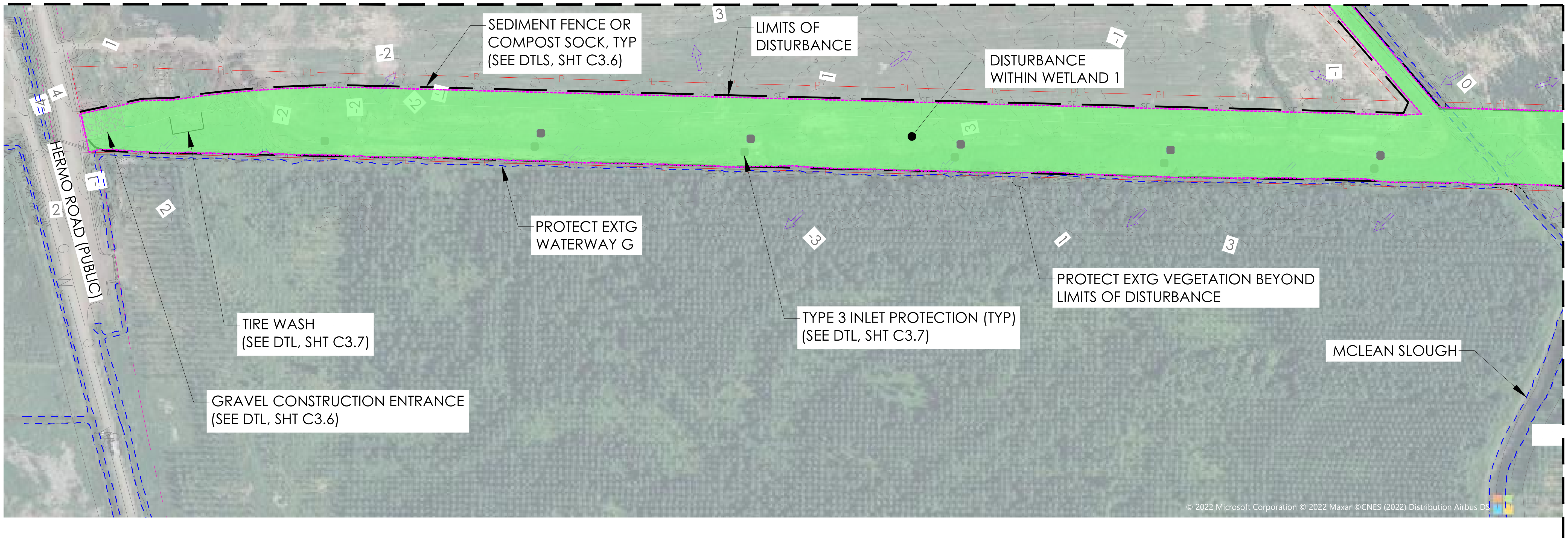
NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 250' 500'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

EXHIBIT
C3.1



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NEXT Renewable Fuels, Inc.

WEST RAIL SPUR ESCP I

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 200' 400'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

EXHIBIT C3.2

Filepath:G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\PLANS\EROSION CONTROL\C3.3 3.4 MAIN PLANT ESCP.dwg

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MFA JOB #:	M1724.01
ISSUE DATE:	12/09/2022
CHECKED:	A. BANASIK
DRAWN:	L. DANIEL

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Date:1/19/2023 11:21:00 AM

NEXT Renewable Fuels, Inc.

MAIN PLANT ESCP

NEXT RENEWABLE FUELS OREGON

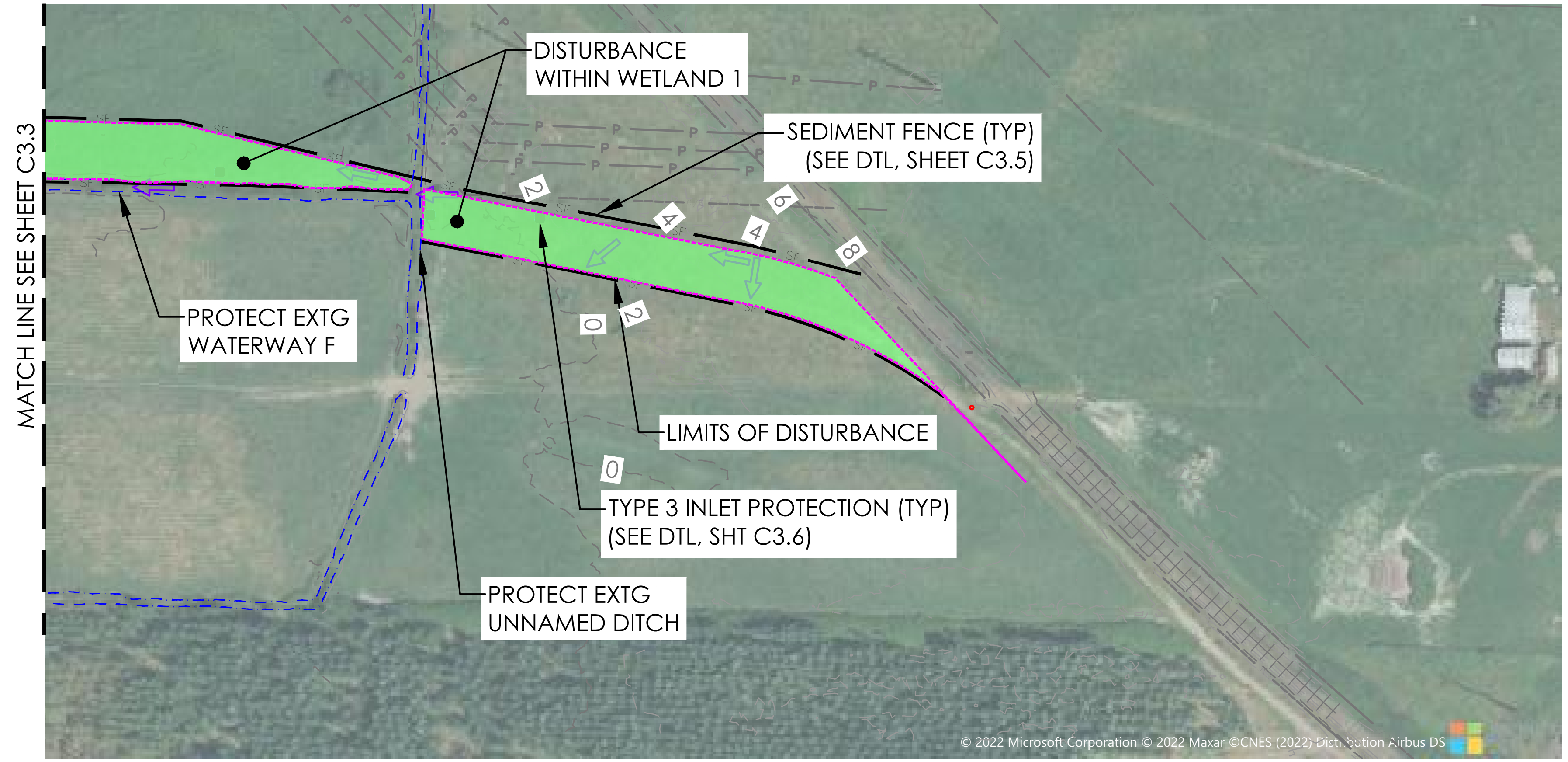
NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 250' 500'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

EXHIBIT
C3.3



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Date:1/18/2023 5:53:44 PM

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NEXT Renewable Fuels, Inc.

EAST RAIL SPUR ESCP

NEXT RENEWABLE FUELS OREGON

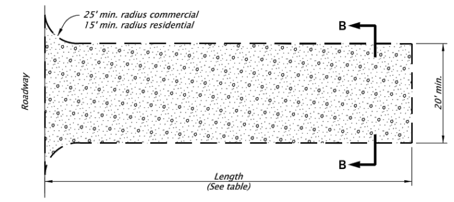
NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

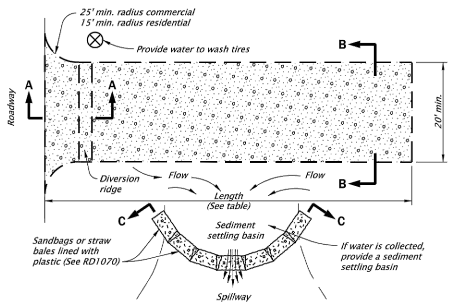
0 200' 400'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

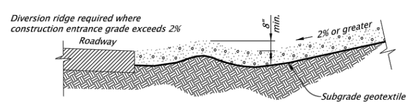
EXHIBIT C3.4



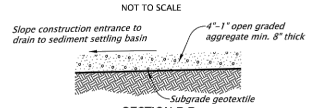
CONSTRUCTION ENTRANCE - TYPE 1
NOT TO SCALE



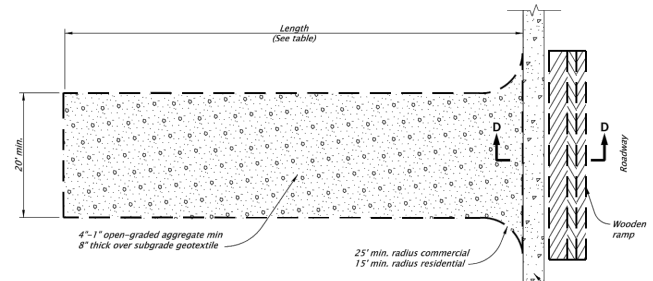
CONSTRUCTION ENTRANCE - TYPE 2
NOT TO SCALE



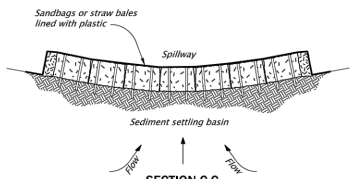
SECTION A-A
NOT TO SCALE



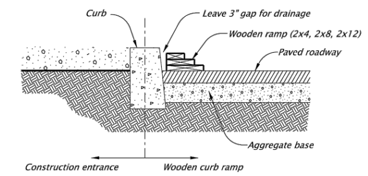
SECTION B-B
NOT TO SCALE



CONSTRUCTION ENTRANCE - TYPE 3
(TYPE 1 OR 2 WITH EXISTING CURB)
NOT TO SCALE



SECTION C-C
NOT TO SCALE



WOODEN CURB RAMP SECTION D-D
NOT TO SCALE

NOTES:
1. The Type 1 entrance is a simple entrance without a diversion ridge or settling basin.
2. The wooden ramp may be used on either Type 1 or Type 2 entrances in situations where there is curb and the curb is not removed for the construction entrance.

CONSTRUCTION ENTRANCE TABLE MINIMUM LENGTH	
Length (FT)	Area Of Exposed Soil (Acre)
20	0.25
50	0.25 < A < 1.0
100	A > 1.0

CALC. BOOK NO. N/A
SDR DATE January, 2021
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

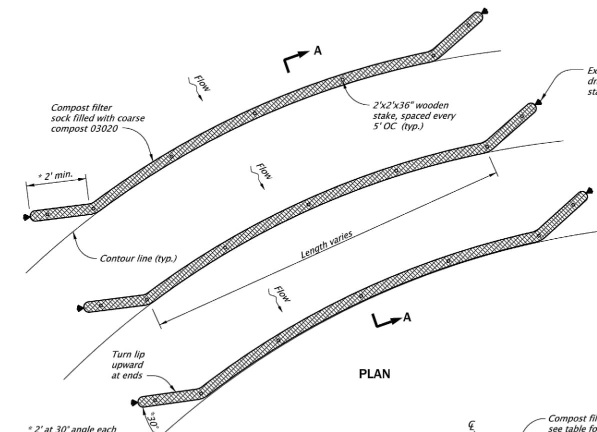
The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

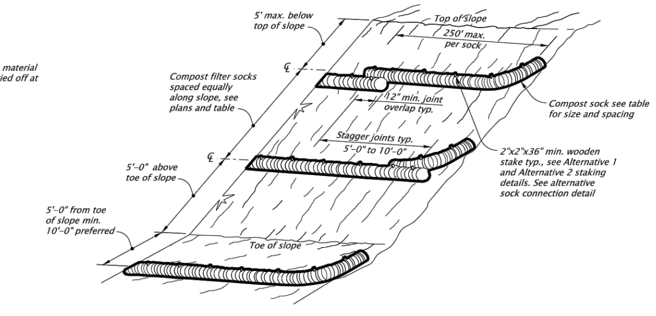
CONSTRUCTION ENTRANCES

2021

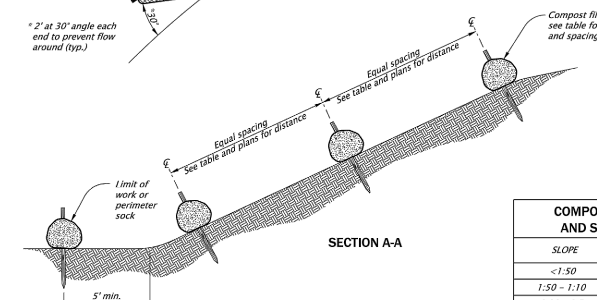
DATE	REVISION DESCRIPTION
Jan 2021	Removed Calc book numbers



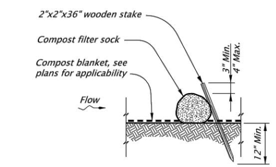
PLAN



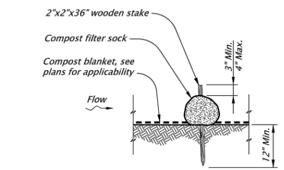
SLOPE APPLICATION - PERSPECTIVE VIEW



SECTION A-A



ALTERNATIVE 1 (Staking)



ALTERNATIVE 2 (Staking)

NOTE:
Fully biodegradable compost sock mesh is recommended for permanent installations. Where compost socks must be moved or removed, synthetic sock mesh should be used.

COMPOST FILTER SOCK DIAMETER AND SPACING BASED ON SLOPE		
SLOPE	SPACING (ft)	DIAMETER (in)
<1:50	250	8
1:50 - 1:10	125	12
1:10 - 1:5	100	12
1:5 - 1:2	50	18
>1:2	25	18

COMPOST FILTER SOCK
NOT TO SCALE

CALC. BOOK NO. N/A
SDR DATE January, 2021
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

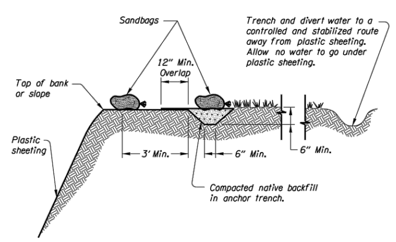
The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

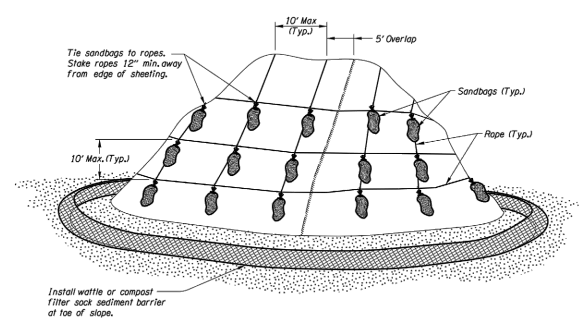
SEDIMENT BARRIER TYPE 8

2021

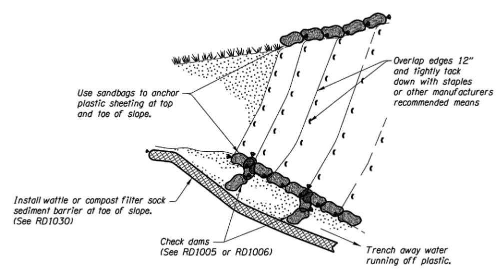
DATE	REVISION DESCRIPTION
Jan 2021	Removed Calc book numbers



TOP OF SLOPE TIE DOWN

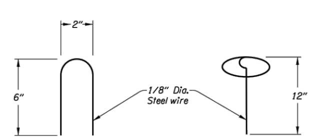


STOCKPILE



SLOPES

NOTES:
1. Install plastic sheeting vertically down slope.
2. Install plastic sheeting so edges overlap and are shingled away from prevailing winds.



STAPLE DETAIL

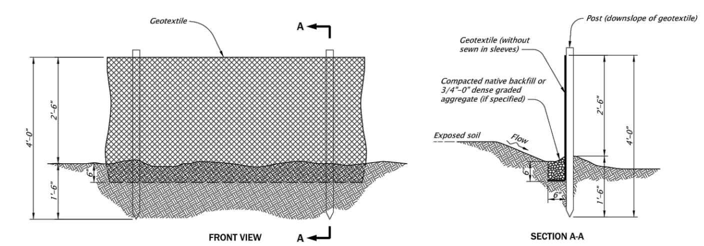
PIN STAPLE

The selection and use of this detail, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

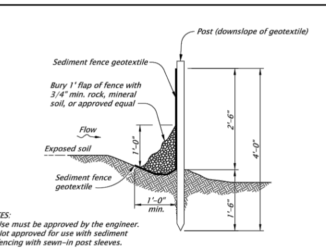
OREGON DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES
DETAILS

PLASTIC SHEETING

DETAIL NO. DET6001

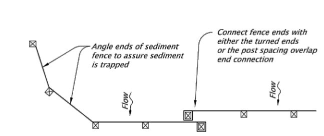


SEDIMENT FENCE AND GEOTEXTILE BURY DETAIL - TYPE 1
NOT TO SCALE

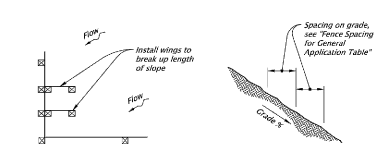


NOTES:
1. Use must be approved by the engineer.
2. Not approved for use with sediment fencing with sewn-in post sleeves.

ALTERNATE SEDIMENT FENCE WITHOUT TRENCHING - TYPE 2
NOT TO SCALE



PLAN VIEW

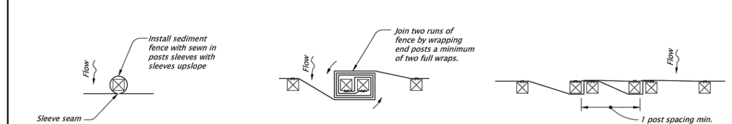


TERMINATION AT CORNER OR PROPERTY LINE

GENERAL NOTES:
1. Use 2"x2" wood fence posts.
2. Posts to be installed on downhill side of sediment fence geotextile. Position posts to prevent separation from geotextile.
3. Compact filter fabric trench backfill and soil on uphill side of fence.
4. Locate fence no closer than three feet to the toe of a slope.
5. Wing spacing shall comply with "Fence Spacing for General Application Table".

FENCE SPACING FOR GENERAL APPLICATION TABLE	
INSTALL PARALLEL ALONG CONTOURS AS FOLLOWS	
GRADE	MAXIMUM SPACING ON GRADE
Grade < 10%	300'
10% ≤ Grade < 15%	150'
15% ≤ Grade < 20%	100'
20% ≤ Grade < 30%	50'
30% ≤ Grade	25'

POST SPACING TABLE	
6'	Sediment Fence with Geotextile elongation less than 50%
4'	Sediment Fence with Geotextile elongation 50% or more



GEOTEXTILE END CONNECTIONS
NOT TO SCALE

CALC. BOOK NO. N/A
SDR DATE January, 2021
NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

SEDIMENT FENCE

2021

DATE	REVISION DESCRIPTION
Jan 2021	Removed Calc book numbers

Effective Date: June 1, 2022 - November 30, 2022

RD1040

rd1040.dgn 01-20-2021

PERMIT DOCUMENT

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ESCP DETAILS I

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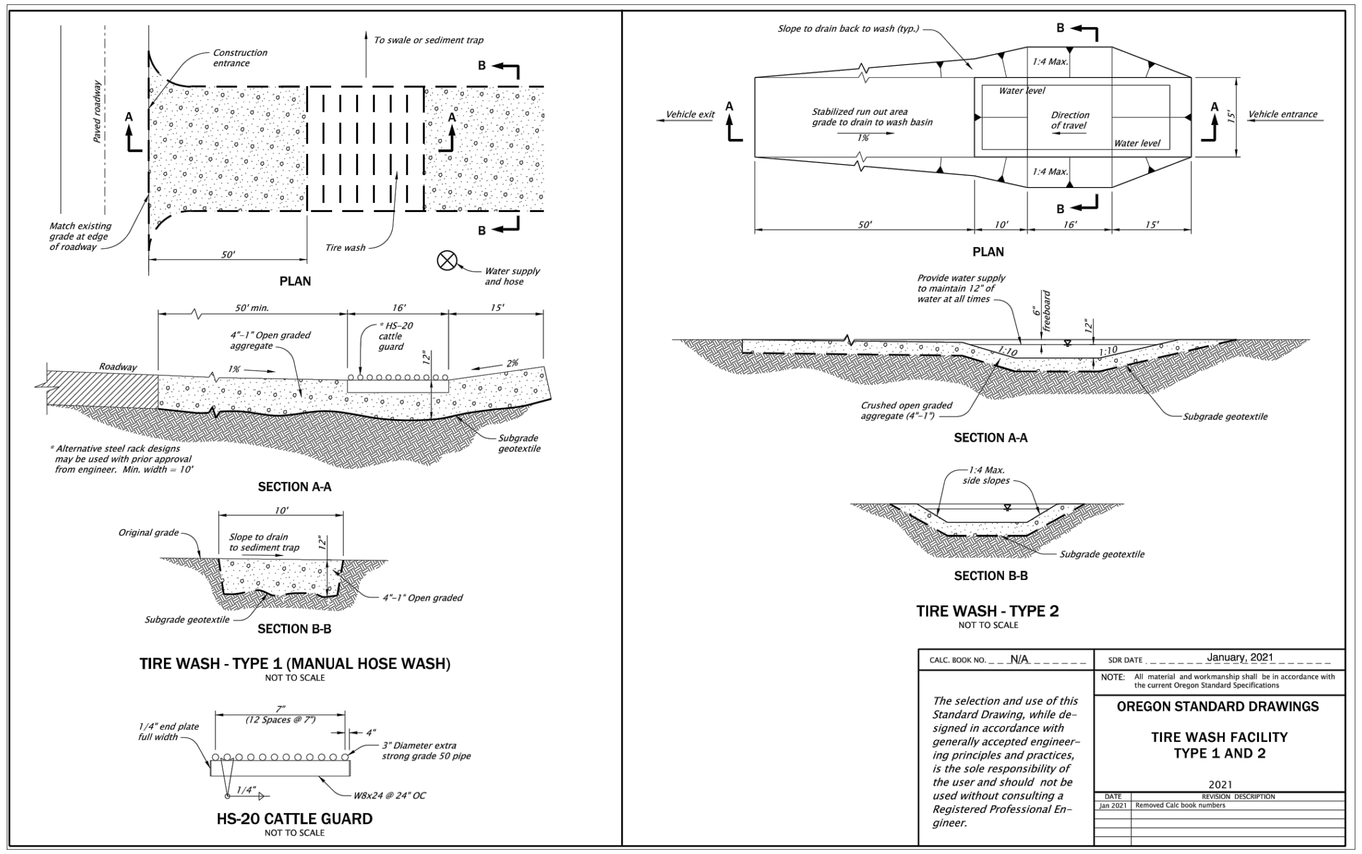
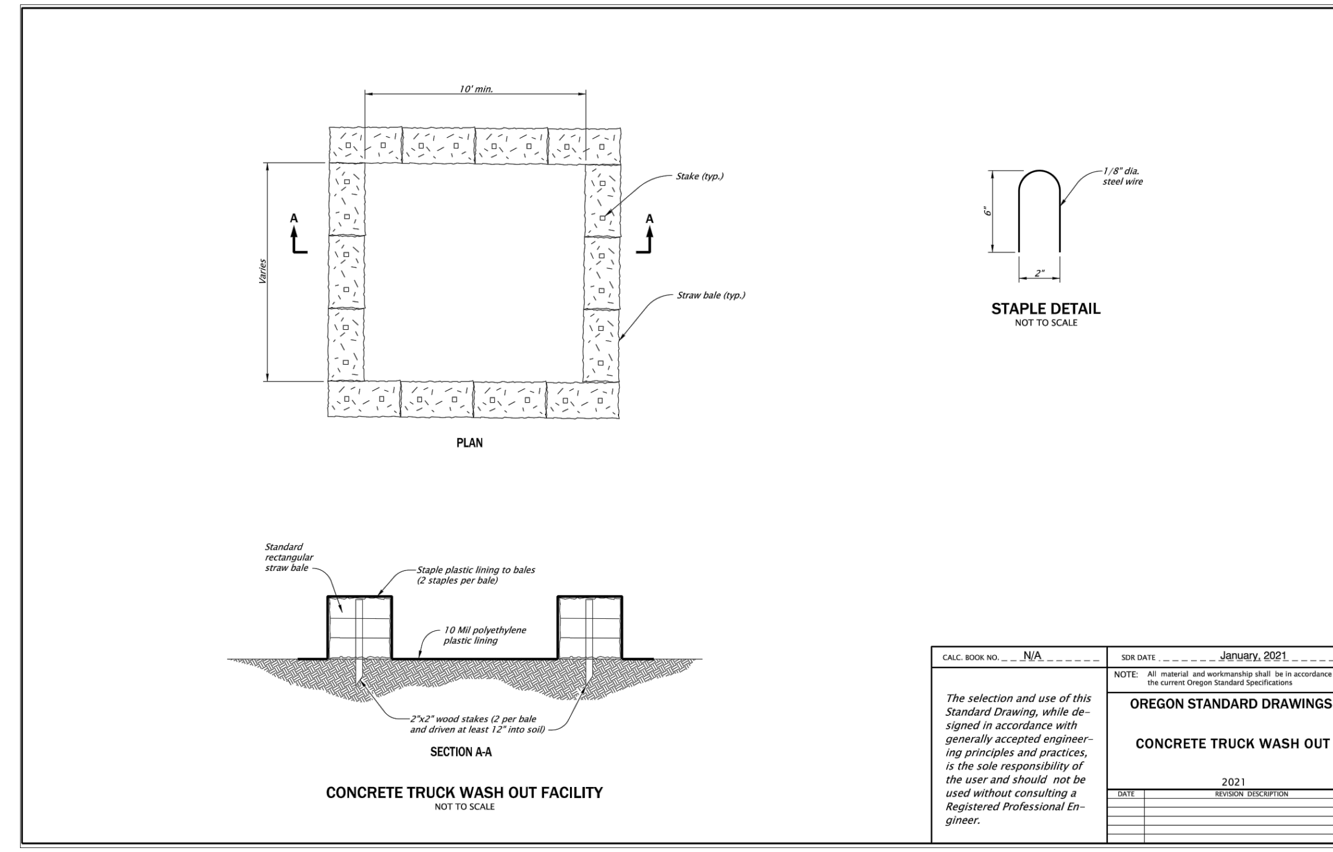
PORT WESTWARD, OREGON

EXHIBIT C3.5





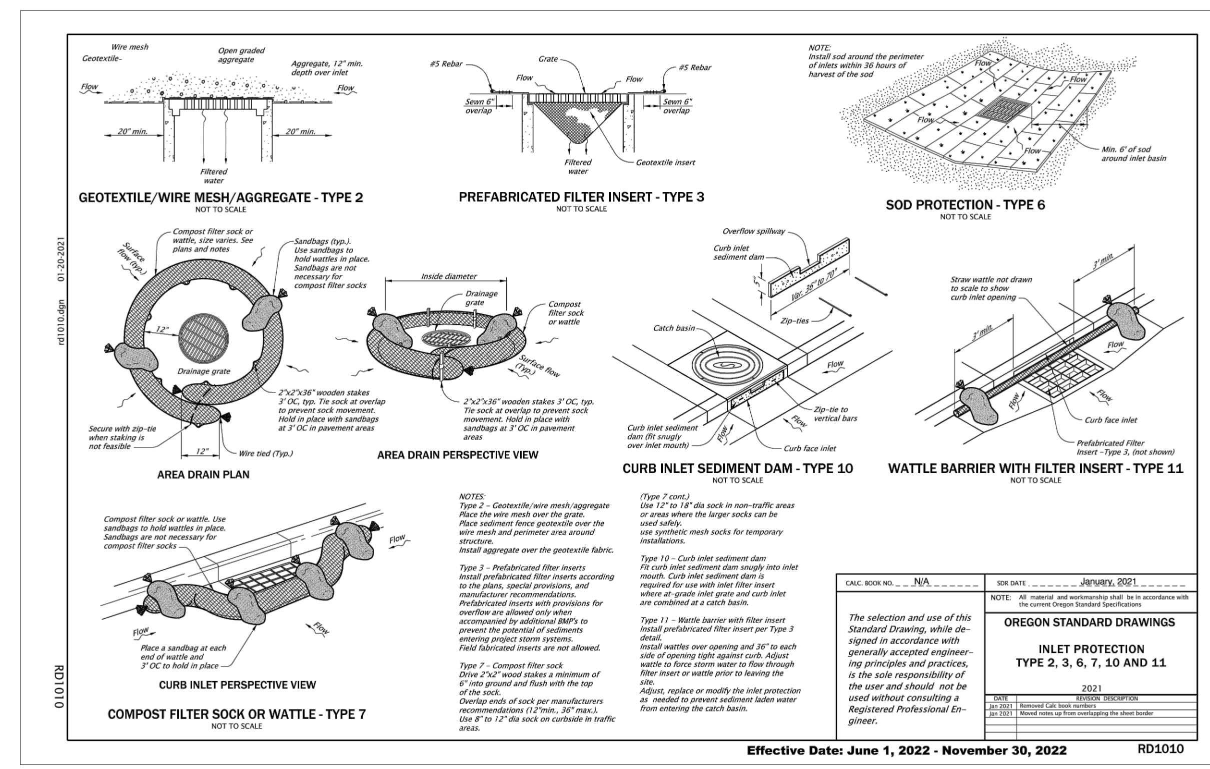


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EXHIBIT
C3.6

1. ONCE KNOWN, INCLUDE A LIST OF ALL CONTRACTORS THAT WILL ENGAGE IN CONSTRUCTION ACTIVITIES ON SITE, AND THE AREAS OF THE SITE WHERE THE CONTRACTOR(S) WILL ENGAGE IN CONSTRUCTION ACTIVITIES. REVISE THE LIST AS APPROPRIATE UNTIL PERMIT COVERAGE IS TERMINATED (SECTION 4.4.C.I). IN ADDITION, INCLUDE A LIST OF ALL PERSONNEL (BY NAME AND POSITION) THAT ARE RESPONSIBLE FOR THE DESIGN, INSTALLATION AND MAINTENANCE OF STORMWATER CONTROL MEASURES (E.G., ESCP DEVELOPER, BMP INSTALLER (SEE SECTION 4.10), AS WELL AS THEIR INDIVIDUAL RESPONSIBILITIES. (SECTION 4.4.C.II)
2. VISUAL MONITORING INSPECTION REPORTS MUST BE MADE IN ACCORDANCE WITH DEQ 1200-C PERMIT REQUIREMENTS (SECTION 6.5)
3. INSPECTION LOGS MUST BE KEPT IN ACCORDANCE WITH DEQ'S 1200-C PERMIT REQUIREMENTS. (SECTION 6.5.Q)
4. RETAIN A COPY OF THE ESCP AND ALL REVISIONS ON SITE AND MAKE IT AVAILABLE ON REQUEST TO DEQ, AGENT, OR THE LOCAL MUNICIPALITY (SECTION 4.7)
5. THE PERMIT REGISTRANTS MUST IMPLEMENT THE ESCP. FAILURE TO IMPLEMENT ANY OF THE CONTROL MEASURES OR PRACTICES DESCRIBED IN THE ESCP IS A VIOLATION OF THE PERMIT (SECTIONS 4 AND 4.11)
6. THE ESCP MUST BE ACCURATE AND REFLECT SITE CONDITIONS (SECTION 4.8)
7. SUBMISSION OF ALL ESCP REVISIONS IS NOT REQUIRED. SUBMITTAL OF THE ESCP REVISIONS IS ONLY UNDER SPECIFIC CONDITIONS. SUBMIT ALL NECESSARY REVISION TO DEQ OR AGENT WITHIN 10 DAYS (SECTION 4.9)
8. SEQUENCE CLEARING AND GRADING TO THE MAXIMUM EXTENT PRACTICAL TO PREVENT EXPOSED INACTIVE AREAS FROM BECOMING A SOURCE OF EROSION (SECTION 2.2.2)
9. CREATE SMOOTH SURFACES BETWEEN SOIL SURFACE AND EROSION AND SEDIMENT CONTROLS TO PREVENT STORMWATER FROM BYPASSING CONTROLS AND PONDING (SECTION 2.2.3)
10. IDENTIFY, MARK, AND PROTECT (BY CONSTRUCTION FENCING OR OTHER MEANS) CRITICAL RIPARIAN AREAS AND VEGETATION INCLUDING IMPORTANT TREES AND ASSOCIATED ROOTING ZONES, AND VEGETATION AREAS TO BE PRESERVED IDENTIFY VEGETATIVE BUFFER ZONES BETWEEN THE SITE AND SENSITIVE AREAS (E.G., WETLANDS), AND OTHER AREAS TO BE PRESERVED, ESPECIALLY IN PERIMETER AREAS (SECTION 2.2.1)
11. PRESERVE EXISTING VEGETATION WHEN PRACTICAL AND RE-VEGETATE OPEN AREAS. RE-VEGETATE OPEN AREAS WHEN PRACTICABLE BEFORE AND AFTER GRADING OR CONSTRUCTION. IDENTIFY THE TYPE OF VEGETATIVE SEED MIX USED (SECTION 2.2.5)
12. MAINTAIN AND DELINEATE ANY EXISTING NATURAL BUFFER WITHIN THE 50-FEET OF WATERS OF THE STATE (SECTION 2.2.4)
13. INSTALL PERIMETER SEDIMENT CONTROL, INCLUDING STORM DRAIN INLET PROTECTION AS WELL AS ALL SEDIMENT BASINS, TRAPS, AND BARRIERS PRIOR TO LAND DISTURBANCE (SECTION 2.1.3)
14. CONTROL BOTH PEAK FLOW RATES AND TOTAL STORMWATER VOLUME, TO MINIMIZE EROSION AT OUTLETS AND DOWNSTREAM CHANNELS AND STREAMBANKS (SECTIONS 2.1.1 AND 2.2.16)
15. CONTROL SEDIMENT AS NEEDED ALONG THE SITE PERIMETER AND AT ALL OPERATIONAL INTERNAL STORM DRAIN INLETS AT ALL TIMES DURING CONSTRUCTION, BOTH INTERNALLY AND AT THE SITE BOUNDARY (SECTIONS 2.2.6 AND 2.2.13)
16. ESTABLISH CONCRETE TRUCK AND OTHER CONCRETE EQUIPMENT WASHOUT AREAS BEFORE BEGINNING CONCRETE WORK (SECTION 2.2.14)
17. APPLY TEMPORARY AND/OR PERMANENT SOIL STABILIZATION MEASURES IMMEDIATELY ON ALL DISTURBED AREAS AS GRADING PROGRESSES. TEMPORARY OR PERMANENT STABILIZATIONS MEASURES ARE NOT REQUIRED FOR AREAS THAT ARE INTENDED TO BE LEFT UNVEGETATED, SUCH AS DIRT ACCESS ROADS OR UTILITY POLE PADS (SECTIONS 2.2.20 AND 2.2.21)
18. ESTABLISH MATERIAL AND WASTE STORAGE AREAS, AND OTHER NON-STORMWATER CONTROLS (SECTION 2.3.7)
19. KEEP WASTE CONTAINER LIDS CLOSED WHEN NOT IN USE AND CLOSE LIDS AT THE END OF THE BUSINESS DAY FOR THOSE CONTAINERS THAT ARE ACTIVELY USED THROUGHOUT THE DAY. FOR WASTE CONTAINERS THAT DO NOT HAVE LIDS, PROVIDE EITHER (1) COVER (E.G., A TARP, PLASTIC SHEETING, TEMPORARY ROOF) TO PREVENT EXPOSURE OF WASTES TO PRECIPITATION, OR (2) A SIMILARLY EFFECTIVE MEANS DESIGNED TO PREVENT THE DISCHARGE OF POLLUTANTS (E.G., SECONDARY CONTAINMENT) (SECTION 2.3.7)
20. PREVENT TRACKING OF SEDIMENT ONTO PUBLIC OR PRIVATE ROADS USING BMPS SUCH AS: CONSTRUCTION ENTRANCE, GRAVELED (OR PAVED) EXITS AND PARKING AREAS, GRAVEL ALL UNPAVED ROADS LOCATED ONSITE, OR USE AN EXIT TIRE WASH. THESE BMPS MUST BE IN PLACE PRIOR TO LAND-DISTURBING ACTIVITIES (SECTION 2.2.7)
21. WHEN TRUCKING SATURATED SOILS FROM THE SITE, EITHER USE WATER-TIGHT TRUCKS OR DRAIN LOADS ON SITE (SECTION 2.2.7.F)
22. CONTROL PROHIBITED DISCHARGES FROM LEAVING THE CONSTRUCTION SITE, I.E., CONCRETE WASH-OUT, WASTEWATER FROM CLEANOUT OF STUCCO, PAINT AND CURING COMPOUNDS (SECTIONS 1.5 AND 2.3.9)
23. ENSURE THAT STEEP SLOPE AREAS WHERE CONSTRUCTION ACTIVITIES ARE NOT OCCURRING ARE NOT DISTURBED (SECTION 2.2.10)
24. PREVENT SOIL COMPACTION IN AREAS WHERE POST-CONSTRUCTION INFILTRATION FACILITIES ARE TO BE INSTALLED (SECTION 2.2.12)
25. USE BMPS TO PREVENT OR MINIMIZE STORMWATER EXPOSURE TO POLLUTANTS FROM SPILLS; VEHICLE AND EQUIPMENT FUELING, MAINTENANCE, AND STORAGE; OTHER CLEANING AND MAINTENANCE ACTIVITIES; AND WASTE HANDLING ACTIVITIES. THESE POLLUTANTS INCLUDE FUEL, HYDRAULIC FLUID, AND OTHER OILS FROM VEHICLES AND MACHINERY, AS WELL AS DEBRIS, FERTILIZER, PESTICIDES AND HERBICIDES, PAINTS, SOLVENTS, CURING COMPOUNDS AND ADHESIVES FROM CONSTRUCTION OPERATIONS (SECTIONS 2.2.15 AND 2.3)
26. PROVIDE PLANS FOR SEDIMENTATION BASINS THAT HAVE BEEN DESIGNED PER SECTION 2.2.17 AND STAMPED BY AN OREGON PROFESSIONAL ENGINEER (SEE SECTION 2.2.17.A)
27. IF ENGINEERED SOILS ARE USED ON SITE, A SEDIMENTATION BASIN/IMPOUNDMENT MUST BE INSTALLED (SEE SECTIONS 2.2.17 AND 2.2.18)
28. PROVIDE A DEWATERING PLAN FOR ACCUMULATED WATER FROM PRECIPITATION AND UNCONTAMINATED GROUNDWATER SEEPAGE DUE TO SHALLOW EXCAVATION ACTIVITIES (SEE SECTION 2.4)
29. IMPLEMENT THE FOLLOWING BMPS WHEN APPLICABLE: WRITTEN SPILL PREVENTION AND RESPONSE PROCEDURES, EMPLOYEE TRAINING ON SPILL PREVENTION AND PROPER DISPOSAL PROCEDURES, SPILL KITS IN ALL VEHICLES, REGULAR MAINTENANCE SCHEDULE FOR VEHICLES AND MACHINERY, MATERIAL DELIVERY AND STORAGE CONTROLS, TRAINING AND SIGNAGE, AND COVERED STORAGE AREAS FOR WASTE AND SUPPLIES (SECTION 2.3)
30. USE WATER, SOIL-BINDING AGENT OR OTHER DUST CONTROL TECHNIQUE AS NEEDED TO AVOID WIND-BLOWN SOIL (SECTION 2.2.9)
31. THE APPLICATION RATE OF FERTILIZERS USED TO REESTABLISH VEGETATION MUST FOLLOW MANUFACTURER'S RECOMMENDATIONS TO MINIMIZE NUTRIENT RELEASES TO SURFACE WATERS. EXERCISE CAUTION WHEN USING TIME-RELEASE FERTILIZERS WITHIN ANY WATERWAY RIPARIAN ZONE (SECTION 2.3.5)
32. IF AN ACTIVE TREATMENT SYSTEM (FOR EXAMPLE, ELECTRO-COAGULATION, FLOCCULATION, FILTRATION, ETC.) FOR SEDIMENT OR OTHER POLLUTANT REMOVAL IS EMPLOYED, SUBMIT AN OPERATION AND MAINTENANCE PLAN (INCLUDING SYSTEM SCHEMATIC, LOCATION OF SYSTEM, LOCATION OF INLET, LOCATION OF DISCHARGE, DISCHARGE DISPERSION DEVICE DESIGN, AND A SAMPLING PLAN AND FREQUENCY) BEFORE OPERATING THE TREATMENT SYSTEM. OBTAIN ENVIRONMENTAL MANAGEMENT PLAN APPROVAL FROM DEQ BEFORE OPERATING THE TREATMENT SYSTEM. OPERATE AND MAINTAIN THE TREATMENT SYSTEM ACCORDING TO MANUFACTURER'S SPECIFICATIONS. (SECTION 1.2.9)
33. TEMPORARILY STABILIZE SOILS AT THE END OF THE SHIFT BEFORE HOLIDAYS AND WEEKENDS, IF NEEDED. THE REGISTRANT IS RESPONSIBLE FOR ENSURING THAT SOILS ARE STABLE DURING RAIN EVENTS AT ALL TIMES OF THE YEAR. (SECTION 2.2)
34. AS NEEDED BASED ON WEATHER CONDITIONS, AT THE END OF EACH WORKDAY SOIL STOCKPILES MUST BE STABILIZED OR COVERED, OR OTHER BMPS MUST BE IMPLEMENTED TO PREVENT DISCHARGES TO SURFACE WATERS OR CONVEYANCE SYSTEMS LEADING TO SURFACE WATERS. (SECTION 2.2.8)
35. SEDIMENT FENCE: REMOVE TRAPPED SEDIMENT BEFORE IT REACHES ONE THIRD OF THE ABOVE GROUND FENCE HEIGHT AND BEFORE FENCE REMOVAL (SECTION 2.1.5.B)
36. OTHER SEDIMENT BARRIERS (SUCH AS BIOBAGS): REMOVE SEDIMENT BEFORE IT REACHES TWO INCHES DEPTH ABOVE GROUND HEIGHT AND BEFORE BMP REMOVAL (SECTION 2.1.5.C)
37. CATCH BASINS: CLEAN BEFORE RETENTION CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT. SEDIMENT BASINS AND SEDIMENT TRAPS: REMOVE TRAPPED SEDIMENTS BEFORE DESIGN CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT AND AT COMPLETION OF PROJECT (SECTION 2.1.5.D)
38. WITHIN 24 HOURS, SIGNIFICANT SEDIMENT THAT HAS LEFT THE CONSTRUCTION SITE, MUST BE REMEDIATED. INVESTIGATE THE CAUSE OF THE SEDIMENT RELEASE AND IMPLEMENT STEPS TO PREVENT A RECURRENCE OF THE DISCHARGE WITHIN THE SAME 24 HOURS. ANY IN-STREAM CLEAN-UP OF SEDIMENT SHALL BE PERFORMED ACCORDING TO THE OREGON DIVISION OF STATE LANDS REQUIRED TIMEFRAME. (SECTION 2.2.19.A)
39. THE INTENTIONAL WASHING OF SEDIMENT INTO STORM SEWERS OR DRAINAGE WAYS MUST NOT OCCUR. VACUUMING OR DRY SWEEPING AND MATERIAL PICKUP MUST BE USED TO CLEANUP RELEASED SEDIMENTS. (SECTION 2.2.19)
40. DOCUMENT ANY PORTION(S) OF THE SITE WHERE LAND DISTURBING ACTIVITIES HAVE PERMANENTLY CEASED OR WILL BE TEMPORARILY INACTIVE FOR 14 OR MORE CALENDAR DAYS (SECTION 6.5.F)
41. PROVIDE TEMPORARY STABILIZATION FOR THAT PORTION OF THE SITE WHERE CONSTRUCTION ACTIVITIES CEASE FOR 14 DAYS OR MORE WITH A COVERING OF BLOWN STRAW AND A TACKIFIER, LOOSE STRAW, OR AN ADEQUATE COVERING OF COMPOST MULCH UNTIL WORK RESUMES ON THAT PORTION OF THE SITE. (SECTION 2.2.20)
42. DO NOT REMOVE TEMPORARY SEDIMENT CONTROL PRACTICES UNTIL PERMANENT VEGETATION OR OTHER COVER OF EXPOSED AREAS IS ESTABLISHED. ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED, ALL TEMPORARY EROSION CONTROLS AND RETAINED SOILS MUST BE REMOVED AND DISPOSED OF PROPERLY, UNLESS NEEDED FOR LONG TERM USE FOLLOWING TERMINATION OF PERMIT COVERAGE (SECTION 2.2.21)
43. ALL FACILITIES TO BE USED FOR POST-CONSTRUCTION STORMWATER MANAGEMENT SHOULD BE DELINEATED ONCE CONSTRUCTED TO PREVENT TRAMPLING BY FOOT OR EQUIPMENT.
44. ONCE INSTALLED, INLET PROTECTION WILL BE IMPLEMENTED FOR EACH CATCH BASIN FOR THE DURATION OF CONSTRUCTION.

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ESCP NOTES

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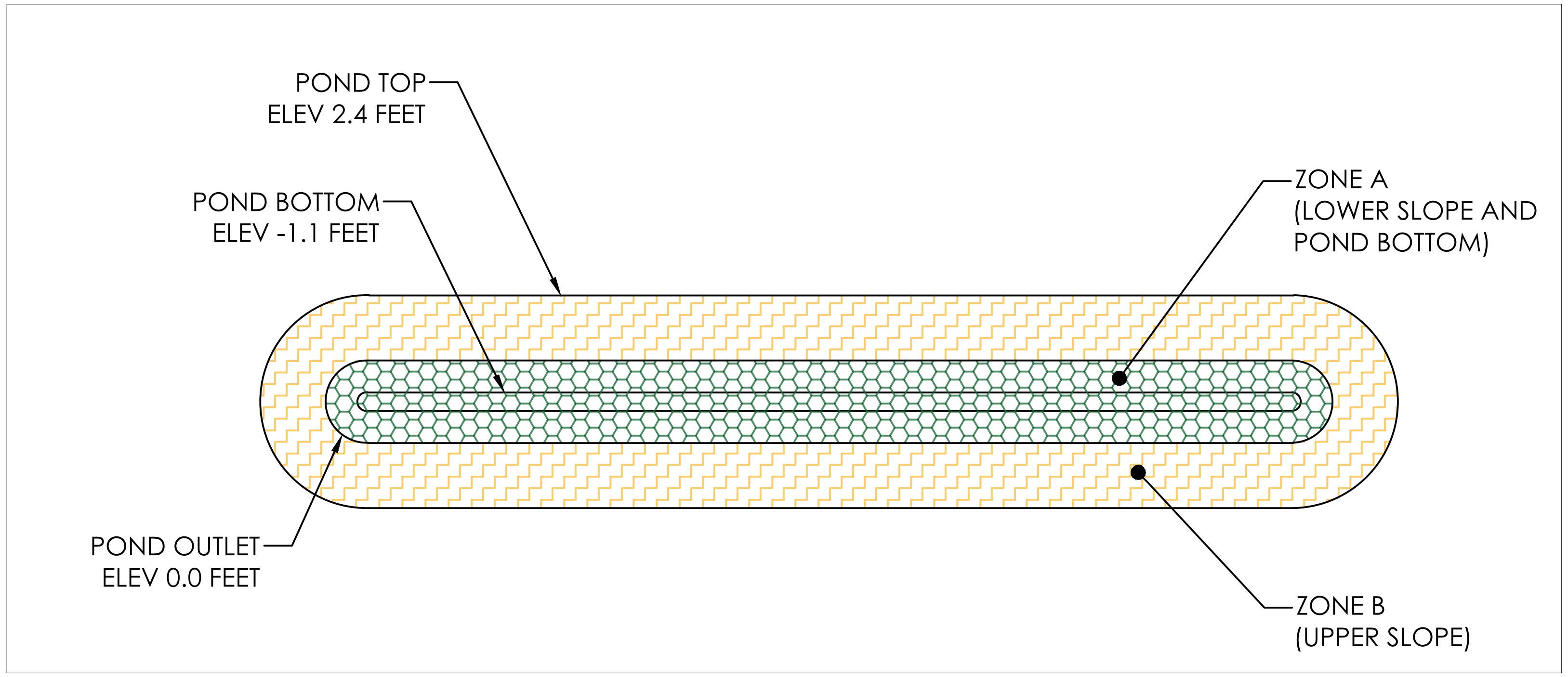
EXHIBIT
C3.7



A STORMWATER POND PLANTING PLAN, TYP

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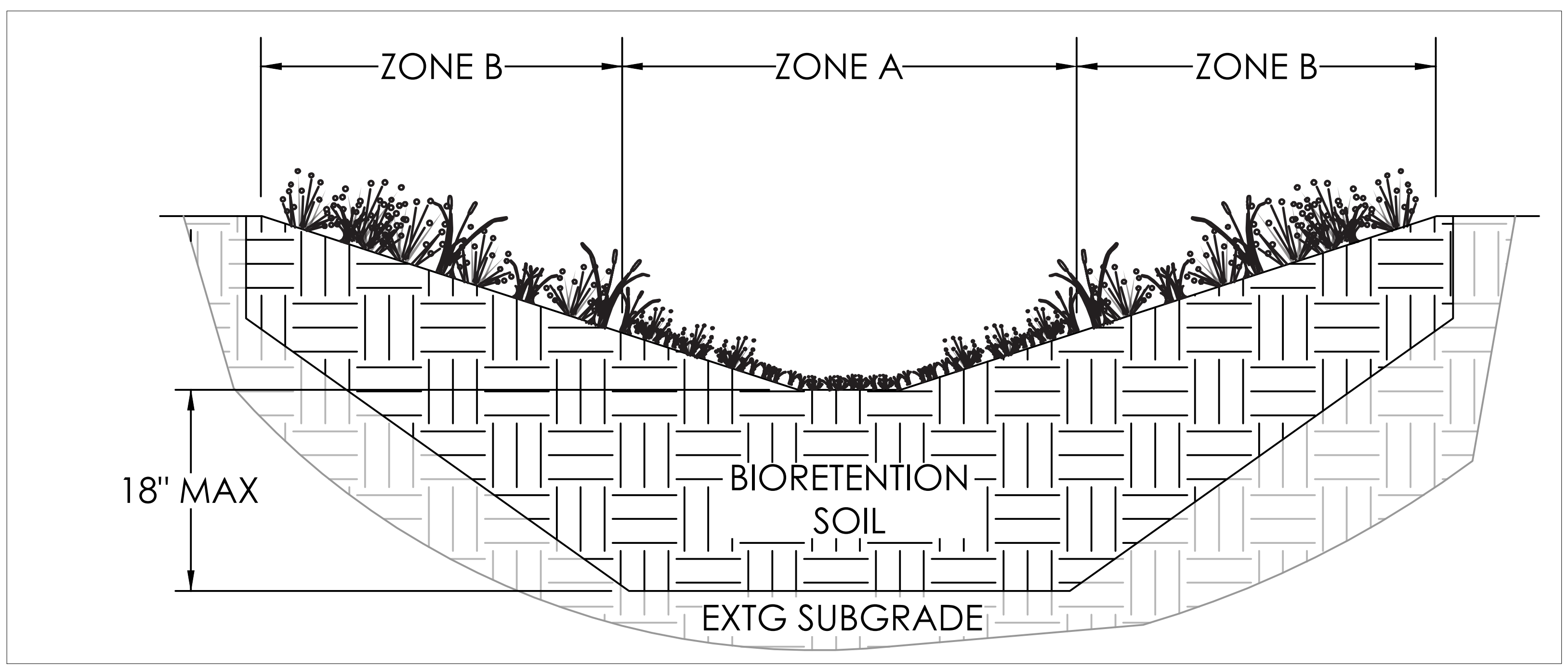

B STORMWATER POND DETAIL

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SEED MIX

LOCATION	DESCRIPTION
ZONE A	PROTIME SEED MIX 440 (NATIVE BIOFILTER MIX): • MEADOW BARLEY (*HORDEUM BRACHYANTHERUM*) • BLUE WILDRYE (*ELYMUS GLAUCUS*) • TUFTED HAIRGRASS (*DESCHAMPSIA CESPITOSA*) • AMERICAN SLOUGHGRASS (*BECKMANNIA SYZIGACHNE*) • WESTERN MANNAGRASS (*GLYCERIA OCCIDENTALIS*)
ZONE B	PROTIME SEED MIX 498 NATIVE RIPARIAN MIX): • BLUE WILDRYE (*ELYMUS GLAUCUS*) • SPIKE BENTGRASS (*AGROSTIS EXARATA*) • SLENDER HAIRGRASS (*DESCHAMPSIA ELONGATA*) • LARGE LEAF LUPINE (*LUPINUS POLYPHYLLUS*)

POND DETAILS

- USE MAXIMUM 18" SOILS THAT MEET THE SPECIFICATIONS OF A HIGH PERFORMANCE BIORETENTION SOIL MIX AS DEFINED IN THE WASHINGTON DEPARTMENT OF ECOLOGY STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON
- 3:1 SIDE SLOPES
- DELINEATION BETWEEN ZONE A AND B IS SET AT THE OUTLET ELEVATION (0.0 FEET)

CONSTRUCTION CONSIDERATIONS

MARK THE LOCATION OF PROPOSED FACILITIES AND FENCE OR COVER FACILITY LOCATIONS AFTER EXCAVATION. LEAVE AT LEAST 6" OF NATIVE SOIL DURING THE INITIAL EXCAVATION TO LIMIT COMPACTION DURING CONSTRUCTION. DO NOT ALLOW VEHICULAR TRAFFIC, FOOT TRAFFIC, MATERIAL STORAGE, OR HEAVY EQUIPMENT WITHIN 10 FEET OF THE POND AREA EXCEPT AS NEEDED TO EXCAVATE, GRADE, AND CONSTRUCT THE FACILITY. DO NOT ALLOW ENTRY OF RUNOFF OR SEDIMENT DURING CONSTRUCTION

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PLANTING PLAN AND POND DETAIL

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

EXHIBIT C3.8

APPENDIX A
SOIL SURVEY REPORT

USDA United States Department of Agriculture

NRCS Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Columbia County, Oregon

NEXT Renewables

December 8, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

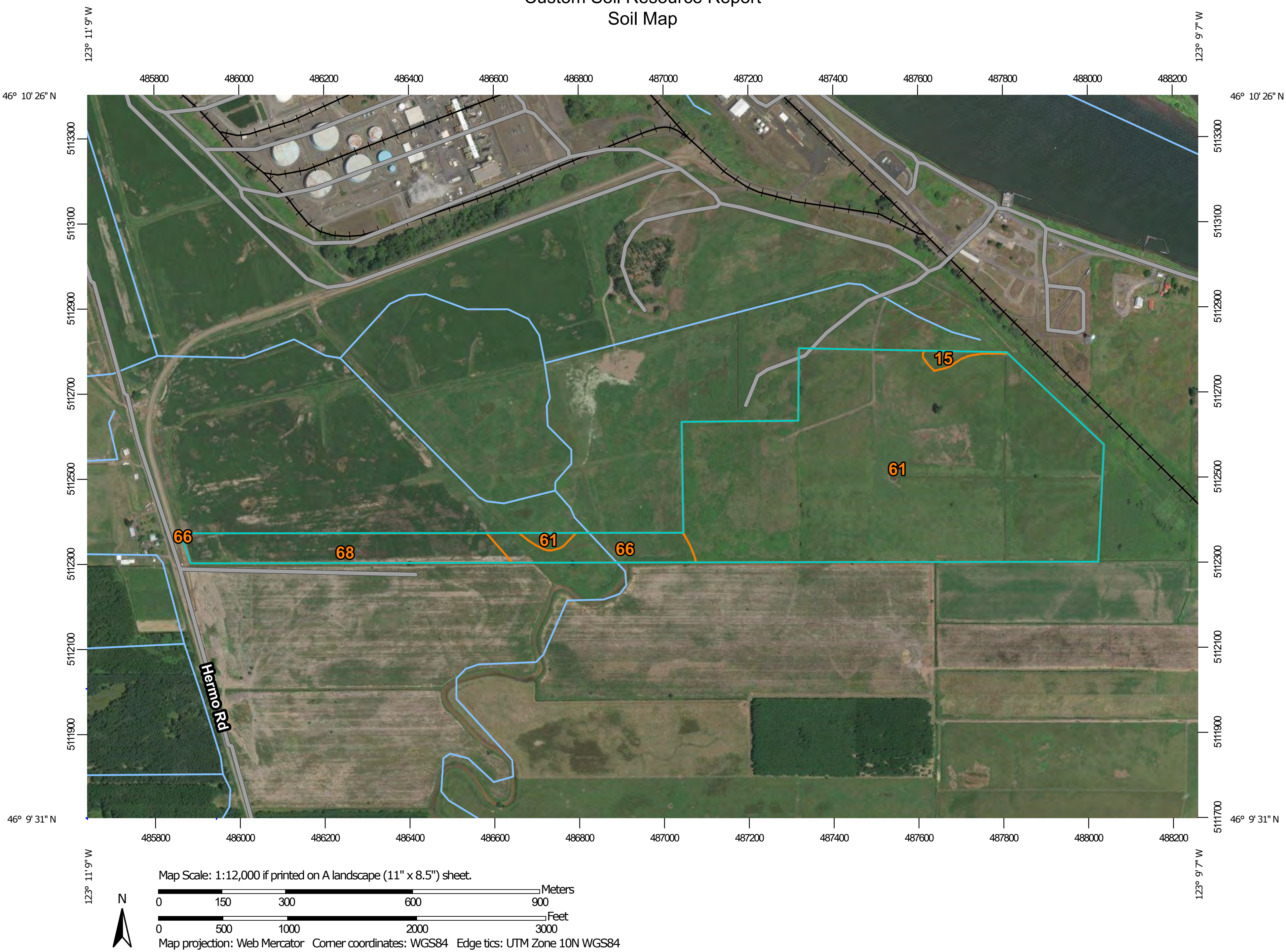
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map


123° 11' 9" W
123° 9' 7" W
46° 10' 26" N
46° 9' 31" N
485800
486000
486200
486400
486600
486800
487000
487200
487400
487600
487800
488000
488200
5113300
5113100
5112900
5112700
5112500
5112300
5112100
5111900
5111700
15
61
61
66
66
68
Hermo Rd
Map Scale: 1:12,000 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0
150
300
600
900
Feet
0
500
1000
2000
3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Columbia County, Oregon
Survey Area Data: Version 17, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 16, 2015—Feb 12, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
15	Crims silt loam, protected	1.0	0.8%
61	Udipsamments, nearly level, protected	104.1	83.4%
66	Wauna silt loam, protected	7.0	5.6%
68	Wauna-Locoda silt loams, protected	12.9	10.3%
Totals for Area of Interest		**124.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Columbia County, Oregon

15—Crims silt loam, protected

Map Unit Setting

National map unit symbol: 21f3
Elevation: 0 to 20 feet
Mean annual precipitation: 50 to 80 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Crims, protected, and similar soils: 95 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crims, Protected

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Partially decomposed herbaceous plant material over silty alluvium

Typical profile

H1 - 0 to 9 inches: silt loam
Oe - 9 to 40 inches: mucky peat
H3 - 40 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: RareNone
Frequency of ponding: Frequent
Available water capacity: Very high (about 22.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Locoda, protected

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Across-slope shape: Linear
Other vegetative classification: Very Poorly Drained (G001XY009OR)
Hydric soil rating: Yes

Wauna, protected

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G001XY008OR)
Hydric soil rating: Yes

61—Udipsamments, nearly level, protected

Map Unit Setting

National map unit symbol: 21h4
Elevation: 0 to 40 feet
Mean annual precipitation: 50 to 80 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 145 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Udipsamments, protected, and similar soils: 85 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udipsamments, Protected

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy dredge spoils

Typical profile

H1 - 0 to 4 inches: loamy sand
H2 - 4 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: Yes

Minor Components

Wauna, protected

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G001XY008OR)
Hydric soil rating: Yes

Locoda, protected

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Very Poorly Drained (G001XY009OR)
Hydric soil rating: Yes

Crims, protected

Percent of map unit: 4 percent
Landform: Flood plains
Hydric soil rating: Yes

66—Wauna silt loam, protected

Map Unit Setting

National map unit symbol: 21h9
Elevation: 0 to 40 feet
Mean annual precipitation: 50 to 80 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 145 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wauna, protected, and similar soils: 90 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wauna, Protected

Setting

Landform: Flood plains

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium derived from mixed sources

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 26 inches: silt loam
H3 - 26 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 60 inches
Frequency of flooding: NoneRare
Frequency of ponding: None
Available water capacity: Very high (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Forage suitability group: Poorly Drained (G002XY006OR)
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Minor Components

Crims, protected

Percent of map unit: 3 percent
Landform: Flood plains
Hydric soil rating: Yes

Locoda, protected

Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Very Poorly Drained (G001XY009OR)
Hydric soil rating: Yes

Udipsamments, protected

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

68—Wauna-Locoda silt loams, protected

Map Unit Setting

National map unit symbol: 21hc
Elevation: 0 to 40 feet
Mean annual precipitation: 50 to 80 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 145 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wauna, protected, and similar soils: 45 percent
Locoda, protected, and similar soils: 35 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wauna, Protected

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium derived from mixed sources

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 26 inches: silt loam
H3 - 26 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 60 inches
Frequency of flooding: NoneRare
Frequency of ponding: None
Available water capacity: Very high (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Forage suitability group: Poorly Drained (G002XY006OR)
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Description of Locoda, Protected

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium from mixed sources

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: RareNone
Frequency of ponding: Frequent
Available water capacity: Very high (about 12.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Forage suitability group: Poorly Drained (G002XY006OR)
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Minor Components

Udipsamments, protected

Percent of map unit: 7 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Crims, protected

Percent of map unit: 7 percent
Landform: Flood plains
Hydric soil rating: Yes

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APPENDIX B

2001 GEOTECHNICAL ENGINEERING REPORT

Harza Engineering Company
Fossil Power Business Unit
Two Honey Creek Corporate Center
115 South 84th Street, Suite 200
Milwaukee, Wisconsin

GEOTECHNICAL EVALUATION
SUMMIT/WESTWARD ENERGY PROJECT
CLATSKANIE, OREGON

May 2001

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JULY 13, 1999
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TABLE OF CONTENTS

TABLE OF CONTENTS *(Continued)*

List of Tables

List of Figures

TABLE OF CONTENTS *(Continued)*

List of Appendices

GEOTECHNICAL EVALUATION
SUMMIT/WESTWARD ENERGY PROJECT
CLATSKANIE, OREGON

1.0 INTRODUCTION

This geotechnical evaluation report has been completed for the proposed Summit/Westward Energy Project, which includes a new natural gas-fired combined-cycle combustion turbine generation facility located near Clatskanie, Oregon. The project site is located on Port of St. Helens property located in Columbia County approximately seven miles northeast of Clatskanie, Oregon. The Vicinity Map, Figure 1, shows the location of the project site.

The purpose of this evaluation was to present findings regarding the geologic and seismic setting of the project site; assess the nature of the subsurface conditions and materials which underlie the project site including site specific seismic evaluation; develop preliminary conclusions concerning the key geotechnical aspects of the project, such as foundations for the turbines/generators and other settlement sensitive facilities; seismic design considerations; and related site geotechnical issues. This report also contains "site specific geological and soil stability assessment" information pertinent to site certificate application, Exhibit H, requirements by Oregon Department of Energy, Energy Facility Siting Council.

2.0 LIMITATIONS

The scope of the geotechnical evaluation presented herein is limited to the assessment of geologic site-specific conditions and evaluation of the subsurface conditions related to the proposed facilities for the Summit/Westward Energy Project near Clatskanie, Oregon. This report has been prepared to aid Harza Engineering Company, Milwaukee, Wisconsin and the project owner in the evaluation of the site and application for site certificate for the proposed facility in accordance with generally accepted engineering geologic and geotechnical engineering practices. No other warranty, based on the contents of this report is intended, and none shall be inferred from the statements or opinions expressed herein.

Our description of the project represents our understanding of the significant aspects of the project relevant to the general arrangement of the project and the proposed site layout provided by Harza Engineering. In the event that any changes in the proposed locations of the structures as outlined in this report are planned or occur, we recommend that a geotechnical review of the changes be made to affirm in writing the conclusions of this report.

The scope of our services reported herein included environmental field screening of the near surface soils to a depth of 15 feet below the current ground surface for the presence of certain soil contaminants. Any statement in this report or on the boring logs regarding odors noted or unusual or suspicious items or conditions observed are solely for the information of our client.

The analyses and conclusions represented in this report are based on the data obtained from the borings made at the locations indicated on the Boring Location Site Map, (Figure 2) and from other information discussed herein. This report is based on the assumption that the subsurface conditions across the site are not significantly different from those revealed by the borings. However, variations in soil conditions may exist between the borings locations. The nature and extent of the variations may not become evident until further investigations are made at the site during the design phase or during construction.

The exploratory activities, laboratory testing, and preliminary analysis are consistent with those normally used in conceptual or preliminary geotechnical evaluations and for site characterizations to develop budgets for future design and construction. When concepts have been better defined, additional explorations and analyses will be necessary to complete the geotechnical analysis and to provide design recommendations.

3.0 BACKGROUND INFORMATION

3.1 Topography

The site is located in the Oak Point 7½-minute quadrangle (U.S. Geological Survey, 1985). The proposed generation facilities site is a relatively flat, vegetation covered pasture land with shallow drainage ditches containing water generally to the south and east of the proposed main plant facilities. The greatest relief on the site is related to the existing drainage ditches, which are less than 10 feet deep with associated spoil piles from the ditch excavations. The ground surface on the site varies between elevations 5 and 10 feet, based on North American Vertical Datum (NAVD) 1988, according to the contours shown on Figure 2. The topography north of the site remains flat for a distance of approximately 2000 feet to a levee that bounds Bradbury Slough, a side channel of the Columbia River.

3.2 Project Description

The proposed project layout map is shown on Figure 2. Along the northeast border of the property are existing gas lines and power lines and a railroad spur. We understand that the generation facility will contain the following major components:

- Combustion Turbines and Generators;
- Heat Recovery Steam Generators (HRSGs);
- A Steam Turbine, Condenser and Generator;
- Main Power Transformers;
- Miscellaneous Buildings;
- Multi-cell Cooling Tower Complex;
- Water Storage Tanks;
- In-plant Substation and Switch Yard; and
- Pipes, Conduits, and Pipe Racks.

We understand there also will be numerous buried utilities and associated underground vaults constructed across the proposed plant site to depths up to 20 feet. Large diameter underground pipelines will be installed between the cooling tower and the steam generator. We understand the orientation of the structures shown on Figure 2 could change, but the general spacing or relative location will remain similar.

4.0 GEOLOGIC SETTING

The information in this section represents a summary of the geologic setting information presented in Appendix D.

4.1 Regional and Site Geology

The Summit/Westward Energy Project site and its related/supporting facilities are located on the Columbia River alluvial valley within the Coast Range physiographic province of northern Oregon and southern Washington. A physiographic province is a region of similar geologic history and composition. The Coast Range province is broadly upwarped, forming a low mountain range located between the Pacific Ocean and coastline on the west and Willamette Valley-Puget Sound Lowlands on the east. The general geology in the vicinity of the project area is shown in Appendix D, Geology Map, Figure H3 (Walsh and others, 1987 and Walker and MacLeod 1991). The region is underlained from oldest to youngest: basement rock of

Eocene epoch age volcanic sea floor basalt and island volcanic centers; a thick marine sedimentary sequence of younger Oligocene to Miocene; Miocene epoch Columbia River Basalt lava flows; and local younger alluvial deposits along the Columbia River, coastal rivers and bays. The Eocene volcanic rock basement is estimated to be about 20 miles thick under the Oregon Coast Range (Orr and Orr, 1996). The overlying marine sedimentary sequence is at least 5,000 feet thick and the Columbia River Basalt 1,400 feet thick in the northern Oregon Coast Range (Beaulieu, 1973). The alluvial sediments may be about 350 feet thick.

Following the cessation of Columbia River Basalt volcanism, the Coast Range began to uplift. Concurrently, the eastern and western margins began to subside and sedimentation resumed along the eastern and western margin of the uplift. As the uplift continued, the erosive power of the Columbia River was able to maintain its course through the growing mountain range.

During the Pleistocene (2 million years) (Orr and Orr, 1996), major continental glaciers periodically formed over much of Canada and Europe. At glacial maximums, vast quantity of water was locked up in glacial ice, which caused 300 to 450 feet lowering of sea level (Balwin, 1964). During these times, the Columbia River eroded a deep channel. The eroded Pleistocene Columbia River channel was probably greater than 350 feet deep at the project site.

During glacial maximums, glacial ice advance blocked the Clark Fork River in northern Idaho and northwestern Montana. Water backed up behind the ice-dam until the dam became unstable and failed, releasing a vast flood of water (Trimble, 1963). These floods are known as the Pleistocene floods or "Bretz Floods". These floods scoured and redeposited sands and gravels in the Pleistocene river channel. At the site, the Pleistocene channel at the time of the floods was probably greater than 350 feet below the present day ground surface. Consequently, the Pleistocene flood deposits are not exposed at the surface in the lower Columbia River valley but are probably present at depths below 300 feet.

At the end of each glacial period, including the latest, sea level rose rapidly as the glacial ice melted. This rise in sea level caused a general flooding and formation of an estuary environment in the lower Columbia River. The base level of the Columbia River rose concurrently, resulting in rapid sedimentation of alluvium along the river. This alluvium consists of sand deposit along the river channel and silt, clay, and organic soils in the overbank (flood plain) deposit.

The geologic structure within the vicinity of the project area is complex. Overall, the area is dominated by the broad north-south upwarp of the Coast Range. The amount of upwarping is uneven, with both the Tillamook highlands to the south and Willapa Hills to the north, uplifted higher than the area in between along the lower Columbia River. Geologic mapping shows the older rocks exposed in the core of the uplifted areas are extensively faulted (Walker and MacLeod, 1991 and Walsh and others, 1987). Faults are generally oriented northwest-southeast and northeast-southwest. Most of these faults, however, appear to be restricted to the older rocks suggesting that they are related to the older tectonism and were not active after the deposition of the younger sedimentary rocks. Therefore, they are not active now.

Superimposed on the broad uplift are numerous small secondary folds. In the vicinity of the project, these secondary folds are oriented northwest-southeast (Walker and MacLeod, 1991 and Walsh and others, 1987). The nearest mapped secondary fold is a syncline that trends through Quincy, beneath the project site and into the state of Washington.

4.2 Seismic Setting

The site is located in the seismic region known as the Cascadia Subduction Zone (CSZ), which extends from Northern California to British Columbia. A more in depth discussion of the CSZ is presented in Appendix D. In the CSZ, just off the coast of Oregon and Washington, the oceanic Juan de Fuca Plate is being forced under the North American Plate. Much of the Pacific Northwest's topographic relief, including the Coast Ranges and Cascade Mountains and the region's seismicity, can be attributed to the plate tectonics of the region. Three types of earthquakes are known to occur within the CSZ: shallow crustal, deeper subcrustal intraplate, and the large interface. The most seismically active area occurs in the Puget Sound region, 60 miles to north.

Earthquakes are sized using two fundamentally different scales: Modified Mercalli scale and magnitude scales. The following definitions are based on Rogers, Walsh, Kockelman, and Priest (1996) definitions. The Modified Mercalli scale was developed before the advent of mechanical means of measuring earthquakes. It is a subjective numerical index describing the severity of an earthquake in terms of its effects on the Earth's surface and on humans and their structures. The index scale spans from Roman Number I, felt by few, to XII, total destruction. Unless specifically stated, Modified Mercalli intensity is the maximum observed at the epicenter of an earthquake.

Magnitude scale is a measured number that characterizes the relative size of an earthquake. It is based on measurement of the maximum motion recorded by a seismograph corrected for attenuation to a standardized distance. Several magnitude scales have been defined, but the most commonly used are 1) local magnitude (M_L), commonly referred to as "Richter magnitude," 2) surface-wave magnitude (MS), 3) body-wave magnitude (m_b), and movement magnitude (M_W). The first three scales have limited range and applicability and do not satisfactorily measure the largest earthquakes. The moment magnitude (M_W) scale is based on the concept of seismic moment, and is uniformly applicable to all sizes of earthquakes. Conceptually, all magnitude scales can be cross-calibrated to yield the same value for any given earthquake. In practice, however, this has only been proved to be approximately true. For engineering purposes, the scales are similar enough that the differences are not significant. Historically, most of the earthquakes recorded in the Pacific Northwest were reported in local magnitude M_L scale. For this report, magnitudes are expressed as **M** without attempting to convert between the various scales.

Shallow crustal earthquakes take place typically between depths of 10 km and 20 km. Several earthquakes between estimated **M**4 and **M**5 have occurred within 31 miles (50 km) of the site over the past 150 years. The most significant event is the estimated **M**5.2, 1962 Portland-Vancouver earthquake located approximately 46 miles east-southeast of the site. Earthquake recurrence relationship suggests a magnitude **M**6.0 event with about a 500-year recurrence and a magnitude **M**6.5 event with about a 5000-year recurrence.

The second major type of earthquake that could affect the site is a deeper subcrustal intraplate earthquake occurring within the subducting Juan de Fuca Plate at depths between 40 km to 60 km. The 1949 Olympia and the 2001 Nisqually earthquakes were deep subcrustal events. An intraplate earthquake could potentially occur directly below the site (depth 50 km). The maximum expected magnitude for an intraplate earthquake is between **M**7.0 and **M**7.5. An earthquake recurrence relationship extrapolated to large magnitudes based on smaller magnitude subcrustal earthquakes suggests that an **M**7.0 event may occur in the region once in 1000 years. The distance that this possible event could have ranges between 0 to more than 30 miles (0 to 50 km). For hazard analysis purposes, a **M**7.0 occurring directly beneath the site (distance 0 km, depth 50 km) and a larger **M**7.5 event occurring at a distance of 30 miles (50 km) were considered.

The third major type of earthquake that potentially could affect the site is an interface, or subduction zone, earthquake, which could take place at the boundary of the Juan de Fuca and the North American plates. Although a subduction zone earthquake has not been historically recorded off the coast of Oregon or Washington, geologic data suggests that a **M9+** earthquake is possible from an interface event. The best estimate for the most likely size ranges between magnitudes **M8** to **M9** depending upon the length that ruptures. Recurrence for a subduction zone interface earthquake ranges from 350 to 600 years, with a mean recurrence of about 450 years. The last event occurred 300 years ago. The nearest approach of a CSZ interface earthquake would be about 30 miles (50 km) west of the site.

A literature review was also conducted to identify known geologically active or potentially active faults within 62 miles (100 km) of the site. The results are presented in Appendix D. Primary reference sources reviewed include Seismic Design Mapping: State of Oregon (Geomatrix Consultants, 1995), National Seismic Hazard Maps (Frankel, et al., 1996) and Wong and others (2000). The review shows that there are at least eleven geologic faults or fault zones with or suspected with greater than 50 percent probability of having Quaternary movement (movement within the last two million years). In addition, the CSZ is active and underlies the site at depth.

4.3 Geologic Hazards

Potential geologic hazards for the site were evaluated. The results are presented in Geologic and Soil Stability Assessment, Appendix D. Based on the geologic history, the alluvial soil is assumed to extend down to about 350 feet below sea level. Deep alluvial soils at the site strongly affect seismic ground response at the surface. The assessment identified the primary geologic and soil stability issues are associated with seismic hazards: primarily strong ground shaking, the potential for liquefaction of some of the subsurface materials, and seismically induced settlement. The analysis indicates that seismic waves would be significantly dampened and deamplified as they traverse up through the deep soil column. In addition, the analysis suggests that some of the loose sandy silt and sand strata may be susceptible to liquefaction during a subduction zone earthquake event. The occurrence of liquefaction could result in loss of foundation bearing capacity of the near surface soils and/or settlement. Consequently, heavy structures and structures sensitive to settlement probably will be founded on deep piles driven to below identified liquefiable zones to provide adequate support.

Other geologic hazards, in our current opinion, are not significant at the site. The site is flat and there are no landslide or slope stability issues. Also, there is little risk of fault displacement at the site. In addition, the site is located behind flood control levees that provide 100-year flood protection with 4.7 feet of freeboard. Since the site is level and over 2000 feet from Bradbury

Slough, the potential for lateral spreading is not considered a hazard. Also, the site is too far from the ocean to be affected by tsunami.

5.0 FIELD EXPLORATIONS AND LABORATORY TESTING

The subsurface conditions beneath the site were investigated with eight borings that were advanced between April 16 and April 25, 2001. Laboratory and field soil tests consisting, of among others, photoionization, soil classification, seismic compression and shear wave, and soil resistivity tests were performed. Presented in the following sections is a discussion of tests performed at the site during the field exploration and laboratory testing that were performed on the samples returned to our office.

5.1 Field Explorations

The locations of the borings, designated B-1 through B-8, are shown on the Borehole Location Map, Figure 2. The borings were advanced to between 80 and 150 feet from the ground surface using a combination of track and truck-mounted drill rigs owned and operated by Geo-Tech Explorations of Tualatin, Oregon. A total of 852 feet lineal feet was drilled, sampled, and logged.

During the drilling, disturbed samples were obtained at about every 2.5 feet in the upper 25 feet, and about 5 feet thereafter using the Standard Penetration Test (SPT) ASTM D1586. During the Standard Penetration Test, the N-value blow counts required to advance the sampler with a 140-pound weight dropped 30 inches was recorded. The N-value, expressed as blows per foot, is used to provide a measure of the relative density of granular soils such as sand, and the consistency of cohesive soils such as silt and clay. In addition, thin-wall Shelby tube samples of relatively undisturbed soil were obtained at selected depths.

Two piezometers, consisting of a slotted PVC pipe backfilled with clean free draining sand were installed in Borings B-4 and B-7 at the site to allow for future measurements of a ground water level. At the ground surface, each piezometer pipe was placed inside a flush mounted monument cover set in concrete. All the other borings were backfilled with bentonite up to the ground surface at the completion of drilling, except for B-3 that also contained the downhole testing PVC pipe, described below.

Presented in Appendix A is a description of the procedures used in making the borings, including the details of the piezometer installations and the techniques utilized in obtaining the various types of soil samples. Table A1 in Appendix A presents the terminology used to describe the soils. Presented on Figure A1 of Appendix A is information related to the symbols, soil and well material graphics, and soil property data presented on the boring logs. The logs of the borings are presented in figures A2 through A9.

5.2 Photoionization Testing

Environmental screening for the presence of volatile vapors in the upper 15 feet of each boring was analyzed by use of a Photoionization detector (PID). The PID measures vapors released from chemical volatilization of organic compounds in parts per million (ppm). For the purpose of environmental screening, a lower limit threshold was set to 10 ppm for this project based on typical industry standards, before further environmental analysis was considered necessary. Additional information on this testing is contained in Appendix A.

5.3 Laboratory Testing

Laboratory tests were performed on selected soils returned to our laboratory to evaluate the soil index properties and provide data related to the strength and settlement characteristics of the soil. The testing program adopted for this investigation includes soil visual examinations, moisture content, grain-size analyses, Atterberg limits, and unit weight measurements. In addition, two unconfined compressive strength and a soil consolidation test were also performed. Presented in Appendix B of this report is a description of the laboratory tests that were performed and the testing results.

5.4 Downhole Seismic Tests

A downhole seismic wave velocity survey for S and P waves was conducted at the project site in Boring B-3 on April 22, 2001. The test was performed by Northwest Geophysical Associates, Corvallis, Oregon, and the results are presented in Appendix C. In general, the test measures the time required for shear (S) and compression (P) waves propagation through soils over a range of distances from a surface energy source. By measuring the arrival time of shear waves at incremental depths in the borehole, a profile of shear wave velocity is developed. Changes in shear wave velocity with depth in the borehole were used to predict differences in soil types, soil properties and soil behavior. Shear wave velocity in the soils was used in the seismic analyses of the site and an evaluation of the range of the level of ground shaking during the controlling earthquake event.

5.5 Soil Resistivity

Soil resistivity measurements were made at the site on May 3, 2001 to determine the soil resistance to an electric current. We understand this information will be used to evaluate the grounding potential of the soils at the site. The resistivity of the soil was measured using the four-point Wenner method with tests performed by Northwest Geophysical Associates. The results of the test are presented in Appendix E.

6.0 DISCUSSION OF SUBSURFACE CONDITIONS

6.1 Soils

Figure 3 through Figure 5 present general geologic cross sections, which show in a generalized manner, the interpreted subsurface conditions disclosed by the borings at various locations at the site. The Cross Sections are designated A-A', B-B', and C-C' and their location and orientation are shown on the Site Plan, Figure 2. The geologic Cross Sections are interpretive in nature and the contacts between soil units may be gradational. Further, variations in soil conditions may exist between the locations of the borings.

As shown on the geologic Cross Sections, the subsurface materials encountered at the site can be divided into two general soil units within the depth of our explorations, based on their engineering characteristics and stratigraphic position. The subsections that follow present a description of the two soil units, including the subsurface conditions and materials present across the site. A more detailed description of the soils is described on the Boring Logs, Figures A2 through A9 (Appendix A).

6.1.1 Upper Fine-Grained Alluvium

An upper fine-grained alluvium unit was encountered in all the borings and consists generally of very soft silt with various minor amounts of fine sand. The upper alluvium was encountered up to depths between 25 to 60 feet from the ground surface. Blow counts or N-values, observed during the Standard Penetration Test (SPT) varied from 0 to 11 blows per foot. In general, the predominantly silt soils, which constituted a majority of the unit, had N-values between 0 and 2. Higher N-values between 5 and 11 were observed in the silt soils containing, in general, a higher percentage of sand. Organics, including isolated pieces of plant and wood fiber, were generally observed in estimated amounts between 5 to about 15 percent (based on volume) of the soil samples. The moisture content of the unit ranged between 40 to 70 percent. Some higher moisture contents were observed within the soils containing a larger percentage of organic matter.

The plasticity characteristics of the soil unit, as measured in Atterberg Limits Tests, indicate a Liquid Limit (LL) between 53 and 73 percent, and a Plastic Limit (PL) between 35 and 41 percent. These values are influenced, in our opinion, because of the presence of organic matter, as described previously. The Plasticity Index (PI) ranged between 0 percent (non-plastic) to 34 percent, with a majority of the test results below 15 percent. Locally within the unit, some minor amounts of clay were apparent, up to estimates of about 5 percent, by weight of the sample. Classification tests performed on the silt, including dry strength, dilatancy and toughness, performed in general accordance with ASTM D-2488, indicate a range of plasticity between non-plastic to medium plasticity, with a majority of the results ranging from non-plastic to low plasticity.

In general, as indicated by a majority of the "N"-values between 0 and 2, the silty soil was classified as either "very loose" or as "soft", depending upon its apparent plasticity. The condition of the silt, together with a high ground water level at the site, and the presence of organic matter, in our opinion, contributes to a moderate to high potential of settlement within the unit. A consolidation test was performed on a sample of the upper fine-grained alluvium with results discussed under Section 7.3.

Measurements of shear strength were performed on selected samples of the soil unit and consisted of unconfined compressive strength test, pocket penetrometer, and torvane strength tests. The results of the unconfined tests indicate undrained shear strength of between .18 and .25 ton per square foot (tsf), correlating to very soft. Pocket penetrometer tests and torvane tests performed on Shelby tube samples returned to our laboratory indicate a range of undrained shear strength between 0 and .25 tsf.

6.1.2 Lower Sandy Alluvium

Below the upper fine-grained alluvium, we encountered a lower sandy alluvium unit consisting mostly of fine-grained poorly graded sand with varying amounts of silt. All of the borings were terminated in this soil unit. N-values varied between 4 to 60 blows per foot, with most of the values between 20 to 35 blows per foot. The lower N-values within this unit were generally observed in the sand soils that contained a higher percentage of silt. The moisture content of the unit ranged between about 30 to 50 percent. Organics, although observed in this unit, were generally less abundant than observed in the upper fine-grained alluvium.

6.2 Ground Water

Ground water was measured at depths between 2 to 4 feet from the ground surface in Borings B-3, B-4 and B-5 during and immediately after drilling. A ground water level was not observed in the other borings and is in general, difficult to measure when a mud-rotary system is used. Based on our analyses and our experience, we believe that the ground water level at the site should be expected at elevations closely related to the surface water level in the Columbia River, located to the north of the site.

6.3 Photoionization Results

Photoionization results on soil samples in the upper 15 feet of each boring ranged from 0 to 8 ppm. Boring B-3 at 10 feet registered 8 ppm, while all other results in the other seven borings registered no more than 0.1 ppm. Since all results were below the minimum threshold, 10 ppm, previously described, no samples required additional analytical analysis.

7.0 PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

7.1 General Findings

The field explorations disclosed that deep soft alluvial sediments exist across the site. The conditions observed in the borings suggest that the upper 50 feet of soils is relatively loose to very soft, and potentially liquefiable during the design earthquake. In addition, ground water occurs at a relatively shallow depth. During periods of flooding, water level in the river is higher than the ground surface. High ground water is currently controlled by a drainage ditch system managed by the Beaver Drainage District. In our opinion, the upper relatively soft soils in their existing condition are not suitable for the support of settlement sensitive equipment, heavily loaded mat foundations, and building foundations. Pile supporting structures or ground modification techniques will be discussed in later sections.

7.2 Site Preparation/Earthwork/Ground Water Control

The following issues are considerations for future design and construction activities.

7.2.1 Clearing and Stripping

There are scattered trees that will need to be cleared and grubbed. The pasture land vegetation cover and topsoil should be stripped under settlement sensitive facilities and other areas where organics left in-place would be a detriment to long-term performance.

7.2.2 Well Abandonment

Regarding subsurface features, we became aware of an existing shallow water well that would need to be abandoned by a State of Oregon licensed water well driller. Similarly, the two soil borings containing the standpipe piezometers and the one boring containing the grouted pipe for the downhole seismic tests will need to abandoned according to Oregon Department of Water Resources regulations.

7.2.3 Working Pad (Site Fill)

Due to the relatively very loose and soft nature of the shallow subsurface materials and the high ground water levels, working pads or mats are advisable for the construction period. Typically, a pad constructed of imported granular material, preferably well-graded, free-draining crushed rock placed on a heavy non-woven geotextile would be used. The material specifications, thickness, and placement methods would depend on how the working pad would be incorporated into the design of the various foundation systems, roadway subgrade preparation, and buried piping. Based on discussions with the site grading consultant, we understand that site filling throughout most of the area will be less than 3 feet. The exception would be areas requiring special treatment. Since site filling would cause some settlement, we have assumed a site fill thickness of 3 feet in our analysis discussed in Section 7.4.

7.2.4 Drainage Ditches

There are at least two fairly deep drainage ditches that intersect the footprint of the plant facilities that will need to be dealt with during site preparation. We understand that these ditches are part of the Beaver Drainage District.

7.2.5 Softer Surface Areas

In the southwest portion of the site in the vicinity of the existing barn, we noticed that the ground surface was generally softer than the rest of the plant site area. Additional stripping or other treatment may be required if facilities area placed in this area.

7.2.6 Ground and Subsurface Modification

To decrease the long-term settlement of the deep, soft and loose subsurface materials for static and seismic loading conditions, various ground improvement methods may be needed as part of the overall site preparation. More discussion related to this is mentioned in sections below.

7.2.7 Earthwork and Ground Water Control

For the various earthwork activities, heavy earthwork equipment and loaded dump trucks most likely will have difficulty operating on the existing ground surface. During our explorations, truck-mounted soil exploration drill rigs were breaking through the vegetative cover and were stuck several times. For the excavations that extend below the shallow ground water, we anticipate that lowering ground water levels with positive control dewatering systems would be needed. Use of sump systems is generally not feasible for these types of soil. The use of excavated material from above and below the ground water levels for structural fill or backfill most likely is not feasible. Potential uses of the excavation spoils may be for landscaping or grading for surface drainage improvements. Grading this material with its high moisture content will be difficult.

7.2.8 Other Related Issues

There other site preparation issues adjacent to the site, such as construction of an access roadway embankment to change grade from the existing road on the levee adjacent to the slough, crossing of the raised grade railroad tracks, and preparation of subsurface for utilities coming into or leaving the site.

7.3 Soil Parameters for the Site

Soil parameters are provided for the project site to assist in the preliminary project site evaluation. Based on the subsurface conditions and the laboratory testing, the recommended soil parameters are presented in Table 1, below. Descriptions of the various parameters follow Table 1.

Table 1
Soil Parameters for the Site

Soil parameter	Very loose silt to sand	Very soft silt	Lower Sandy Alluvium
Poisson's ratio	0.2	0.3	0.25
Modulus of elasticity	100,000 psf	10,000 psf	250,000 psf
Shear modulus	300,000 psf	340,000 psf	900,000 psf
Subgrade modulus	30 pci	25 pci	100 pci
Moist unit weight	105 pcf	100 pcf	120 pcf

psf = pounds per square foot
pcf = pounds per cubic foot
pci = pounds per square inch per inch

7.3.1 Poisson's Ratio

Poisson's ratio, μ, is defined as the ratio of axial compression to lateral expansion strains. Poisson's ratio is both nonlinear and stress-dependent. The range of Poisson's ratio is relatively small for the same types of soil at the site; therefore, we estimated Poisson's ratio based on the soil classifications. The estimated Poisson's ratio values are presented on Table 1. The Poisson's ratio for the very soft silt is estimated for drained condition.

7.3.2 Modulus of Elasticity

The modulus of elasticity, E_0, is the initial slope of soil stress-strain curve. It is often estimated by correlation from field tests, such as the Standard Penetration Test (SPT) and Cone Penetration Test (CPT). For this project, we used the field SPT N-values and laboratory test results to estimate the Modulus of Elasticity for both the very loose silt to sand and very soft silt. The modulus of elasticity of the very soft silt is estimated for drained condition. The estimated modulus of elasticity values are shown in Table 1. Estimates of E_o were based on information from EPRI, 1990.

7.3.3 Shear Modulus

The shear modulus, G, is defined as the slope of the shear stress-strain curve. For soil seismic evaluation purposes, the shear modulus is often estimated by using shear wave velocity measurements, v_s. The relationship between shear modulus and shear wave velocity is: $G = \rho\, v_s^2$, where ρ is the mass density of the soil. The shear modulus estimated using the above method is a low-strain shear modulus. The shear modulus for the project site were estimated by using the measured shear wave velocity data obtained using a downhole technique in Boring B-3.

Appendix C provides additional background data related to the downhole shear wave velocity values. The estimated shear modulus values are shown in Table 1.

7.3.4 Subgrade Modulus

The subgrade modulus, k_{s1}, is defined as the ratio of stress to deformation for a 1-foot by 1-foot square plate or 1-foot wide beam resting on the subgrade. The subgrade modulus is generally dependent on the relative density of the native soil and the thickness of the compacted foundation structural fill above the native material. The estimated subgrade modulus for the native soils is shown in Table 1. The estimated subgrade modulus values in Table 1 are based on an assumption that footings directly are founded on the native soils. Therefore, in the final design phase, the subgrade modulus should be modified based on the thickness of the compacted working pad and foundation structural fill above the native soils.

7.3.5 Consolidation Settlement Parameters

A one-dimensional consolidation test was performed on a sample of the upper fine-grained alluvium layer, specifically from boring B-6, at a depth of 15 feet. The test sample was classified as soft silt (ML) with trace fine sand and scattered organics. An Atterberg Limits Test resulted LL = 53.6%, PL = 40.8 %, and PI = 13.9%.

The percent strain in the sample was plotted versus the applied test load. Since the interpreted apparent pre-consolidation pressure was slightly above the present overburden pressure, the sample was judged to be essentially normally consolidated. From the strained based consolidation test, soil was judged to normally consolidated based on a reconstructed curve to adjust for potential sample disturbance. The following parameters were estimated based on the results of the consolidation test and our experience:

$C_{c\varepsilon}$	=	0.12
$C_{r\varepsilon}$	=	0.0008
$C_{\alpha\varepsilon}$	=	0.002
Pre-consolidation pressure	=	1,700 psf
OCR	=	slightly over 1

where $C_{c\varepsilon} = \dfrac{C_c}{1 + e_o}$.

For definition of terms, we recommend referring to Holtz and Kovacs, 1981. In our experience with silty soil with organics along the Columbia River, we have seen $C_{c\varepsilon}$ values range from approximately 0.10 to 0.20, depending on the soil consistency and amount of organics.

7.3.6 Coefficient of Sliding Resistance

The lateral loads on the various power facilities, including lateral earth pressures, earthquakes, and wind can be resisted by sliding resistance of the foundation and partial soil passive pressure, which should be estimated in the final design. The coefficient of sliding resistance for concrete on granular materials generally ranges between 0.3 to 0.4. For this site, it is not feasible to place concrete foundations directly on the native soil.

7.3.7 CBR and Resilient Modulus

The native soil subgrade at the plant site is predominately very low strength non-plastic silt to sand with relatively high natural moisture content. For design of flexible pavement sections, we estimate a California Bearing Ratio (CBR) of 1 percent. Also, for use in design of flexible pavement sections, we estimate a resilient modulus (M_R) value of 1,500 psi. The CBR value was estimated by past experience on these types of soils, and use of the soil classification tests performed on the near surface soils. The M_R value was estimated by the commonly used expression (1500 x CBR) presented in AASHTO Guide for Design of Pavement Structures (1993).

7.3.8 Hydraulic Conductivity of Native Soil

Hydraulic conductivity tests have not been conducted on the native soils. However, based on visual soil classification, experience in similar soils along the Columbia River, and comparison to the consolidation test time rates, hydraulic conductivity is expected to be low. The upper silt and silty fine sand is estimated to have a hydraulic conductivity of about 10^{-5} to 10^{-3} cm/sec. The hydraulic conductivity of the underlying very soft silt is estimated to be in the range of 10^{-6} to 10^{-4} cm/sec.

7.3.9 Seismic Soil Profile Type

The seismic soil profile type represents the average condition of the upper 100 feet beneath the site. The Uniform Building Code, 1997 Edition (UBC-97) Soil Profile Type for the site is S_F because the soil is vulnerable to potential failure due to liquefaction occurring in the medium dense silty sand. The designation S_F means that a site-specific evaluation must be conducted.

From our site evaluation, the site is underlain by about 50 feet of loose sandy silt and medium dense silty sand that is susceptible to liquefaction and 20 to 30 feet of very soft silt (PI <20).

7.3.10 Site Response

Site response spectra for the site is presented in Appendix D. The site is classified as a seismically soft site with potential for soil liquefaction to occur above elevation -50 feet. The foundation support system should consider this risk.

7.4 Foundation Alternative Evaluation

To compare foundation support alternatives for the non-heavily loaded structures planned for the site, we have completed a preliminary evaluation of two different support alternatives using two site soil models. These consist of 1) shallow mat foundations, and 2) pile-supported deep foundations. The two different soil models and types of planned structures are:

- Main Plant Area – Typical water tanks planned for construction in the north central portion of the site.
- Cooling Tower Area – A series of multi-cell cooling towers planned near the southeast corner of the site.

Presented below is an estimate of static settlement and seismically induced post-liquefaction settlement for the shallow foundation system. With large amounts of settlements anticipated for these structures, piles for most of the structures may be warranted. A discussion of estimated pile capacities is presented in a later section. Also discussed are possible mitigation measures to reduce settlement.

We have assumed the heavily loaded structures such as turbines, generators, HRSGs, and other settlement sensitive structures would be placed on pile-supported foundations.

7.4.1 Shallow Foundations Main Plant Area

To analyze a typical shallow foundation support alternative, we have assumed a mat foundation with a plan area of 40 feet by 40 feet and a static dead and sustained live load of 500, 1000, 2000, and 3000 psf. A preliminary soil analytical model was developed for this area based on the interpreted subsurface soil conditions, and the results of laboratory tests. A detail of the soil model for the main plant area is presented in Figure 6. For these settlement estimates, the lower sandy alluvium is considered non-compressible.

For static dead load and sustained live loads, estimates of total settlement, including estimates of secondary settlement, are:

For 500 psf:	1 to 2 inches
For 1,000 psf:	3 to 6 inches
For 2,000 psf:	6 to 10 inches
For 3,000 psf:	10 to 15 inches

Settlement at the site may also occur due to earthquake induced post-liquefaction settlement. The extent and level of liquefaction in general, will depend on the severity of ground shaking at the site. Figure 6 shows approximated soil zones that would liquefy during the design level magnitude earthquake that was selected based on the site-specific earthquake and hazard analyses described in Appendix D. We estimate that between 10 and 15 inches of post-liquefaction induced settlement may occur.

Based on these estimates of static and seismic induced settlement, settlement mitigation will be necessary to prevent damage to the structures. For mitigation of static and seismically induced settlement, we suggest supporting the structures on piles. Preloading could mitigate excessive static settlement; however, in our opinion, typical schedule constraints for fast-track power plant projects cannot accommodate the time necessary for conventional preloading approaches. Based on our analysis and experience, we estimate that a preload fill without installing vertical drains in the subsurface should remain in place a minimum of 3 to 4 months to induce the consolidation settlement. Installing vertical wick drains could substantially speed up the time for settlement to occur. Since preloads generally cannot mitigate for seismically induced liquefaction settlement, ground modification construction techniques should be evaluated to densify the sandy liquefiable materials.

7.4.2 Shallow Foundations Cooling Tower Area

To analyze the shallow foundation support alternative for the cooling tower area, we have assumed a mat foundation with a plan area of 40 feet by 450 feet and a static dead load and sustained live load of 500, 1,000, 2,000, and 3,000 psf. A soil analytical model was developed for this area based on the interpreted subsurface soil conditions and the results of laboratory tests. A detail of the soil model for the cooling tower area is presented in Figure 7. For these settlement estimates, lower sandy alluvium is considered non-compressible.

For static dead load and sustained live loads, estimates of total settlement, including estimates of secondary settlement, are:

For 500 psf:	4 to 6 inches
For 1,000 psf:	8 to 12 inches
For 2,000 psf:	12 to 18 inches
For 3,000 psf:	18 to 24 inches

Figure 7 shows our estimate of the soil zones that would liquefy under the same seismic event described in Appendix D. We estimate that between 12 and 18 inches of soil liquefaction induced settlement may occur.

Settlement mitigation will again be necessary to prevent structural damage to the structures. The settlement mitigation measures described above also apply to this area.

7.4.3 Deep Foundations for the Site

As previously discussed, the preliminary analytical soil models presented on Figures 6 and 7 show a layer of very soft compressive silt, and layers of very loose to medium dense liquefiable sandy silt to sand up to a depth of 60 feet below the existing ground surface. Since this surface condition results in very large estimated settlements, pile-supported foundations should be considered for all the settlement sensitive plant facilities or the seismically designed facilities. We recommend that the minimum pile embedment be 80 feet which includes at least 20 feet below the bottom of the potentially liquefiable layers to account for variability of subsurface conditions at the site. We recommend additional subsurface explorations including use of the Cone Penetration Test (CPT) to better define the thickness of the compressible soil layers.

For preliminary evaluation, we analyzed piles consisting of 12¾-inch and 16-inch diameter driven closed-end, steel pipe piles. Pipe piles should conform to the requirements of ASTM A252, Specifications for Welded and Seamless Steel Pipe Piles. We assumed the pipe piles would be fitted with a welded flat plate.

The allowable compressive and uplift capacities of the driven closed-end, steel pipe piles were evaluated under both static and seismic conditions with capacity estimates in Table 2. For the static compression condition, a nominal soil shaft friction was used for the upper 60-foot compressible zone. The allowable compressive values have a factor of safety equal to or slightly greater than 3. For the seismic compression condition, the upper 60-foot compressible zone was assumed to provide no soil shaft friction resistance and apply no downdrag or negative skin friction to the pile. The allowable seismic compressive values have a factor of safety equal to or slightly above 2. For the allowable static uplift capacities shown in Table 3, the 60-foot compressible zone was treated in the same manner as for compression. The factor of safety for the static allowable uplift condition is equal to or greater than 3. The factor of safety for the seismic allowable condition is equal to or greater than 1.

Table 2
Allowable Compressive Pile Capacities

Pile Depth (ft)	12¾-inch Dia. (kips)		16-inch Diameter (kips)	
	Static	Seismic	Static	Seismic
70	80	65	120	100
80	100	85	150	130
90	125	110	190	170

Table 3
Allowable Uplift Pile Capacities

Pile Depth (ft)	12¾-inch Dia. (kips)		16-inch Diameter (kips)	
	Static	Seismic	Static	Seismic
70	50	30	75	55
80	65	45	95	75
90	85	65	120	100

The above compressive and uplift capacities with the pile embedment lengths shown should result in less than ½-inch settlement. The allowable capacities assume no reduction for group effects and that all piles are driven no closer than 3 pile diameters center-to-center. Also, to maintain spacing, we assume piles would be driven with a maximum deviation from vertical of not more than 3 percent (1.5 inches in 4 feet).

The proposed structures will be subject to lateral loads due to wind and earthquake forces. The lateral load capacities of these pipe piles were evaluated for both static and seismic loading conditions. The laterally loaded pipe pile analyses were performed with the aid of the computer program "LPILE". Two pile sections, PP12¾ X 0.375 and PP16 X 0.375, under a free-pile head condition were evaluated. For these values a reduction for group action was not considered and no lateral resistance was assumed form passive resistance from an embedded pile cap. Based upon our evaluation, the single pipe piles, PP12¾ X 0.375 and PP16 X 0.375, can provide 4 kips and 6 kips, allowable lateral capacities, respectively, under static loading condition and horizontal deflection of approximately ½-inch. Included is a factor of safety equal to about 2.0. Under seismic loading conditions, the allowable lateral capacities of the piles should be reduced to about 50 percent of the static condition. The results of the computer analyses showed an approximate depth to fixity below the top of the pile as follows:

PP12¾ X 0.375	25 feet
PP16 X 0.375	30 feet

7.4.4 Settlement Sensitive Pipes, Pipe Racks, and Conduits

We estimate that differential static settlement between pipe racks, utility conduits and pipelines (i.e., linear facilities) may occur between structures with different foundation support systems. In addition, seismic induced liquefaction settlement could have a significant impact on settlement sensitive linear facilities. If these facilities cannot tolerate the settlement magnitudes estimated, we suggest deep foundation be considered. If linear facilities are allowed to settle, we recommend evaluating special pipe joints and connections, sleeves, shorter pipe lengths, and other methods to help mitigate such settlement and possible infrastructure damage. Also, we recommend that settlement analyses based on the type, depth, and difference in settlement tolerance between the planned structures be completed to evaluate the impact on these type of structures.

7.4.5 Lateral Earth Pressure

Lateral earth pressure on retaining walls depend on the type of wall (i.e., yielding or non-yielding), the type and method of placement of backfill against the wall, the magnitude of surcharge during construction or permanent loads on the ground surface adjacent to the wall, the slope of the backfill, location of the ground water level, use of positive drainage systems behind wall, and the design criteria such as static or seismic condition, and combination loading conditions. Based on the nature of the native soil at the site, it is our opinion that the native soil should not be used for backfill, and backfill material should be imported. For retaining wall backfill, import material consisting of free-draining, crushed rock would be the most desirable.

7.4.6 Roadways

Construction staging areas, roadways, and parking areas constructed on these loose and soft subsurface materials will require special consideration for subgrade stabilization. The subgrade bearing values for the native materials are estimated to be extremely low; therefore the use of geotextile, geogrids, and free-draining imported crushed rock should be considered to develop an adequate zone of subbase strength. Also, the consideration of maintaining drained subbase base material should also be considered.

8.0 REFERENCES

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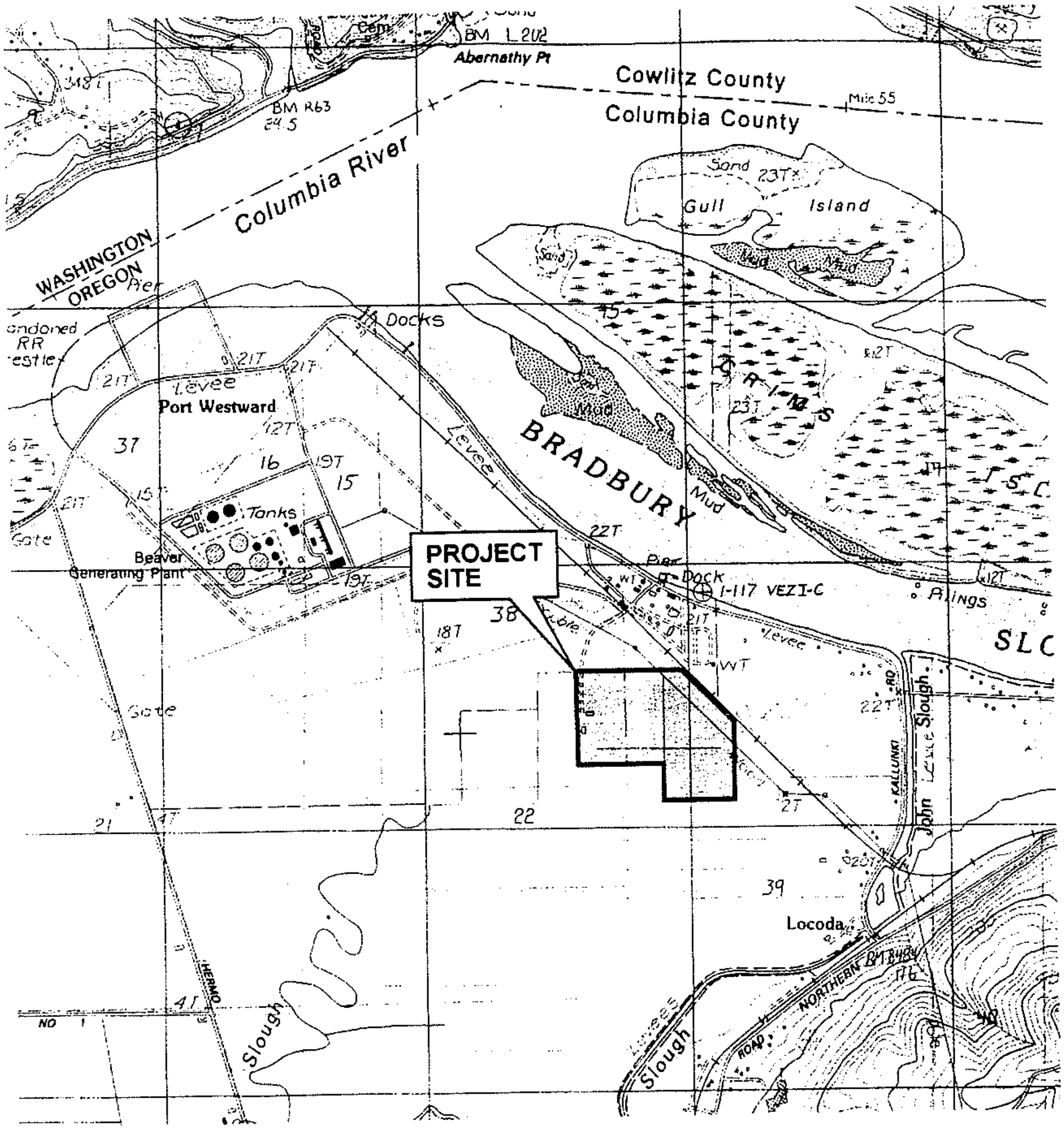
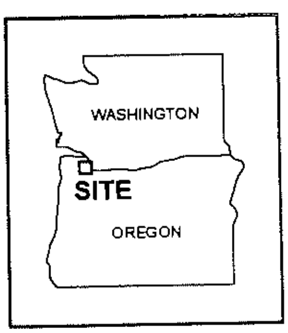
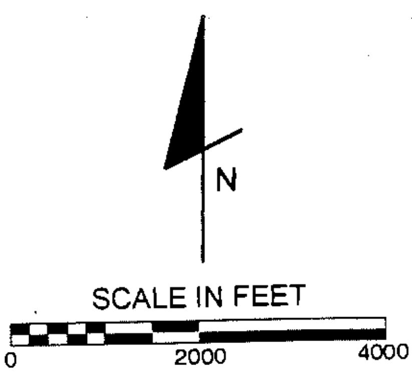
Note: A more comprehensive list of references for the Site Specific Geological and Soil Stability Assessment is contained in Appendix D.







Source:
USGS 7.5 minute quadrangle map.
"OAK POINT, WASH,-OREG."

SUMMIT/WESTWARD ENERGY PROJECT
CLATSKANIE, OREGON

VICINITY MAP

SQUIER ASSOCIATES

FIGURE 1

NOTE: Features shown are for illustrative purposes only and are approximate.

Drawn by: GCD	Checked by:	Graphics Check: AHK	File: GRAPHICS\FIG1.FH8	Date: 4/24/01	Job. No. 201578

TABLE 2

DC Resistivity Models
Summit/Westward Energy Project
Clatskanie, Oregon

Models

Sounding	Layer 1 Resistivity (ohm-m)	Layer 1 Depth (Feet)	Layer 2 Resistivity (ohm-m)	Layer 2 Depth (Feet)	Layer 3 Resistivity (ohm-m)	Layer 3 Depth (Feet)	Layer 4 Resistivity (ohm-m)	Model Misfit % Error
R-1	204	1.5	105	15.4	18	40	52	3.1%
R-2	161	4.7	67	18.1	19	46	57	5.2%
R-3	122	2.9	98	14.3	18	39	57	1.9%
R-4	102	3.2	57	14.5	17	36	51	2.3%
R-5	148	1.5	87	7.3	35	32	49	0.7%
R-6	213	3.4	72	15.8	21	40	54	1.9%

TABLE 1

a-spacing (feet)	Apparent Resistivity (Ohm-m)	Apparent Resistivity (Ohm-ft)	V/I (Ohms)	Error	Current (mA)
Sounding R-5					
Boring B-6	E-W Sounding offset 20 feet north of B-6(new)				
3.0	111.3	319.9	1.70E+01	0.1%	100
4.0	99.2	285.1	1.13E+01	0.0%	100
5.0	91.0	261.5	8.32E+00	0.0%	100
7.0	79.8	229.2	5.21E+00	0.0%	100
10.0	67.2	193.2	3.08E+00	0.0%	100
15.0	52.6	151.0	1.60E+00	0.0%	100
20.0	45.0	129.2	1.03E+00	0.0%	100
25.0	42.8	123.0	7.83E-01	0.0%	100
30.0	42.0	120.8	6.41E-01	0.1%	100
40.0	41.4	119.0	4.74E-01	0.0%	100
50.0	42.3	121.5	3.87E-01	0.1%	100
70.0	43.3	124.4	2.83E-01	0.0%	100
100.0	45.3	130.1	2.07E-01	0.0%	100
130.0	46.6	134.0	1.64E-01	0.0%	100
160.0	47.4	136.3	1.36E-01	0.0%	100
Sounding R-6					
Boring B-4	E-W Sounding offset 10 feet north of B-4				
3.0	181.2	520.8	2.76E+01	0.0%	100
4.0	170.2	489.0	1.95E+01	0.0%	100
5.0	147.0	422.5	1.34E+01	0.0%	100
7.0	115.8	332.9	7.57E+00	0.1%	100
10.0	87.4	251.1	4.00E+00	0.0%	100
15.0	66.4	190.8	2.02E+00	0.0%	100
20.0	52.4	150.5	1.20E+00	0.0%	100
25.0	46.1	132.5	8.43E-01	0.1%	100
30.0	40.5	116.3	6.17E-01	0.0%	100
40.0	35.1	100.7	4.01E-01	0.1%	100
50.0	34.5	99.1	3.15E-01	0.1%	100
70.0	36.4	104.6	2.38E-01	0.0%	100
100.0	41.6	119.6	1.90E-01	0.0%	100
130.0	44.6	128.0	1.57E-01	0.0%	100
160.0	47.7	137.2	1.36E-01	0.6%	100
200.0	46.2	132.8	1.06E-01	0.0%	100

END

TABLE 1

a-spacing (feet)	Apparent Resistivity (Ohm-m)	Apparent Resistivity (Ohm-ft)	V/I (Ohms)	Error	Current (mA)
Sounding R-3					
B-7 offset	E-W Sounding offset 100 feet east of B-7				
3.0	120.2	345.4	1.83E+01	0.3%	100
4.0	113.3	325.6	1.30E+01	0.0%	100
5.0	107.3	308.3	9.81E+00	0.0%	100
7.0	98.2	282.3	6.42E+00	0.0%	100
10.0	91.4	262.7	4.18E+00	0.0%	100
15.0	77.2	221.8	2.35E+00	0.1%	100
20.0	60.8	174.6	1.39E+00	0.0%	100
25.0	48.4	139.1	8.86E-01	0.0%	100
30.0	41.9	120.3	6.38E-01	0.0%	100
40.0	33.9	97.4	3.88E-01	0.0%	100
50.0	32.6	93.6	2.98E-01	0.0%	100
70.0	35.5	101.9	2.32E-01	0.0%	100
100.0	40.1	115.2	1.83E-01	0.0%	100
130.0	43.6	125.2	1.53E-01	0.0%	100
160.0	45.4	130.5	1.30E-01	0.2%	100
Sounding R-4					
	E-W Sounding offset 300 feet east of B-7				
3.0	92.0	264.4	1.40E+01	0.0%	100
4.0	86.3	248.0	9.87E+00	0.0%	100
5.0	82.8	238.0	7.57E+00	0.0%	100
7.0	69.5	199.8	4.54E+00	0.0%	100
10.0	58.8	169.0	2.69E+00	0.0%	100
15.0	48.7	139.9	1.48E+00	0.0%	100
20.0	40.5	116.3	9.26E-01	0.1%	100
25.0	35.8	103.0	6.55E-01	0.0%	100
30.0	31.9	91.7	4.87E-01	0.0%	100
40.0	28.5	81.9	3.26E-01	0.0%	100
50.0	31.7	91.2	2.90E-01	0.1%	100
70.0	32.3	93.0	2.11E-01	0.0%	100
100.0	37.5	107.8	1.72E-01	0.0%	100
130.0	41.3	118.8	1.45E-01	0.0%	100
160.0	42.0	120.7	1.20E-01	0.0%	100

TABLE 1

DC Resistivity Soundings
Wenner Array
Summit/Westward Energy Project
Clatskanie, Oregon

a-spacing (feet)	Apparent Resistivity (Ohm-m)	Apparent Resistivity (Ohm-ft)	V/I (Ohms)	Error	Current (mA)
Sounding R-1					
Boring B-5	N-S Sounding offset 10 feet west of B-5				
3.0	138.2	397.1	2.11E+01	0.0%	20
4.0	135.7	389.8	1.55E+01	0.0%	20
5.0	112.9	324.4	1.03E+01	0.0%	20
7.0	103.5	297.4	6.76E+00	0.0%	20
10.0	96.2	276.3	4.40E+00	0.0%	20
15.0	84.6	243.0	2.58E+00	0.0%	20
20.0	69.1	198.5	1.58E+00	0.0%	20
25.0	54.3	156.1	9.94E-01	0.0%	20
30.0	44.5	127.9	6.79E-01	0.0%	50
40.0	35.5	102.1	4.06E-01	0.0%	50
50.0	33.4	96.0	3.06E-01	0.3%	50
70.0	34.4	98.8	2.25E-01	0.0%	50
100.0	38.0	109.3	1.74E-01	0.0%	100
150.0	42.2	121.3	1.29E-01	0.0%	100
Sounding R-2					
Boring B-3	N-S Sounding offset 10 feet east of B-3				
3.0	139.4	400.7	2.13E+01	0.7%	100
4.0	136.0	390.7	1.55E+01	0.8%	100
5.0	146.6	421.2	1.34E+01	1.0%	100
7.0	113.3	325.5	7.40E+00	0.2%	100
10.0	84.7	243.5	3.87E+00	0.1%	100
15.0	70.6	203.0	2.15E+00	0.1%	100
20.0	59.0	169.4	1.35E+00	0.0%	100
25.0	47.2	135.5	8.63E-01	0.2%	100
30.0	41.0	117.8	6.25E-01	0.0%	100
40.0	34.2	98.2	3.91E-01	0.1%	100
50.0	33.0	95.0	3.02E-01	0.0%	100
70.0	34.5	99.3	2.26E-01	0.0%	100
100.0	39.5	113.5	1.81E-01	0.1%	100
130.0	42.7	122.6	1.50E-01	0.2%	100
160.0	44.6	128.2	1.28E-01	0.0%	100

Geophysical Services

Environmental • Groundwater • Geotechnical

D.C. Resisitivity

INTRODUCTION

D.C. resistivity (electrical resistivity) techniques measure earth resistivity by driving a direct current (D.C.) signal into the ground and measuring the resulting potentials (voltages) created in the earth. From the data the electrical properties of the earth (the geoelectric section) can be derived. In turn, from those electrical properties we can infer geologic properties of the earth.

In geophysical and geotechnical literature, the terms "electrical resistivity" and "D.C. resistivity" are used synonymously. The term "vertical electric sounding" (VES) is also used to refer to soundings using the D.C resistivity method. The terms "resistivity" or "electrical" are often used to refer to the same methods or techniques, although "electrical" is sometimes used to encompass a broader range of techniques including the electromagnetic methods.

APPLICATIONS

Electrical resistivity of soils and rocks correlates with other soil/rock properties which are of interest to the geologist, hydrogeologist, geotechnical engineer and/or quarry operator. Several geologic parameters which affect earth resistivity (and its reciprocal, conductivity) include:

- clay content,
- groundwater conductivity,
- soil or formation porosity, and
- degree of water saturation.

D.C. resistivity techniques may be used in the profiling mode (dipole-dipole surveys) to map lateral changes and identify near-vertical features (e.g., fracture zones), or they may be used in the sounding mode (e.g., Schlumberger soundings) to determine depths to geoelectric horizons (e.g., depth to saline groundwater).

Common applications of the D.C. resistivity method include:

- delineation of aggregate deposits for quarry operations
- measuring earth impedance or resistance for electrical grounding circuits or for cathodic protection,
- estimating depth to bedrock, to the water table, or to other geoelectric boundaries, and
- mapping and/or detecting other geologic features.

D.C. resistivity and electromagnetic (EM) techniques both measure electrical properties of the earth, and hence both are used for many of the same applications. Conductivity, which is often reported by EM instruments, is the reciprocal of resistivity.

THEORY OF OPERATION

Figure 2 is a schematic diagram showing the basic principle of D.C. resistivity measurements. Two short metallic stakes (electrodes) are driven about 1 foot into the earth to apply the current to the ground. Two additional electrodes are used to measure the earth voltage (or electrical potential) generated by the current.

Depth of investigation is a function of the electrode spacing. The greater the spacing between the outer current electrodes, the deeper the electrical currents will flow in the earth, hence the greater the depth of exploration. The depth of investigation is generally 20% to 40% of the outer electrode spacing, depending on the earth resistivity structure.

(Continued Next Page)

Figure 1 - D.C. Resistivity Crew In Operation In The Willamette Valley of Oregon

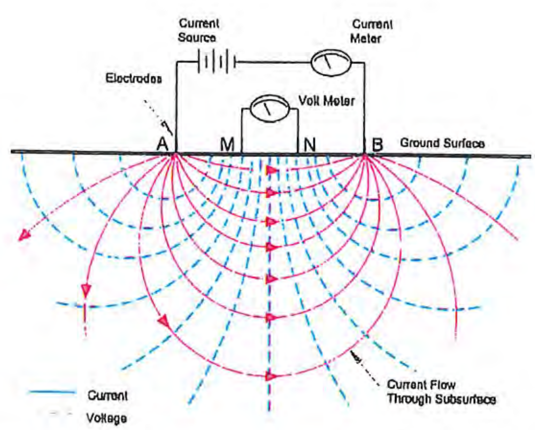


Figure 2 - Schematic Illustrating Basic Concept Of Electrical Resistivity Measurement

:hwest Geophysical Associates, Inc.
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ATA ANALYSIS & INTERPRETATION

Apparent Resistivity:
Instrument readings (current and voltage) are generally reduced to "apparent resistivity" values. The apparent resistivity is the resistivity of the homogeneous half-space which would produce the observed instrument response for a given electrode spacing. Apparent resistivity is a weighted average of soil resistivities over the depth of investigation.

For soundings a log-log plot of apparent resistivity versus electrode separation is obtained. This is sometimes referred to as the "sounding curve."

Modeling:
Resistivity data is generally interpreted using the "modeling" process: A hypothetical model of the earth and its resistivity structure (geoelectric sections) is generated. The theoretical electrical resistivity response over that model is then calculated. The theoretical response is then compared with the observed field response and differences between observed and calculated are noted. The hypothetical earth model is then adjusted to create a response which more nearly fits the observed data. When this iterative process is automated it is referred to as "iterative inversion" or "optimization."

iqueness
.esistivity models are generally not unique; i.e., a large number of earth models can produce the same observed data or sounding curve. In general, resistivity methods determine the "conductance" of a given stratigraphic layer or unit. The conductance is the product of the resistivity and the thickness of a unit. Hence that layer could be thinner and more conductive or thicker and less conductive, and produce essentially the same results. Hence constraints on the model, from borehole data or assumed unit resistivities, can greatly enhance the interpretation.

Deliverables
The end product from a D.C. resistivity survey is generally a "geoelectric" cross section showing thicknesses and resistivities of all the geoelectric units or layers. If borehole data or a conceptual geologic model is available, then a geologic identity can be assigned to the geoelectric units.

A two-dimensional geoelectric section may be made up of a series of one-dimensional soundings joined together to form a two-dimensional section, or it may be a continual two-dimensional cross section. The type of section produced depends on the acquisition parameters and the type of processing applied to the data.

Figure 3 is a two dimensional geoelectric section from a dipole-dipole survey in Alaska. The resistivity survey, part of a water resources investigation, was conducted in order to identify fracture zones with increased porosity. The geophysical objective was to locate conductive fracture zones in the more resistive bedrock. The zone with lower resistivities (1500 to 2000 ohm-meters), which is seen in Figure 3 between 90m and 100m, is indicative of increased water content due to higher fracture porosity in that region.

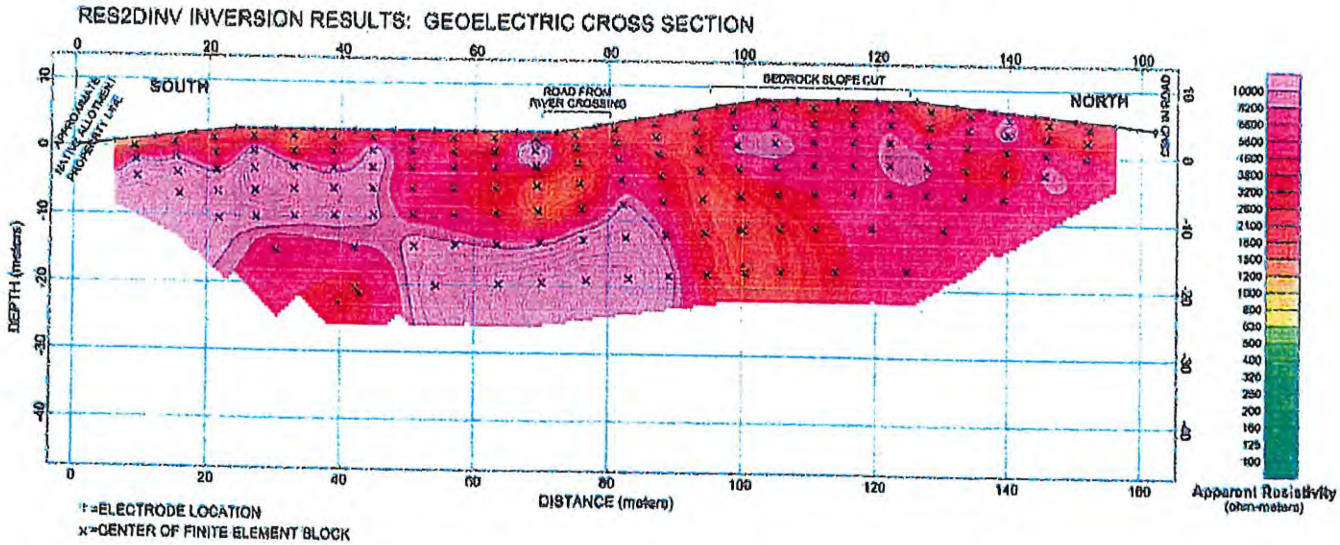
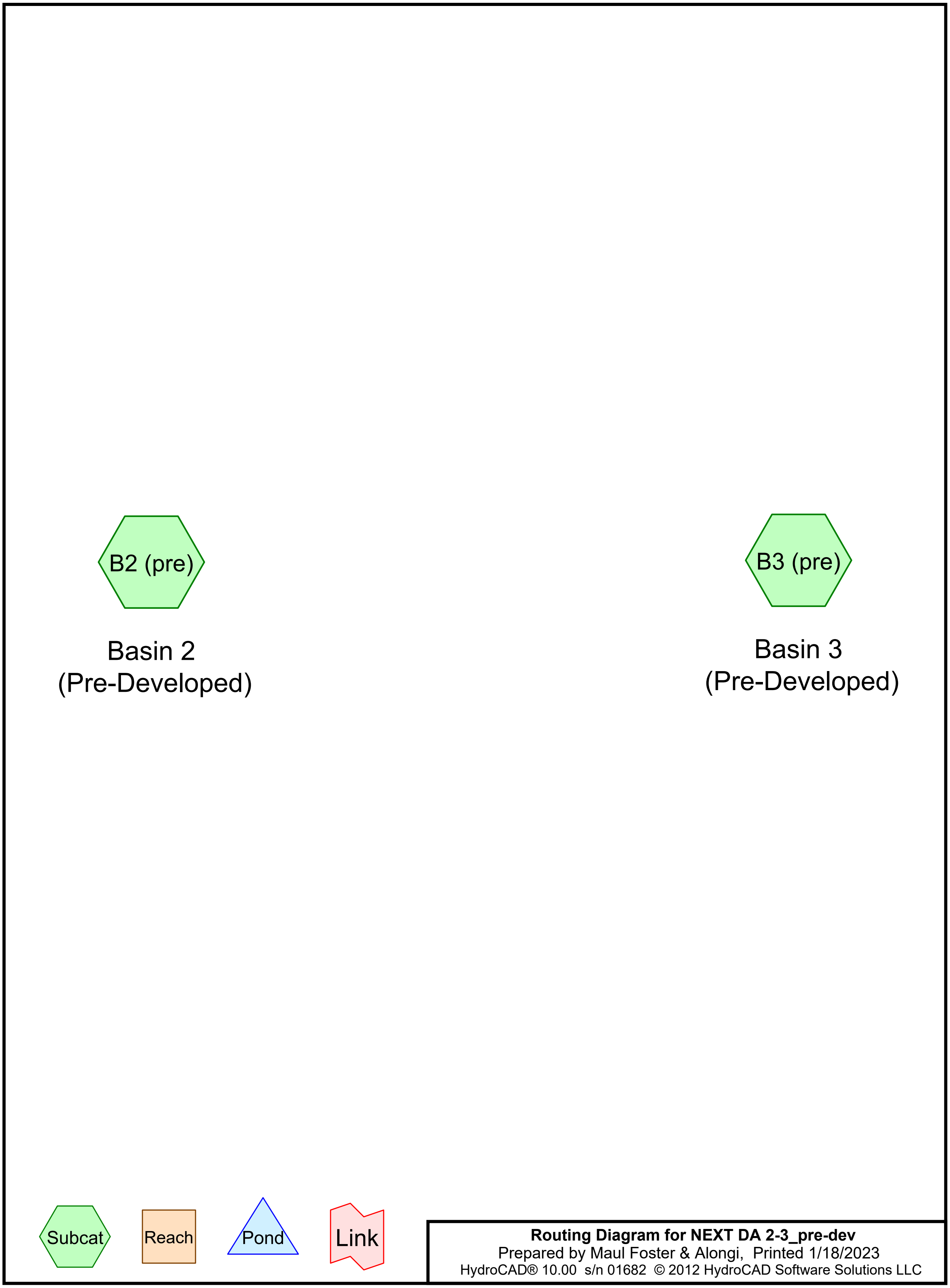


Figure 3 - Geoelectric Model From Dipole-Dipole Resistivity Survey

APPENDIX C

PRE-DEVELOPED AND DEVELOPED HYDROLOGY AND CONVEYANCE CALCULATIONS


B2 (pre)
Basin 2
(Pre-Developed)
B3 (pre)
Basin 3
(Pre-Developed)
Subcat
Reach
Pond
Link
Routing Diagram for NEXT DA 2-3_pre-dev
Prepared by Maul Foster & Alongi, Printed 1/18/2023
HydroCAD® 10.00 s/n 01682 © 2012 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
565,844	78	Existing Grass or Vegetated Field (B2 (pre), B3 (pre))
565,844	**78**	**TOTAL AREA**

Summary for Subcatchment B2 (pre): Basin 2 (Pre-Developed)

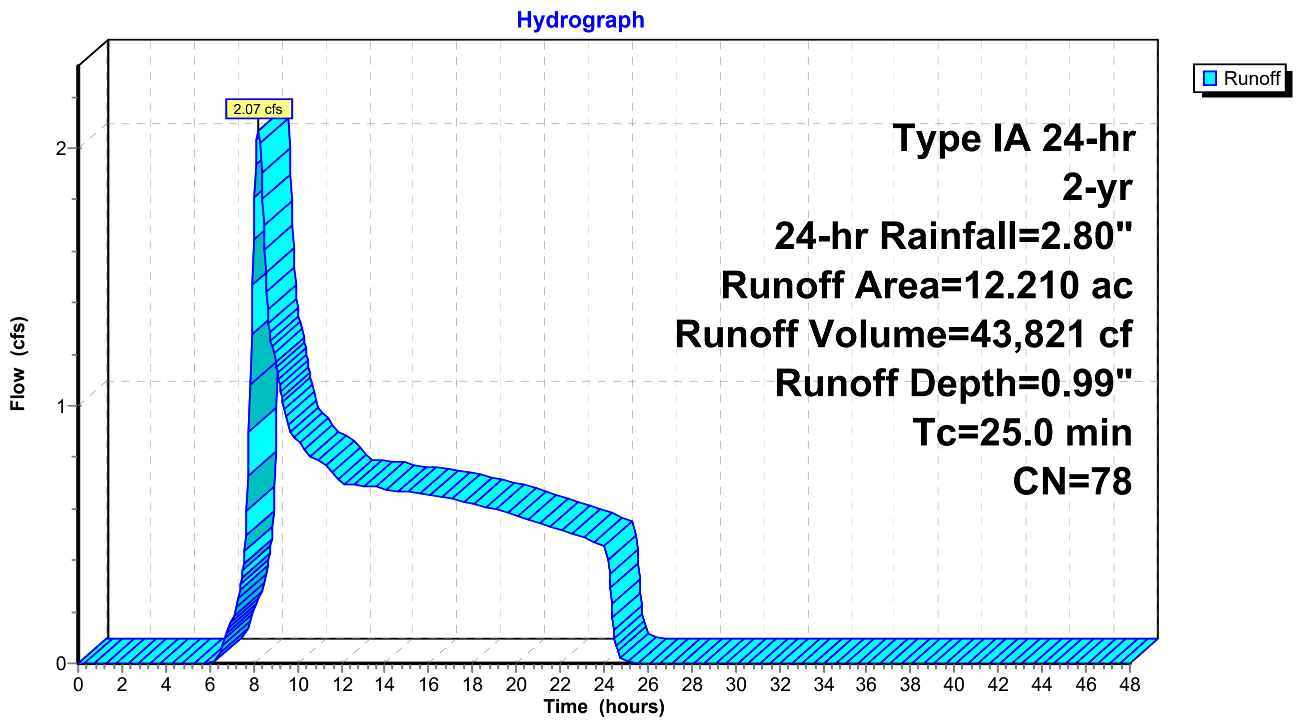
Runoff = 2.07 cfs @ 8.21 hrs, Volume= 43,821 cf, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-yr, 24-hr Rainfall=2.80"

	Area (ac)	CN	Description
*	12.210	78	Existing Grass or Vegetated Field
	12.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.0					**Direct Entry, TR-55 Minimum**

Subcatchment B2 (pre): Basin 2 (Pre-Developed)



Summary for Subcatchment B3 (pre): Basin 3 (Pre-Developed)

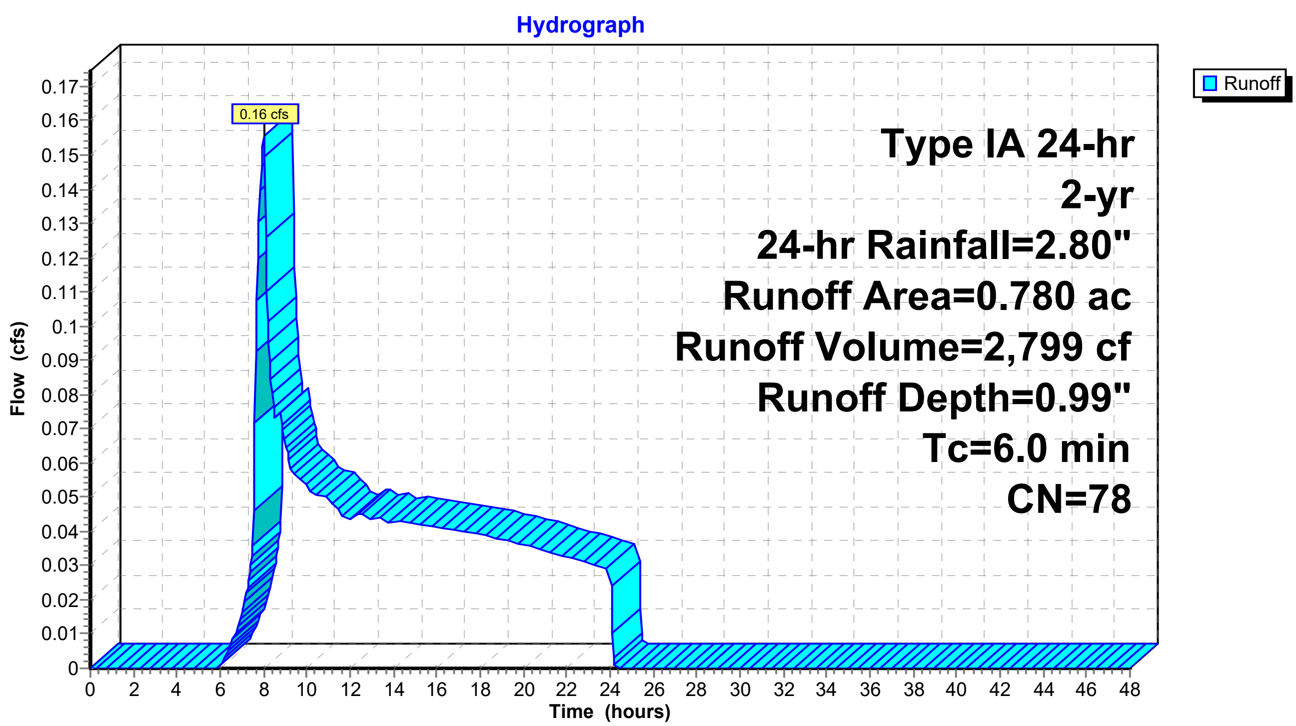
Runoff = 0.16 cfs @ 7.99 hrs, Volume= 2,799 cf, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-yr, 24-hr Rainfall=2.80"

	Area (ac)	CN	Description
*	0.780	78	Existing Grass or Vegetated Field
	0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment B3 (pre): Basin 3 (Pre-Developed)



Summary for Subcatchment B2 (pre): Basin 2 (Pre-Developed)

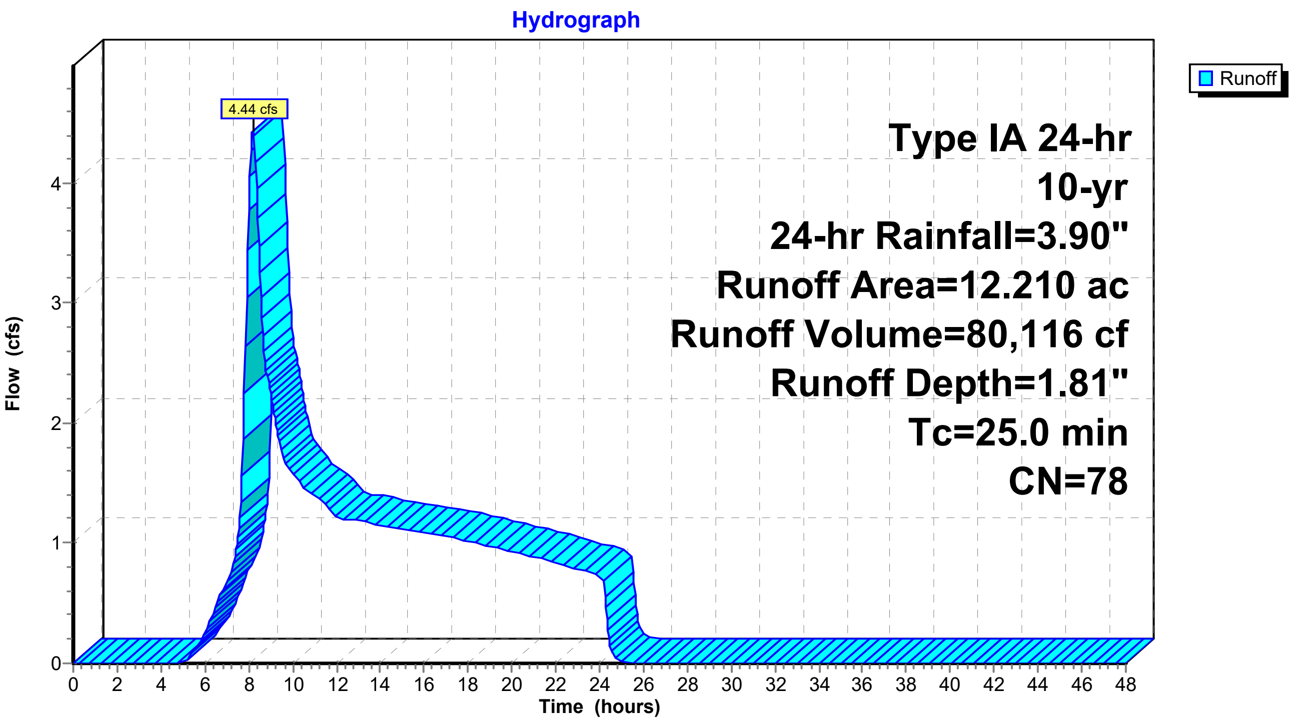
Runoff = 4.44 cfs @ 8.18 hrs, Volume= 80,116 cf, Depth= 1.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr, 24-hr Rainfall=3.90"

	Area (ac)	CN	Description
*	12.210	78	Existing Grass or Vegetated Field
	12.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.0					**Direct Entry, TR-55 Minimum**

Subcatchment B2 (pre): Basin 2 (Pre-Developed)



Summary for Subcatchment B3 (pre): Basin 3 (Pre-Developed)

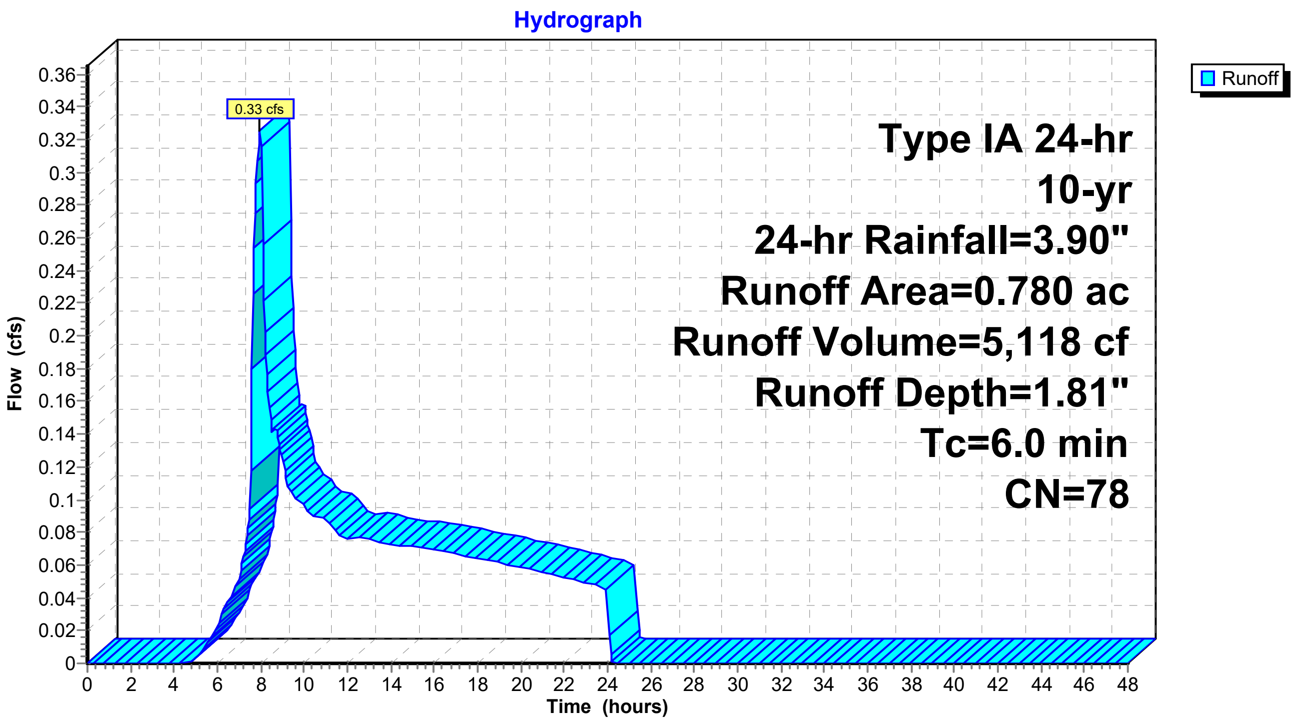
Runoff = 0.33 cfs @ 7.98 hrs, Volume= 5,118 cf, Depth= 1.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr, 24-hr Rainfall=3.90"

	Area (ac)	CN	Description
*	0.780	78	Existing Grass or Vegetated Field
	0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment B3 (pre): Basin 3 (Pre-Developed)



Summary for Subcatchment B2 (pre): Basin 2 (Pre-Developed)

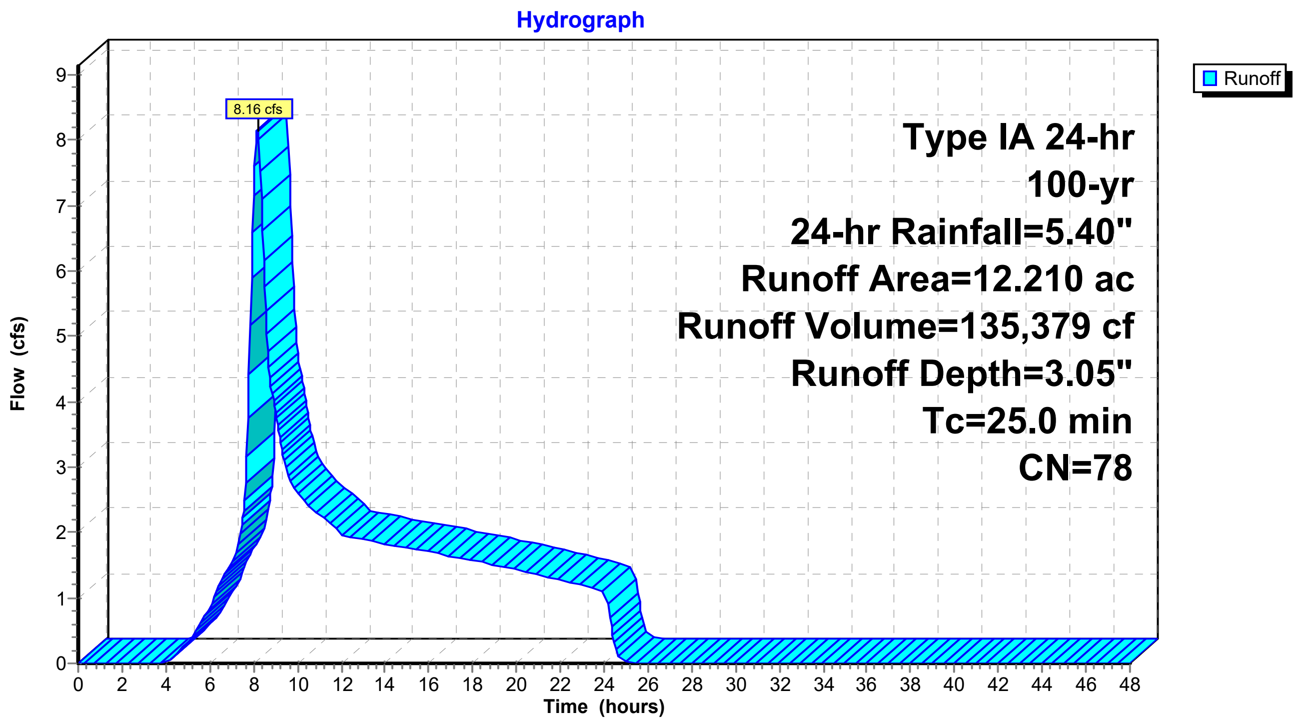
Runoff = 8.16 cfs @ 8.17 hrs, Volume= 135,379 cf, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-yr, 24-hr Rainfall=5.40"

	Area (ac)	CN	Description
*	12.210	78	Existing Grass or Vegetated Field
	12.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.0					**Direct Entry, TR-55 Minimum**

Subcatchment B2 (pre): Basin 2 (Pre-Developed)



Summary for Subcatchment B3 (pre): Basin 3 (Pre-Developed)

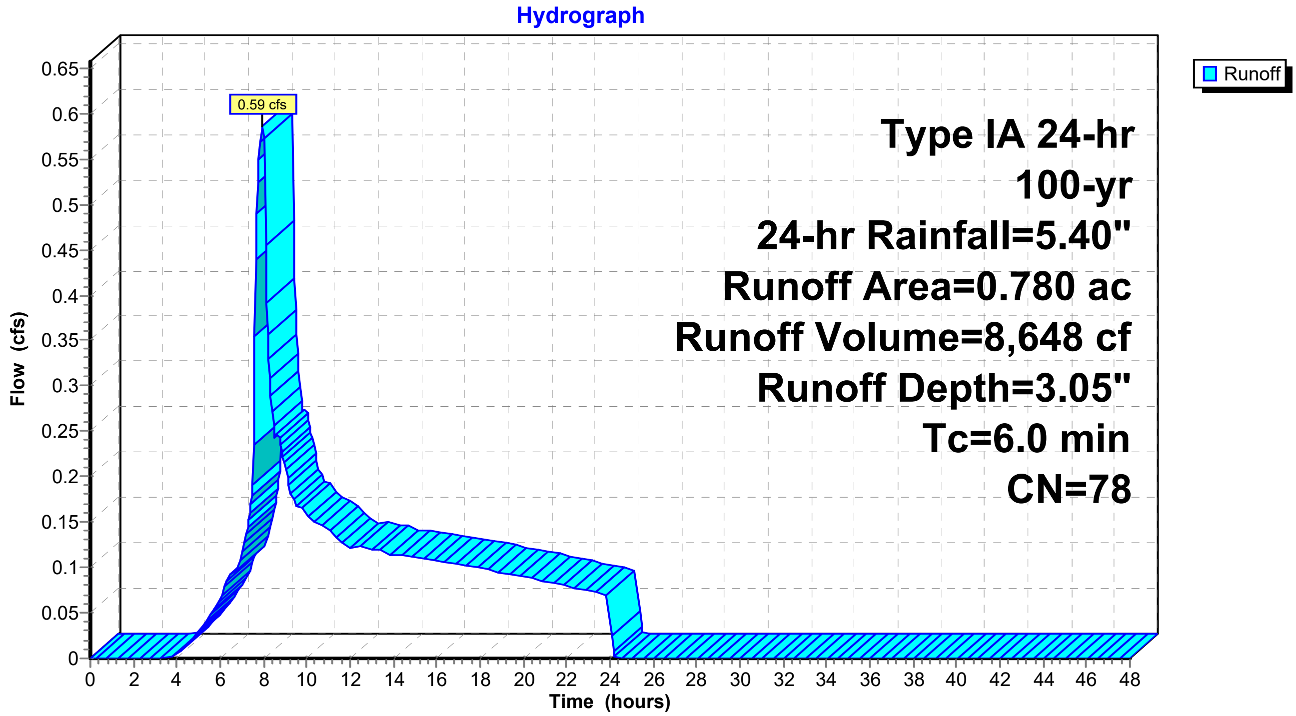
Runoff = 0.59 cfs @ 7.96 hrs, Volume= 8,648 cf, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-yr, 24-hr Rainfall=5.40"

	Area (ac)	CN	Description
*	0.780	78	Existing Grass or Vegetated Field
	0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment B3 (pre): Basin 3 (Pre-Developed)



Summary for Subcatchment B2 (pre): Basin 2 (Pre-Developed)

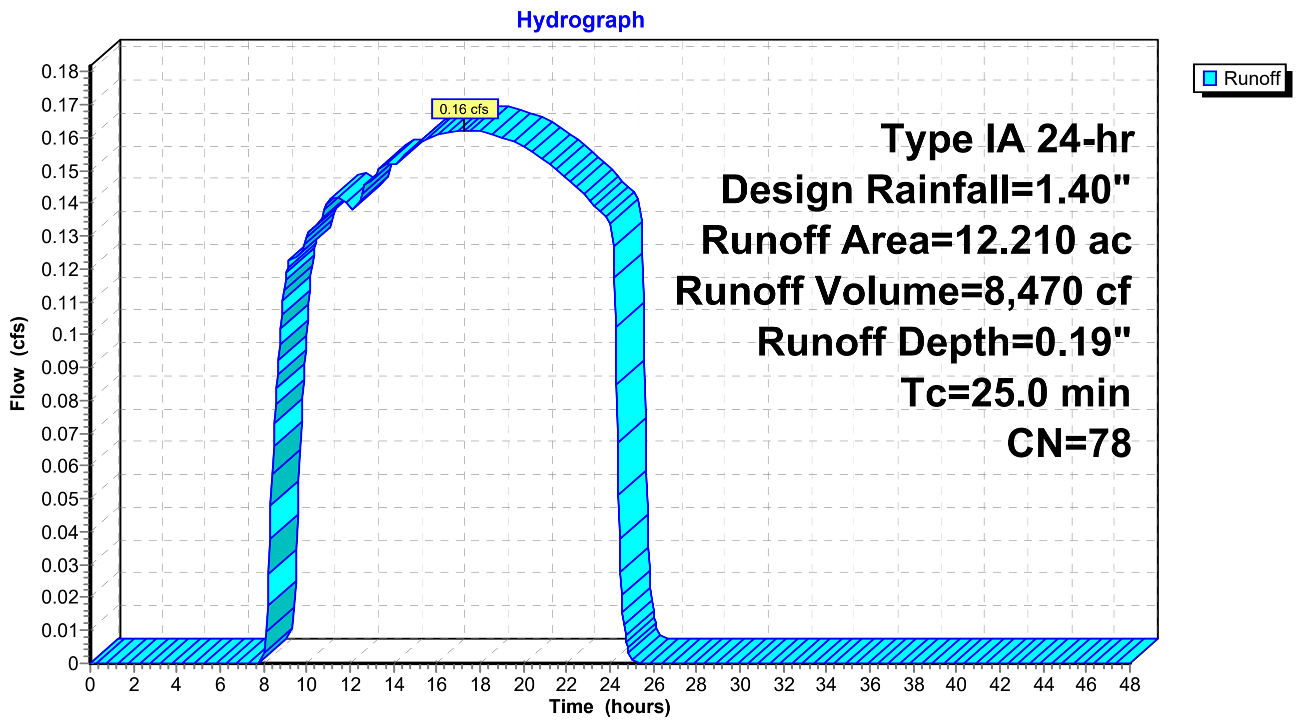
Runoff = 0.16 cfs @ 17.29 hrs, Volume= 8,470 cf, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr Design Rainfall=1.40"

	Area (ac)	CN	Description
*	12.210	78	Existing Grass or Vegetated Field
	12.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.0					**Direct Entry, TR-55 Minimum**

Subcatchment B2 (pre): Basin 2 (Pre-Developed)



Summary for Subcatchment B3 (pre): Basin 3 (Pre-Developed)

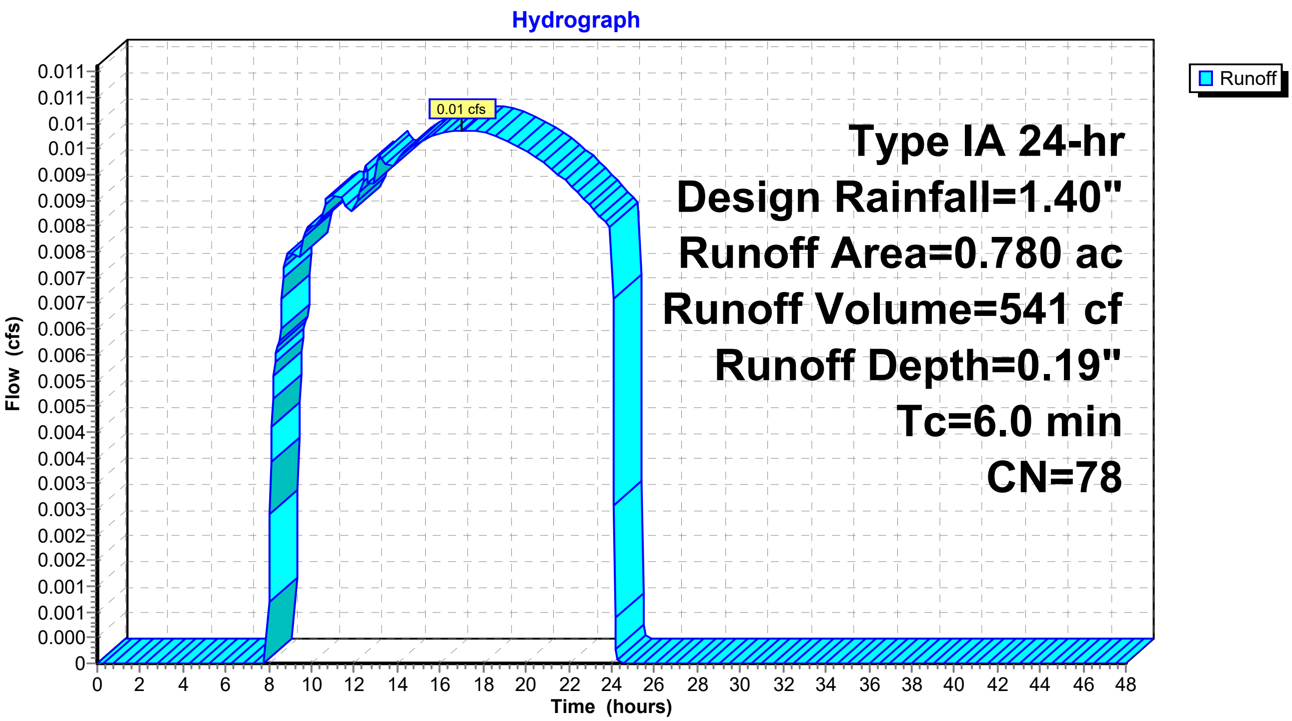
Runoff = 0.01 cfs @ 17.01 hrs, Volume= 541 cf, Depth= 0.19"

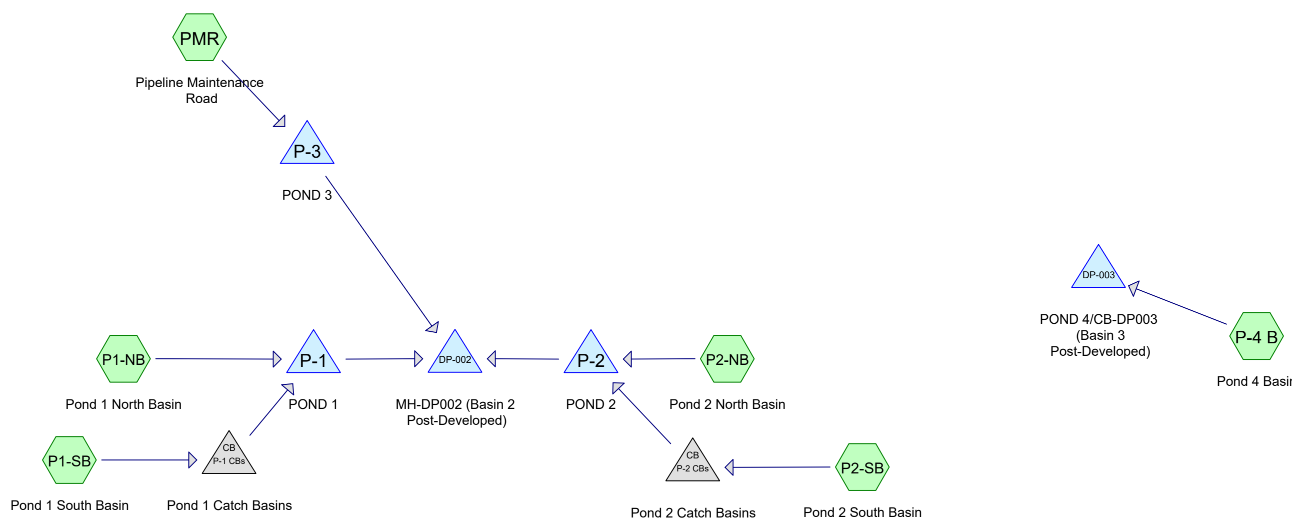
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr Design Rainfall=1.40"

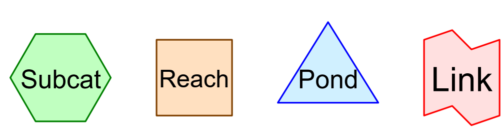
	Area (ac)	CN	Description
*	0.780	78	Existing Grass or Vegetated Field
	0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment B3 (pre): Basin 3 (Pre-Developed)







Routing Diagram for NEXT DA 2-3_post-dev
Prepared by Maul Foster & Alongi, Printed 1/18/2023
HydroCAD® 10.00 s/n 01682 © 2012 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
36,155	92	Gravel Access Road (P1-SB, P2-SB)
27,443	92	Gravel Laydown (P1-NB, P2-NB)
25,265	92	Maintenance Road (PMR)
82,328	98	Paved Road (P1-NB)
34,848	100	Paved Road (P2-NB)
54,450	80	Pipeline (P1-NB, P2-NB, PMR)
54,014	100	Pond 1 (P1-NB)
26,136	100	Pond 2 (P2-NB)
21,344	100	Pond 3 (PMR)
5,227	100	Pond 4 (P-4 B)
199,505	78	Rail/Gravel Base (P-4 B, P1-SB, P2-SB)
566,716	**89**	**TOTAL AREA**

Summary for Subcatchment P-4 B: Pond 4 Basin

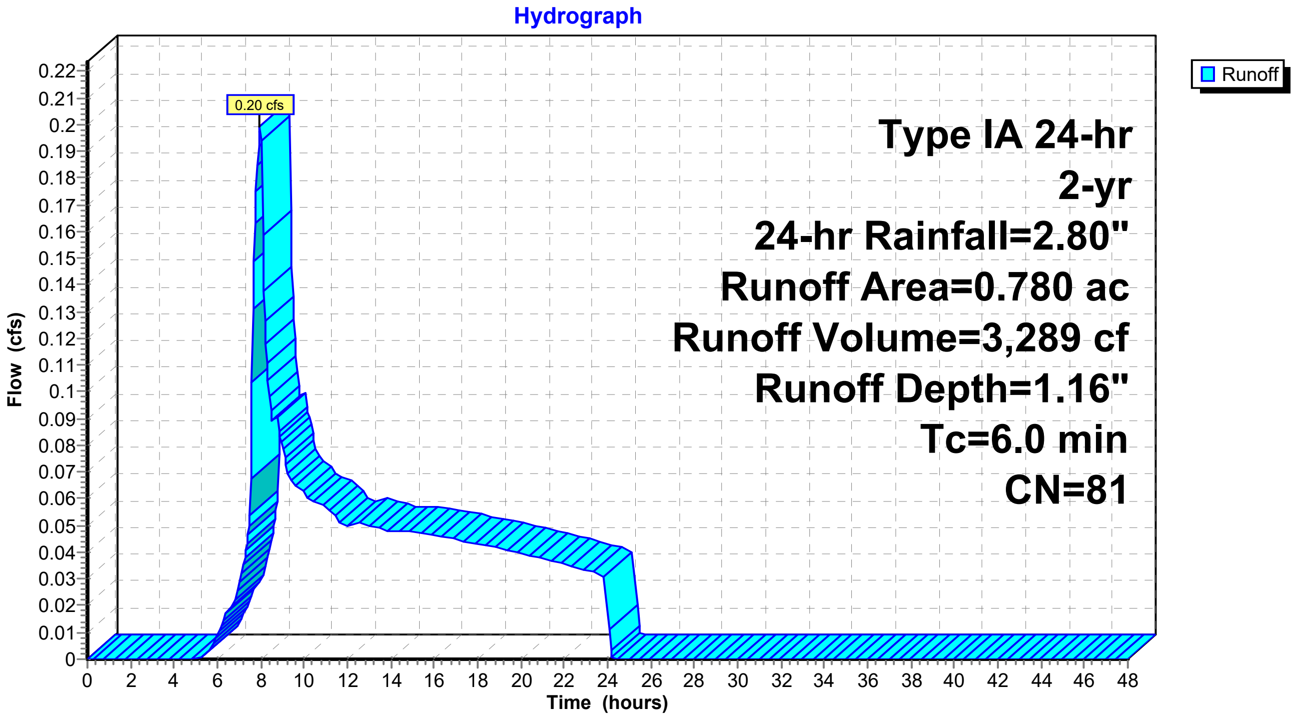
Runoff = 0.20 cfs @ 7.98 hrs, Volume= 3,289 cf, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-yr, 24-hr Rainfall=2.80"

	Area (ac)	CN	Description
*	0.660	78	Rail/Gravel Base
*	0.120	100	Pond 4
	0.780	81	Weighted Average
	0.660		84.62% Pervious Area
	0.120		15.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P-4 B: Pond 4 Basin



Summary for Subcatchment P1-NB: Pond 1 North Basin

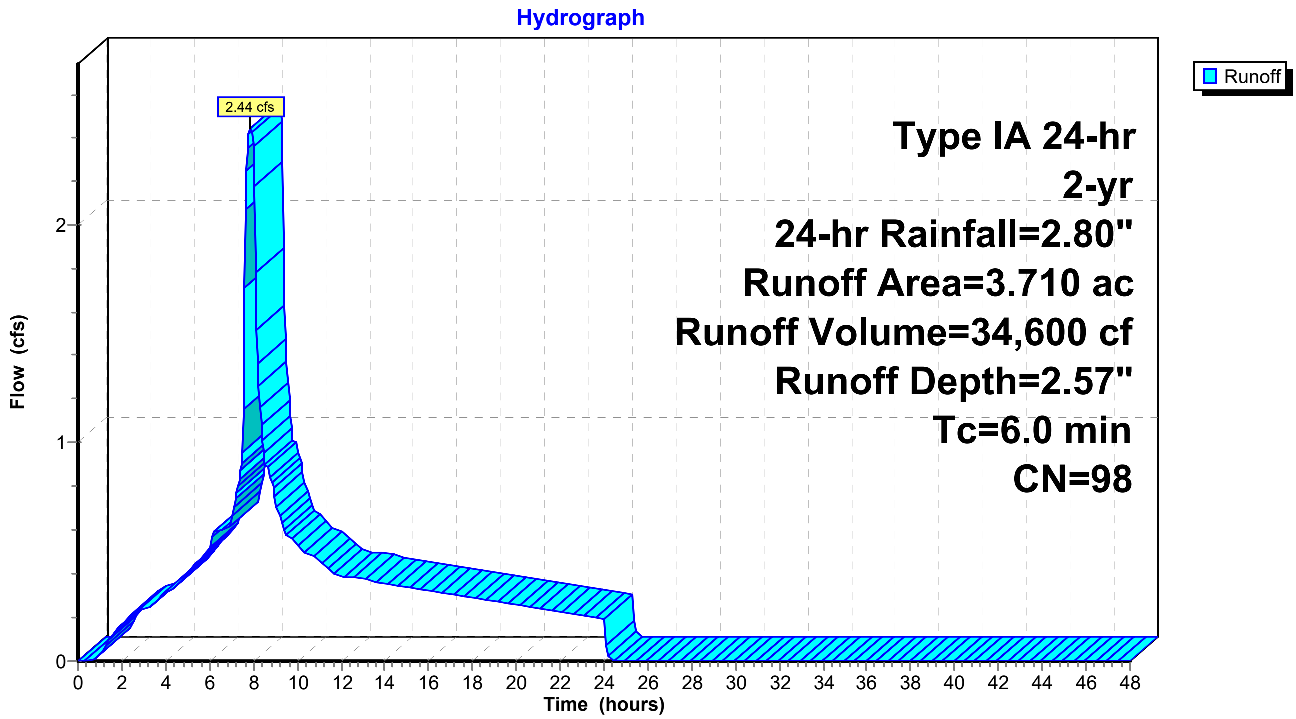
Runoff = 2.44 cfs @ 7.87 hrs, Volume= 34,600 cf, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-yr, 24-hr Rainfall=2.80"

	Area (ac)	CN	Description
*	1.890	98	Paved Road
*	0.550	92	Gravel Laydown
*	1.240	100	Pond 1
*	0.030	80	Pipeline
	3.710	98	Weighted Average
	0.580		15.63% Pervious Area
	3.130		84.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P1-NB: Pond 1 North Basin



Summary for Subcatchment P1-SB: Pond 1 South Basin

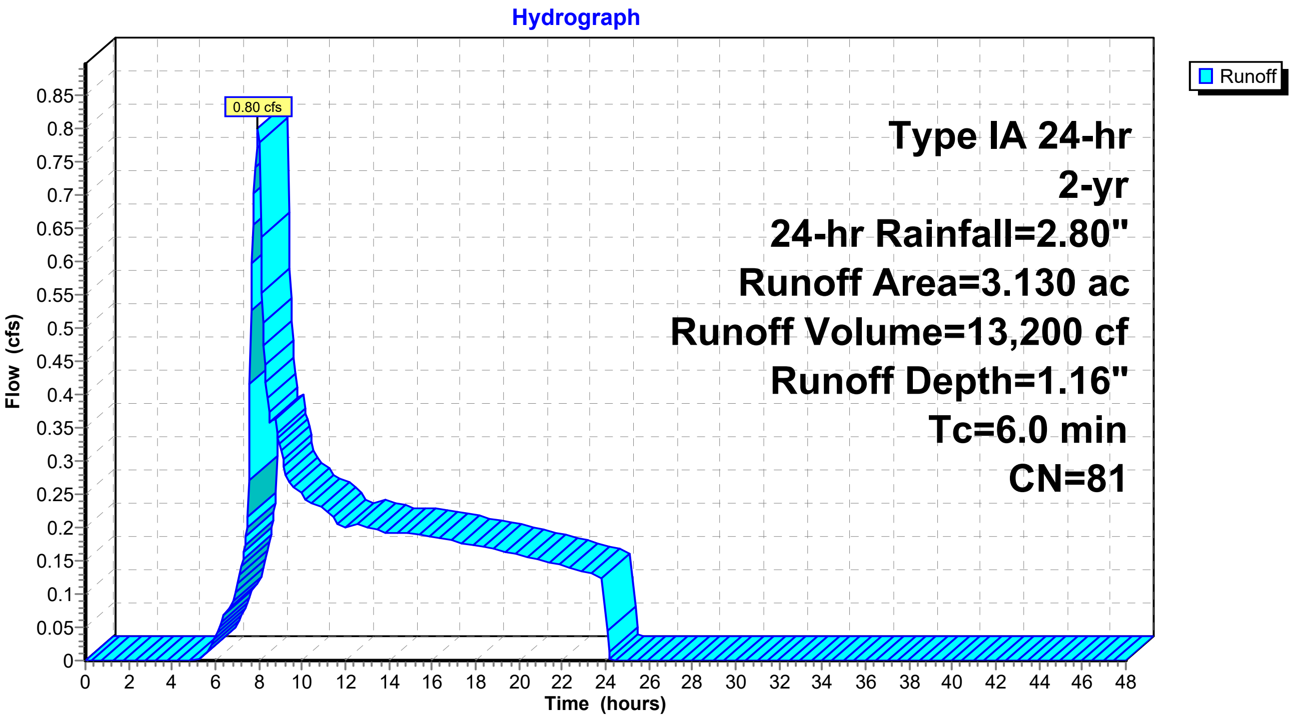
Runoff = 0.80 cfs @ 7.98 hrs, Volume= 13,200 cf, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-yr, 24-hr Rainfall=2.80"

	Area (ac)	CN	Description
*	2.570	78	Rail/Gravel Base
*	0.560	92	Gravel Access Road
	3.130	81	Weighted Average
	3.130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P1-SB: Pond 1 South Basin



Summary for Subcatchment P2-NB: Pond 2 North Basin

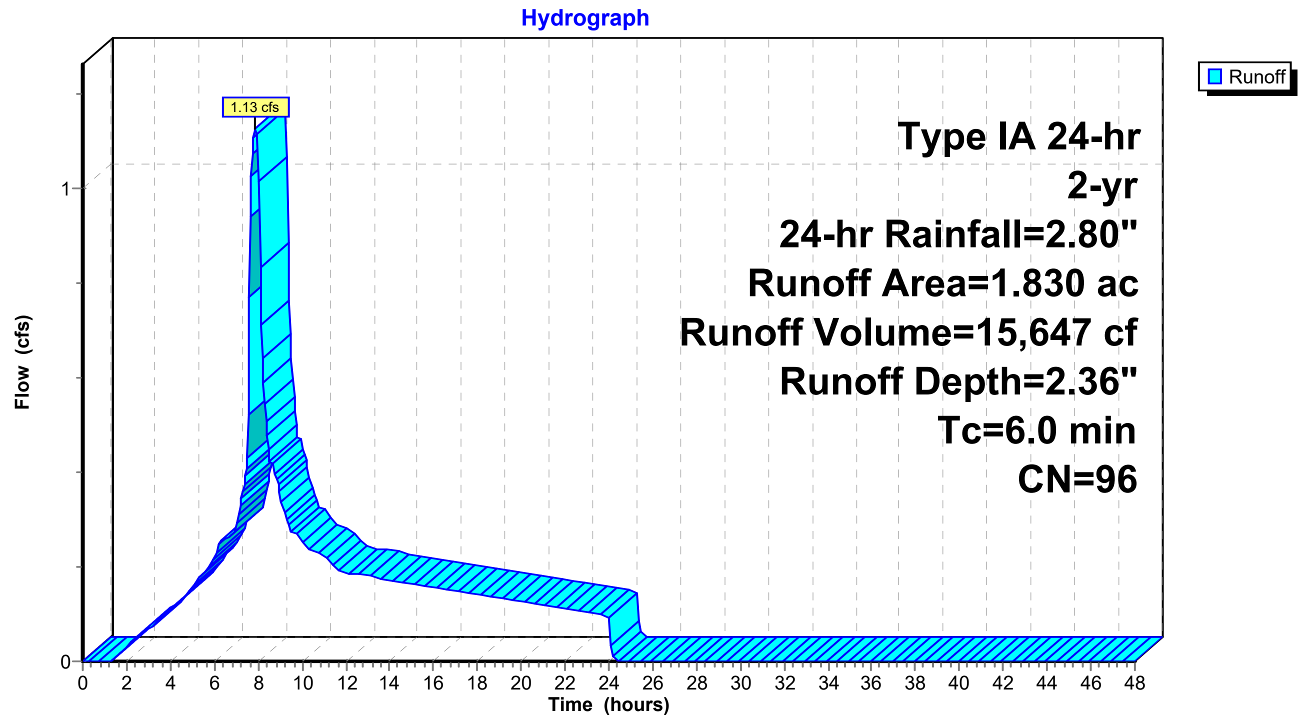
Runoff = 1.13 cfs @ 7.89 hrs, Volume= 15,647 cf, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-yr, 24-hr Rainfall=2.80"

	Area (ac)	CN	Description
*	0.350	80	Pipeline
*	0.800	100	Paved Road
*	0.080	92	Gravel Laydown
*	0.600	100	Pond 2
	1.830	96	Weighted Average
	0.430		23.50% Pervious Area
	1.400		76.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P2-NB: Pond 2 North Basin



Summary for Subcatchment P2-SB: Pond 2 South Basin

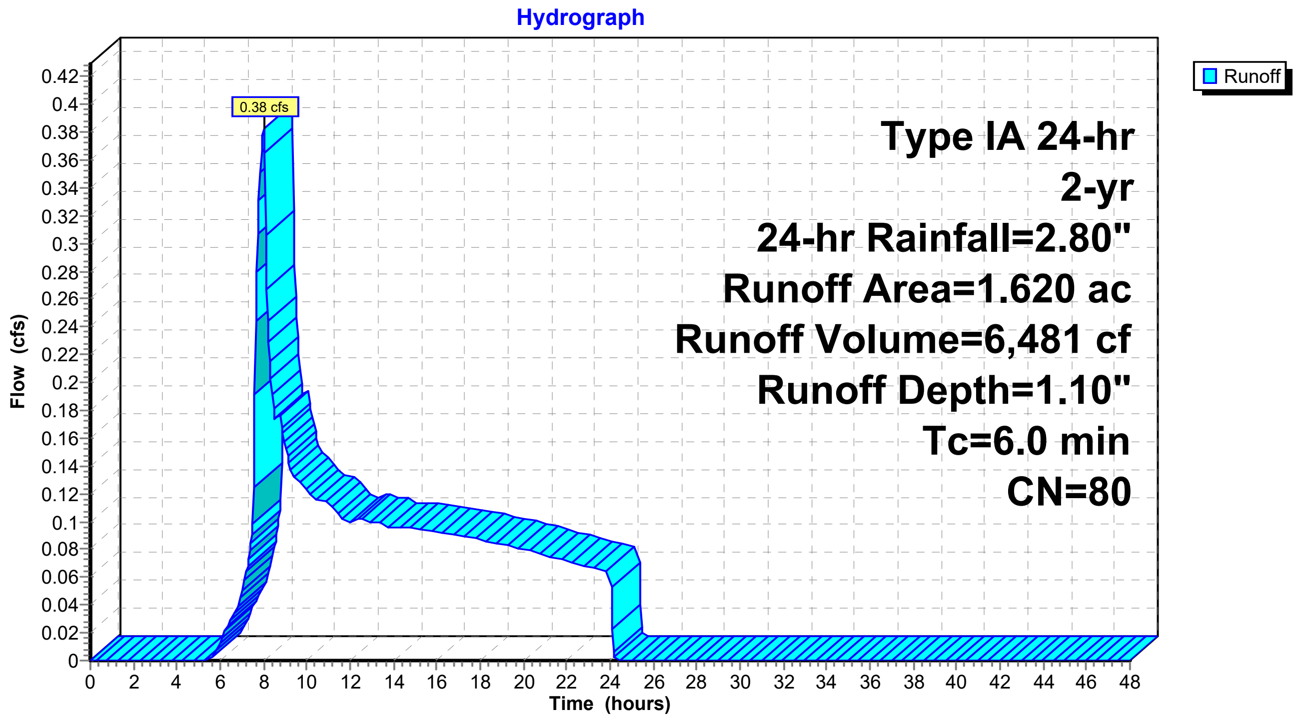
Runoff = 0.38 cfs @ 7.99 hrs, Volume= 6,481 cf, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-yr, 24-hr Rainfall=2.80"

	Area (ac)	CN	Description
*	1.350	78	Rail/Gravel Base
*	0.270	92	Gravel Access Road
	1.620	80	Weighted Average
	1.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P2-SB: Pond 2 South Basin



Summary for Subcatchment PMR: Pipeline Maintenance Road

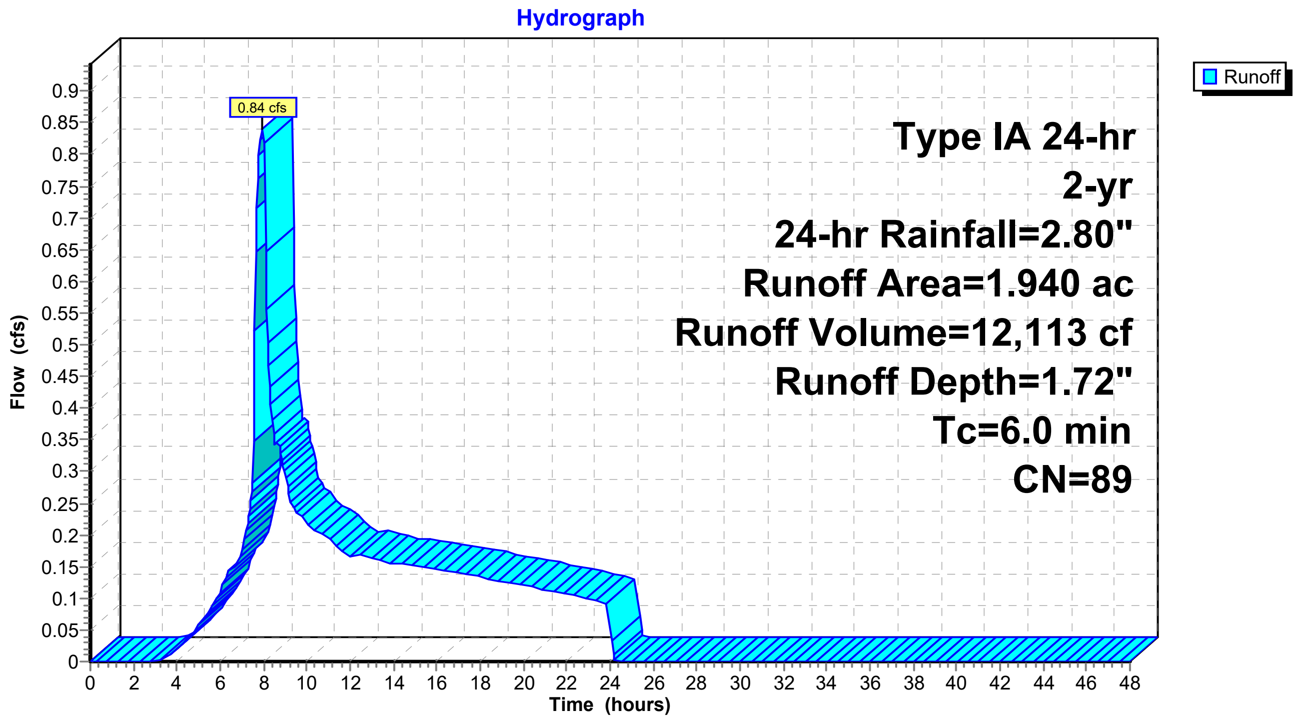
Runoff = 0.84 cfs @ 7.94 hrs, Volume= 12,113 cf, Depth= 1.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-yr, 24-hr Rainfall=2.80"

	Area (ac)	CN	Description
*	0.580	92	Maintenance Road
*	0.490	100	Pond 3
*	0.870	80	Pipeline
	1.940	89	Weighted Average
	1.450		74.74% Pervious Area
	0.490		25.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment PMR: Pipeline Maintenance Road



Summary for Pond DP-002: MH-DP002 (Basin 2 Post-Developed)

Inflow Area = 532,739 sf, 41.05% Impervious, Inflow Depth > 1.25" for 2-yr, 24-hr event
Inflow = 0.86 cfs @ 16.32 hrs, Volume= 55,284 cf
Outflow = 0.86 cfs @ 16.32 hrs, Volume= 55,282 cf, Atten= 0%, Lag= 0.1 min
Primary = 0.86 cfs @ 16.32 hrs, Volume= 55,282 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= -2.52' Surf.Area= 20 sf Storage= 30 cf
Peak Elev= -2.05' @ 16.32 hrs Surf.Area= 20 sf Storage= 39 cf (9 cf above start)

Plug-Flow detention time= 1.7 min calculated for 55,195 cf (100% of inflow)
Center-of-Mass det. time= 0.2 min (1,202.0 - 1,201.8)

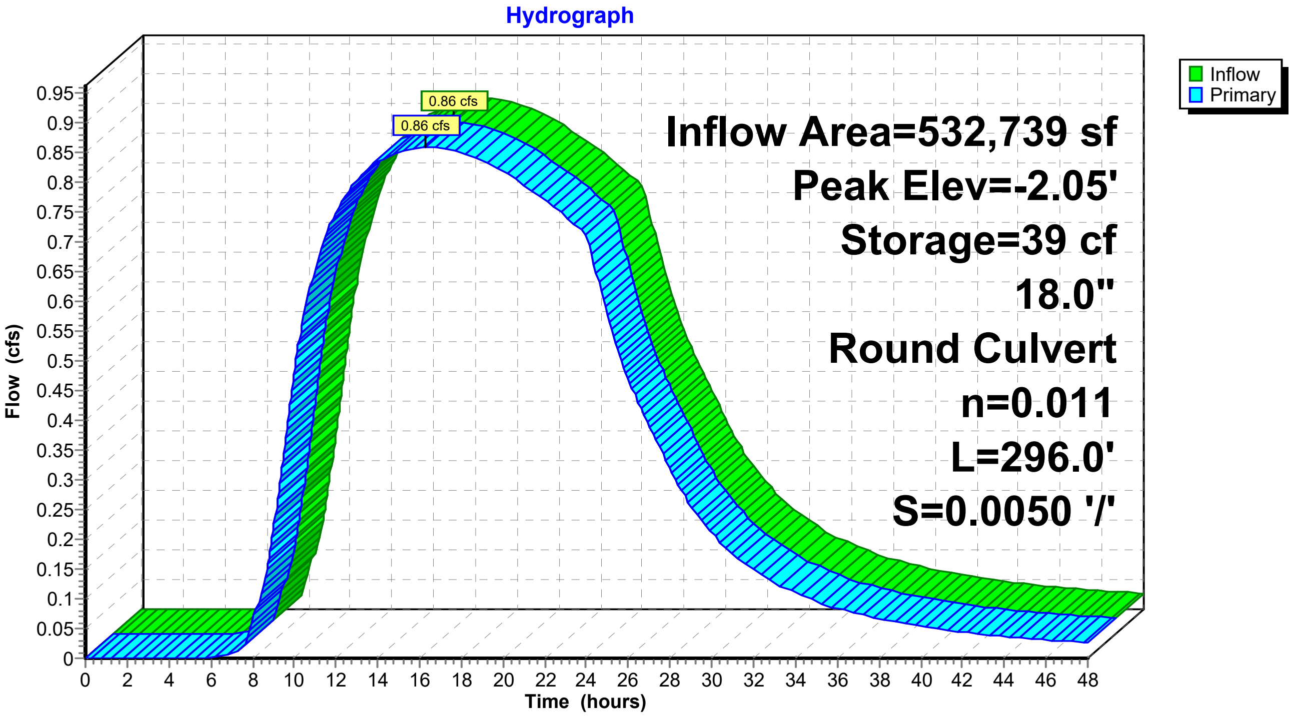
Volume	Invert	Avail.Storage	Storage Description
#1	-4.00'	140 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-4.00	20	0	0
3.00	20	140	140

Device	Routing	Invert	Outlet Devices
#1	Primary	-2.52'	**18.0" Round Pipe to McLean Slough** L= 296.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= -2.52' / -4.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.86 cfs @ 16.32 hrs HW=-2.05' (Free Discharge)
└─**1=Pipe to McLean Slough** (Inlet Controls 0.86 cfs @ 1.83 fps)

Pond DP-002: MH-DP002 (Basin 2 Post-Developed)



Summary for Pond DP-003: POND 4/CB-DP003 (Basin 3 Post-Developed)

Inflow Area = 33,977 sf, 15.38% Impervious, Inflow Depth = 1.16" for 2-yr, 24-hr event
Inflow = 0.20 cfs @ 7.98 hrs, Volume= 3,289 cf
Outflow = 0.06 cfs @ 10.98 hrs, Volume= 3,201 cf, Atten= 71%, Lag= 180.1 min
Primary = 0.06 cfs @ 10.98 hrs, Volume= 3,201 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 2.00' Surf.Area= 0 sf Storage= 3,518 cf
Peak Elev= 2.16' @ 10.98 hrs Surf.Area= 0 sf Storage= 4,233 cf (715 cf above start)
Flood Elev= 3.00' Surf.Area= 0 sf Storage= 8,061 cf (4,543 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 226.8 min (1,055.8 - 829.0)

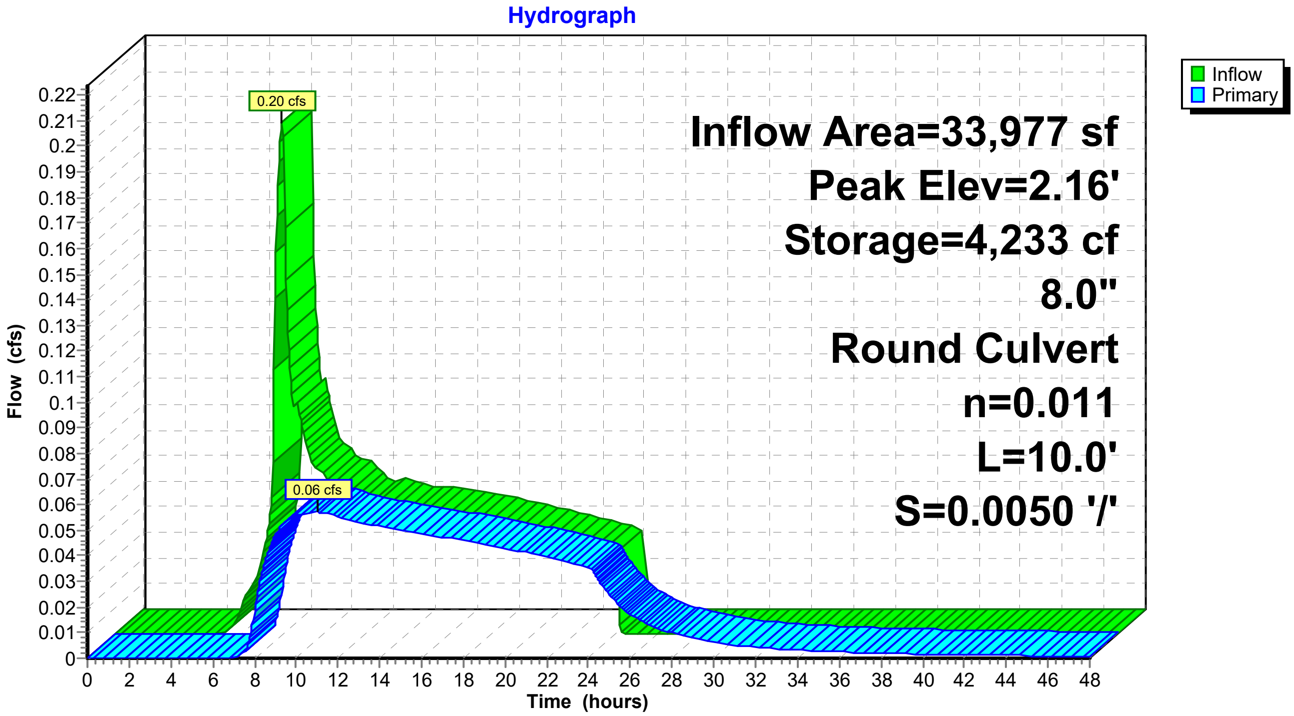
Volume	Invert	Avail.Storage	Storage Description
#1	1.00'	8,061 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.00	3,518
3.00	8,061

Device	Routing	Invert	Outlet Devices
#1	Primary	2.00'	**8.0" Round Pipe to CB-DP-003** L= 10.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.95' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.06 cfs @ 10.98 hrs HW=2.16' (Free Discharge)
└**1=Pipe to CB-DP-003** (Barrel Controls 0.06 cfs @ 1.37 fps)

Pond DP-003: POND 4/CB-DP003 (Basin 3 Post-Developed)



Summary for Pond P-1: POND 1

Inflow Area = 297,950 sf, 45.76% Impervious, Inflow Depth = 1.93" for 2-yr, 24-hr event
Inflow = 3.21 cfs @ 7.91 hrs, Volume= 47,799 cf
Outflow = 0.45 cfs @ 18.59 hrs, Volume= 30,061 cf, Atten= 86%, Lag= 640.4 min
Primary = 0.45 cfs @ 18.59 hrs, Volume= 30,061 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.50' @ 18.59 hrs Surf.Area= 0 sf Storage= 27,509 cf
Flood Elev= 2.35' Surf.Area= 0 sf Storage= 102,326 cf

Plug-Flow detention time= 761.7 min calculated for 30,030 cf (63% of inflow)
Center-of-Mass det. time= 543.5 min (1,256.9 - 713.4)

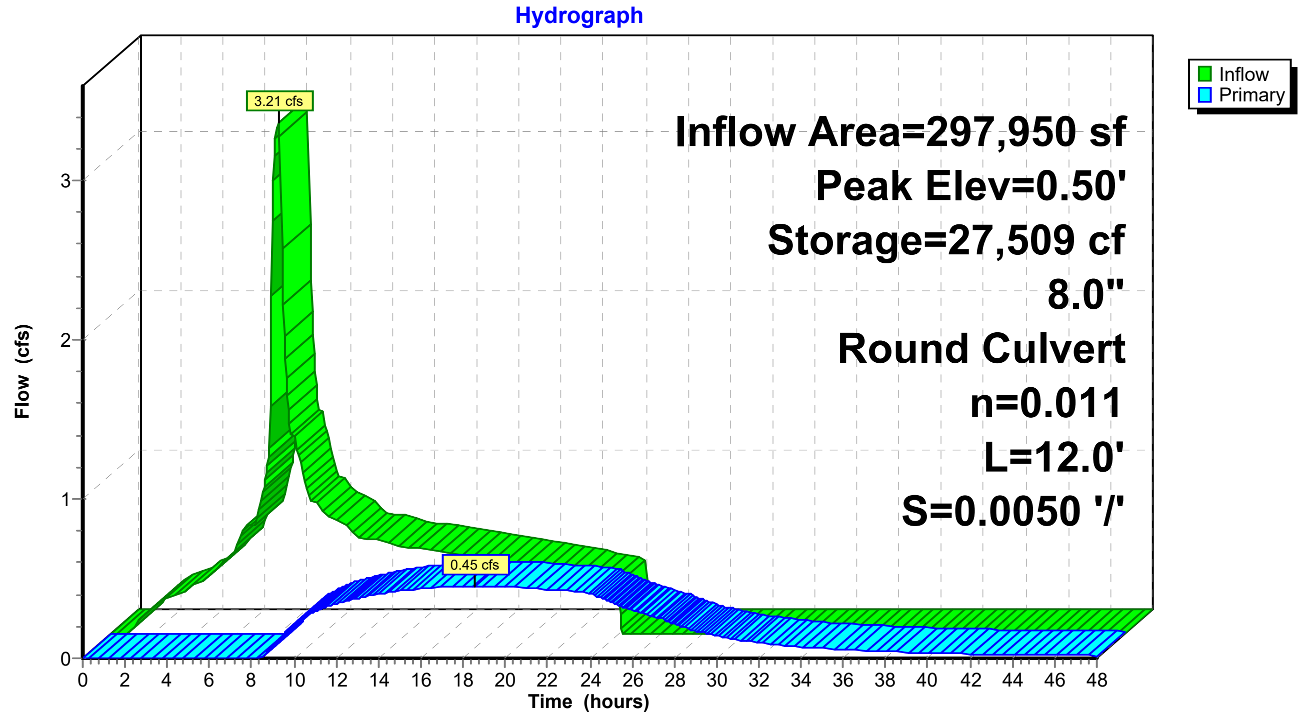
Volume	Invert	Avail.Storage	Storage Description
#1	-1.15'	102,326 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-1.15	0
-0.65	4,073
0.35	22,730
1.35	55,457
2.35	102,326

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.0" Round Pipe to MH-DP002** L= 12.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -0.06' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.45 cfs @ 18.59 hrs HW=0.50' TW=-2.06' (Dynamic Tailwater)
1=Pipe to MH-DP002 (Barrel Controls 0.45 cfs @ 2.26 fps)

Pond P-1: POND 1



Summary for Pond P-1 CBs: Pond 1 Catch Basins

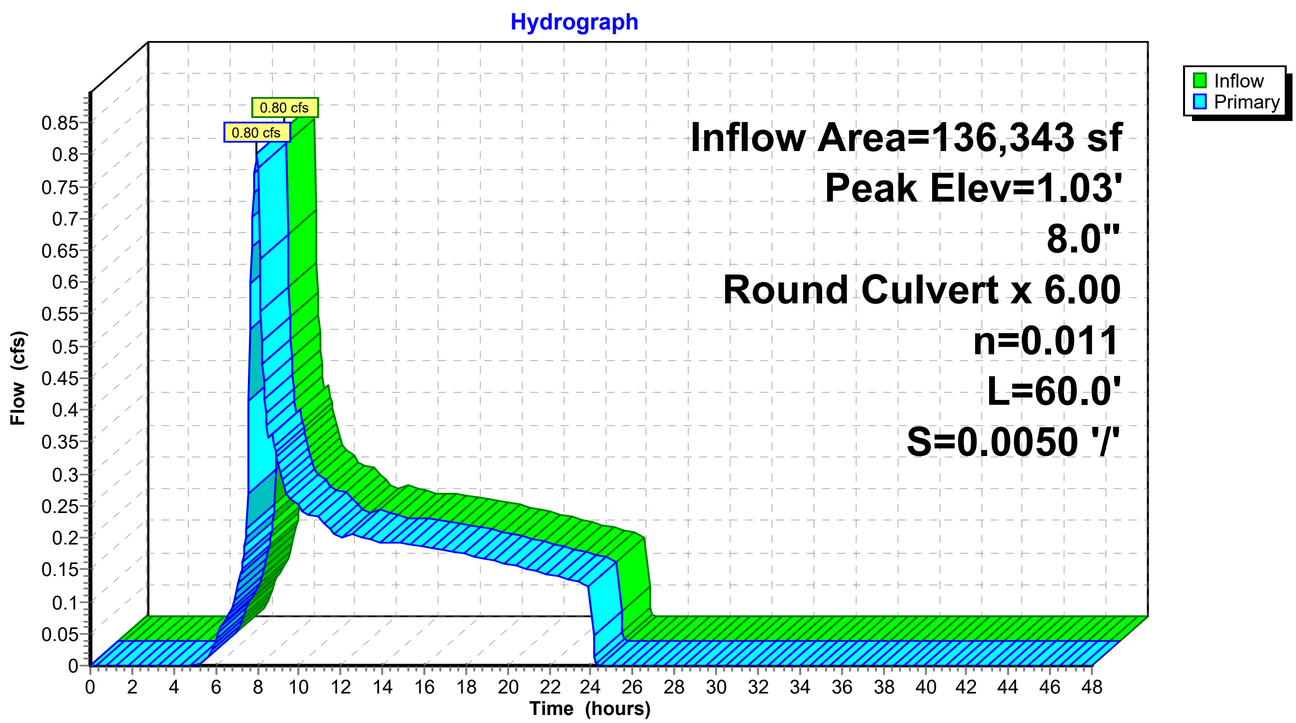
Inflow Area =	136,343 sf,	0.00% Impervious,	Inflow Depth = 1.16"	for 2-yr, 24-hr event	
Inflow =	0.80 cfs @	7.98 hrs, Volume=	13,200 cf		
Outflow =	0.80 cfs @	7.98 hrs, Volume=	13,200 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	0.80 cfs @	7.98 hrs, Volume=	13,200 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1.03' @ 7.98 hrs
Flood Elev= 2.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	0.80'	**8.0" Round Storm Pipe Under Tracks to Pond X 6.00** L= 60.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.80' / 0.50' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.80 cfs @ 7.98 hrs HW=1.03' TW=-0.13' (Dynamic Tailwater)
└─**1=Storm Pipe Under Tracks to Pond**(Barrel Controls 0.80 cfs @ 1.88 fps)

Pond P-1 CBs: Pond 1 Catch Basins



Summary for Pond P-2: POND 2

Inflow Area = 150,282 sf, 40.58% Impervious, Inflow Depth = 1.77" for 2-yr, 24-hr event
Inflow = 1.50 cfs @ 7.93 hrs, Volume= 22,128 cf
Outflow = 0.26 cfs @ 14.50 hrs, Volume= 13,985 cf, Atten= 82%, Lag= 394.5 min
Primary = 0.26 cfs @ 14.50 hrs, Volume= 13,985 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.35' @ 14.50 hrs Surf.Area= 0 sf Storage= 10,934 cf
Flood Elev= 2.35' Surf.Area= 0 sf Storage= 49,476 cf

Plug-Flow detention time= 601.1 min calculated for 13,985 cf (63% of inflow)
Center-of-Mass det. time= 386.7 min (1,124.3 - 737.6)

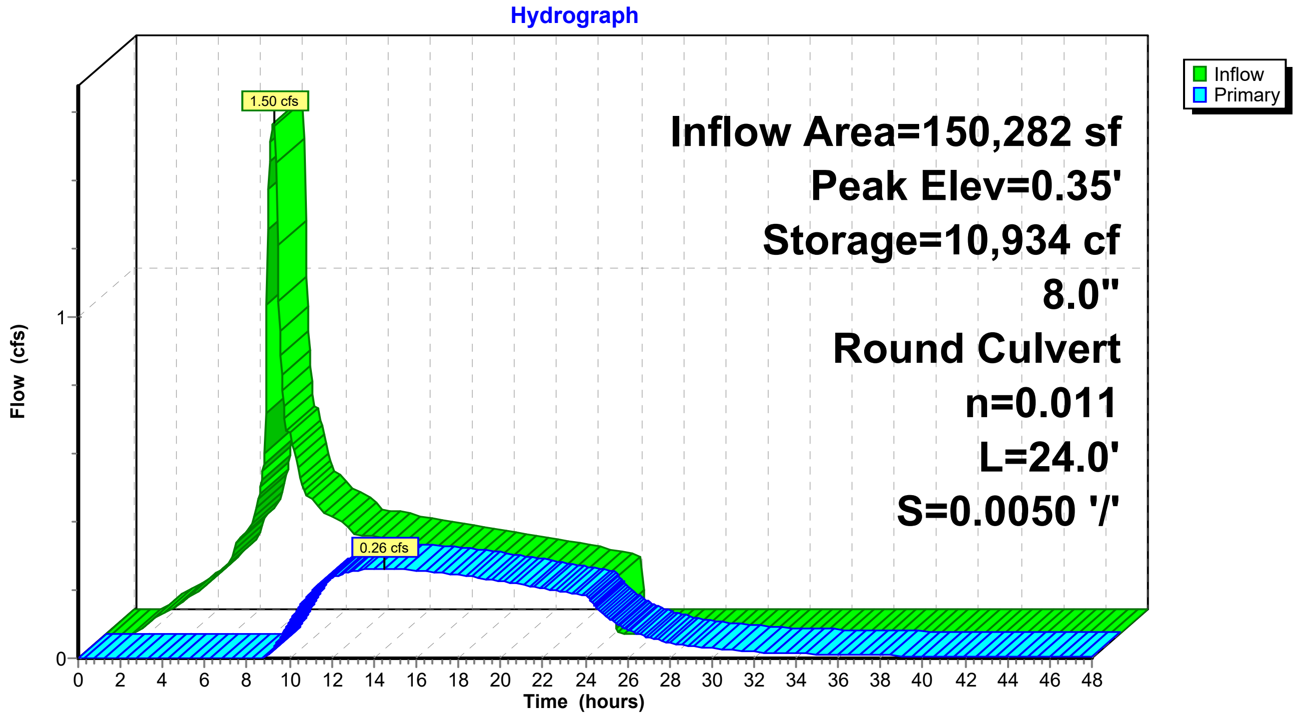
Volume	Invert	Avail.Storage	Storage Description
#1	-1.15'	49,476 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-1.15	0
-0.65	1,959
0.35	10,959
1.35	26,767
2.35	49,476

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.0" Round Pipe to MH-DP002** L= 24.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -0.12' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.26 cfs @ 14.50 hrs HW=0.35' TW=-2.06' (Dynamic Tailwater)
1=Pipe to MH-DP002 (Barrel Controls 0.26 cfs @ 2.08 fps)

Pond P-2: POND 2



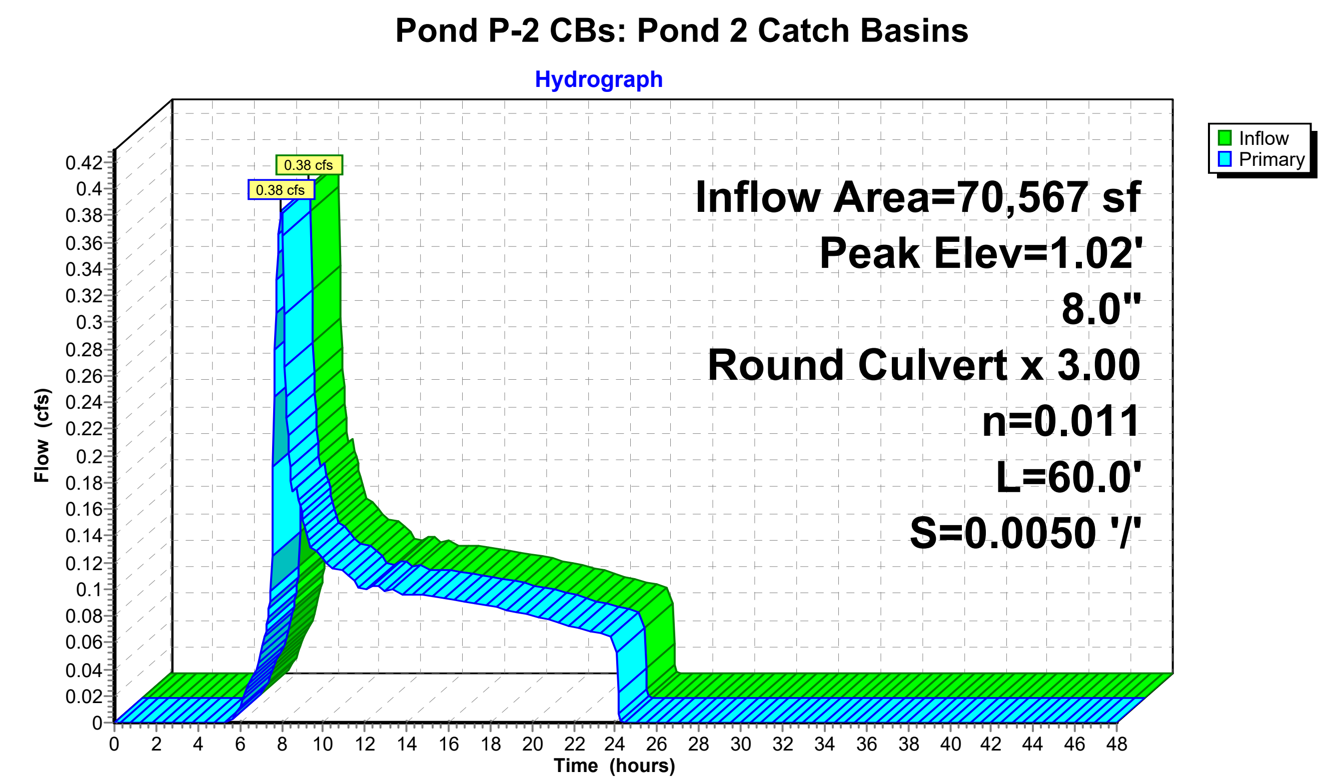
Summary for Pond P-2 CBs: Pond 2 Catch Basins

Inflow Area =	70,567 sf,	0.00% Impervious,	Inflow Depth = 1.10"	for 2-yr, 24-hr event
Inflow =	0.38 cfs @	7.99 hrs, Volume=	6,481 cf	
Outflow =	0.38 cfs @	7.99 hrs, Volume=	6,481 cf, Atten= 0%, Lag= 0.0 min	
Primary =	0.38 cfs @	7.99 hrs, Volume=	6,481 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1.02' @ 7.99 hrs
Flood Elev= 2.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	0.80'	**8.0" Round Storm Pipe Under Tracks to Pond 2 X 3.00** L= 60.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.80' / 0.50' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.38 cfs @ 7.99 hrs HW=1.02' TW=-0.24' (Dynamic Tailwater)
1=Storm Pipe Under Tracks to Pond 2(Barrel Controls 0.38 cfs @ 1.86 fps)



Summary for Pond P-3: POND 3

Inflow Area = 84,506 sf, 25.26% Impervious, Inflow Depth = 1.72" for 2-yr, 24-hr event
Inflow = 0.84 cfs @ 7.94 hrs, Volume= 12,113 cf
Outflow = 0.17 cfs @ 11.72 hrs, Volume= 11,237 cf, Atten= 80%, Lag= 226.8 min
Primary = 0.17 cfs @ 11.72 hrs, Volume= 11,237 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= -1.00' Surf.Area= 0 sf Storage= 6,229 cf
Peak Elev= -0.74' @ 11.72 hrs Surf.Area= 0 sf Storage= 10,407 cf (4,178 cf above start)

Plug-Flow detention time= 1,100.2 min calculated for 5,003 cf (41% of inflow)
Center-of-Mass det. time= 384.9 min (1,151.1 - 766.1)

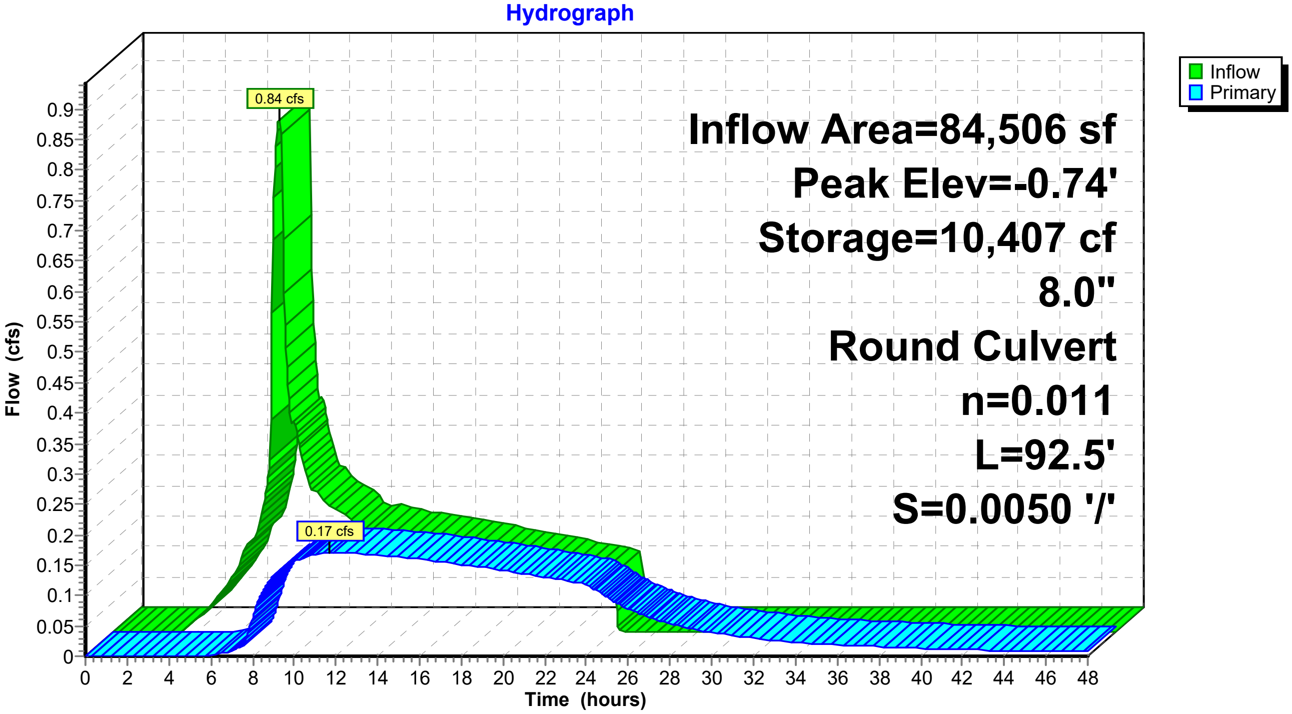
Volume	Invert	Avail.Storage	Storage Description
#1	-2.00'	22,444 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-2.00	0
-1.00	6,229
0.00	22,444

Device	Routing	Invert	Outlet Devices
#1	Primary	-1.00'	**8.0" Round Pipe to MH-DP002** L= 92.5' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= -1.00' / -1.46' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.17 cfs @ 11.72 hrs HW=-0.74' TW=-2.09' (Dynamic Tailwater)
└─**1=Pipe to MH-DP002** (Inlet Controls 0.17 cfs @ 1.36 fps)

Pond P-3: POND 3



Summary for Subcatchment P-4 B: Pond 4 Basin

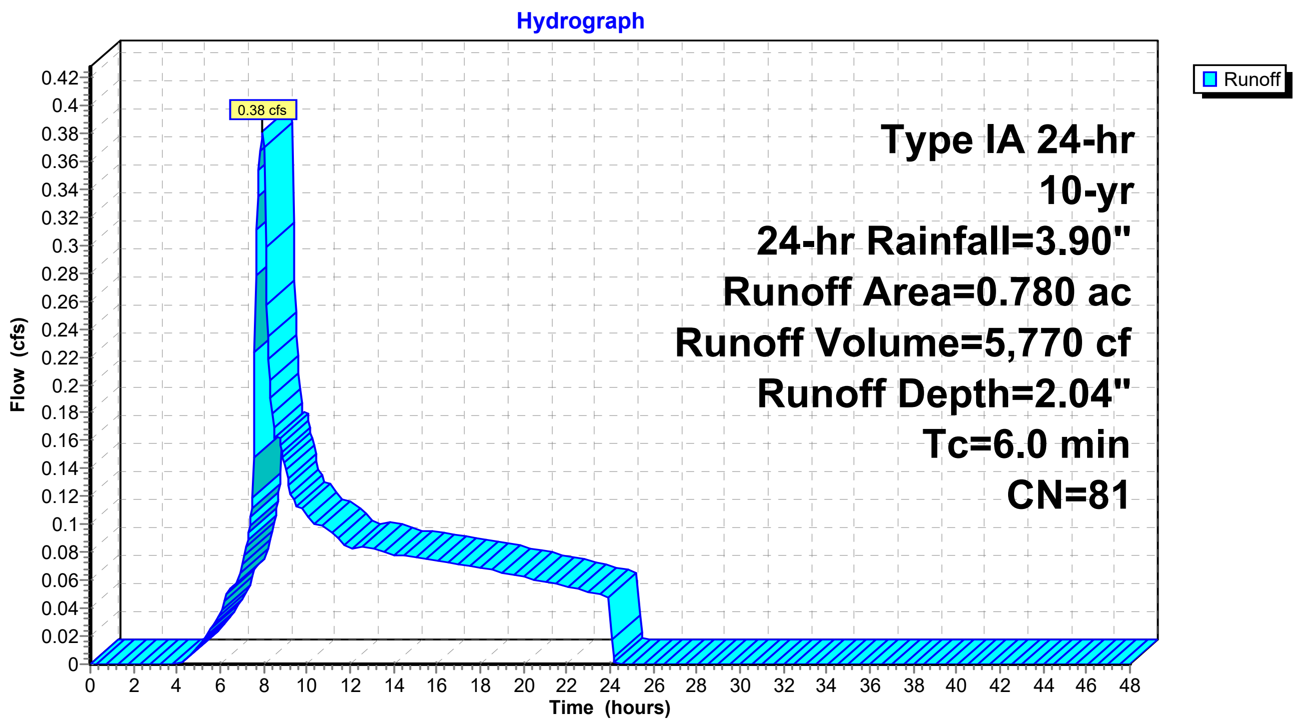
Runoff = 0.38 cfs @ 7.97 hrs, Volume= 5,770 cf, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr, 24-hr Rainfall=3.90"

	Area (ac)	CN	Description
*	0.660	78	Rail/Gravel Base
*	0.120	100	Pond 4
	0.780	81	Weighted Average
	0.660		84.62% Pervious Area
	0.120		15.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P-4 B: Pond 4 Basin



Summary for Subcatchment P1-NB: Pond 1 North Basin

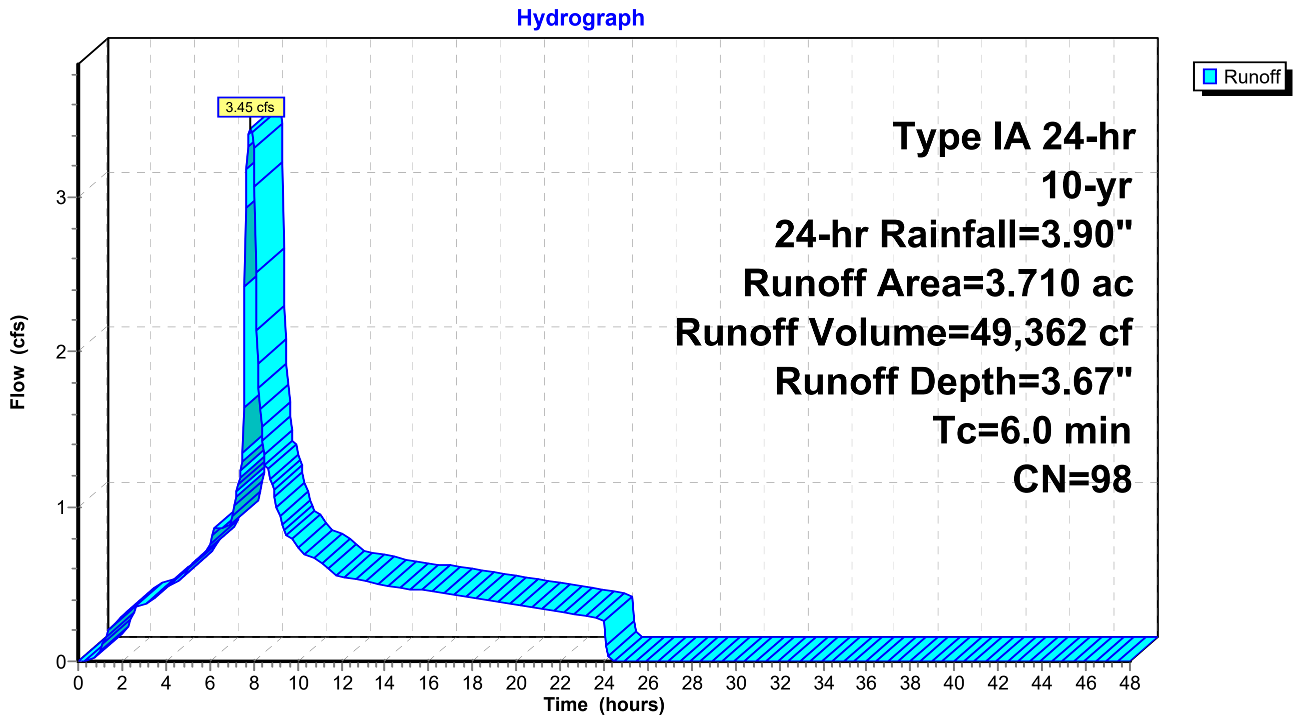
Runoff = 3.45 cfs @ 7.87 hrs, Volume= 49,362 cf, Depth= 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr, 24-hr Rainfall=3.90"

	Area (ac)	CN	Description
*	1.890	98	Paved Road
*	0.550	92	Gravel Laydown
*	1.240	100	Pond 1
*	0.030	80	Pipeline
	3.710	98	Weighted Average
	0.580		15.63% Pervious Area
	3.130		84.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P1-NB: Pond 1 North Basin



Summary for Subcatchment P1-SB: Pond 1 South Basin

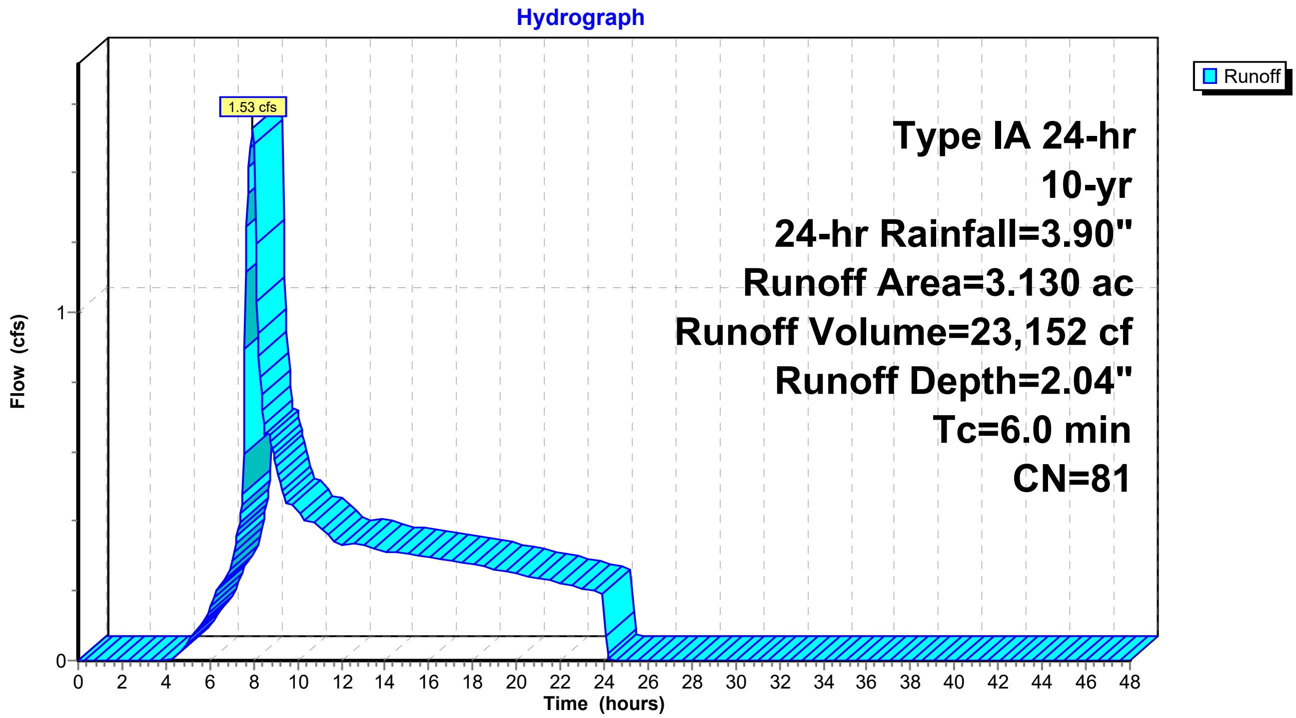
Runoff = 1.53 cfs @ 7.97 hrs, Volume= 23,152 cf, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr, 24-hr Rainfall=3.90"

	Area (ac)	CN	Description
*	2.570	78	Rail/Gravel Base
*	0.560	92	Gravel Access Road
	3.130	81	Weighted Average
	3.130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P1-SB: Pond 1 South Basin



Summary for Subcatchment P2-NB: Pond 2 North Basin

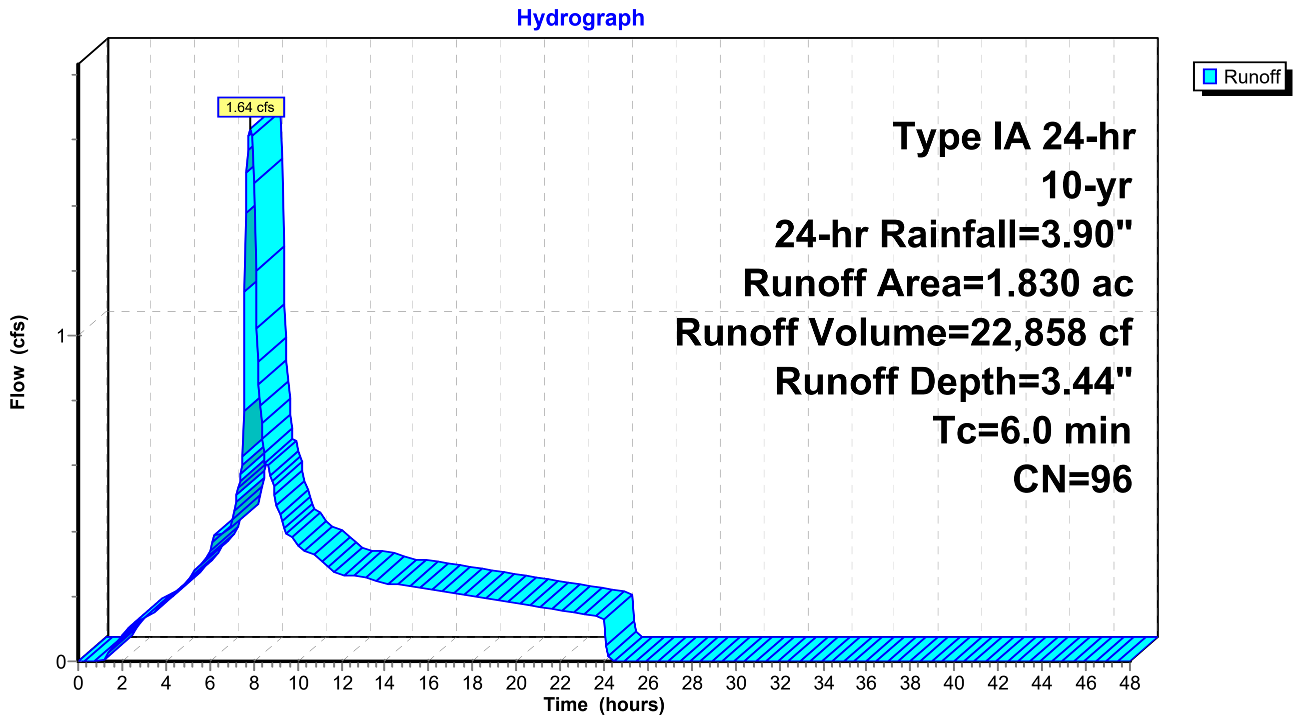
Runoff = 1.64 cfs @ 7.88 hrs, Volume= 22,858 cf, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr, 24-hr Rainfall=3.90"

	Area (ac)	CN	Description
*	0.350	80	Pipeline
*	0.800	100	Paved Road
*	0.080	92	Gravel Laydown
*	0.600	100	Pond 2
	1.830	96	Weighted Average
	0.430		23.50% Pervious Area
	1.400		76.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P2-NB: Pond 2 North Basin



Summary for Subcatchment P2-SB: Pond 2 South Basin

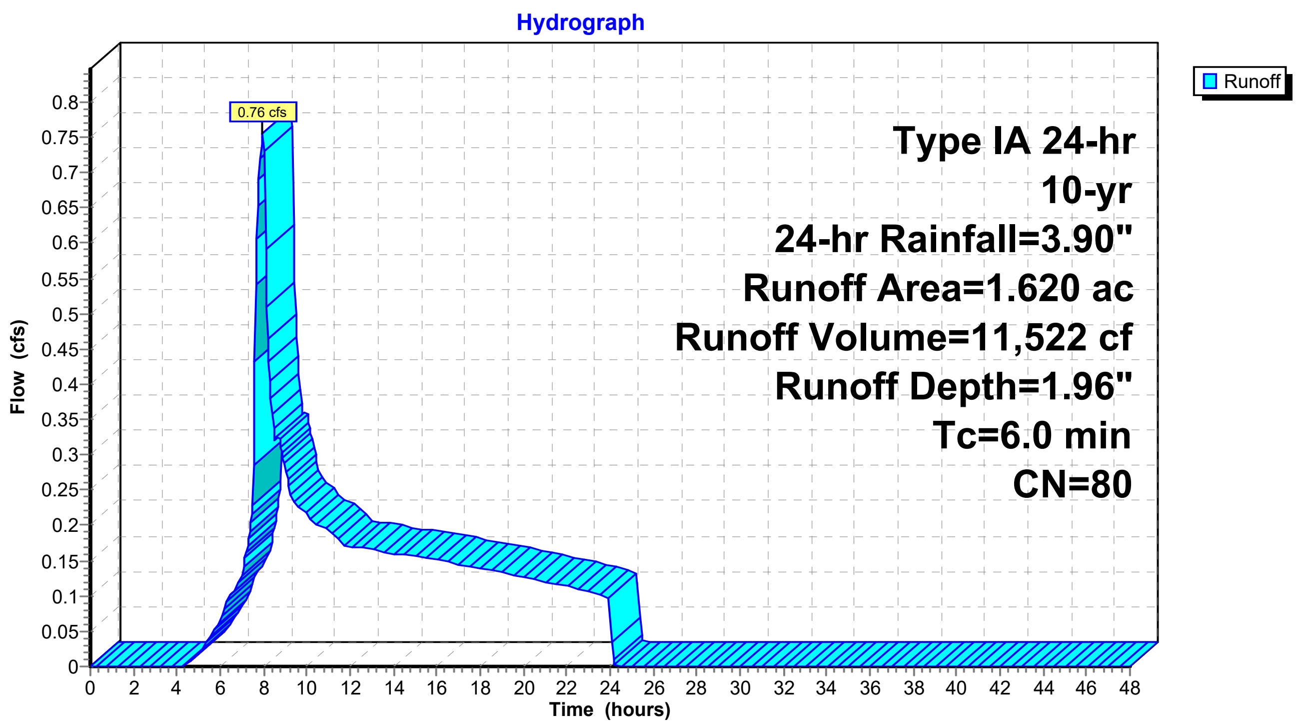
Runoff = 0.76 cfs @ 7.98 hrs, Volume= 11,522 cf, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr, 24-hr Rainfall=3.90"

	Area (ac)	CN	Description
*	1.350	78	Rail/Gravel Base
*	0.270	92	Gravel Access Road
	1.620	80	Weighted Average
	1.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P2-SB: Pond 2 South Basin



Summary for Subcatchment PMR: Pipeline Maintenance Road

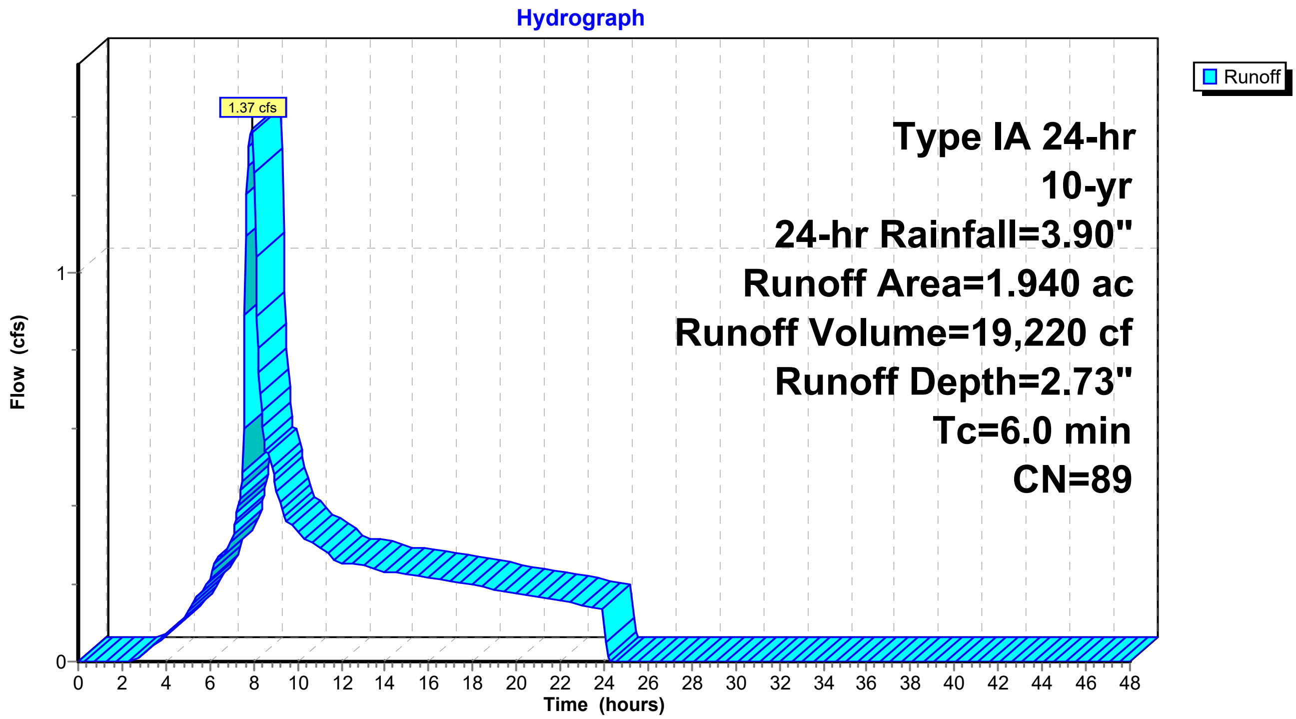
Runoff = 1.37 cfs @ 7.92 hrs, Volume= 19,220 cf, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10-yr, 24-hr Rainfall=3.90"

	Area (ac)	CN	Description
*	0.580	92	Maintenance Road
*	0.490	100	Pond 3
*	0.870	80	Pipeline
	1.940	89	Weighted Average
	1.450		74.74% Pervious Area
	0.490		25.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment PMR: Pipeline Maintenance Road



Summary for Pond DP-002: MH-DP002 (Basin 2 Post-Developed)

Inflow Area = 532,739 sf, 41.05% Impervious, Inflow Depth > 2.23" for 10-yr, 24-hr event
Inflow = 1.56 cfs @ 11.56 hrs, Volume= 99,134 cf
Outflow = 1.56 cfs @ 11.56 hrs, Volume= 99,132 cf, Atten= 0%, Lag= 0.1 min
Primary = 1.56 cfs @ 11.56 hrs, Volume= 99,132 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= -2.52' Surf.Area= 20 sf Storage= 30 cf
Peak Elev= -1.88' @ 11.56 hrs Surf.Area= 20 sf Storage= 42 cf (13 cf above start)

Plug-Flow detention time= 1.1 min calculated for 98,999 cf (100% of inflow)
Center-of-Mass det. time= 0.1 min (1,112.2 - 1,112.1)

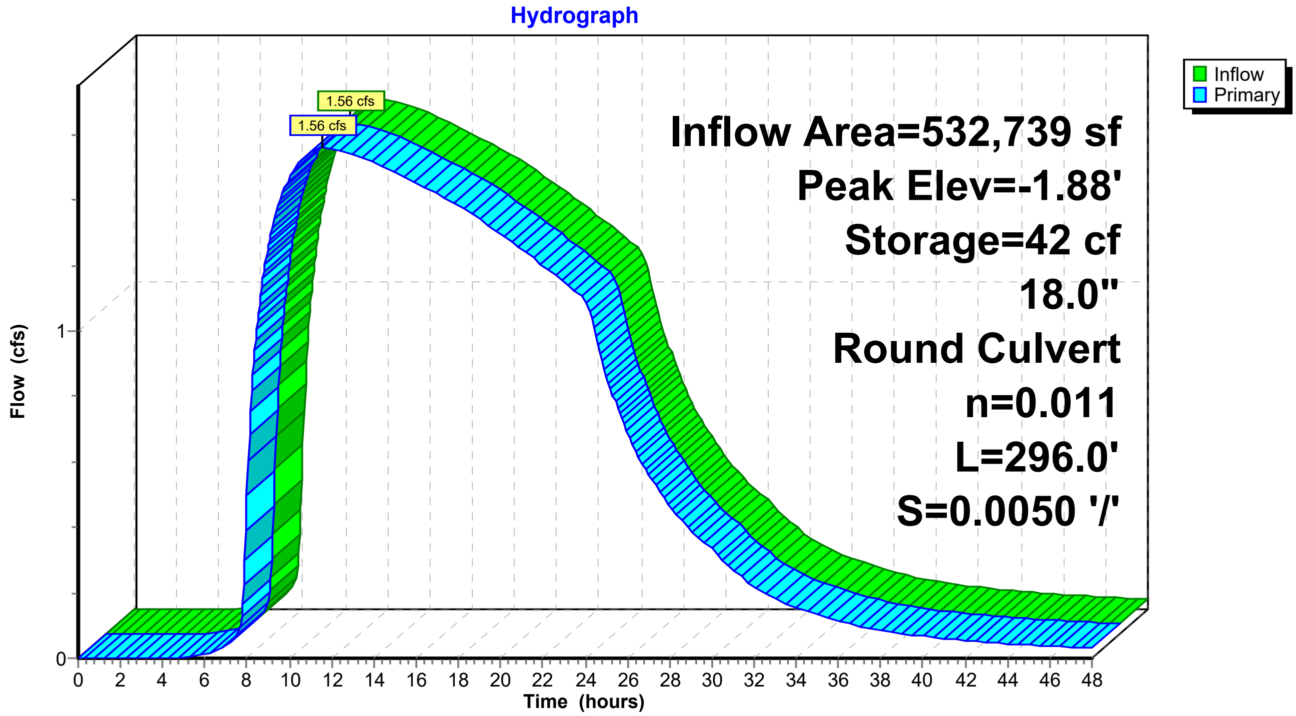
Volume	Invert	Avail.Storage	Storage Description
#1	-4.00'	140 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-4.00	20	0	0
3.00	20	140	140

Device	Routing	Invert	Outlet Devices
#1	Primary	-2.52'	**18.0" Round Pipe to McLean Slough** L= 296.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= -2.52' / -4.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.56 cfs @ 11.56 hrs HW=-1.88' (Free Discharge)
└─**1=Pipe to McLean Slough** (Inlet Controls 1.56 cfs @ 2.16 fps)

Pond DP-002: MH-DP002 (Basin 2 Post-Developed)



Summary for Pond DP-003: POND 4/CB-DP003 (Basin 3 Post-Developed)

Inflow Area = 33,977 sf, 15.38% Impervious, Inflow Depth = 2.04" for 10-yr, 24-hr event
Inflow = 0.38 cfs @ 7.97 hrs, Volume= 5,770 cf
Outflow = 0.14 cfs @ 9.04 hrs, Volume= 5,679 cf, Atten= 64%, Lag= 64.4 min
Primary = 0.14 cfs @ 9.04 hrs, Volume= 5,679 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 2.00' Surf.Area= 0 sf Storage= 3,518 cf
Peak Elev= 2.25' @ 9.04 hrs Surf.Area= 0 sf Storage= 4,666 cf (1,148 cf above start)
Flood Elev= 3.00' Surf.Area= 0 sf Storage= 8,061 cf (4,543 cf above start)

Plug-Flow detention time= 887.6 min calculated for 2,159 cf (37% of inflow)
Center-of-Mass det. time= 177.0 min (970.9 - 793.9)

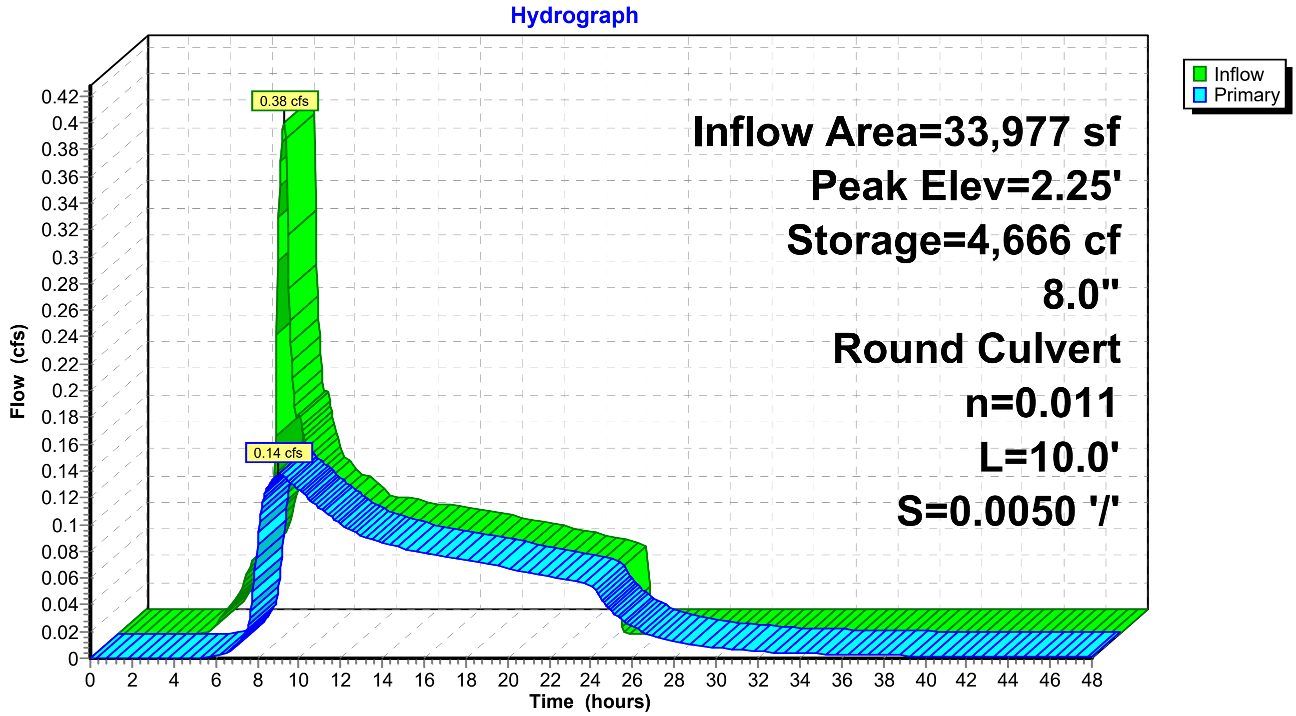
Volume	Invert	Avail.Storage	Storage Description
#1	1.00'	8,061 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.00	3,518
3.00	8,061

Device	Routing	Invert	Outlet Devices
#1	Primary	2.00'	**8.0" Round Pipe to CB-DP-003** L= 10.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.95' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.14 cfs @ 9.04 hrs HW=2.25' (Free Discharge)
└─**1=Pipe to CB-DP-003** (Barrel Controls 0.14 cfs @ 1.68 fps)

Pond DP-003: POND 4/CB-DP003 (Basin 3 Post-Developed)



Summary for Pond P-1: POND 1

Inflow Area = 297,950 sf, 45.76% Impervious, Inflow Depth = 2.92" for 10-yr, 24-hr event
Inflow = 4.95 cfs @ 7.91 hrs, Volume= 72,514 cf
Outflow = 0.78 cfs @ 14.91 hrs, Volume= 54,604 cf, Atten= 84%, Lag= 420.4 min
Primary = 0.78 cfs @ 14.91 hrs, Volume= 54,604 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.71' @ 14.91 hrs Surf.Area= 0 sf Storage= 34,660 cf
Flood Elev= 2.35' Surf.Area= 0 sf Storage= 102,326 cf

Plug-Flow detention time= 625.4 min calculated for 54,547 cf (75% of inflow)
Center-of-Mass det. time= 469.6 min (1,172.6 - 703.0)

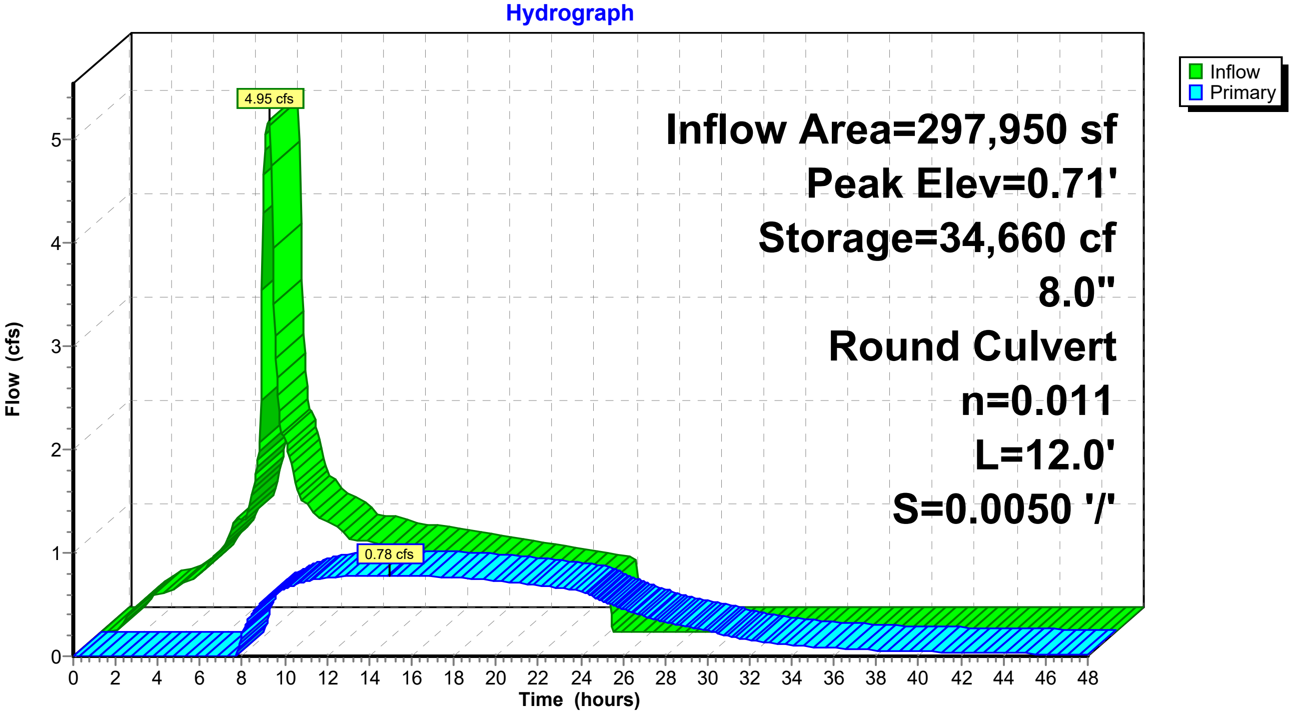
Volume	Invert	Avail.Storage	Storage Description
#1	-1.15'	102,326 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-1.15	0
-0.65	4,073
0.35	22,730
1.35	55,457
2.35	102,326

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.0" Round Pipe to MH-DP002** L= 12.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -0.06' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.78 cfs @ 14.91 hrs HW=0.71' TW=-1.89' (Dynamic Tailwater)
└─**1=Pipe to MH-DP002** (Barrel Controls 0.78 cfs @ 2.61 fps)

Pond P-1: POND 1



Summary for Pond P-1 CBs: Pond 1 Catch Basins

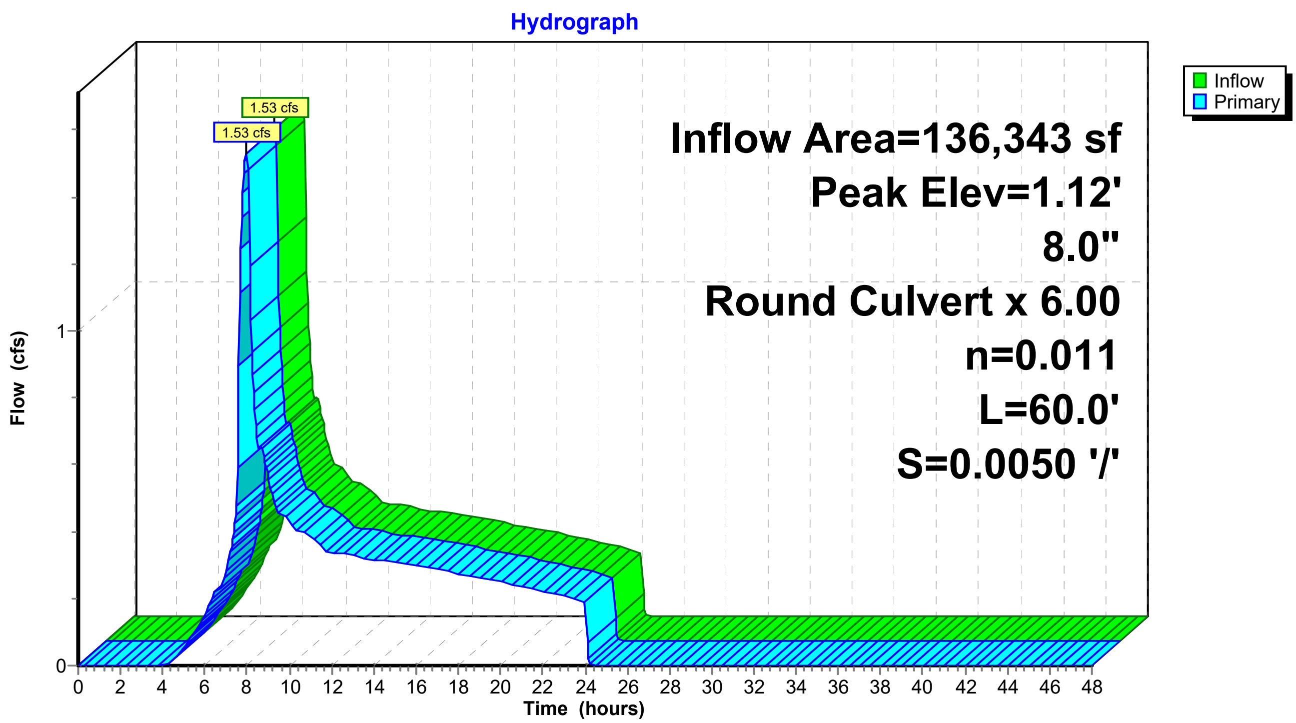
Inflow Area =	136,343 sf,	0.00% Impervious,	Inflow Depth = 2.04"	for 10-yr, 24-hr event
Inflow =	1.53 cfs @	7.97 hrs, Volume=	23,152 cf	
Outflow =	1.53 cfs @	7.97 hrs, Volume=	23,152 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.53 cfs @	7.97 hrs, Volume=	23,152 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1.12' @ 7.97 hrs
Flood Elev= 2.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	0.80'	**8.0" Round Storm Pipe Under Tracks to Pond X 6.00** L= 60.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.80' / 0.50' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=1.53 cfs @ 7.97 hrs HW=1.12' TW=0.29' (Dynamic Tailwater)
↑—**1=Storm Pipe Under Tracks to Pond** (Barrel Controls 1.53 cfs @ 2.21 fps)

Pond P-1 CBs: Pond 1 Catch Basins



Summary for Pond P-2: POND 2

Inflow Area = 150,282 sf, 40.58% Impervious, Inflow Depth = 2.75" for 10-yr, 24-hr event
Inflow = 2.38 cfs @ 7.91 hrs, Volume= 34,380 cf
Outflow = 0.50 cfs @ 11.11 hrs, Volume= 26,226 cf, Atten= 79%, Lag= 191.8 min
Primary = 0.50 cfs @ 11.11 hrs, Volume= 26,226 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.51' @ 11.11 hrs Surf.Area= 0 sf Storage= 13,474 cf
Flood Elev= 2.35' Surf.Area= 0 sf Storage= 49,476 cf

Plug-Flow detention time= 446.9 min calculated for 26,226 cf (76% of inflow)
Center-of-Mass det. time= 297.9 min (1,019.8 - 721.9)

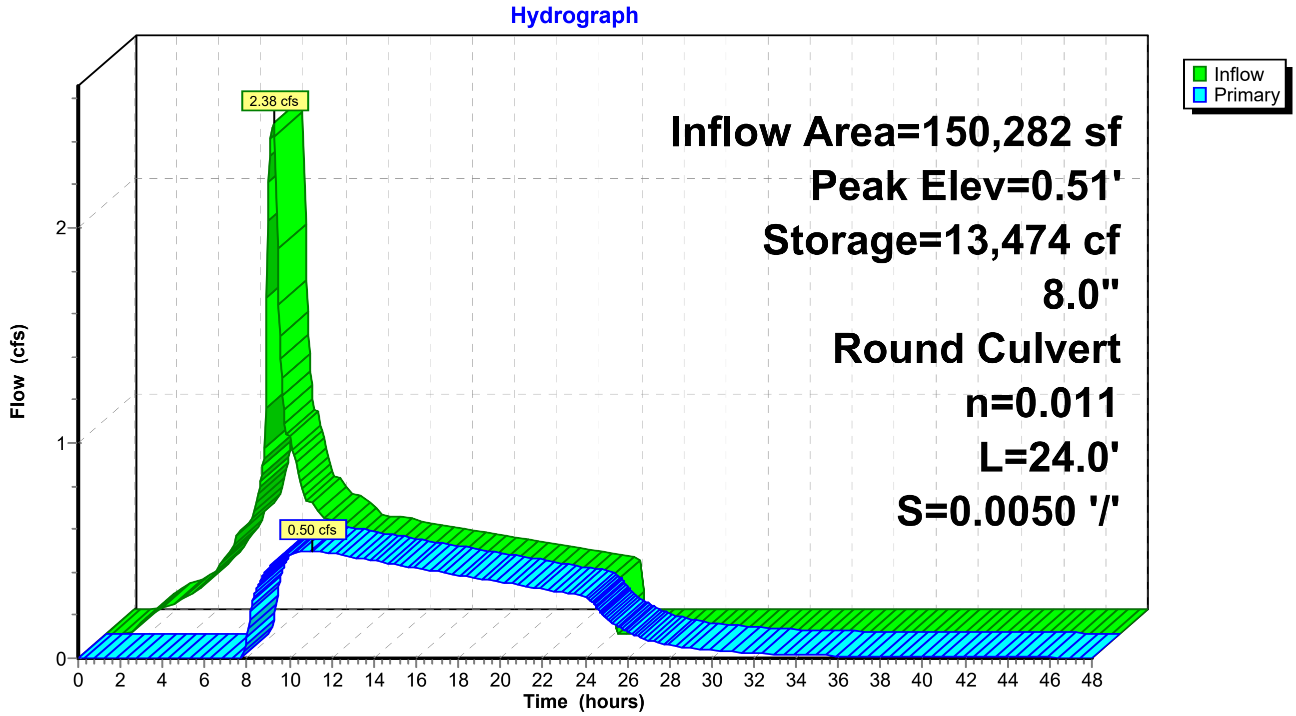
Volume	Invert	Avail.Storage	Storage Description
#1	-1.15'	49,476 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-1.15	0
-0.65	1,959
0.35	10,959
1.35	26,767
2.35	49,476

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.0" Round Pipe to MH-DP002** L= 24.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -0.12' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.50 cfs @ 11.11 hrs HW=0.51' TW=-1.88' (Dynamic Tailwater)
└─**1=Pipe to MH-DP002** (Barrel Controls 0.50 cfs @ 2.41 fps)

Pond P-2: POND 2



Summary for Pond P-2 CBs: Pond 2 Catch Basins

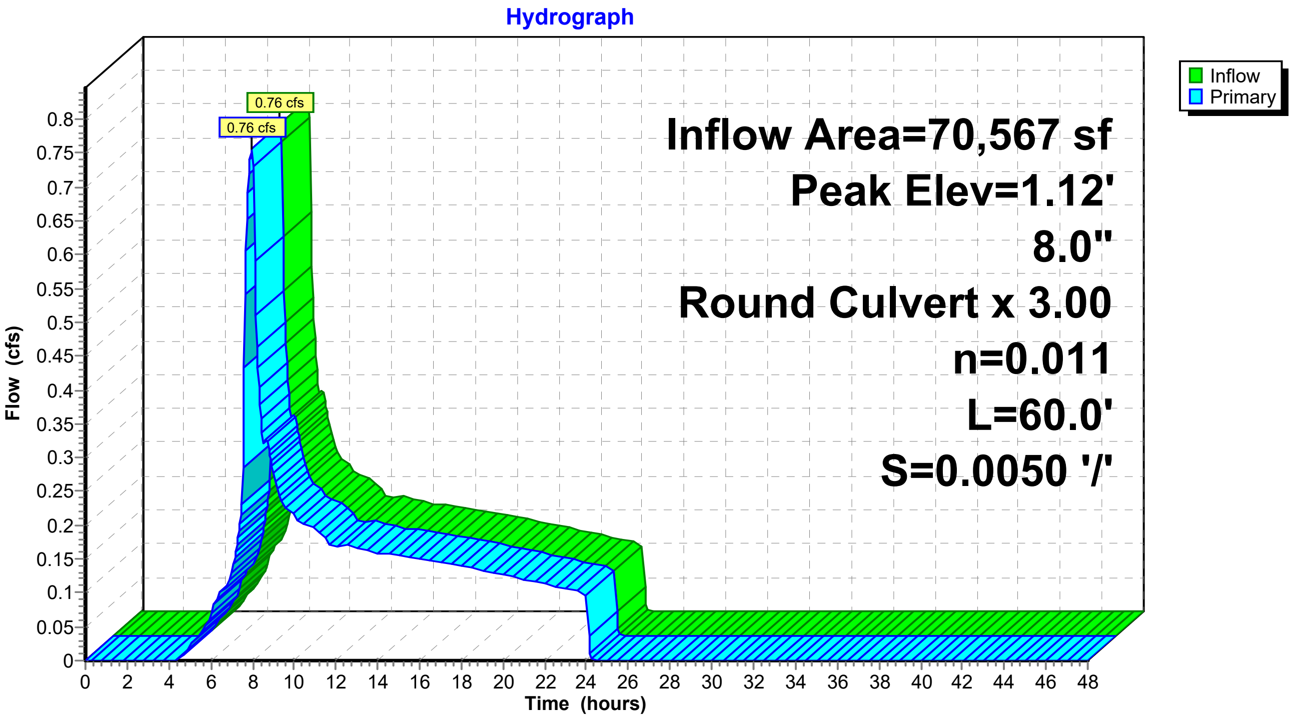
Inflow Area = 70,567 sf, 0.00% Impervious, Inflow Depth = 1.96" for 10-yr, 24-hr event
Inflow = 0.76 cfs @ 7.98 hrs, Volume= 11,522 cf
Outflow = 0.76 cfs @ 7.98 hrs, Volume= 11,522 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.76 cfs @ 7.98 hrs, Volume= 11,522 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1.12' @ 7.98 hrs
Flood Elev= 2.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	0.80'	**8.0" Round Storm Pipe Under Tracks to Pond 2 X 3.00** L= 60.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.80' / 0.50' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.75 cfs @ 7.98 hrs HW=1.12' TW=0.18' (Dynamic Tailwater)
└─**1=Storm Pipe Under Tracks to Pond 2**(Barrel Controls 0.75 cfs @ 2.20 fps)

Pond P-2 CBs: Pond 2 Catch Basins



Summary for Pond P-3: POND 3

Inflow Area = 84,506 sf, 25.26% Impervious, Inflow Depth = 2.73" for 10-yr, 24-hr event
Inflow = 1.37 cfs @ 7.92 hrs, Volume= 19,220 cf
Outflow = 0.33 cfs @ 10.09 hrs, Volume= 18,304 cf, Atten= 76%, Lag= 130.2 min
Primary = 0.33 cfs @ 10.09 hrs, Volume= 18,304 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= -1.00' Surf.Area= 0 sf Storage= 6,229 cf
Peak Elev= -0.63' @ 10.09 hrs Surf.Area= 0 sf Storage= 12,283 cf (6,054 cf above start)

Plug-Flow detention time= 760.0 min calculated for 12,063 cf (63% of inflow)
Center-of-Mass det. time= 323.1 min (1,063.9 - 740.7)

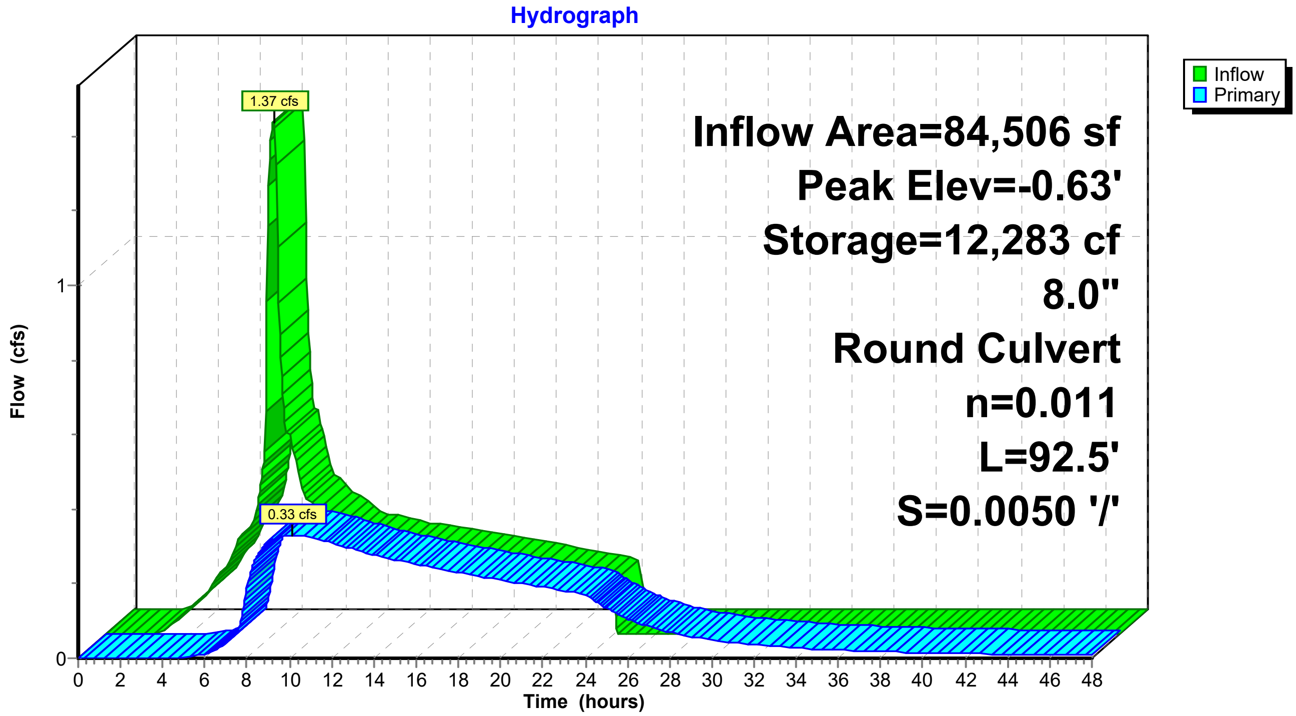
Volume	Invert	Avail.Storage	Storage Description
#1	-2.00'	22,444 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-2.00	0
-1.00	6,229
0.00	22,444

Device	Routing	Invert	Outlet Devices
#1	Primary	-1.00'	**8.0" Round Pipe to MH-DP002** L= 92.5' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= -1.00' / -1.46' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.33 cfs @ 10.09 hrs HW=-0.63' TW=-1.90' (Dynamic Tailwater)
└─**1=Pipe to MH-DP002** (Inlet Controls 0.33 cfs @ 1.64 fps)

Pond P-3: POND 3



Summary for Subcatchment P-4 B: Pond 4 Basin

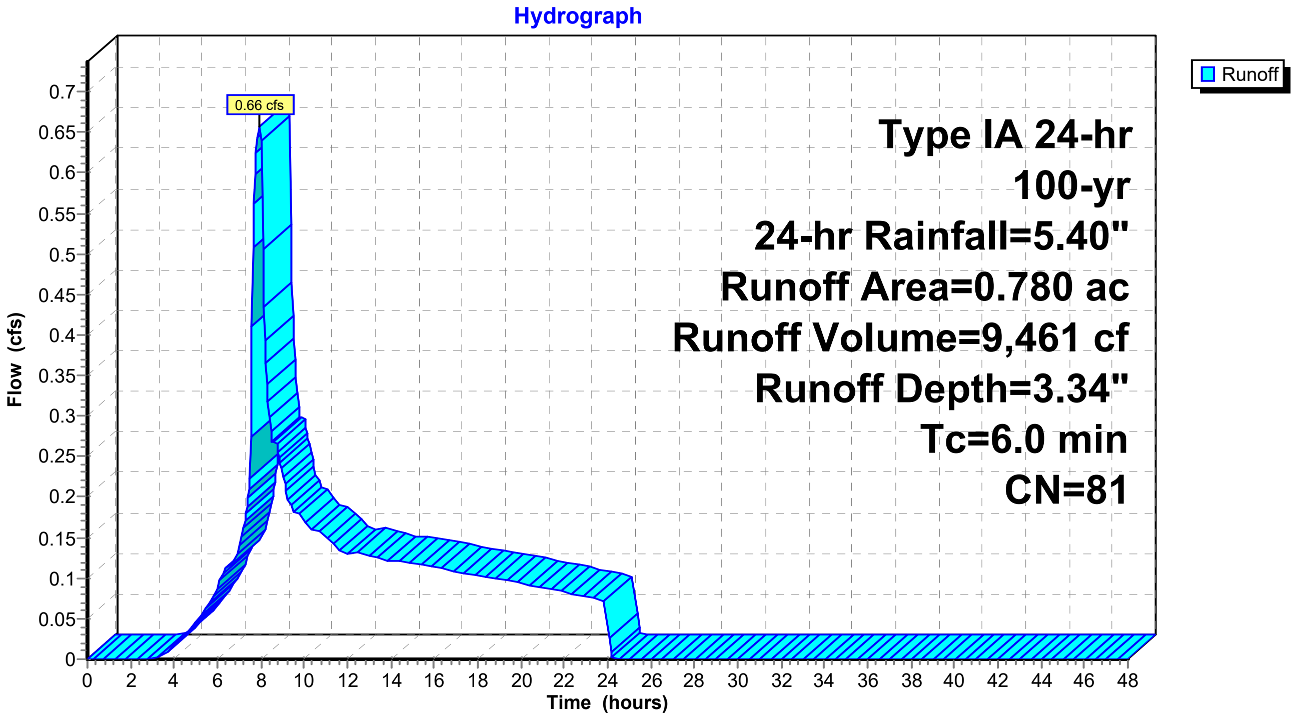
Runoff = 0.66 cfs @ 7.94 hrs, Volume= 9,461 cf, Depth= 3.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-yr, 24-hr Rainfall=5.40"

	Area (ac)	CN	Description
*	0.660	78	Rail/Gravel Base
*	0.120	100	Pond 4
	0.780	81	Weighted Average
	0.660		84.62% Pervious Area
	0.120		15.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P-4 B: Pond 4 Basin



Summary for Subcatchment P1-NB: Pond 1 North Basin

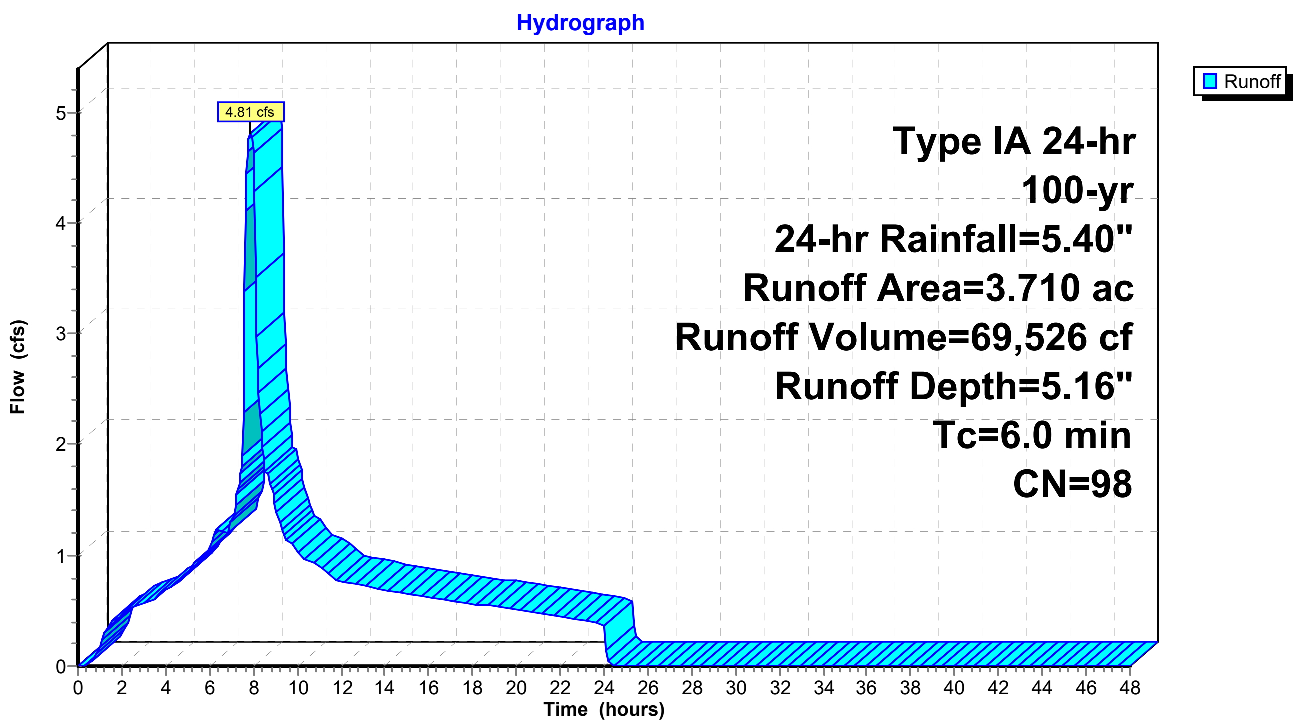
Runoff = 4.81 cfs @ 7.87 hrs, Volume= 69,526 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-yr, 24-hr Rainfall=5.40"

	Area (ac)	CN	Description
*	1.890	98	Paved Road
*	0.550	92	Gravel Laydown
*	1.240	100	Pond 1
*	0.030	80	Pipeline
	3.710	98	Weighted Average
	0.580		15.63% Pervious Area
	3.130		84.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P1-NB: Pond 1 North Basin



Summary for Subcatchment P1-SB: Pond 1 South Basin

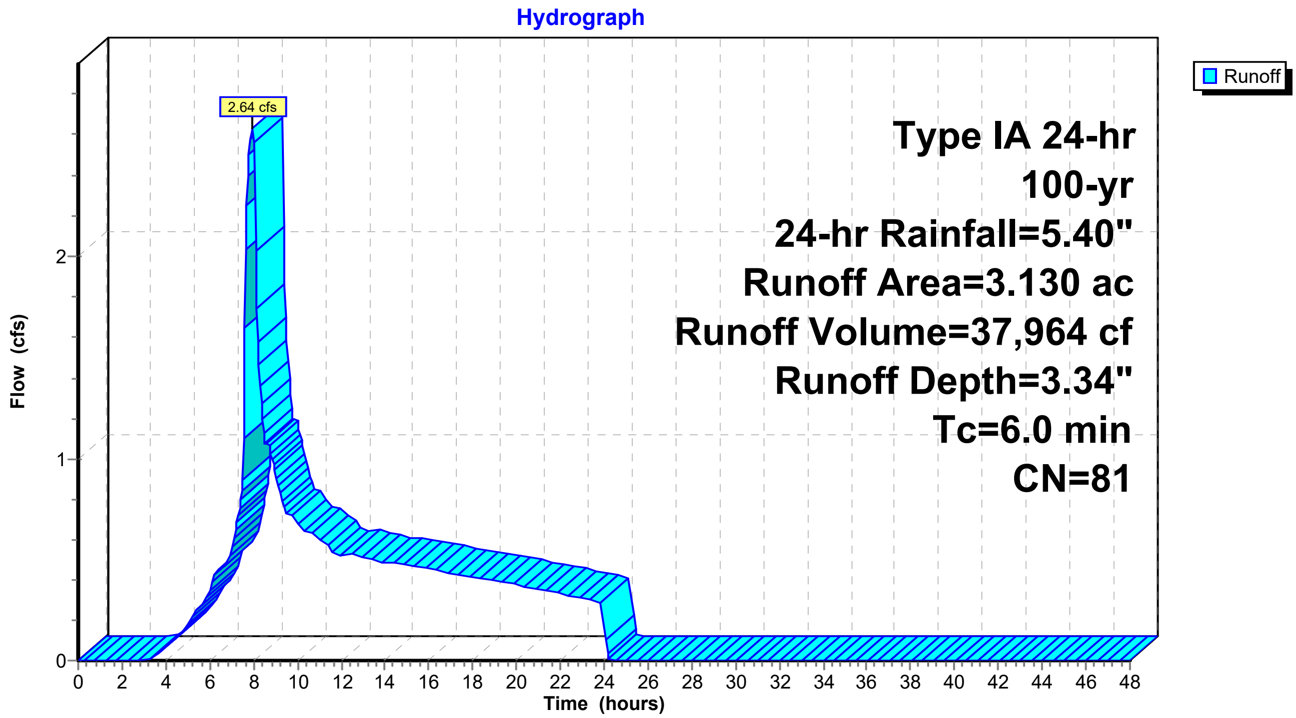
Runoff = 2.64 cfs @ 7.94 hrs, Volume= 37,964 cf, Depth= 3.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-yr, 24-hr Rainfall=5.40"

	Area (ac)	CN	Description
*	2.570	78	Rail/Gravel Base
*	0.560	92	Gravel Access Road
	3.130	81	Weighted Average
	3.130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P1-SB: Pond 1 South Basin



Summary for Subcatchment P2-NB: Pond 2 North Basin

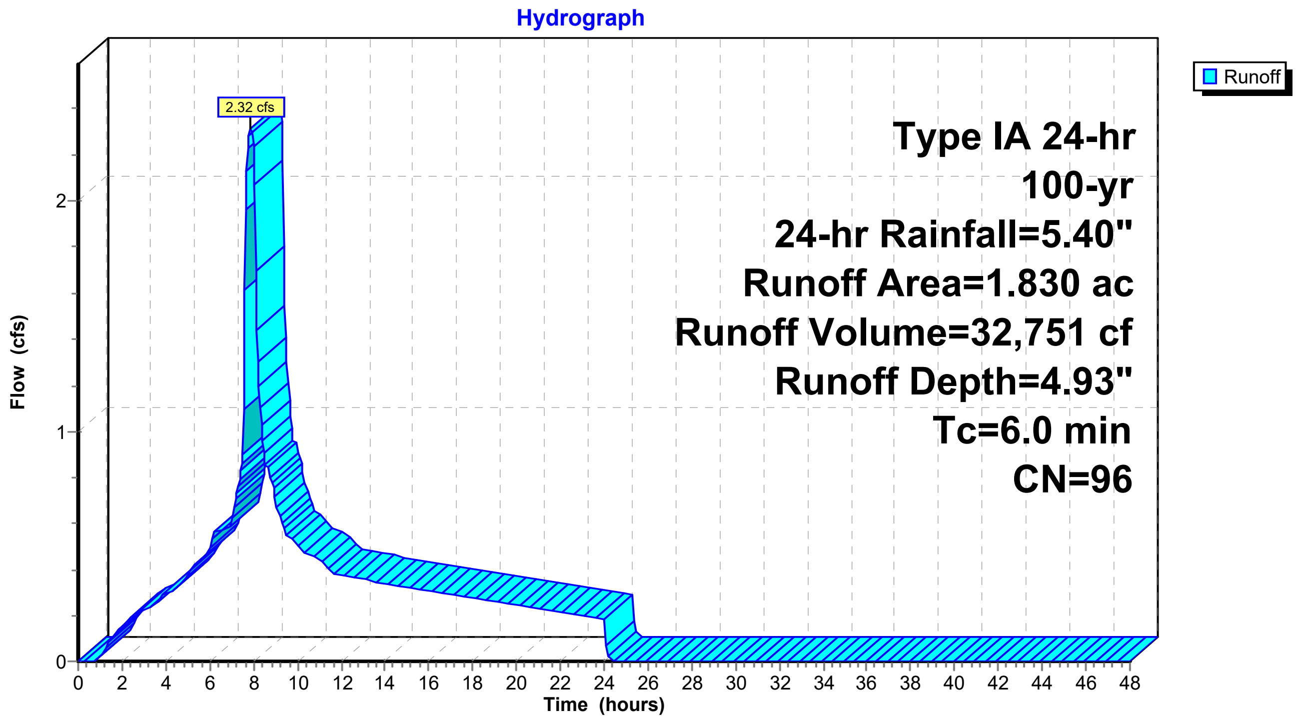
Runoff = 2.32 cfs @ 7.87 hrs, Volume= 32,751 cf, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-yr, 24-hr Rainfall=5.40"

	Area (ac)	CN	Description
*	0.350	80	Pipeline
*	0.800	100	Paved Road
*	0.080	92	Gravel Laydown
*	0.600	100	Pond 2
	1.830	96	Weighted Average
	0.430		23.50% Pervious Area
	1.400		76.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P2-NB: Pond 2 North Basin



Summary for Subcatchment P2-SB: Pond 2 South Basin

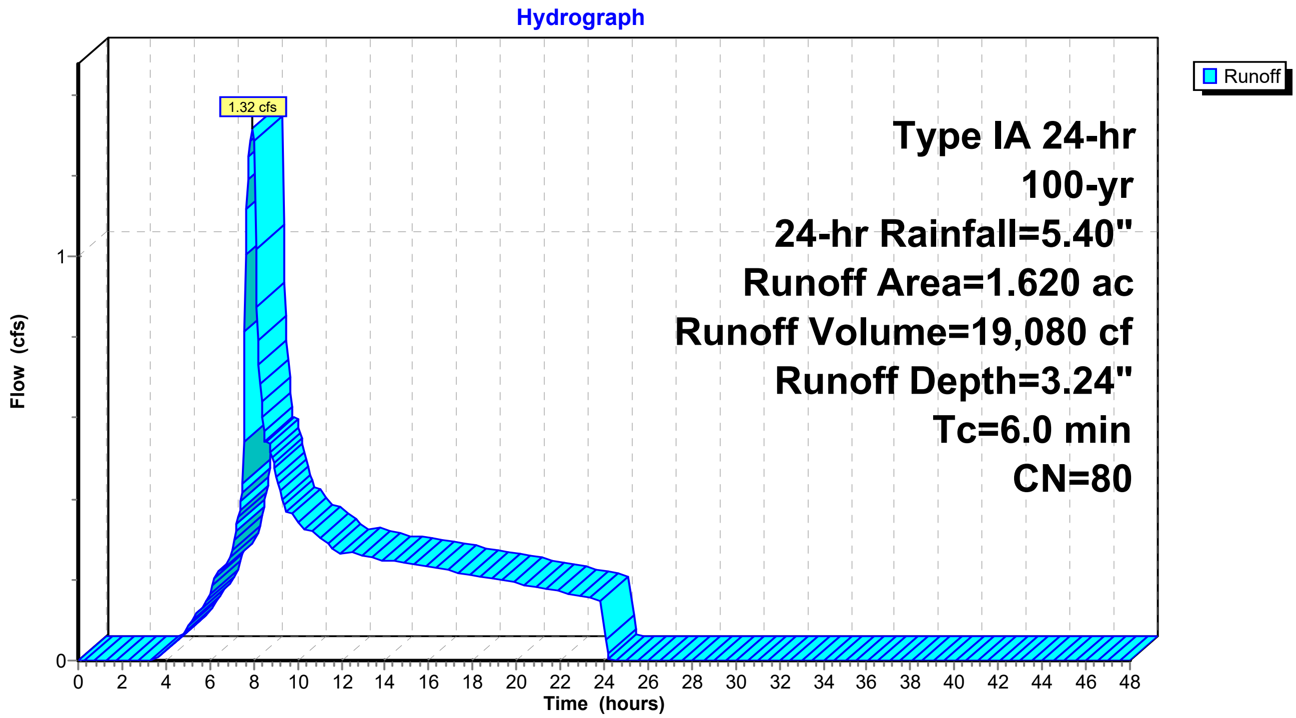
Runoff = 1.32 cfs @ 7.95 hrs, Volume= 19,080 cf, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-yr, 24-hr Rainfall=5.40"

	Area (ac)	CN	Description
*	1.350	78	Rail/Gravel Base
*	0.270	92	Gravel Access Road
	1.620	80	Weighted Average
	1.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P2-SB: Pond 2 South Basin



Summary for Subcatchment PMR: Pipeline Maintenance Road

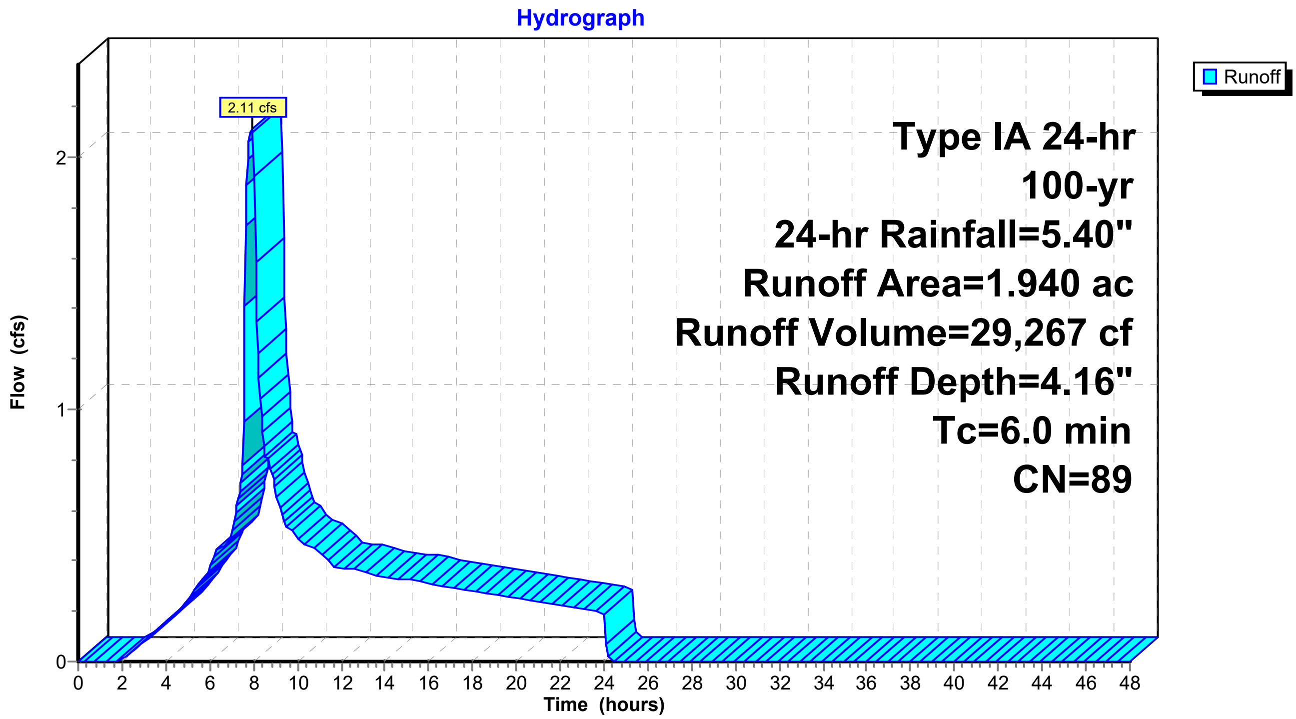
Runoff = 2.11 cfs @ 7.90 hrs, Volume= 29,267 cf, Depth= 4.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-yr, 24-hr Rainfall=5.40"

	Area (ac)	CN	Description
*	0.580	92	Maintenance Road
*	0.490	100	Pond 3
*	0.870	80	Pipeline
	1.940	89	Weighted Average
	1.450		74.74% Pervious Area
	0.490		25.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment PMR: Pipeline Maintenance Road



Summary for Pond DP-002: MH-DP002 (Basin 2 Post-Developed)

Inflow Area = 532,739 sf, 41.05% Impervious, Inflow Depth > 3.63" for 100-yr, 24-hr event
Inflow = 2.62 cfs @ 10.07 hrs, Volume= 161,276 cf
Outflow = 2.62 cfs @ 10.08 hrs, Volume= 161,274 cf, Atten= 0%, Lag= 0.5 min
Primary = 2.62 cfs @ 10.08 hrs, Volume= 161,274 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= -2.52' Surf.Area= 20 sf Storage= 30 cf
Peak Elev= -1.66' @ 10.08 hrs Surf.Area= 20 sf Storage= 47 cf (17 cf above start)

Plug-Flow detention time= 0.8 min calculated for 161,245 cf (100% of inflow)
Center-of-Mass det. time= 0.1 min (1,082.2 - 1,082.1)

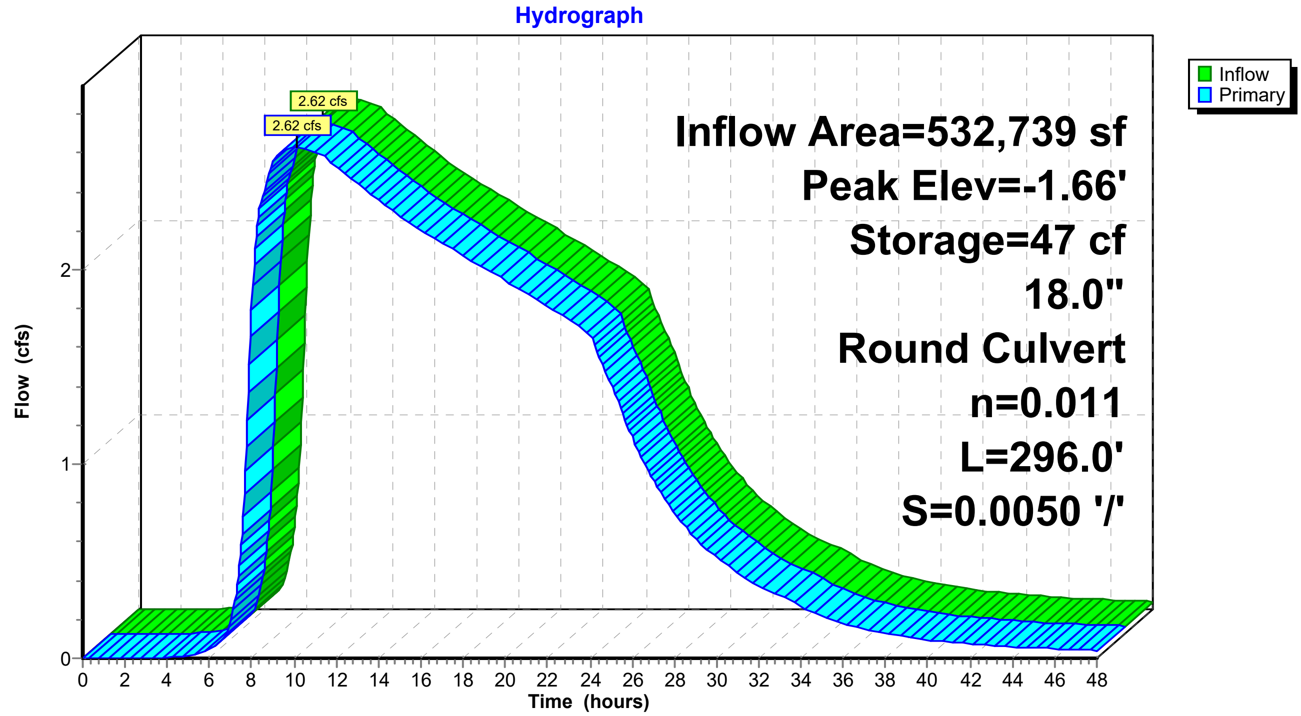
Volume	Invert	Avail.Storage	Storage Description
#1	-4.00'	140 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-4.00	20	0	0
3.00	20	140	140

Device	Routing	Invert	Outlet Devices
#1	Primary	-2.52'	**18.0" Round Pipe to McLean Slough** L= 296.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= -2.52' / -4.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.62 cfs @ 10.08 hrs HW=-1.66' (Free Discharge)
└─**1=Pipe to McLean Slough** (Inlet Controls 2.62 cfs @ 2.50 fps)

Pond DP-002: MH-DP002 (Basin 2 Post-Developed)



Summary for Pond DP-003: POND 4/CB-DP003 (Basin 3 Post-Developed)

Inflow Area = 33,977 sf, 15.38% Impervious, Inflow Depth = 3.34" for 100-yr, 24-hr event
Inflow = 0.66 cfs @ 7.94 hrs, Volume= 9,461 cf
Outflow = 0.30 cfs @ 8.41 hrs, Volume= 9,368 cf, Atten= 55%, Lag= 27.9 min
Primary = 0.30 cfs @ 8.41 hrs, Volume= 9,368 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 2.00' Surf.Area= 0 sf Storage= 3,518 cf
Peak Elev= 2.39' @ 8.41 hrs Surf.Area= 0 sf Storage= 5,289 cf (1,771 cf above start)
Flood Elev= 3.00' Surf.Area= 0 sf Storage= 8,061 cf (4,543 cf above start)

Plug-Flow detention time= 566.7 min calculated for 5,844 cf (62% of inflow)
Center-of-Mass det. time= 142.9 min (907.7 - 764.8)

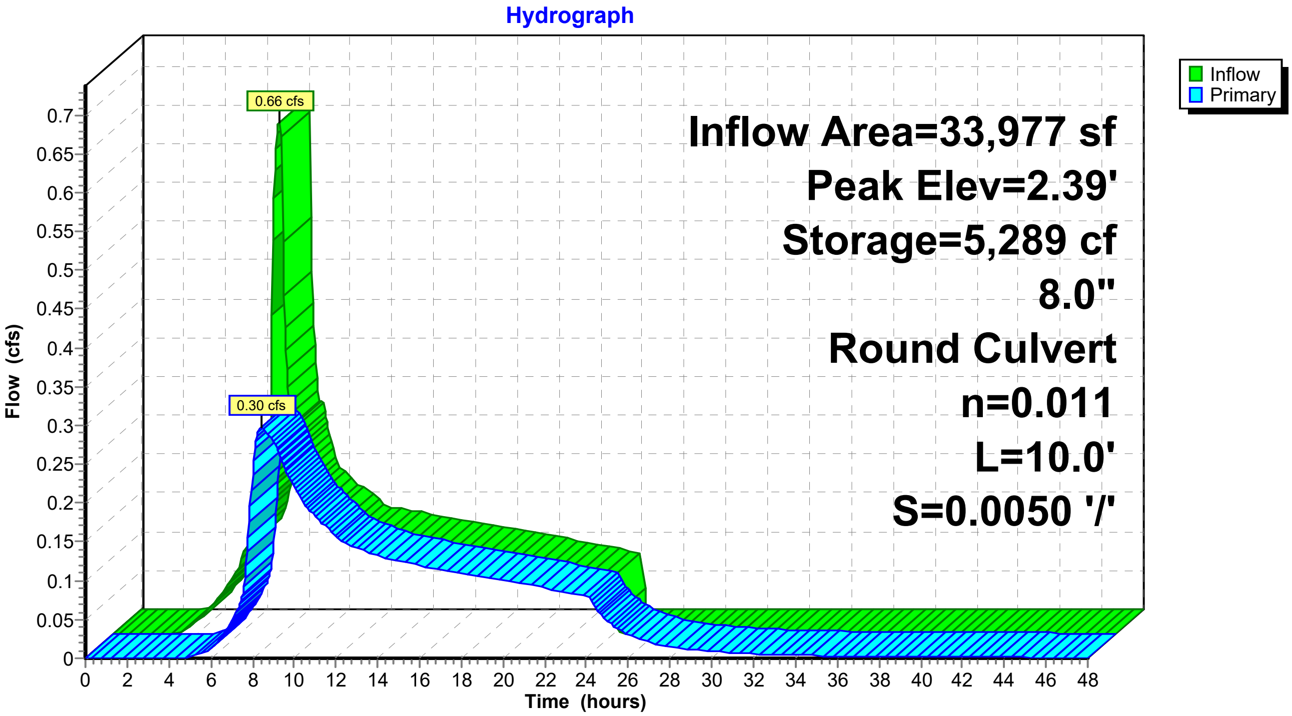
Volume	Invert	Avail.Storage	Storage Description
#1	1.00'	8,061 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.00	3,518
3.00	8,061

Device	Routing	Invert	Outlet Devices
#1	Primary	2.00'	**8.0" Round Pipe to CB-DP-003** L= 10.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.95' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.30 cfs @ 8.41 hrs HW=2.39' (Free Discharge)
└—**1=Pipe to CB-DP-003** (Barrel Controls 0.30 cfs @ 2.02 fps)

Pond DP-003: POND 4/CB-DP003 (Basin 3 Post-Developed)



Summary for Pond P-1: POND 1

Inflow Area = 297,950 sf, 45.76% Impervious, Inflow Depth = 4.33" for 100-yr, 24-hr event
Inflow = 7.43 cfs @ 7.90 hrs, Volume= 107,490 cf
Outflow = 1.19 cfs @ 13.61 hrs, Volume= 89,298 cf, Atten= 84%, Lag= 342.7 min
Primary = 1.19 cfs @ 13.61 hrs, Volume= 89,298 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1.14' @ 13.61 hrs Surf.Area= 0 sf Storage= 48,496 cf
Flood Elev= 2.35' Surf.Area= 0 sf Storage= 102,326 cf

Plug-Flow detention time= 586.3 min calculated for 89,298 cf (83% of inflow)
Center-of-Mass det. time= 472.9 min (1,165.7 - 692.8)

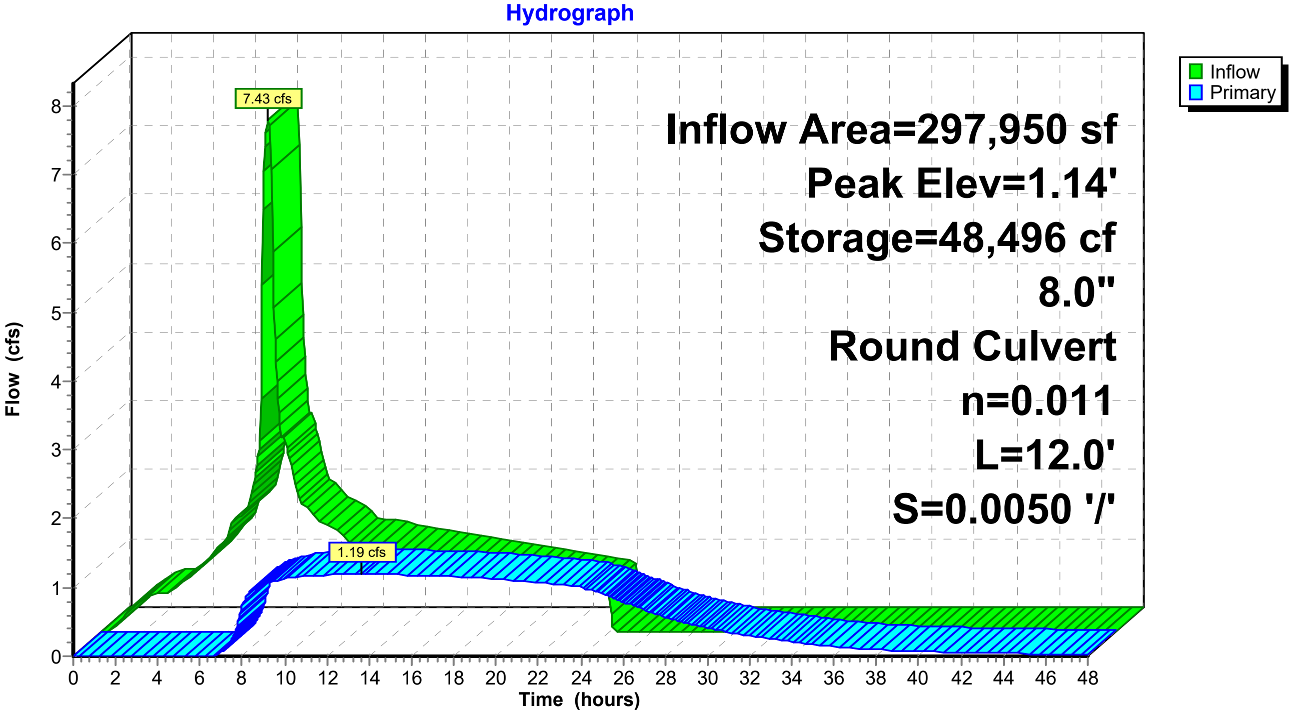
Volume	Invert	Avail.Storage	Storage Description
#1	-1.15'	102,326 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-1.15	0
-0.65	4,073
0.35	22,730
1.35	55,457
2.35	102,326

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.0" Round Pipe to MH-DP002** L= 12.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -0.06' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=1.19 cfs @ 13.61 hrs HW=1.14' TW=-1.70' (Dynamic Tailwater)
└─**1=Pipe to MH-DP002** (Inlet Controls 1.19 cfs @ 3.41 fps)

Pond P-1: POND 1



Summary for Pond P-1 CBs: Pond 1 Catch Basins

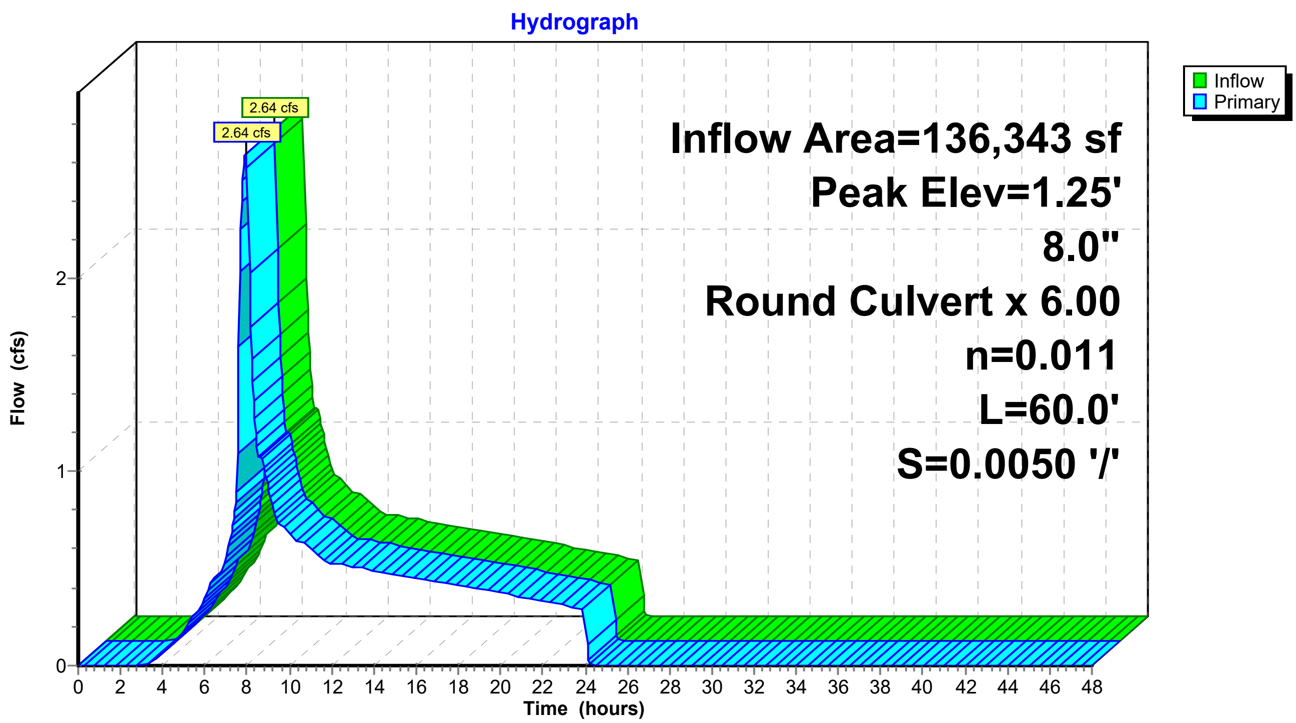
Inflow Area =	136,343 sf,	0.00% Impervious,	Inflow Depth = 3.34"	for 100-yr, 24-hr event
Inflow =	2.64 cfs @	7.94 hrs, Volume=	37,964 cf	
Outflow =	2.64 cfs @	7.94 hrs, Volume=	37,964 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.64 cfs @	7.94 hrs, Volume=	37,964 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1.25' @ 7.94 hrs
Flood Elev= 2.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	0.80'	**8.0" Round Storm Pipe Under Tracks to Pond X 6.00** L= 60.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.80' / 0.50' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=2.64 cfs @ 7.94 hrs HW=1.25' TW=0.63' (Dynamic Tailwater)
1=Storm Pipe Under Tracks to Pond(Barrel Controls 2.64 cfs @ 2.51 fps)

Pond P-1 CBs: Pond 1 Catch Basins



Summary for Pond P-2: POND 2

Inflow Area = 150,282 sf, 40.58% Impervious, Inflow Depth = 4.14" for 100-yr, 24-hr event
Inflow = 3.62 cfs @ 7.90 hrs, Volume= 51,832 cf
Outflow = 0.92 cfs @ 9.51 hrs, Volume= 43,663 cf, Atten= 75%, Lag= 96.5 min
Primary = 0.92 cfs @ 9.51 hrs, Volume= 43,663 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.81' @ 9.51 hrs Surf.Area= 0 sf Storage= 18,257 cf
Flood Elev= 2.35' Surf.Area= 0 sf Storage= 49,476 cf

Plug-Flow detention time= 361.6 min calculated for 43,617 cf (84% of inflow)
Center-of-Mass det. time= 258.3 min (965.8 - 707.5)

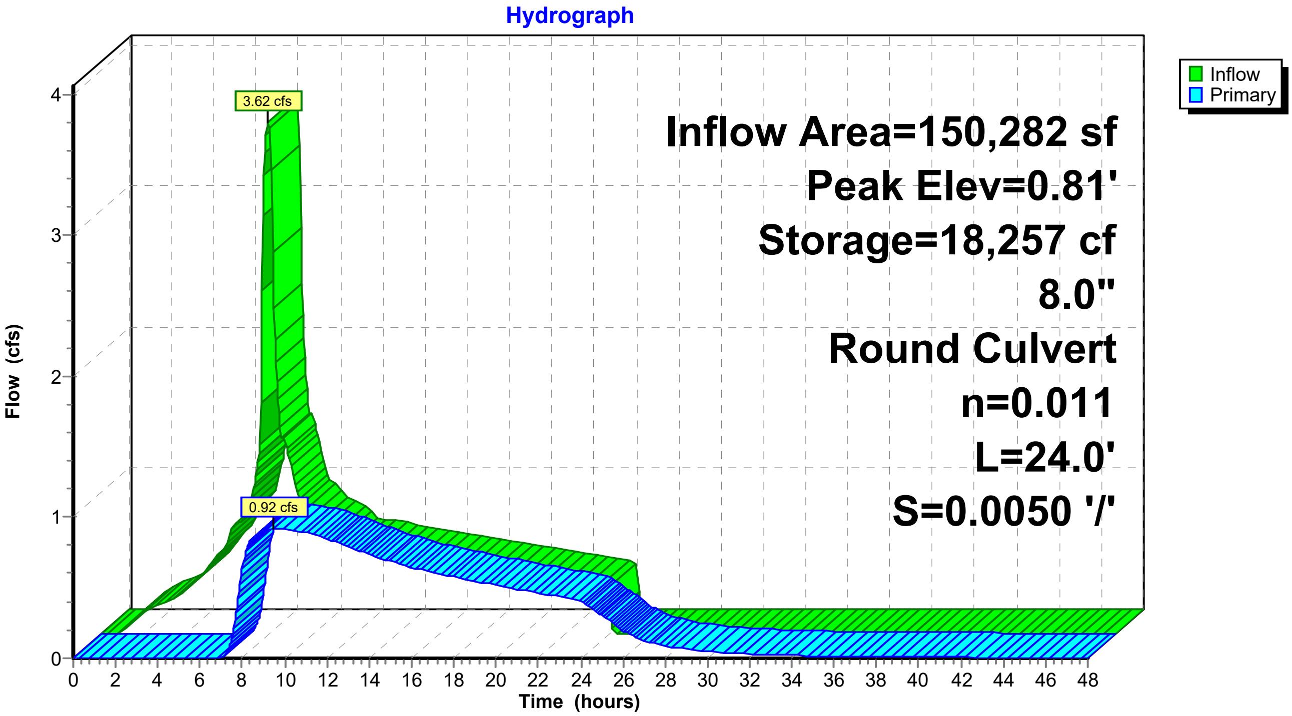
Volume	Invert	Avail.Storage	Storage Description
#1	-1.15'	49,476 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-1.15	0
-0.65	1,959
0.35	10,959
1.35	26,767
2.35	49,476

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.0" Round Pipe to MH-DP002** L= 24.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -0.12' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.92 cfs @ 9.51 hrs HW=0.81' TW=-1.66' (Dynamic Tailwater)
└─**1=Pipe to MH-DP002** (Inlet Controls 0.92 cfs @ 2.63 fps)

Pond P-2: POND 2



Summary for Pond P-2 CBs: Pond 2 Catch Basins

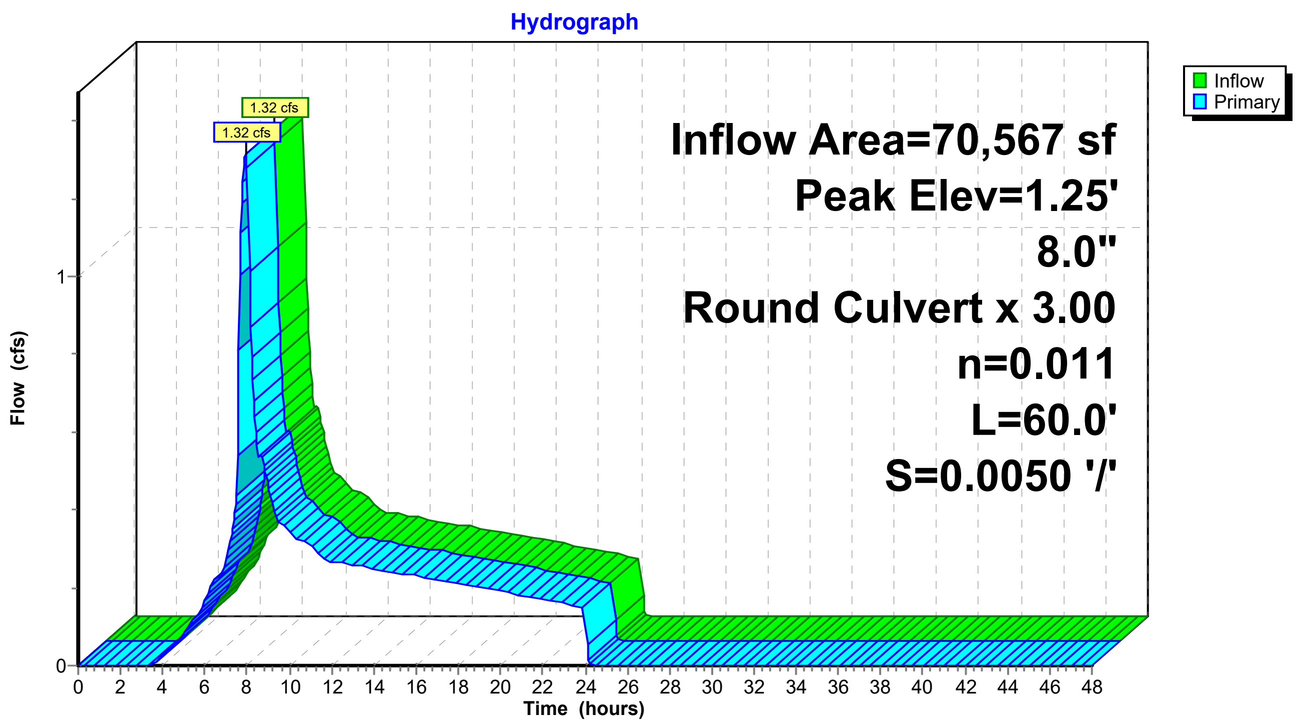
Inflow Area =	70,567 sf,	0.00% Impervious,	Inflow Depth = 3.24"	for 100-yr, 24-hr event	
Inflow =	1.32 cfs @	7.95 hrs,	Volume=	19,080 cf	
Outflow =	1.32 cfs @	7.95 hrs,	Volume=	19,080 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.32 cfs @	7.95 hrs,	Volume=	19,080 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 1.25' @ 7.95 hrs
Flood Elev= 2.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	0.80'	**8.0" Round Storm Pipe Under Tracks to Pond 2 X 3.00** L= 60.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.80' / 0.50' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=1.32 cfs @ 7.95 hrs HW=1.25' TW=0.56' (Dynamic Tailwater)
└─**1=Storm Pipe Under Tracks to Pond 2**(Barrel Controls 1.32 cfs @ 2.51 fps)

Pond P-2 CBs: Pond 2 Catch Basins



Summary for Pond P-3: POND 3

Inflow Area = 84,506 sf, 25.26% Impervious, Inflow Depth = 4.16" for 100-yr, 24-hr event
Inflow = 2.11 cfs @ 7.90 hrs, Volume= 29,267 cf
Outflow = 0.60 cfs @ 9.22 hrs, Volume= 28,316 cf, Atten= 72%, Lag= 78.9 min
Primary = 0.60 cfs @ 9.22 hrs, Volume= 28,316 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= -1.00' Surf.Area= 0 sf Storage= 6,229 cf
Peak Elev= -0.46' @ 9.22 hrs Surf.Area= 0 sf Storage= 14,983 cf (8,754 cf above start)

Plug-Flow detention time= 561.1 min calculated for 22,064 cf (75% of inflow)
Center-of-Mass det. time= 277.8 min (997.4 - 719.6)

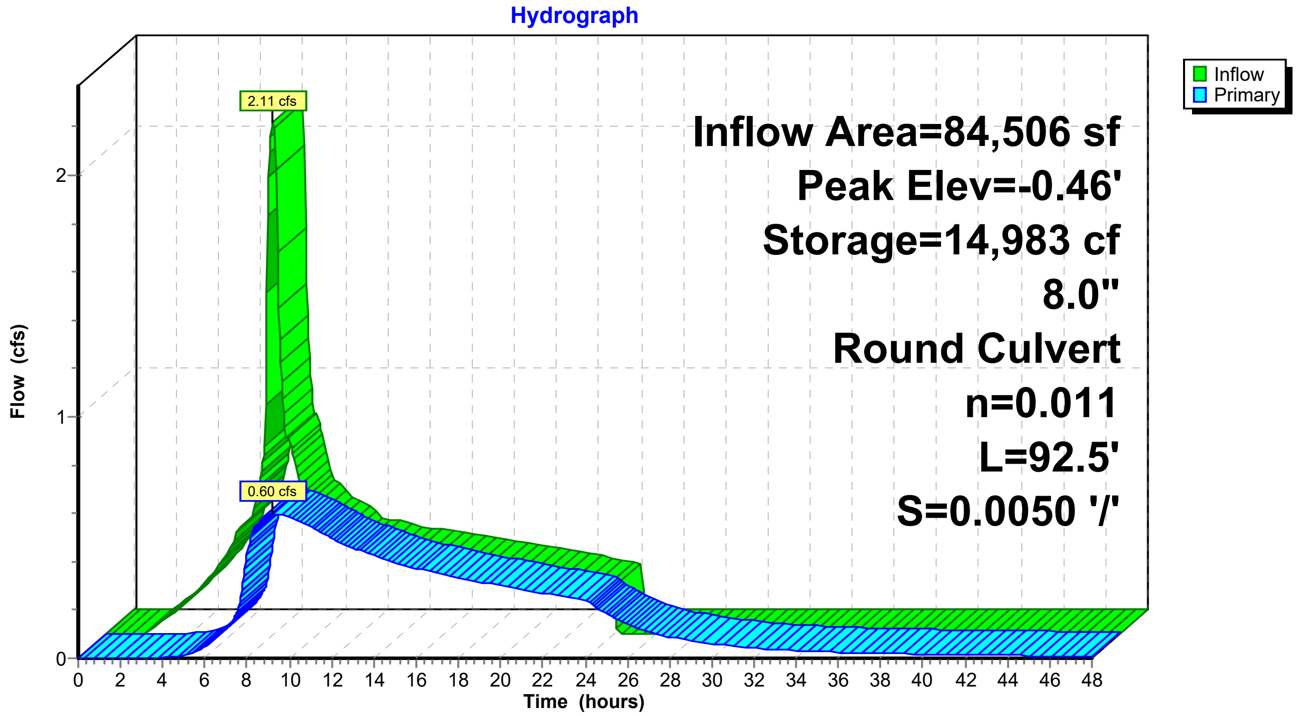
Volume	Invert	Avail.Storage	Storage Description
#1	-2.00'	22,444 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-2.00	0
-1.00	6,229
0.00	22,444

Device	Routing	Invert	Outlet Devices
#1	Primary	-1.00'	**8.0" Round Pipe to MH-DP002** L= 92.5' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= -1.00' / -1.46' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.60 cfs @ 9.22 hrs HW=-0.46' TW=-1.67' (Dynamic Tailwater)
└─**1=Pipe to MH-DP002** (Inlet Controls 0.60 cfs @ 1.97 fps)

Pond P-3: POND 3



Summary for Subcatchment P-4 B: Pond 4 Basin

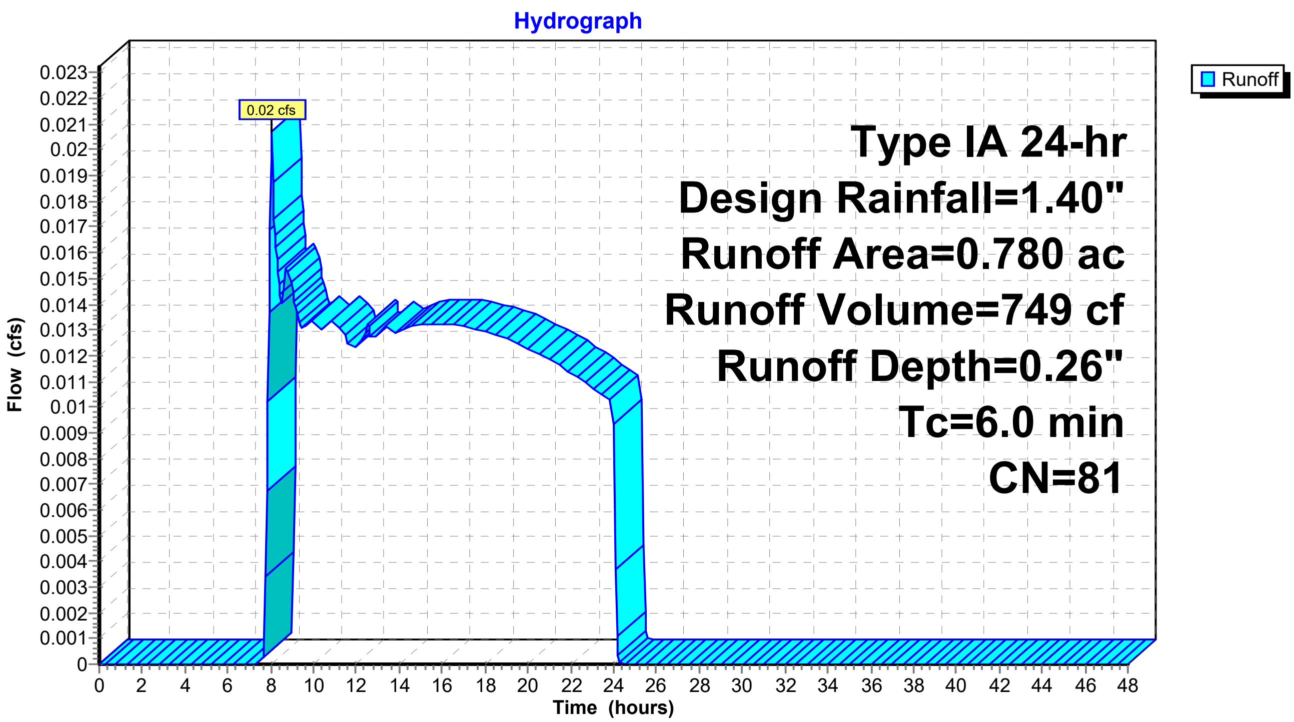
Runoff = 0.02 cfs @ 8.04 hrs, Volume= 749 cf, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr Design Rainfall=1.40"

	Area (ac)	CN	Description
*	0.660	78	Rail/Gravel Base
*	0.120	100	Pond 4
	0.780	81	Weighted Average
	0.660		84.62% Pervious Area
	0.120		15.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P-4 B: Pond 4 Basin



Summary for Subcatchment P1-NB: Pond 1 North Basin

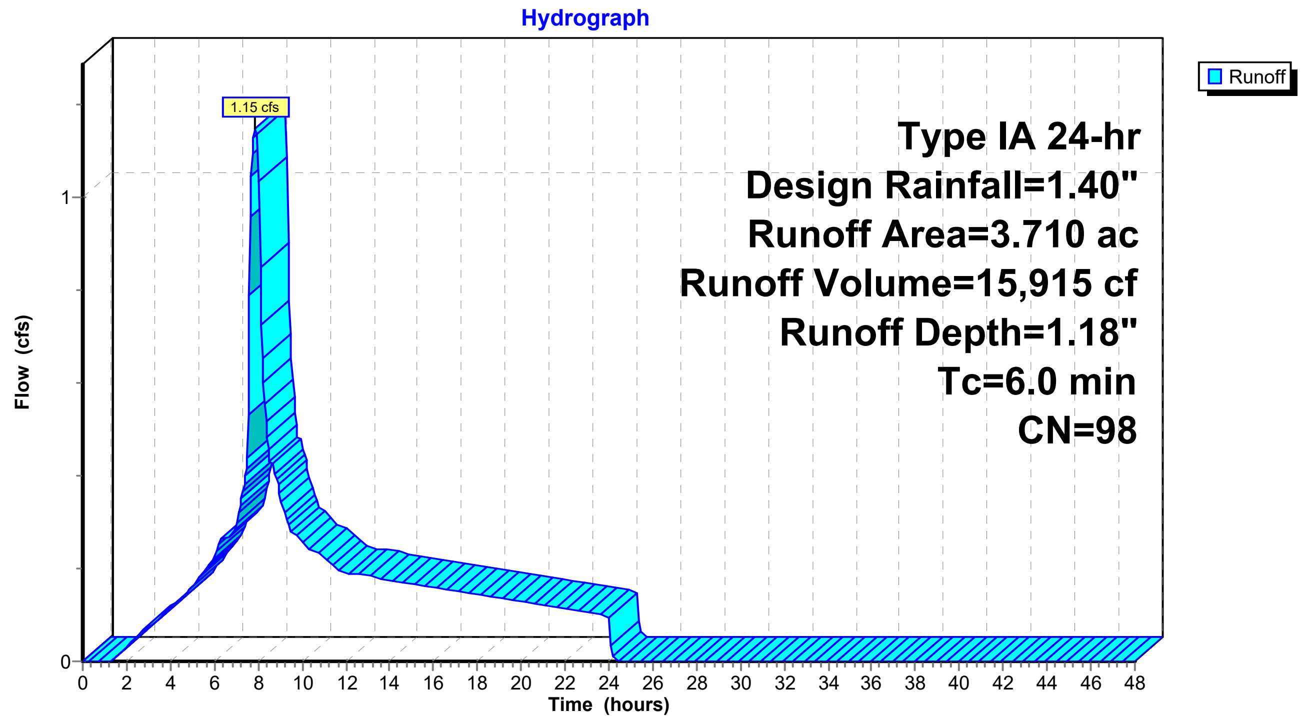
Runoff = 1.15 cfs @ 7.89 hrs, Volume= 15,915 cf, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr Design Rainfall=1.40"

	Area (ac)	CN	Description
*	1.890	98	Paved Road
*	0.550	92	Gravel Laydown
*	1.240	100	Pond 1
*	0.030	80	Pipeline
	3.710	98	Weighted Average
	0.580		15.63% Pervious Area
	3.130		84.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P1-NB: Pond 1 North Basin



Summary for Subcatchment P1-SB: Pond 1 South Basin

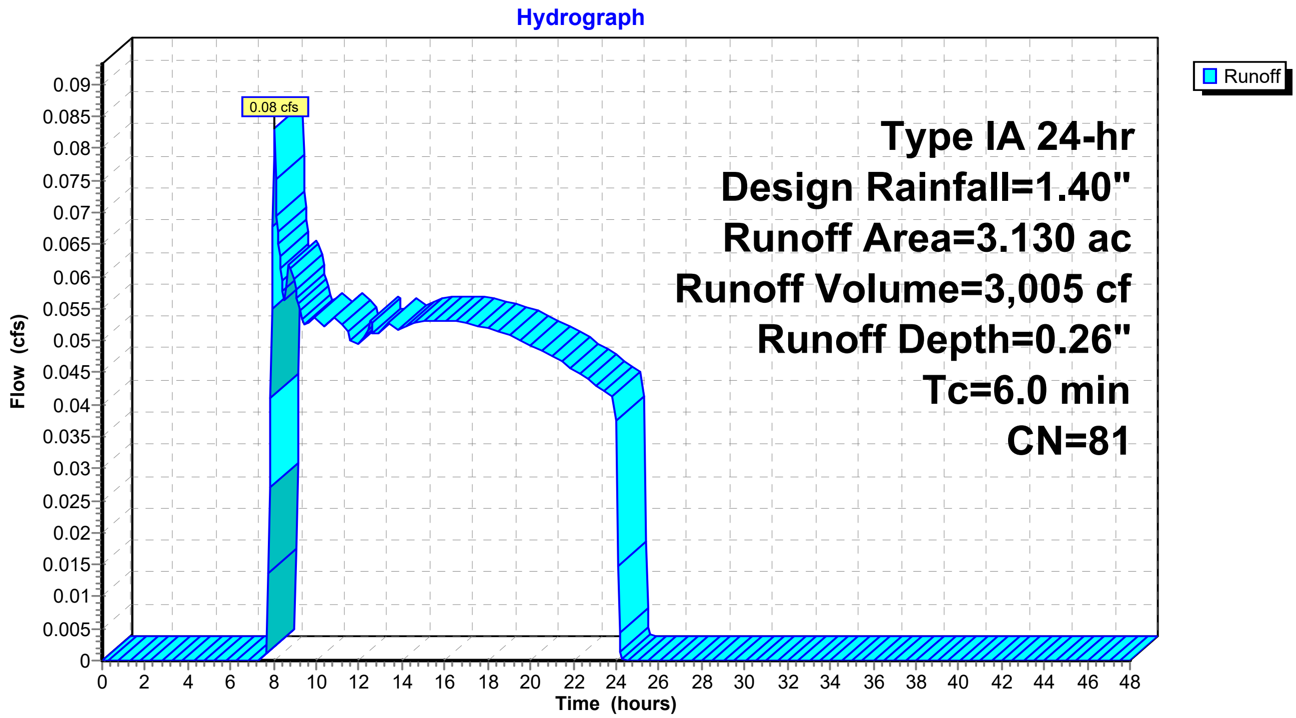
Runoff = 0.08 cfs @ 8.04 hrs, Volume= 3,005 cf, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr Design Rainfall=1.40"

	Area (ac)	CN	Description
*	2.570	78	Rail/Gravel Base
*	0.560	92	Gravel Access Road
	3.130	81	Weighted Average
	3.130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P1-SB: Pond 1 South Basin



Summary for Subcatchment P2-NB: Pond 2 North Basin

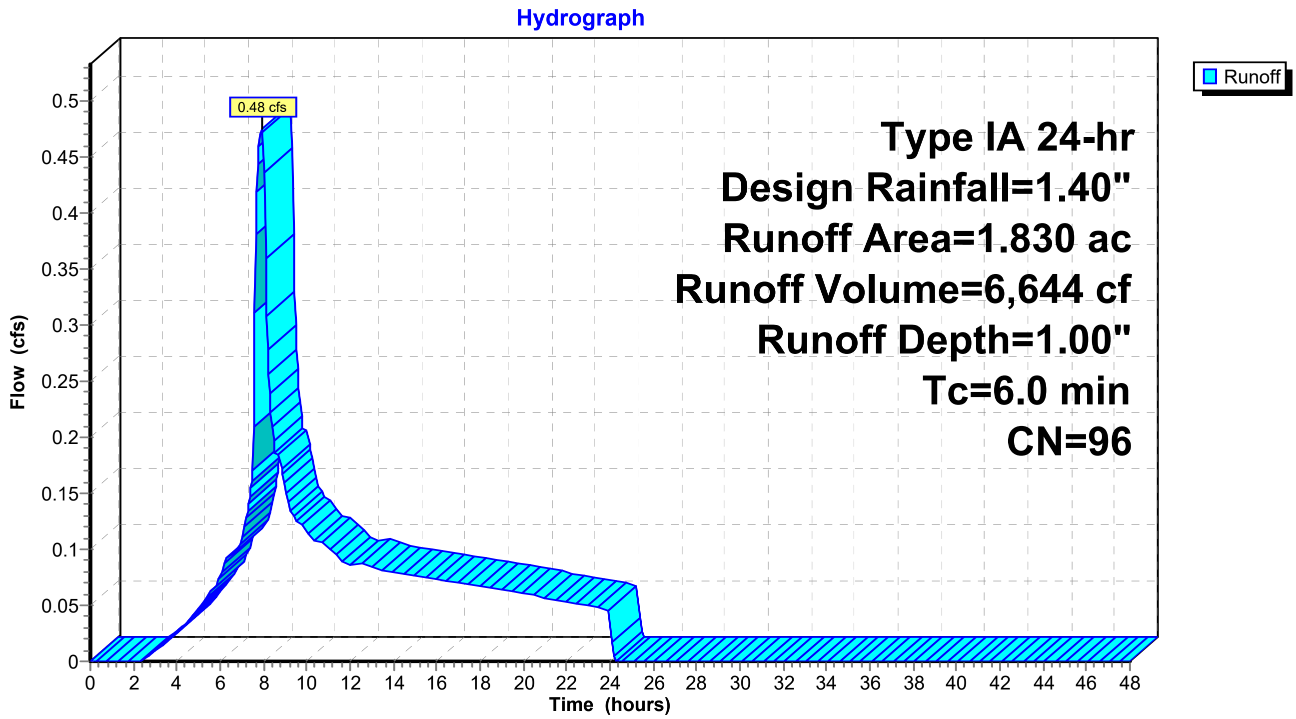
Runoff = 0.48 cfs @ 7.92 hrs, Volume= 6,644 cf, Depth= 1.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr Design Rainfall=1.40"

	Area (ac)	CN	Description
*	0.350	80	Pipeline
*	0.800	100	Paved Road
*	0.080	92	Gravel Laydown
*	0.600	100	Pond 2
	1.830	96	Weighted Average
	0.430		23.50% Pervious Area
	1.400		76.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P2-NB: Pond 2 North Basin



Summary for Subcatchment P2-SB: Pond 2 South Basin

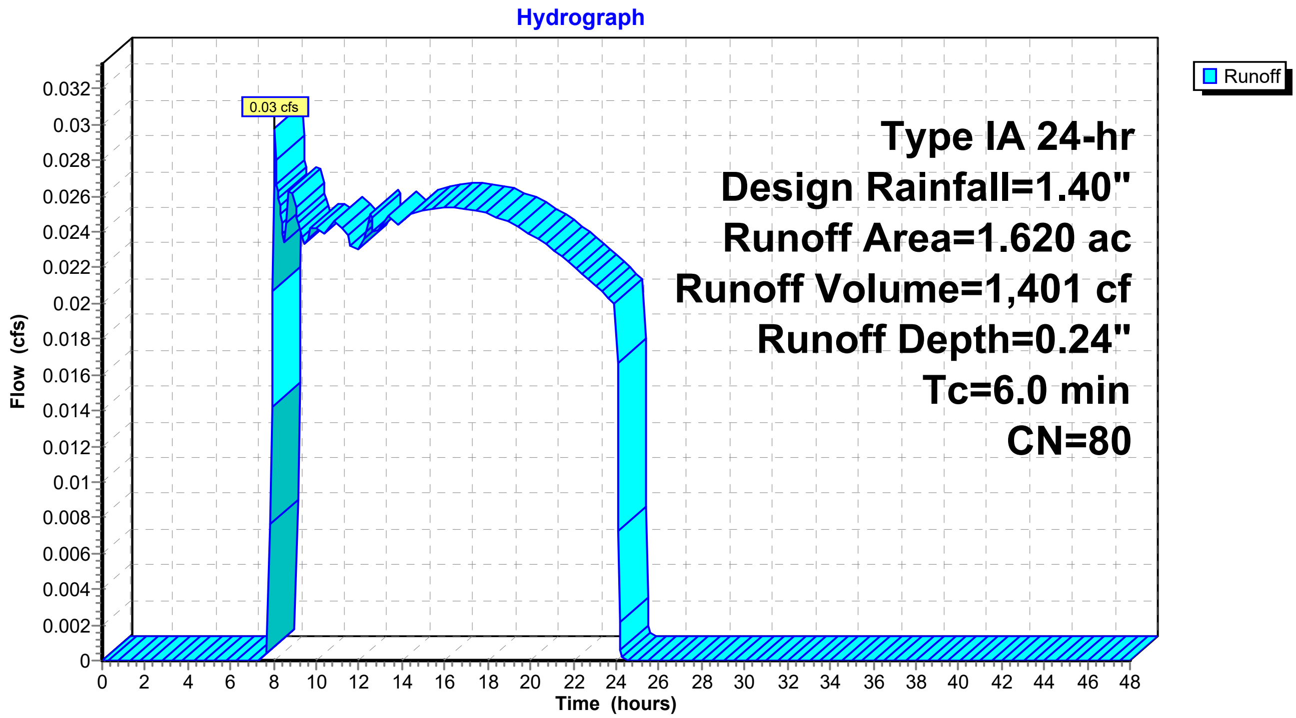
Runoff = 0.03 cfs @ 8.06 hrs, Volume= 1,401 cf, Depth= 0.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr Design Rainfall=1.40"

	Area (ac)	CN	Description
*	1.350	78	Rail/Gravel Base
*	0.270	92	Gravel Access Road
	1.620	80	Weighted Average
	1.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment P2-SB: Pond 2 South Basin



Summary for Subcatchment PMR: Pipeline Maintenance Road

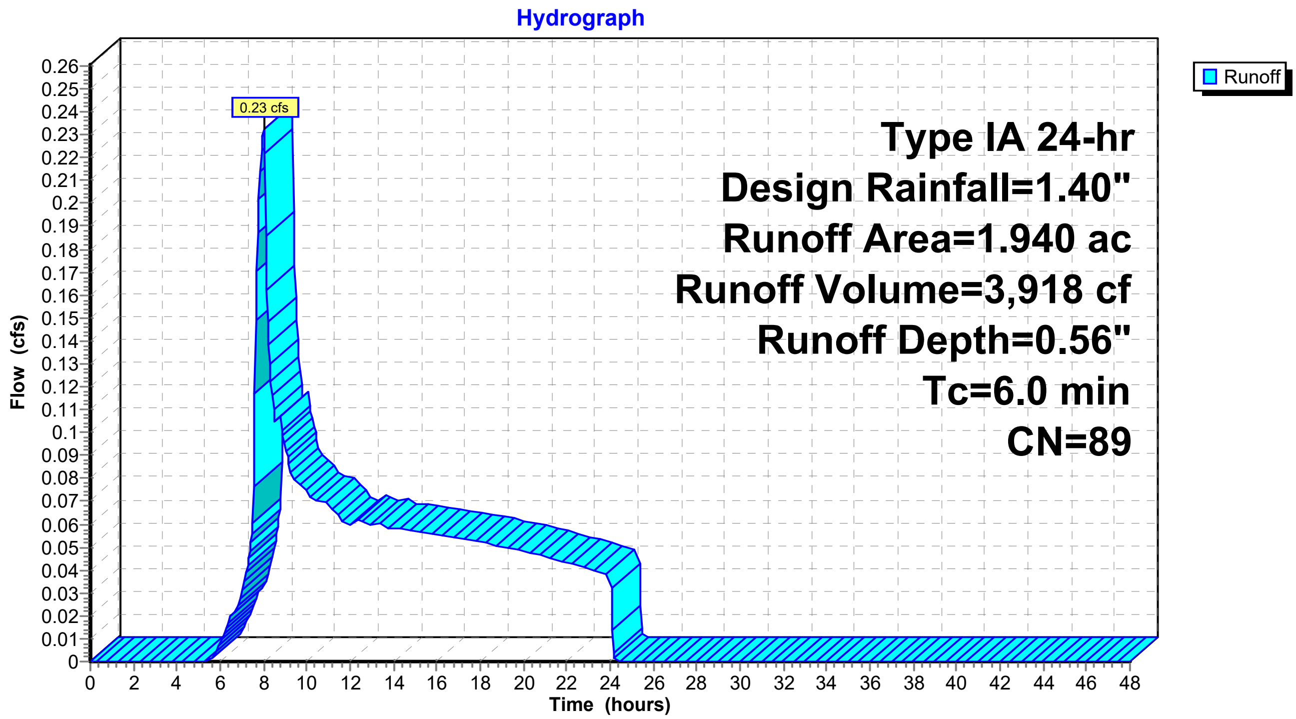
Runoff = 0.23 cfs @ 7.99 hrs, Volume= 3,918 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr Design Rainfall=1.40"

	Area (ac)	CN	Description
*	0.580	92	Maintenance Road
*	0.490	100	Pond 3
*	0.870	80	Pipeline
	1.940	89	Weighted Average
	1.450		74.74% Pervious Area
	0.490		25.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 Minimum**

Subcatchment PMR: Pipeline Maintenance Road



Summary for Pond DP-002: MH-DP002 (Basin 2 Post-Developed)

Inflow Area = 532,739 sf, 41.05% Impervious, Inflow Depth > 0.11" for Design event
Inflow = 0.09 cfs @ 24.10 hrs, Volume= 4,970 cf
Outflow = 0.09 cfs @ 24.10 hrs, Volume= 4,969 cf, Atten= 0%, Lag= 0.3 min
Primary = 0.09 cfs @ 24.10 hrs, Volume= 4,969 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= -2.52' Surf.Area= 20 sf Storage= 30 cf
Peak Elev= -2.38' @ 24.10 hrs Surf.Area= 20 sf Storage= 32 cf (3 cf above start)

Plug-Flow detention time= 15.1 min calculated for 4,934 cf (99% of inflow)
Center-of-Mass det. time= 0.6 min (1,584.4 - 1,583.9)

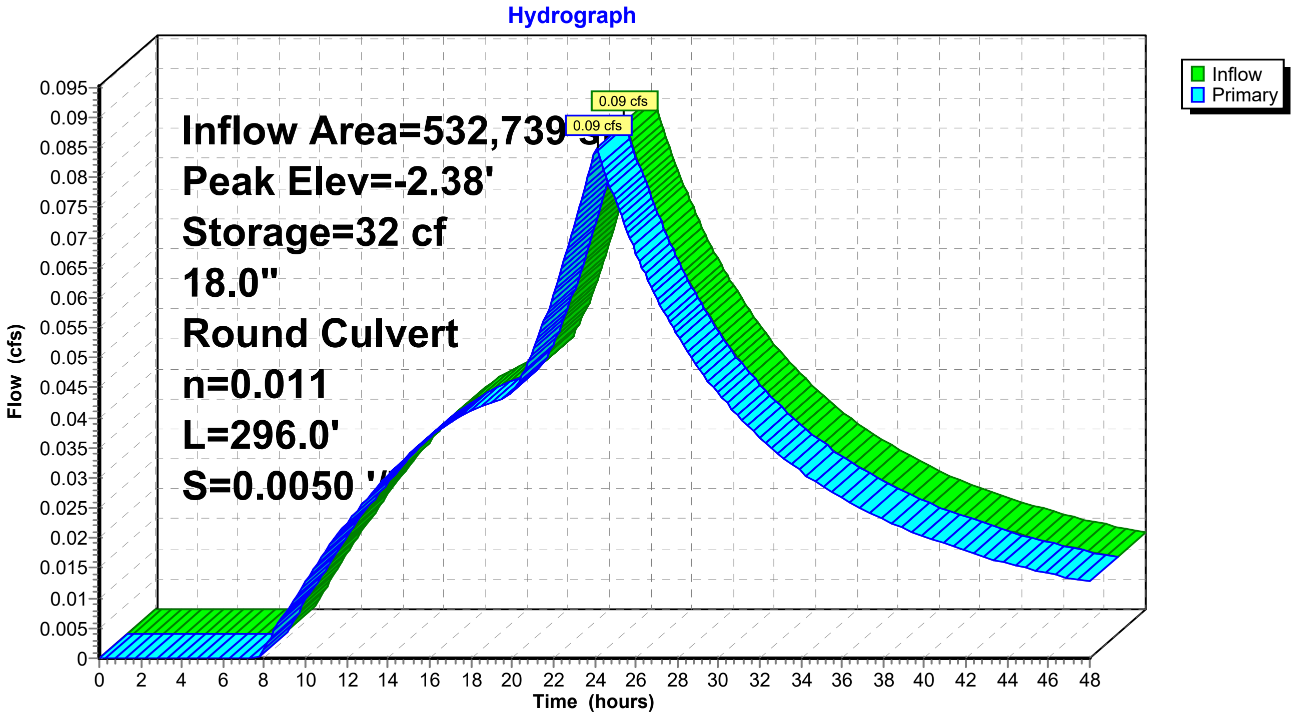
Volume	Invert	Avail.Storage	Storage Description
#1	-4.00'	140 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
-4.00	20	0	0
3.00	20	140	140

Device	Routing	Invert	Outlet Devices
#1	Primary	-2.52'	**18.0" Round Pipe to McLean Slough** L= 296.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= -2.52' / -4.00' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.09 cfs @ 24.10 hrs HW=-2.38' (Free Discharge)
└─**1=Pipe to McLean Slough** (Inlet Controls 0.09 cfs @ 1.01 fps)

Pond DP-002: MH-DP002 (Basin 2 Post-Developed)



Summary for Pond DP-003: POND 4/CB-DP003 (Basin 3 Post-Developed)

Inflow Area = 33,977 sf, 15.38% Impervious, Inflow Depth = 0.26" for Design event
Inflow = 0.02 cfs @ 8.04 hrs, Volume= 749 cf
Outflow = 0.01 cfs @ 21.52 hrs, Volume= 670 cf, Atten= 44%, Lag= 808.6 min
Primary = 0.01 cfs @ 21.52 hrs, Volume= 670 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 2.00' Surf.Area= 0 sf Storage= 3,518 cf
Peak Elev= 2.07' @ 21.52 hrs Surf.Area= 0 sf Storage= 3,834 cf (316 cf above start)
Flood Elev= 3.00' Surf.Area= 0 sf Storage= 8,061 cf (4,543 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 424.5 min (1,359.3 - 934.8)

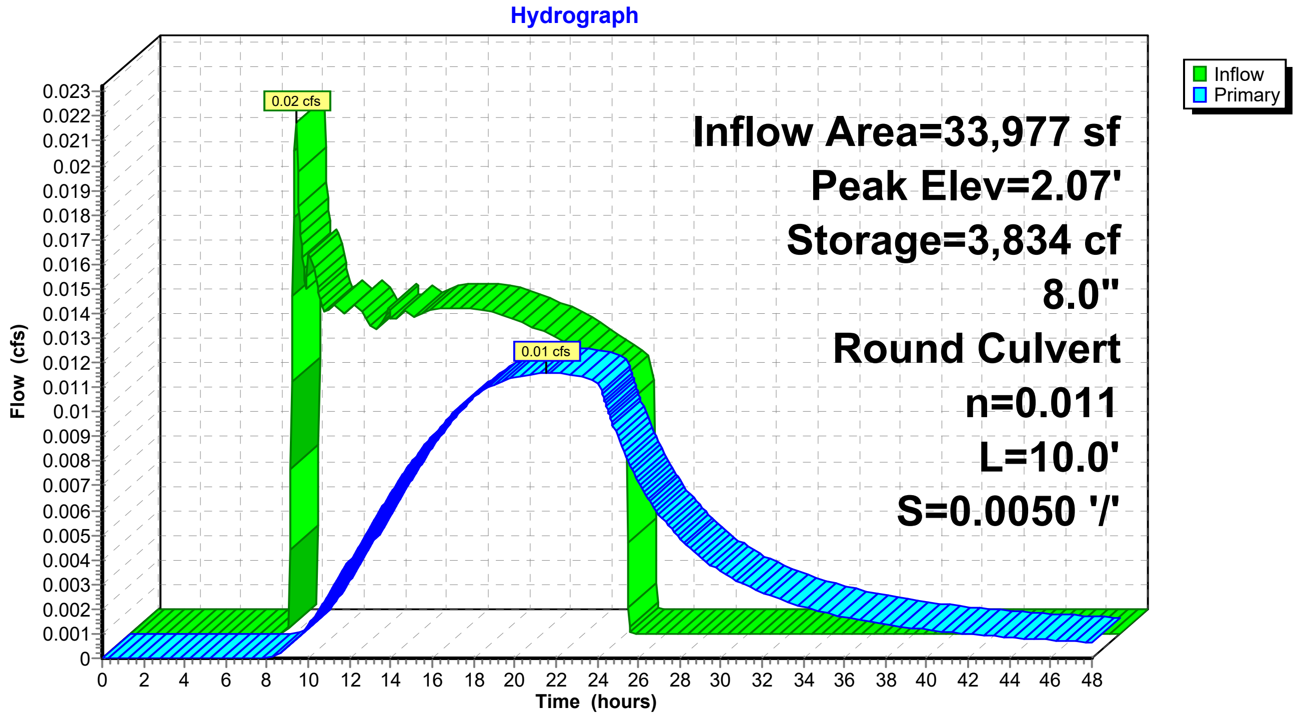
Volume	Invert	Avail.Storage	Storage Description
#1	1.00'	8,061 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
1.00	0
2.00	3,518
3.00	8,061

Device	Routing	Invert	Outlet Devices
#1	Primary	2.00'	**8.0" Round Pipe to CB-DP-003** L= 10.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.95' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.01 cfs @ 21.52 hrs HW=2.07' (Free Discharge)
└─**1=Pipe to CB-DP-003** (Barrel Controls 0.01 cfs @ 0.92 fps)

Pond DP-003: POND 4/CB-DP003 (Basin 3 Post-Developed)



Summary for Pond P-1: POND 1

Inflow Area = 297,950 sf, 45.76% Impervious, Inflow Depth = 0.76" for Design event
Inflow = 1.21 cfs @ 7.93 hrs, Volume= 18,920 cf
Outflow = 0.04 cfs @ 24.12 hrs, Volume= 1,725 cf, Atten= 97%, Lag= 970.9 min
Primary = 0.04 cfs @ 24.12 hrs, Volume= 1,725 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.13' @ 24.12 hrs Surf.Area= 0 sf Storage= 18,639 cf
Flood Elev= 2.35' Surf.Area= 0 sf Storage= 102,326 cf

Plug-Flow detention time= 1,595.8 min calculated for 1,725 cf (9% of inflow)
Center-of-Mass det. time= 1,128.3 min (1,861.9 - 733.6)

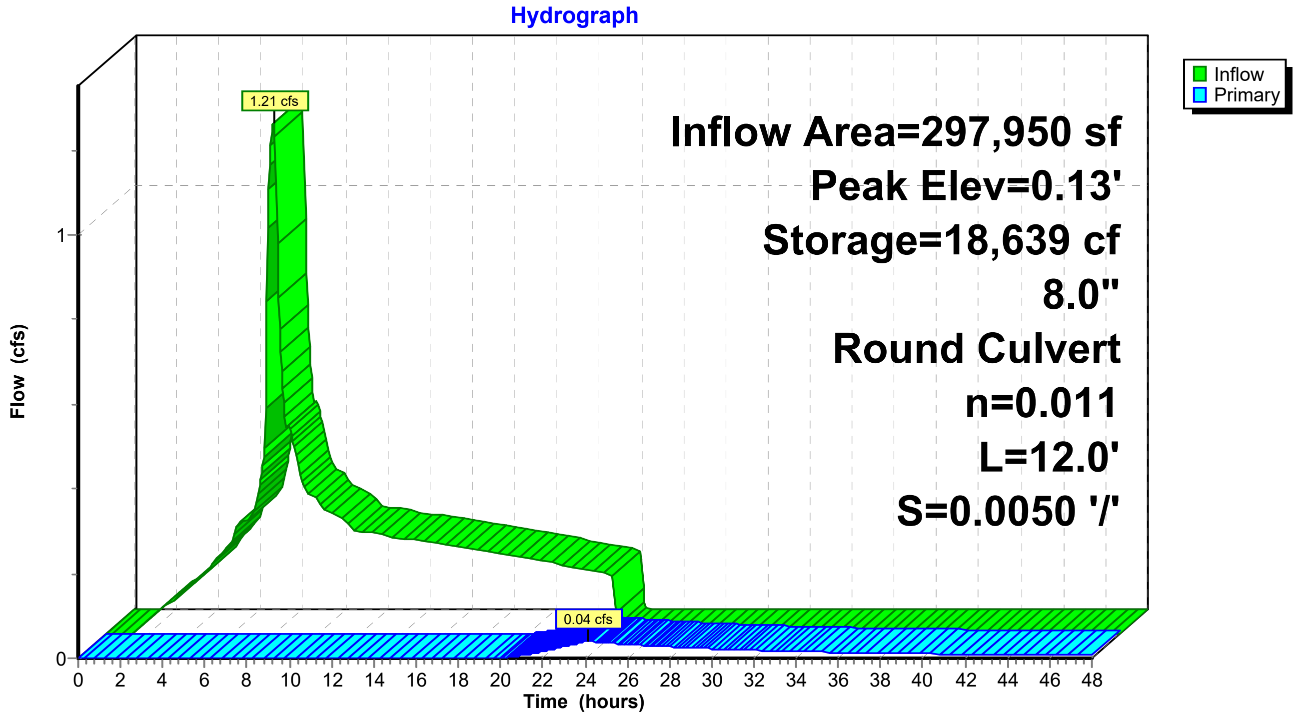
Volume	Invert	Avail.Storage	Storage Description
#1	-1.15'	102,326 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-1.15	0
-0.65	4,073
0.35	22,730
1.35	55,457
2.35	102,326

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.0" Round Pipe to MH-DP002** L= 12.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -0.06' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.04 cfs @ 24.12 hrs HW=0.13' TW=-2.38' (Dynamic Tailwater)
1=Pipe to MH-DP002 (Barrel Controls 0.04 cfs @ 1.27 fps)

Pond P-1: POND 1



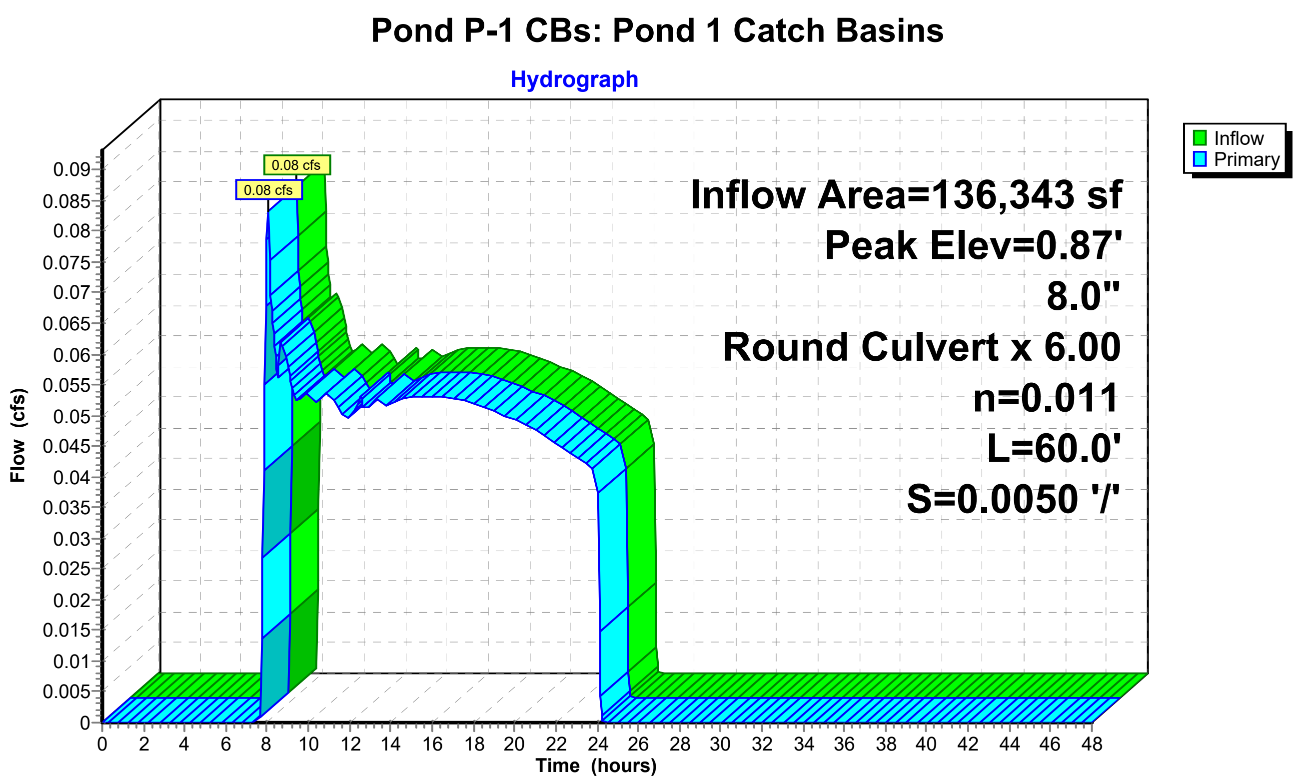
Summary for Pond P-1 CBs: Pond 1 Catch Basins

Inflow Area =	136,343 sf,	0.00% Impervious,	Inflow Depth = 0.26"	for Design event
Inflow =	0.08 cfs @	8.04 hrs, Volume=	3,005 cf	
Outflow =	0.08 cfs @	8.04 hrs, Volume=	3,005 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.08 cfs @	8.04 hrs, Volume=	3,005 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.87' @ 8.04 hrs
Flood Elev= 2.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	0.80'	**8.0" Round Storm Pipe Under Tracks to Pond X 6.00** L= 60.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.80' / 0.50' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.08 cfs @ 8.04 hrs HW=0.87' TW=-0.58' (Dynamic Tailwater)
└─**1=Storm Pipe Under Tracks to Pond** (Barrel Controls 0.08 cfs @ 1.01 fps)



Summary for Pond P-2: POND 2

Inflow Area = 150,282 sf, 40.58% Impervious, Inflow Depth = 0.64" for Design event
Inflow = 0.50 cfs @ 7.97 hrs, Volume= 8,045 cf
Outflow = 0.00 cfs @ 24.22 hrs, Volume= 84 cf, Atten= 100%, Lag= 975.2 min
Primary = 0.00 cfs @ 24.22 hrs, Volume= 84 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.03' @ 24.22 hrs Surf.Area= 0 sf Storage= 8,042 cf
Flood Elev= 2.35' Surf.Area= 0 sf Storage= 49,476 cf

Plug-Flow detention time= 1,827.8 min calculated for 84 cf (1% of inflow)
Center-of-Mass det. time= 1,266.9 min (2,040.3 - 773.3)

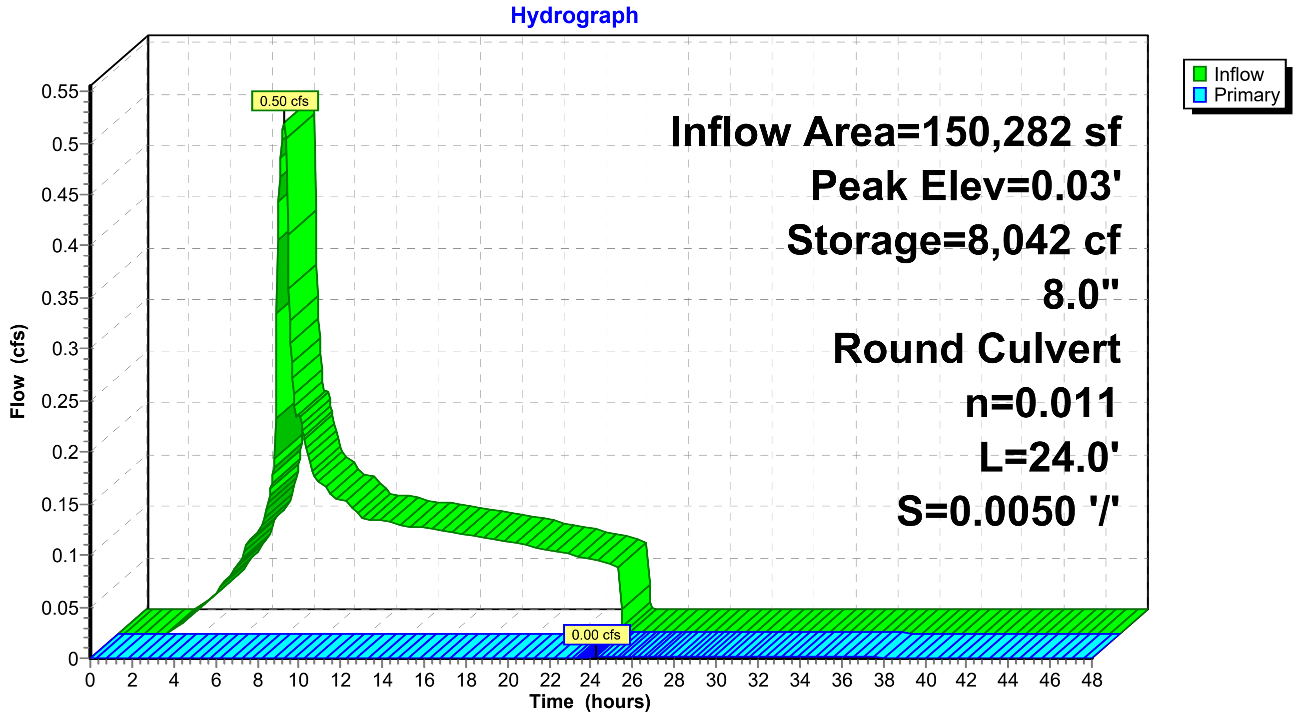
Volume	Invert	Avail.Storage	Storage Description
#1	-1.15'	49,476 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-1.15	0
-0.65	1,959
0.35	10,959
1.35	26,767
2.35	49,476

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**8.0" Round Pipe to MH-DP002** L= 24.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -0.12' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.00 cfs @ 24.22 hrs HW=0.03' TW=-2.38' (Dynamic Tailwater)
└─**1=Pipe to MH-DP002** (Barrel Controls 0.00 cfs @ 0.52 fps)

Pond P-2: POND 2



Summary for Pond P-2 CBs: Pond 2 Catch Basins

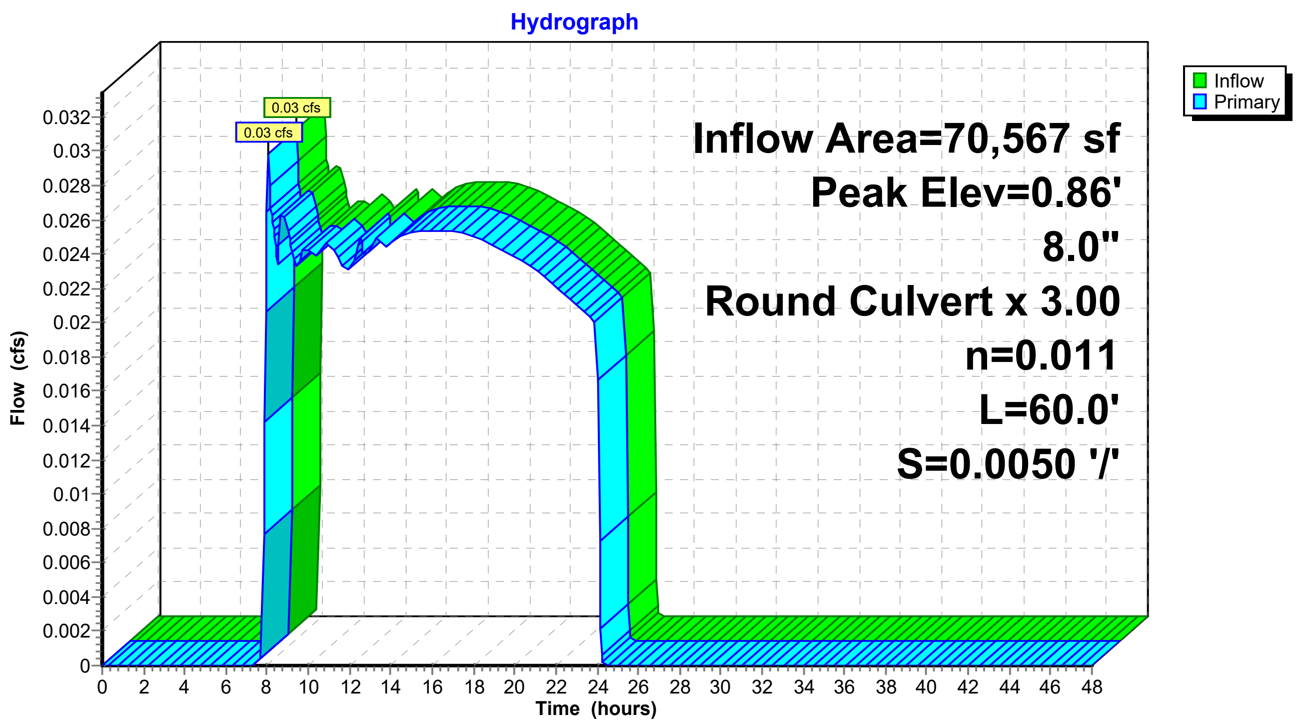
Inflow Area =	70,567 sf,	0.00% Impervious,	Inflow Depth = 0.24"	for Design event
Inflow =	0.03 cfs @	8.06 hrs, Volume=	1,401 cf	
Outflow =	0.03 cfs @	8.06 hrs, Volume=	1,401 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.03 cfs @	8.06 hrs, Volume=	1,401 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 0.86' @ 8.06 hrs
Flood Elev= 2.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	0.80'	**8.0" Round Storm Pipe Under Tracks to Pond 2 X 3.00** L= 60.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.80' / 0.50' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.03 cfs @ 8.06 hrs HW=0.86' TW=-0.68' (Dynamic Tailwater)
1=Storm Pipe Under Tracks to Pond 2(Barrel Controls 0.03 cfs @ 0.91 fps)

Pond P-2 CBs: Pond 2 Catch Basins



Summary for Pond P-3: POND 3

Inflow Area = 84,506 sf, 25.26% Impervious, Inflow Depth = 0.56" for Design event
Inflow = 0.23 cfs @ 7.99 hrs, Volume= 3,918 cf
Outflow = 0.04 cfs @ 21.66 hrs, Volume= 3,161 cf, Atten= 81%, Lag= 820.2 min
Primary = 0.04 cfs @ 21.66 hrs, Volume= 3,161 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Starting Elev= -1.00' Surf.Area= 0 sf Storage= 6,229 cf
Peak Elev= -0.87' @ 21.66 hrs Surf.Area= 0 sf Storage= 8,316 cf (2,087 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 584.7 min (1,419.9 - 835.2)

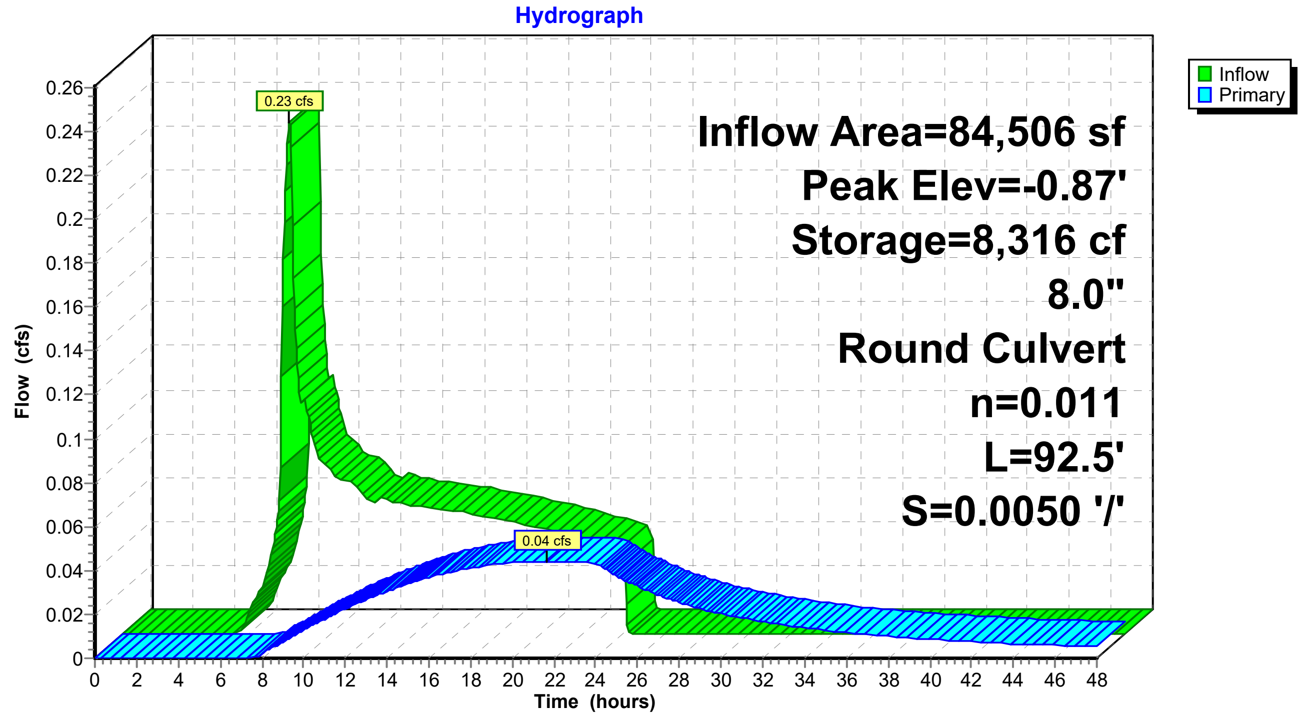
Volume	Invert	Avail.Storage	Storage Description
#1	-2.00'	22,444 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
-2.00	0
-1.00	6,229
0.00	22,444

Device	Routing	Invert	Outlet Devices
#1	Primary	-1.00'	**8.0" Round Pipe to MH-DP002** L= 92.5' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= -1.00' / -1.46' S= 0.0050 '/' Cc= 0.900 n= 0.011, Flow Area= 0.35 sf

Primary OutFlow Max=0.04 cfs @ 21.66 hrs HW=-0.87' TW=-2.40' (Dynamic Tailwater)
└─**1=Pipe to MH-DP002** (Barrel Controls 0.04 cfs @ 1.41 fps)

Pond P-3: POND 3



APPENDIX D
WASTEWATER TREATMENT PLANT DESIGN INFORMATION

NEXT Renewable Fuels, Oregon LLC

WASTEWATER-STORM WATER
DESIGN BASIS

April 15, 2021
Revised January 23, 2023
Rev 1

I. INTRODUCTION

NEXT Renewable Fuels, Oregon LLC (NEXT) is a private company focused on producing and delivering clean transportation fuels. NEXT plans to build a Renewable Fuels facility at Port Westward, Oregon.

Details regarding the Facility and the renewable fuels manufacturing process are outlined in the NEXT Project Design Basis in Attachment 1.

As part of the Renewable Fuels project, NEXT will install a wastewater and stormwater management facilities within the Main Plant (referred to as Drainage Area 1 on Figure 1). The wastewater and stormwater at the Main Plant are commingled and treated as wastewater. Once the two streams are commingled and treated, the two streams are referred to as “Process Wastewater” and discharge consistent with Port Westward’s individual National Pollutant Discharge Elimination System (NPDES) Waste Discharge Permit (DEQ File No. 111746) to the Port wastewater system.

The stormwater management system for runoff generated in Drainage Areas 2 and 3, which include proposed roads, pipe rack, and rail areas (see Figure 1), are outlined in the Post Construction Stormwater Management Plan (SWMP).

II. OVERVIEW

The NEXT Renewable Fuels facility Wastewater Treatment facility is designed to treat wastewater produced from processing vegetable oil (VO) and animal fats (AF) to produce 50,000 barrels per day (BPD) of Renewable Diesel, as well as stormwater that comes into contact with the oil-handling process equipment at the Main Plant.

A process flow diagram showing the Wastewater / Stormwater Treatment facilities is included in Attachment 2.

The NEXT treated Process Wastewater effluent will discharge to the existing Port Westward outfall to the Columbia River. The effluent quality will be required to comply with the Port Westward NPDES Waste Discharge Permit (see Attachment 3). To ensure compliance with the Port's NPDES permit, the NEXT Wastewater Treatment (WWT) effluent design specifications, shown in Table 1, are more stringent than the Port's effluent limits. These specifications will be adjusted if the Port's effluent limitations change when the Waste Discharge Permit is renewed.

Table 1: NEXT WWT/SW Effluent Specifications

WWT Specifications	Spec	Comment
Temperature DT:	**0 °F**	Temp delta is influent raw water - WWT effluent
COD:	**N/A**	
BOD5:	**≤ 20 mg/L**	
FOG:	**≤ 20 mg/L**	
TSS:	**≤ 10 mg/L**	
Total Nitrogen:	**≤ 50 mg/L**	
Phosphorus-P:	**≤ 5 mg/L**	
Alkalinity:	**≥ 50 mg/L**	
pH:	**6.6 – 8.5**	
Free Chlorine:	**≤ 0.15 mg/L**	

<u>Wastewater Treatment</u>

As Attachment 2 highlights, the WWT flow scheme has been designed to segregate and optimize the treating of the various streams and contaminants.

The VO/AF pretreatment facility will produce two wastewater streams, High and Low Strength. The high strength wastewater will contain a high chemical oxygen demand (COD) load from the degumming section and the low strength will be a lower COD stream made up of several wastewater sources. These streams will be segregated and processed differently. The low strength COD stream will be comingled with the normal process wastewater stream and processed through the dissolved air floatation (DAF) facility to separate of oily float, solids, and water. The high strength COD stream will be comingled with the DAF float and processed in the Anerobic Digestion system.

The treated products from the DAF and the Anerobic Digester will flow to the Equalization Tank where they will be comingled with low COD water from several sources, RO Reject, Boiler Blowdown, Stripped Sour Water (SSW), and Cooling Tower (CT) Blowdown and stormwater from the process area of the Main Plant. These waters will be mixed and discharged to the Aerobic Sequential Batch Bioreactors (SBRs) for further treatment.

The water from the SBRs will flow to the Post Equalization Tank for further oxidation and clarification before being sent to Tertiary Filtration to substantially reduce solids content. Stormwater from non-process areas of the facility will be comingled with the Post Equalization water and be treated through the Tertiary Filters.

The final step in processing is cooling of the streams to ensure compliance with the Port's NPDES Waster Discharge Permit temperature effluent limit. A heat exchanger will be used to cool the Process Wastewater effluent against incoming plant raw water.

Refer to the tables in Section IV for pretreatment and effluent parameters in the wastewater treatment system mentioned above.

Main Plant Stormwater System

The Main Plant stormwater system will be designed to collect and process stormwater generated during a 100-year, 24-hour storm event. The design storms used for the project are based on Appendix E of the Columbia County's Stormwater and Erosion Control Ordinance No. 2001-10 adopted November 28, 2001, using the rainfall depths for Clatskanie as shown in Table 2.

Table 2: Columbia County Design Storm Rainfall Depths

Storm Event	Water Quality (SLOPES V)	2-yr 24-hr	5-yr 24-hr	10-yr 24-hr	25-yr 24-hr	100-yr 24-hr
Rainfall Depth	1.40”	2.8”	3.4”	3.9”	4.5”	5.4”

Stormwater treatment facilities were designed with the assumption that infiltration is negligible. The runoff curve numbers for the site surfaces are selected to reflect the low permeability soil conditions, as follows.

Table 3: Runoff Curve Numbers

Surface Coverage	Runoff Curve Number
Paved Roadway, Building Roof, and Sidewalks	98
Gravel Surfacing and Roadways	92
Proposed Landscaping	78
Existing Grass or Vegetated Field	78

Stormwater within the Main Plant boundary will come from several different areas and will consist of both uncontaminated and potentially contaminated runoff. The Main Plant stormwater will be segregated into two separate drainage systems. These include:

- Uncontaminated stormwater from outside the process unpaved areas (Stormwater System).
- Potentially contaminated stormwater from process and utility areas (Process Wastewater System).

The various areas and their proposed drainage:

- **Process & Utility Areas**
  These areas of the Main Plant are subject to biodiesel processing activities and stormwater from these areas is considered potentially contaminated and will be routed to the Process Wastewater System (PWS).

- **Paved Areas other than Process & Utility Areas**
  These areas are considered uncontaminated and will be routed to the Stormwater System (SW). This includes paved roads as well as parking areas.

- **Unpaved Areas**
  These areas are considered uncontaminated and will be routed to SW or will continue to follow existing drainage conditions.

- **Inside Tank Dikes**
  The area inside the dikes is normally considered uncontaminated. Stormwater will be contained inside the dike and allowed to evaporate. If a diked area needs to be drained the water will be visually inspected for a sheen prior to draining. If contaminated, the water will be collected with vacuum trucks or other methods and transported to be comingled with the Post Equalization water and be processed through the Tertiary Filters.

Process Wastewater System (PWS):

The PWS system is a single contained system for collecting stormwater and water wash-downs from the paved process unit and utility areas of the Main Plant.This water is considered to be potentially contaminated and requires treatment. The PWS system will include:

- PWS Basin, Capacity of 12,825 barrels (bbl)
- PWS Tank #1, Capacity of 65,000 bbl
- Equalization Tank, Capacity of 65,000 bbl reserved for stormwater
- Three (3) PWS Basin Sump Pumps and one (1) small pump
- PWS transfer pumps

Runoff from the various process areas is collected through a network of underground pipes and gravity flows to lift stations. Stormwater from smaller pump manifolds, flare drum areas, and loading/unloading areas, which are remote from the process areas will be collected in a similar manner and routed to one or more lift stations to be pumped to the PWS Tank. Water is pumped from the lift stations to the PWS Tank and is then pumped at a controlled rate (750 gallons per minute (gpm)) to the WWT system.

Treated effluent from the WWT will meet the effluent specifications outlined in Table 1.

Refer to attached Figure 2 for the extent of the PWS system.

Stormwater (SW) System:

In the SW (Stormwater) system, the uncontaminated runoff from outside the process areas is conveyed to the Stormwater Tank (SW Tank). Runoff from the paved roads is collected through a network of underground pipes that gravity flow to stormwater collection sumps that pump stormwater to the SW Tank (see Figure 2). The SW system will include:

- SW Basin, Capacity of 12,825 barrels (bbl)
- SW Tank, Capacity of 125,000 bbl
- Three (3) SW Basin Sump Pumps and one (1) small pump
- SW transfer pumps

Stormwater from the SW Tank will be tested and if it complies with effluent specifications in Table

1, it will be released gradually over a period of 10 days at a controlled flow rate of 750 gpm to the Tertiary Filters before discharging to the Port Outfall.

Refer to the attached Figure 2 that depicts the extent of the SW system.

Table 4 summarizes the acreage attributed to each stormwater drainage area.

Table 4: NEXT Main Plant Stormwater Basins

NEXT Main Plant Stormwater Basin Acreage	
	Acres
Process Wastewater System (PWS) Area	33
Stormwater (SW) System Area	42
Tank Dike Areas	21
Other Pervious Surface Areas[1]	14
Total Surface Area	110

[1] Pervious surface areas are expected to evaporate or follow existing drainage conditions.

III. DESIGN BASIS / CONSIDERATIONS

Storage Capacity

During extreme storm events (i..e., the100-year, 24-hour storm of 5.4 in.), the stormwater system will need to contain ~230,000 barrels (bbl) of process and stormwater. The water will be contained in various tanks within the PWS and SW systems and pumped through the treatment facility over a 2-week period.

The pump out rate from each system (PWS and SW) is based on a 100-year, 24-hour storm (5.40 inches).The pump out rate for the PWS and SW systems will be provided by three pumps at 3,750 GPM each. An additional small pump is provided at 500 gpm to handle pumping small daily rain episodes. Table 5 shows the current design's water storage capacity and pump rates.

Table 5: Stormwater Tankage

Source	Basins		Tanks				
	Basin Volume (bbl)	Minimum Basin Pump Rate (GPM)	PWS Tank 1 (bbl)	Equalization Tank (bbl)	SW Tank 2(bbl)	Tank Pump Rate (GPM)	Total (bbl)
PWS	12,825	6,610	65,000	65,000	-	750	132,825
SW	12,825	7,800	-	-	125,000	750	137,825
Total Water Storage							270,650

The HydroCAD model output report is included in Attachment 4.

IV. WWT INFLUENT WATER SPECIFICATIONS

The tables below depict the potential WWT effluent monitoring parameters and pretreatment standards that the Port may apply to discharges from the wastewater treatment system.

Pretreat Unit Summary Table		without high COD stream to WWTP		high-COD stream only		If all streams combined
Flow Rate	GPM	118		53		171
Flow Rate	pph	58962		26233		85194
COD (estimated)	ppm	19824		282697		100767
BOD5	ppm	11498		163965		58445
Lyso-Phospholipids	ppm	335		28631		9048
Phospholipids	ppm	0		0		0
Fats & Oils	ppm	9058		52771		22518
Inorganic Chlorides	ppm	15		655		212
Citric Acid	ppm	0		9772		3009
Phosphorus	ppm	43		1661		542
TSS (insoluble impurities + Fats & Oils entrained with insoluble impurities)	ppm	0		93814		28887
TDS (not considering TDS of process water provided by client)	ppm	102		3099		1025
Sulfur (rough estimate)	ppm	51		807		284
Nitrogen (rough estimate	ppm	130		2039		717

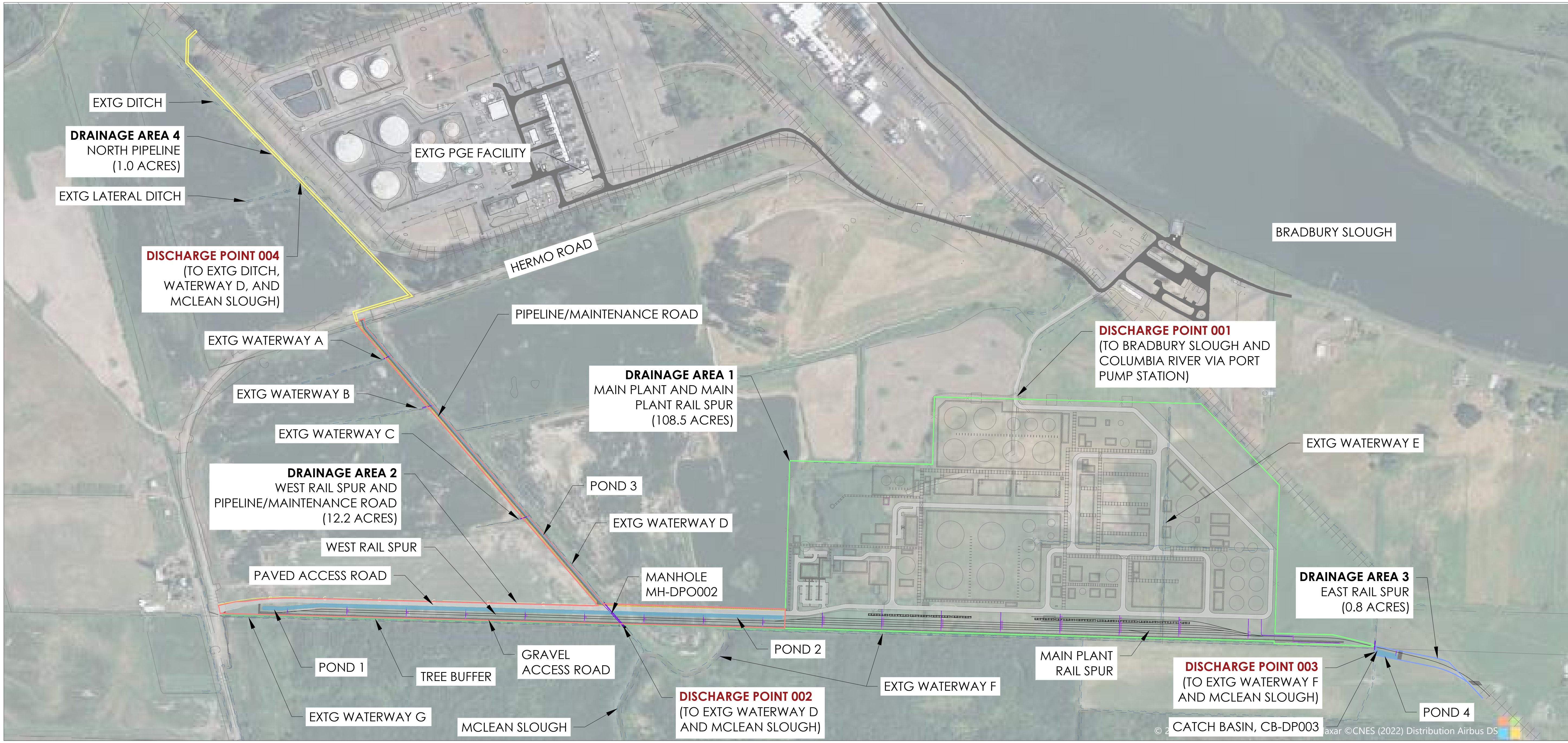
	Cooling Tower Blowdown	RO Reject
Dissolved Oxygen, ppm O2		
pH	7.5-8.0	
Total Hardness as CACO3, ppm	345	590
Alkalinity – Bicarbonate, ppm	266.5	506
Total Iron, ppm FE	0.21	0
Total Copper, ppm Cu	0.0035	
Total Dissolved Solids, ppm	450	850
Total Suspended Solids, ppm	73.5	127
Silica ppm as SiO2	63	117
Conductivity, microohms/cm at 68F	725	1250
Turbidity	-	
Chloride	23.5	
Fluoride	0.5	
Nitrate as N	2.5	
Sulfate	48.5	
Calcium	79.5	
Magnesium, Total	23	
Potassium, Total	6	
Sodium, Total	33	
Temp	70-120 F	70-90 F

Typical Boiler Blowdown Properties		
Boiler pressure	psig	600 - 750
Iron Concentration	*(ppm)*	0.025
Copper Concentration	*(ppm)*	0.02
Hardness $CaCO_3$	*(ppm)*	0.2
Silica Concentration	*(ppm)*	30
Alkalinity $CaCO_3$	*(ppm)*	400
Total Dissolved Solids	*(ppm)*	1000
Specific Conductivity	*(µS/cm)* *	4000
Temp		400-450 F

Sour Water Effluent Stream	
Ammonia ppm	50
H2S ppm	<5
Phenol ppm	30
BOD ppm	120
COD ppm	514
TOC ppm	160
pH	5-7

Oily Water Effluent		
pH		6-9
COD, ppm		750
BOD, ppm		300
TSS, ppm		250
TOC, ppm		150
Alkalinity, ppm		125
Ammonia, ppm		0
Temp		100 F

FIGURES



LEGEND

- STORMWATER POND
- PAVED ROAD
- GRAVEL
- TREE BUFFER
- DRAINAGE AREA BOUNDARY
- RAIL SPUR
- PIPE RACK
- STORM PIPE
- CATCH BASIN
- EXISTING WATERWAY/DITCH

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Date:1/19/2023 10:35:25 AM

MFA JOB #:	M1724.01
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DRAWN:	L. DANIEL

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PHONE: 971.544.2139
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NEXT Renewable Fuels, Inc.

SITE LAYOUT

NEXT RENEWABLE FUELS OREGON

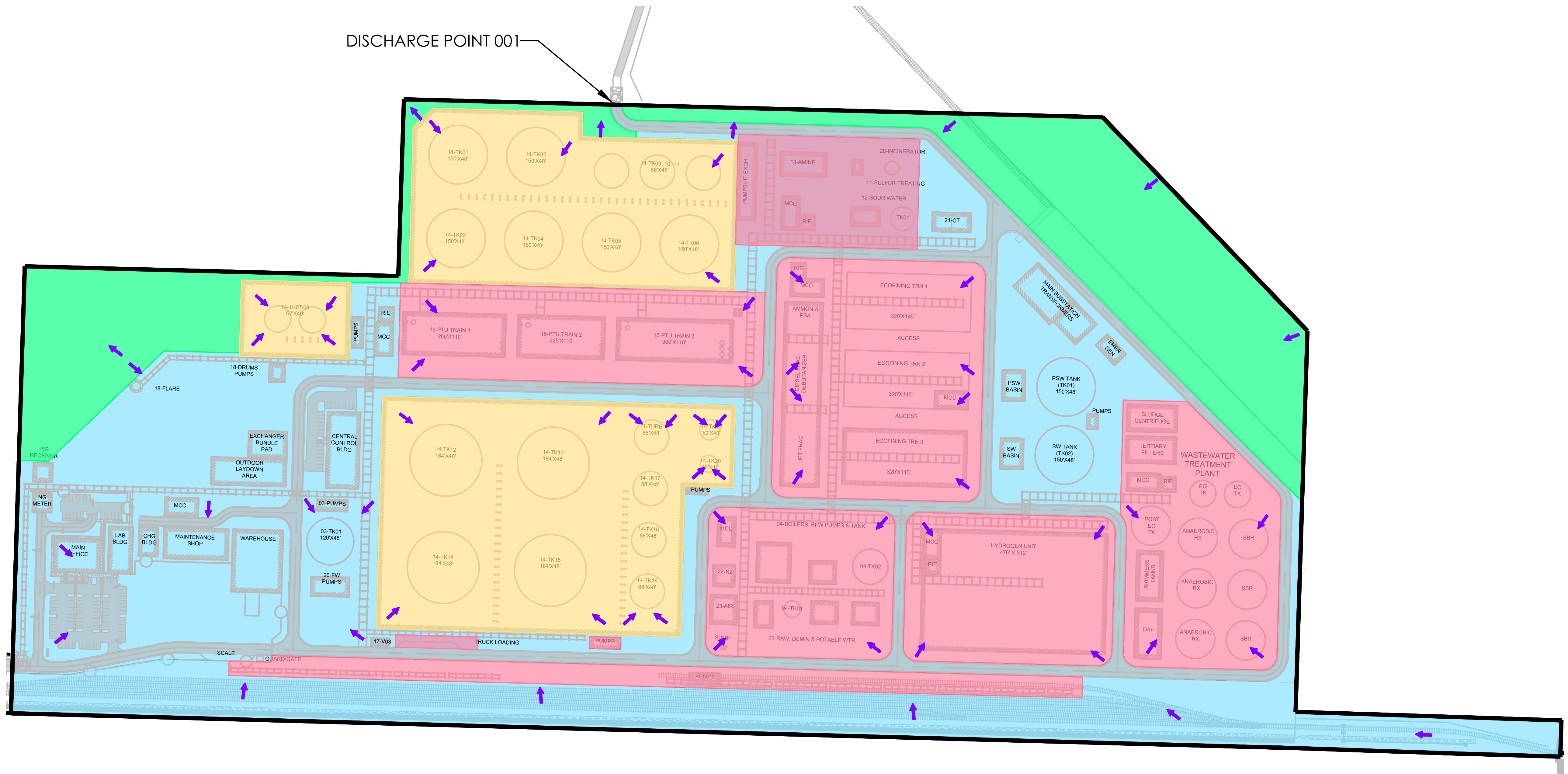
NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 700' 1400'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

FIGURE 1



LEGEND

- PROCESS WASTEWATER AREAS (33-ACRES)
- STORMWATER AREAS (40-ACRES)
- TANK DIKE AREAS (21-ACRES)
- OTHER PERVIOUS AREAS (15-ACRES)
- DRAINAGE FLOW DIRECTION

PERMIT

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MFA JOB #:	M1724.01
ISSUE DATE:	1/23/2023
CHECKED:	B. TINO
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NEXT Renewable Fuels, Inc.

MAIN PLANT DRAINAGE AREAS

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.

PORT WESTWARD, OREGON

0 300' 600'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

FIGURE 2

ATTACHMENT 1

PROJECT DESIGN BASIS – 50,000 BPD

NEXT Renewable Fuels, Oregon LLC.

PROJECT DESIGN BASIS

50,000 BPD
RENEWABLE DIESEL PROJECT

Revision B
May 7, 2021

Table of Contents

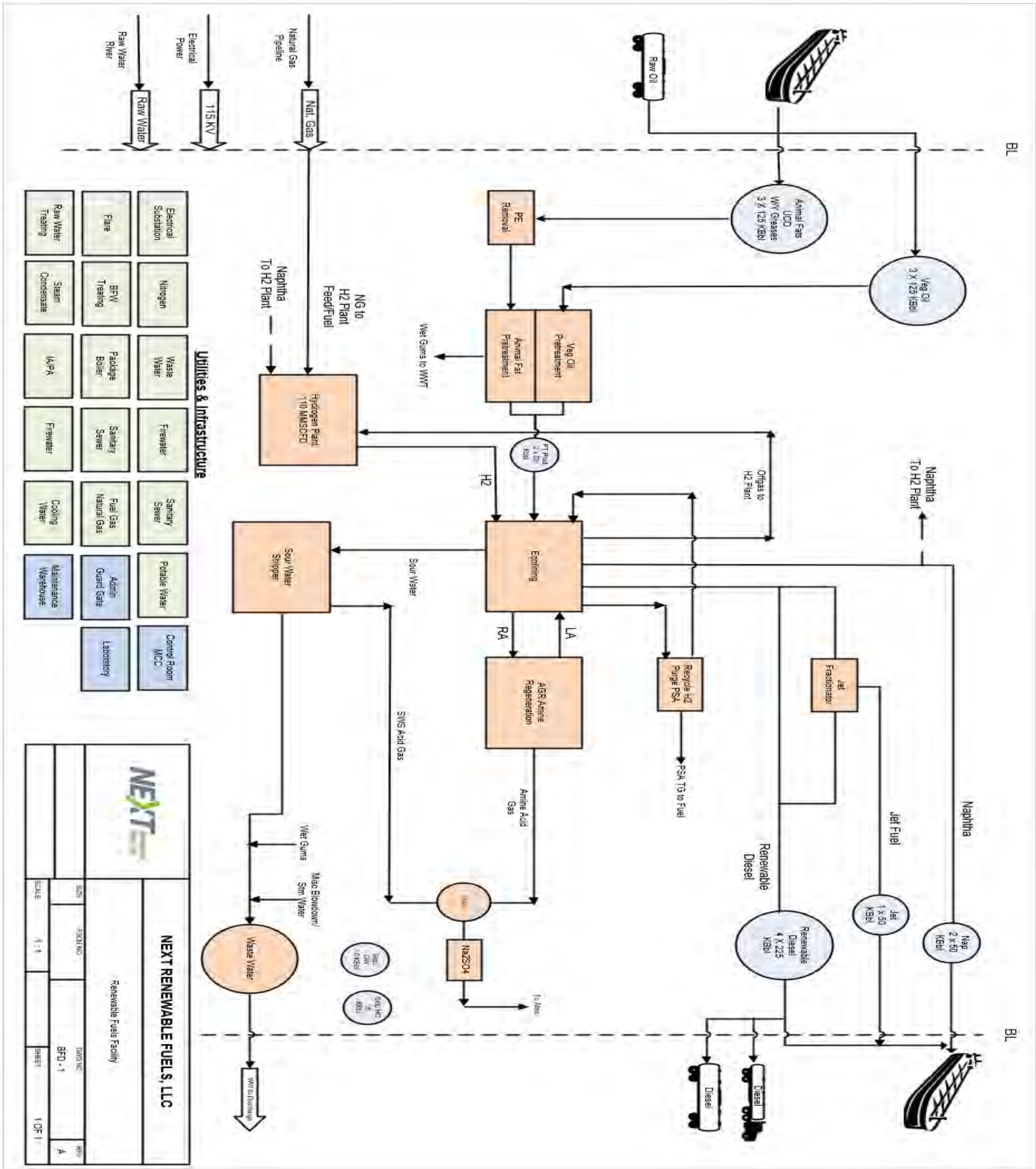
1. Introduction

NEXT Renewable Fuels, LLC is a private company focused on producing and delivering clean transportation fuels. NEXT Renewable Fuels plans to build a flexible Green Diesel facility utilizing the Honeywell UOP Ecofining^{TM} Green Diesel technology. This design basis was prepared for NEXT Renewable Fuels based on constructing a facility that can produce 50,000 BPD of renewable fuels utilizing the Honeywell UOP Ecofining^{TM} Green Diesel technology. The facility would be located in the Pacific Northwest with access to West Coast markets.

The Ecofining^{TM} process is a versatile solution for producing renewable diesel from a range of sustainable feedstocks such as used cooking oil, animal fats, and various vegetable oils. Renewable diesel produced in the Ecofining process is a drop-in fuel which can directly replace up to 100% petroleum-based diesels complying with ASTM975 diesel specification.

The Renewable Diesel facility will be designed to process a variety of used cooking oils, animal fats, vegetable oils, and choice white and yellow greases. The facility will process 51,500 BPD of raw vegetable oils, tallows and animal fats to produce ~50,000 BPD of renewable products. Outlined in Figure 1 is the general block flow for the overall NEXT Green Diesel facility.

Figure 1: NEXT Renewable Diesel BFD



Due to the capacity of the Renewable Diesel facility, the Raw Oil Pretreat and Ecofining™ Units will be multi-train.

A preliminary plot plan, Figure 2, has been developed for the NEXT Renewable Fuels site.

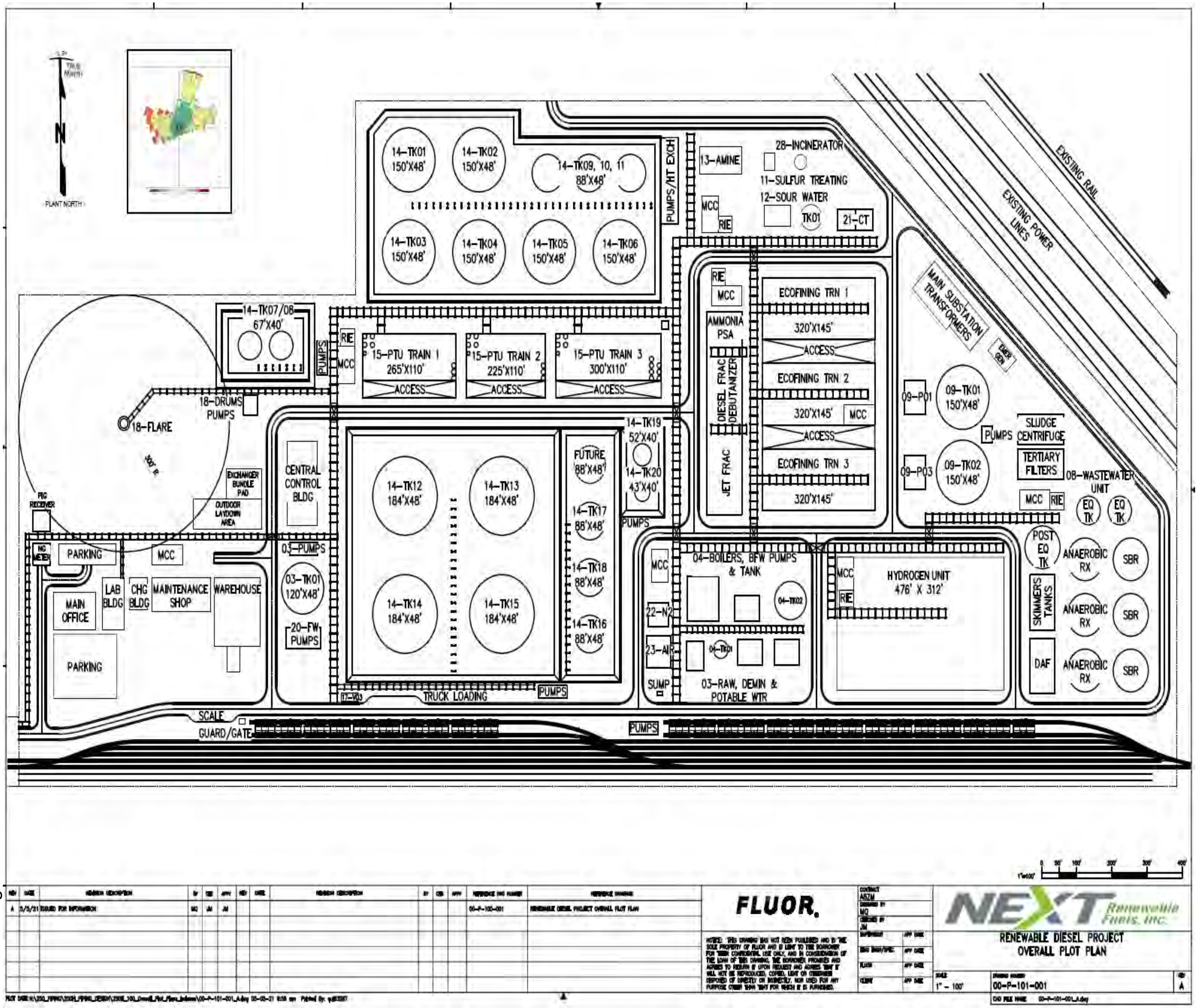


Figure 2: NEXT Renewable Plot Plan

NEXT Renewable Fuels, Inc.

2. Overall Design Basis

NEXT Renewable Fuels is planning to construct a UOP Green Diesel facilitylocated in the pacific northwest. .The design of the facility will be based on processing vegetable oils, animal fats or reclaimed oil / greases (Soybean, DCO, Used Cooking Oil, Beef Tallow, Choice White Grease and Yellow Grease). The planned distribution is listed below.

Raw Oil Feedstock	Oil	Wt%
Soybean Oil	Veg Oil	30
Distillers Corn Oil	Veg Oil	15
Used Cooking Oil	Veg Oil	15
Beef Tallow	Animal Fat	20
Choice White Grease (Pork Oil)	Animal Fat	10
Yellow Grease	Animal Fat	10

The Raw Oil Pretreatment System will be designed to process a total of 51,500 BPSD of raw oils. The pretreament unit will be three (3) trains of equal hydraulic capacity but each unit configuration will be have different features to provide flexibility in processing vegatable oils, tallows/greases and used cooking oils.

The general steps included in each train are:

- Train 1: Enzymatic Degumming/Special Degumming and Adsorption
- Train 2: Acid Washing/Special Degumming and Adsorption
- Train 3: Polyethylene Removal, Acid Washing/Special Degumming and Adsorption

Train (1) one will utilize enzymatic degumming to process phospholipids in the vegetable oils. Train (3) three will have a PE removal system ahead of the Degumming and Adsorption facilities.

The goal is to remove feed gums, metals, soaps, color, and phospholipids with minimal loss of free fatty acids. A deodorizing step is not needed with these feeds.

The Ecofining™ Units will process the treated raw oils from the Raw Oil Pretreat facilities. The facility will be designed to process 50,000 BPD treated oil feedstock.

The Ecofining™ Unit equipment will be designed to bracket a range of feedstocks and operating modes.

- Max Diesel - 100% Beef Tallow
- 25 vol% Jet Fuel - 100% Camelina Vegetable Oil
- Max Diesel - design feedstock blend
- 25 vol% Jet Fuel - design feedstock blend

3. Feed and Product Specifications

Feedstock Specifications

The Base design feedstock to the Ecofining^{TM} Unit will be a combination of Vegetable Oils and Animal Fats. Listed below are chemical and physical properties for the base raw oil feedstocks.

Raw Oils / Fats General Properties	Unit	Soybean (VO)	Corn Oil Distillers (VO)	Used Coooking Oil (UCO)	Tallow (AF)	Choice White Greases (AF)	Yellow Greases (AF)
Feed Comp	**wt%**	**30**	**15**	**15**	**20**	**10**	**10**
Density	SG	0.92	0.92	0.89	0.92	0.92	0.92
Kinematic Viscosity	mm2/s 40°C	28.9	30.8	27	45.34	41	132.1
Unsponifiables	wt%	0.4	1.3	0.1	0.4	0.5	0.4
Phospholipids	wt%	1.5-2.5	0.7-2.0*	-	-	-	-
Sponification Value	mgKOH/g	195	183	199	198	202	198
Phosphorous	ppmw	200	500*	27	271	42.5	132.1
Ca+Na+Mg+K	ppmw	0.5*	1*	1	100*	1	38.9
Fe	ppmw	2-6	-	-	-	-	-
Sulfur	ppmw	0.8	10.5	3.4	25.2	7.7	30.7
Nitrogen	ppmw	*	*	*	*	*	*
Moisture	wt%	0.03	0.15	0.24	0.05	0.22	0.49
FAC Color			33	11B	11A	<13	11B
Chlorides	ppmw	*	*	*	*	*	*
MIU	wt%	0.77	2.36	0.85	0.8	1	0.8
FFA	wt%	0.3-0.7	12.22	2.72	1.61	0.5-2.5	7-15
Fatty Acid Composition							
C12:0	Lauric	0.1	--	0.3	0.2	0.2	0.1
C14:0	Myristic	0.1	--	0.7	2.4	1.4	0.7
C15:0	entadecano	--	--	--	--	0.1	0.2
C16:0	Palmitic	11.4	11.8	17.3	24.4	21.3	15
C16:1	Palmitoleic	0.2	0.1	3.6	2.7	3.3	2
C18:0	Stearic	4.1	2.1	7.3	20	9.5	9.1
C18:1	Oleic	23.5	27.4	44.3	41.7	43.4	49
C18:2	Linoleic	53.5	57.7	22.8	5.9	17.4	21.3
C18:3	Linolenic	6.6	0.6	2	0.7	1.9	2
C20:0	Arachidic	0.3	0.3	0.4	0.4	0.1	0.5
C20:1	Eicosenoic	0.2	0.3	0.6	0.5	0.8	--
C22:0	Behenic	0.3	--	0.4	--	--	0.3
C22:1	Erucic	--	--	0.15	0.1	0.1	--
C24:0	Lignoceric	--	0.14	0.3	0.27	0.43	--

The raw oil feedstock specifications are:

NEXT Renewable Inc Pretreat Unit Feed / Product Specs					
Property	**Unit**	**Feed Blend**		**Max Any Feedstock**	**Product Spec**
Moisture	%	1	max	2	No Free Water
Insoluables	wt%	0.2	max	1.00	<0.05
FFA	wt%	10	max	20	N/A
Unsaponafiables	wt%	1	max	2	N/A
Total Metals (Ca+Mg+Na+K+Fe+Si+Al)	ppmw	500	max	750	<10
Ca+Mg	ppmw	50		100	TotMtl Spec
Na+K	ppmw	150		300	<2
Fe	ppmw	10		25	TotMtl Spec
Si	ppmw	5		10	TotMtl Spec
Phosphorous	ppmw	200	max	1000	<3
Polyethylene	ppmw	150 (Note 3)	Max	50	<10
Total Chlorides (Organic + Inorganic)	ppmw	+25 over Inorganic	Max	100 over inorganic	N/A
Inorganic Chlorides (Salt)	ppmw	100	Max	200	<5
Sulfur	ppmw	20	max	250	N/A
Nitrogen	ppmw	350	max	500	N/A
Temperature	F	120	min		120

Note 3: PE Train only, other trains 50 ppmw

The crude vegatable oil and animal fat pretreat product specifications are required to meet UOP's Ecofining fresh feed specifications:

UOP Property Specifications	Contaminant Limit (Note 3)	Test Method
Free Fatty Acid (FFA), %	< 20 (Note 1)	AOCS Ca 5a-40
Total Metals (Si, Fe, Al, K, Na, Mg, Ca, P), wppm	< 10	UOP 391 or UOP 389
Including these separate maximums:		UOP 391 or UOP 389
Sodium, wppm	< 2	UOP 391 or UOP 389
Phosphorous, wppm	< 3	UOP 391 or UOP 389
Sulfur, wppm	< 20	ASTM D 1552 or ASTM D 4294
Nitrogen, wppm	< 30 (Note 2)	ASTM D 4629
Chloride, wppm	< 50	UOP 7359
Water, wppm	no free water	ASTM D 2709
Unsaponifiables, wt-%	<1.0	AOCS Ca 6a-40
Insoluble impurities, wt-%	0.05 max	AOCS Ca 3a-46
Polyethylene, wppm	<50	AOCS Ca 16-75

Make up hydrogen will be PSA quality:

Property	Unit	Contaminant Limit
Hydrogen Purity	mol%	>99.9
Methane	mol%	<0.1
Nitrogen	vppm	<150
CO+CO2	vppm	<20

Product specifications

The products generated from the UOP Ecofining™ Process will be:

- C5+ Naphtha
- Renewable Jet Fuel
- Renewable Distillate

The product specifications for the evaluation are:

- <u>C5+ Naphtha</u>
  - RVP 7.0-7.5 psia Target
- <u>Renewable Jet Fuel (Meet ASTM D7566 specification)</u>
  - Sulfur <0.3 wt%
  - Copper Strip Corrosion 1.0 max
  - Distillation
    - o T10 / FBP 205 °C max / 300 °C max
  - Flash Point 38 °C min
  - Smoke Point 25 mm min
  - Existent Gum 7 mg/100ml max
- <u>Renewable Diesel (Meet ASTM D975 specification)</u>
  - Sulfur <10 ppmw
  - Cetane Number Report
  - Cloud Point
    - o Summer -7 °C
    - o Winter -10 °C
  - Pour Point Report
  - Flash Point >135 °F
  - CFPP Report

4. Facility Components

This design basis has been developed with the understanding that all facility components will be required to meet environmental permitting requirements set by the governing agencies located in the Pacific Northwest. Final design of all components will be modified, if necessary, in order to meet the requirements of the location where the project is permitted.

The overall basis for the project is defined below:

- Overall plant vegetable oil and animal fat input 51,500 BPD
- Overall plant input 50,000 BPD feed to Ecofiner
- Three (3) Alfa Laval Pretreat units
- Three (3) UOP Ecofiner units
- All Ecofiner heaters will utilize SCR Technology. Specification of 5 ppm NOx / 20 ppm CO
- 110 MMSCFD SMR Hydrogen Plant. SMR furnace will have SCR 5 ppm NOx / 10 ppm CO
- Jet Fractionation designed to process mid-distillate product from 2 Ecofiner trains at 25 vol% jet yield.
- Jet Fractionator heater will require SCR controls 5 ppm NOx / 20 ppm CO
- 225 gpm Sour Water Stripper
- MDEA Amine system
- Incinerator for Treated Sour Water Offgas and Amine Regenerator Offgas. Incinerator will require SCR 9 ppm NOx / 20 ppm CO / 75 ppm SO2
- HP and LP flare system for overall plant capacity
- Access to a two-ship berth operation with the following capacity:
    - Berth 1 - Vessel size –19,000 - 80,000 DWT
        - Diesel Export - 20 KBPH
        - Veg Oils / Animal Fats Import – 10 KBPH
    - Berth 2 - Vessel/Barge size - 5,000 - 35,000 DWT
        - Veg Oils / Animal Fats Import – 10 KBPH
- Rail
    - 22,500 LF Track
    - 10 spot unloading bleaching earth 80 cars/month
    - 30 spot unloading feedstock oils 930 cars/month
    - 10 spot loading renewable diesel 240 cars/month
- Truck
    - 1 spot loading renewable diesel 60 trucks/month

- Process Tankage:

Service	# Tanks	Design Volume (BBLS)	Type of Roof	Seals	Heated Y/N	Approx. Dimen ft
Raw Oil Feedstock	6	125,000	Fixed	N/A	Y	150x48
Treated Oil	3	50,000	Fixed	N/A	Y	88x48
Renewable Diesel	3	225,000	Fixed	N/A	N	184x48
Renewable Jet	1	225,000	IFR	Dual	N	184x48
Naphtha/Jet	3	50,000	IFR	Dual	N	88x48
HC Slop	1	15,000	IFR	Dual	Y	52x40
OWS Slop	1	10,000	IFR	Dual	Y	43x40
PT Prod Day TK	2	25,000	Fixed	N/A	Y	67X40
Sour Water Tank	1	10,000	IFR	Dual	N	43X48

- Utilities
  - 1880 gpm raw water treatment facilities
  - 2 - 50 KPPH 600 psig steam boiler. Boiler will have SCR 5 ppm NOx / 20 ppm CO / 10 ppm NH3
  - 20,000 gpm 2 cell Cooling Tower
  - 750 gpm wastewater treatment facility
  - Process and Storm water collection / containment system
  - 115 KV electrical supply – estimated power demand 40-50 MW
  - Natural Gas – 8” pipeline / normal demand 15-25 MMSCFD
  - Nitrogen – VSA

- Infrastructure
  - Buildings
    - Administration – 20,000 ft^2 (2 story)
    - Guard Shack – 250 ft^2
    - Maintenance Facility – 13,500 ft^2
    - Warehouse – 20,000 ft^2
    - Fire Station – 5,000 ft^2
    - DCS Control Room – 8,000 ft^2
    - Local Operator Shelters – 4 x 400ft^2
    - Change Room – 5,000 ft^2
    - Laboratory – 7,500 ft^2
    - Raw water treatment/RO – TBD
    - Instrument Air/Plant Air – TBD

5. Process Units

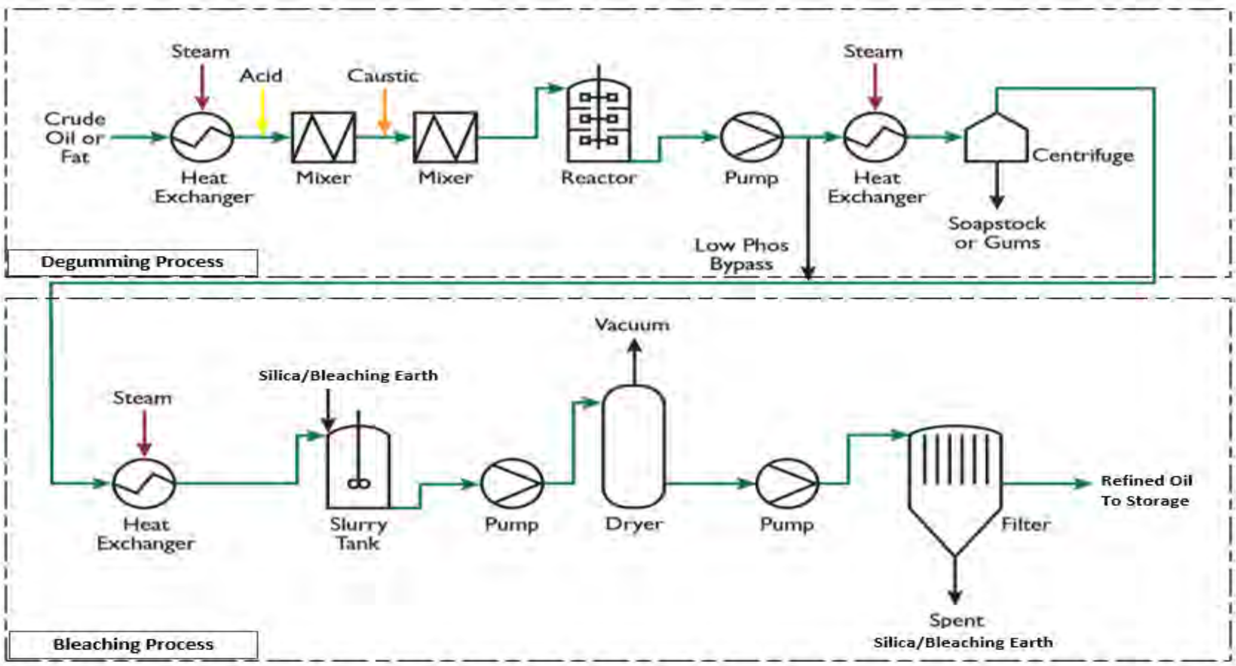
The ISBL Process facilities consist of following units:

- Raw Oil Pretreatment Units
- UOP Ecofining^{TM} Units

5.1 Raw Oil Pretreatment Unit

The Raw Oil Pretreatment (ROP) System will be designed to produce a total of 50,000 BPSD of feed oils to the Ecofining^{TM} units. The Pretreat process facility will consist of three (3) Pretreat Units. All the Pretreat Units will include a two-stage refining system which consists of degumming and bleaching units, Figure 3.

Figure 3: Raw Oil Pretreat Simplified PFD



Additional or modified processes from the base degumming/bleaching are outlined below.

Vegetable Oil – Trains 1 will be designed to process high phospholipid vegetable oils. The degumming process will incorporate enzymatic degumming to allow processing of the gums in the wastewater and to maximize FFA yields.

Animal Fats – Trains 3 will be designed to process high PE animal fats. A polyethylene removal (PE) system has been incorporated into Train 3 due to contamination of animal fats, mainly tallows. Polyethylene finds its way into the rendering plant as meat wrappers mixed in with the raw material. Most of the polyethylene wrappers used by the meat industry are of low-density type that will melt at lower temperatures and stay soluble in the tallow. At present the only feasible means of removing PE from tallow is to filter the tallow at low temperature using special filter aids.

Outlined below are the processing steps incorporated into each train:

Pretreat Unit Configuration Process Steps	Soy/DCO Train 1	DCO/UCO YG Train 2	Tallow Greases Train 3
PE / Solids Removal			X
Enzymatic	X		
Special Degumming	X	X	X
Hot Wash	X	X	X
Adsorption/Bleaching	X	X	X

The majority of the Pretreat Train processing equipment will be indoors in separate buildings. Bulk acid, caustic, filter silo's and area sump will be located outside.

5.2 UOP Ecofining™ Units

The UOP Ecofining™ Units will be designed to process a total of 50,000 BPSD of treated feed oils. There will be 3 reactor trains with integrated fractionation.

The Ecofining™ Unit equipment will be designed by UOP to bracket a range of feedstocks and operating modes. The following feedstock and operating options will be incorporated into the Ecofining equipment design to provide flexability and capacity.

Design Feedstock Blend	Oil	Wt%
Soybean Oil	Veg Oil	30
Distillers Corn Oil	Veg Oil	15
Used Cooking Oil	Veg Oil	15
Beef Tallow	Animal Fat	20
Choice White Grease (Pork Oil)	Animal Fat	10
Yellow Grease	Animal Fat	10

- Max Diesel - 100% Beef Tallow
- 25 vol% Jet Fuel - 100% Camelina Vegetable Oil
- Max Diesel - design feedstock blend
- 25 vol% Jet Fuel - design feedstock blend

The Ecofiner Fractionation system will consist of the following:

- Jet Fractionator/Stripper for 2 trains
- Diesel Stripper/Dryer for 1 train

- Debutanizer common to all 3 trains.
- Make up Hydrogen specified as PSA quality hydrogen, 99.9% H2.
- Fired Heater
  - o SCR technology with Low NOx burners will be installed on all Ecofiner heaters.
  - o The charge and isom heater flue gas stacks will be combined into a single exhaust stack.
  - o Stack testing ports – 2- 4" ports
  - o Heater fuel gas piping will be upgraded to stainless steel.
  - o A coalescer filter will be installed inline in the new fuel gas piping.
  - o Piping downstream of the coalescer/filter will be steam traced and insulated.
  - o A BMS, instruments, and controls will be required.
- All rotating equipment will be motor driven
- No LPG will be recovered as liquid product. All the LPG produced will be recovered as a gas product and routed to the Hydrogen Plant.
- The offgas from the Ecofining^{TM} units routed to the Hydrogen plant as feed.
- The DMDS tank and injection system will be designed for 15 days inventory at 100% of sulfur demand.
- Fractionation will consist of a common jet fuel fraction section designed to recovery 25 vol% jet fuel from two Ecofiner trains and a diesel stripper on a single Ecofiner train.
- A single recycle gas purge PSA for all three Ecofiner trains will be installed.

6. Auxiliary Support Units

The NEXT Renewable Diesel facility is a grassroots facility and consequently requires all process support and utility infrastructure systems. Outlined below are the significant systems required which are further described in the sections below:

Process Support

- Hydrogen Supply
- Offgas Sulfur Management / H_2S Treaters and Incineration
- Acid Gas Regeneration Units (AGR)
- Sour Water Stripper
- Feed, Product, and Intermediate Storage
- Logistic Facilities Dock/Rail/Truck
- Flare System
- Pipelines

Utilities

- Steam and Condensate
- Raw water and boiler feed water treating facilities
- Electrical supply and distribution

- Natural gas
- Fuel gas
- Cooling water
- Fire Water
- Potable Water
- Sanitary Sewer
- Plant and Instrument Air
- Wastewater Treatment
- Storm Water Treatment
- Nitrogen
- DCS/SIS Systems
- Communications

Infrastructure

- Buildings

6.0 AUXILARY SUPPORT DESIGN CRITERIA:

6.1 Hydrogen Supply

The Hydrogen Production and Compression facility to support the Ecofiner™ hydrogen requirements are planned to be a combination of stick-built and module fabrication. The facility will include a hydrogen production unit with a design capacity of 110 MMSCFD. The SMR design will combine standard SMR technology with an HTER reformer to provide the required hydrogen capacity.

Additional considerations for the hydrogen plant are defined below:

- The permitted SMR furnace duty is limited to 700 MMBTU/hr HHV.
- Hydrogen plant design should incorporate processing all the Ecofiner offgas as supplement hydrogen plant feed.
- Hydrogen plant design should incorporate processing up to 3500 BPD of renewable naphtha as supplemental hydrogen plant feed.
- The Hydrogen purity to be no less than 99.9% and hydrogen recovery 85% minimum.
- Plant Hydrogen header pressure 350 psig.
- Natural gas supply pressure 400 psig.
- Natural gas compressor is anticipated to be required. The design of the compressor is for 100% of the required feed with a 100% spare,
- On-line stream factor for the facility is to be a minimum of 98%.
- All drivers shall be electric motors.
- The Hydrogen Plant shall be designed with a minimum catalyst life of four (4) years for feed gas pre-reforming, steam reforming, and temperature shift converter systems.

- Any Sulfur guard system shall be designed with two beds in series and such that either bed can be switched to the lead bed or by-passed. Each bed shall be designed for an on-stream operation of 6 (six) months.
- The burners in the steam reforming furnace shall be based on Low NOx type.
- SMR furnace is utilize SCR for NOx.
- CEMS stack gas analyzers will be installed.
- SMR heater stack emissions requirements are:
  - NOx 5 ppm
  - CO 10 ppm
  - NH_3 Slip 10 ppmv @ 3% O2
- CO_2 recovery is not required.

6.2 AGR Amine Regeneration System

The AGR Amine Systems is the regeneration section for the following Ecofiner™ amine systems:

- High pressure lean offgas
- Recycle Hydrogen purge gas
- DeC4 offgas

The amine system will include

- Amine absorbers (2x50%)
- Amine Regeneration tower and required exchanges, pumps and vessels
- Amine flash drum with acid gas stripper
- Amine storage tank and amine sump
- Amine cartridge filter and carbon filter
- Lean Amine storage tank

The acid gas produced off the regeneration system will be routed the offgas sulfur incineration / treating system.

6.3 Sour Water Stripper

A sour water stripper will be required to process sour water from the Ecofiner™ units. The Sour Water Stripper will be designed for up to 225 GPM sour water. The SWS stripper will be a single tower design. H_2S/NH_3 Acid Gas from the SWS Stripper will be routed to the H2S scavenger system then to the Incinerator.

The stripped water specification is NH_3 <50 ppmw and H_2S <10 ppmw. Stripped sour water will be routed to wastewater treatment.

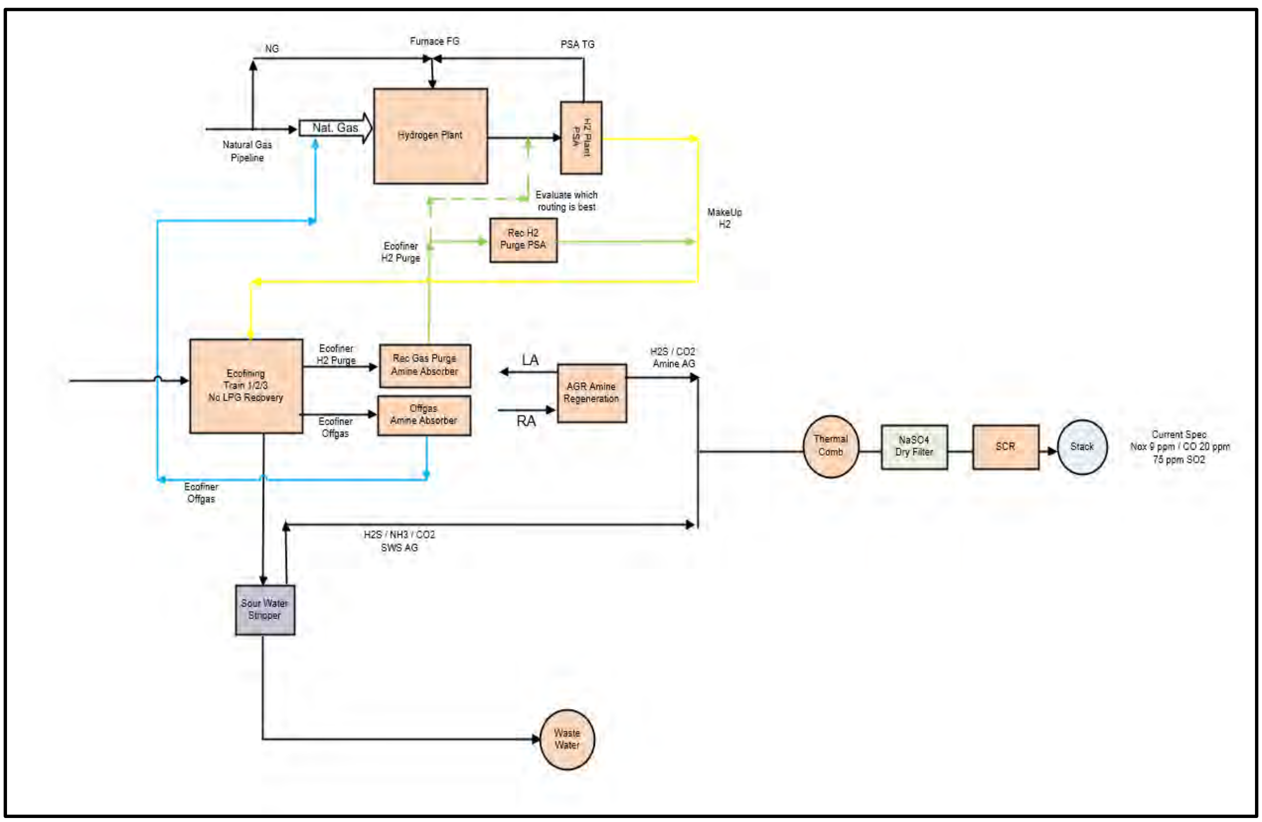
The Sour Water Stripper(s) will consist of the following:

- SWS towers and required exchangers, pumps and vessels
- Pumparound cooling with no overhead system
- Reboilers with condensate recovery
- NH_3 offgas water wash system
- Sour water feed multiphase flash drum
- Sour water storage tank designed for 3 days sour water capacity.
- Sour water tank will require an IFR with dual seals and floating suction system.

6.4 Offgas Sulfur Incineration / Treating System

A sour water offgas H_2S capture system needs to be installed to remove H_2S from the sour water stripper and amine acid gas streams.

A UOP nViro Eco acid gas Incineration system will be installed on the SWS and Amine Acid Gas systems. The nViro Eco system will recover the sulfur as Na2SO4 which potentially can be sold as a product versus disposed. The nViro Eco system will include incineration, Na2SO4 removal and a flue gas stack with SCR technology.



6.5 Feed, Product, and Intermediate Tankage

The Renewable Diesel facility tankage that is required in hydrocarbon service is listed below.

Service	# Tanks	Tank Volume (BBLS)	Type of Roof	Seals	Heated Y/N	Approx Dimen ft
Raw Oil Feedstock	6	125,000	Fixed	N/A	Y	150x48
Treated Oil	3	50,000	Fixed	N/A	Y	88x48
Renewable Diesel	3	225,000	Fixed	N/A	N	184x48
Renewable Jet/Diesel	1	225,000	IFR	Dual	N	184x48
Naphtha/Jet	3	50,000	IFR	Dual	N	88x48
HC Slop	1	15,000	IFR	Dual	Y	52x40
OWS Slop	1	10,000	IFR	Dual	Y	43x40
PT Prod Day TK	2	25,000	Fixed	N/A	Y	67X40
Sour Water Tank	1	10,000	IFR	Dual	N	43X48

All tanks that require heating will be a pumped system through an external heat exchange. MP or LP steam will be the heating medium. The pump systems will return tangentially into the tank to ensure good mixing.

Product tanks used in intermittent service will be installed with one pump with a warehouse spare. Raw Oil, Treated Oil, and Slop tanks in continuous service will have spare pump installed.

6.6 Logistic Loading and Unloading Systems

Ship Dock Services	Unload/ Load	Production[1] BPD	Avg[2] MMBbl/ Mth	VCU Required
Raw Oil – Ship/Barge Train	U	52,000[1]	1.61	No
Diesel* Ship Train Truck	 L L L	50,000[1]	1.55	No

Jet* - Ship	L	6,425[1]	0.20	No

Production[1]- Peak production for either Max Diesel or Jet Modes.
Avg[2] – based on 31 day/month
*** Future**

Raw Oil Unloading

- Ship / Barge Unloading – **1-2 ships per month / 10-11 barges per month**
  - o Access to unloading facilities at a dock with two berths able to handle the necessary capacity is required.
  - o The raw vegetable oils, used cooking oils, and animal fats/greases will be discharged from a dock facility at both berth 1 and 2.
  - o One berth will need to have the capacity to discharge larger ships 150,000-200,000 bbls.
  - o The second berth will need to have the capacity to discharge barge and smaller ships 50,000-150,000 bbls
  - o The ship/barge unloading rate will be designed to offload a ship in less than 24 hours.
  - o One berth at the loading facility will require a single 10,000 BPH unloading booster pump to achieve unloading capacity. Raw oil has a high pour point and will require capability to heat ship/barge cargoes prior to discharge. This capability will be provided by the ship and is not a design requirement for the dock facilities.
  - o All raw oil unloading facilities will require insulation and heat tracing.
  - o No vapor combustion is required.

- Rail Unloading – **930 railcars per month**
  - o Raw Oil rail unloading will be 2 - 15 bottom unloading spots with individual unloading arms
  - o All loading arms will be capable of unloading at the same time
  - o Two discharge lines will be provided, one dedicated to vegetable oil and the other to animal fats
  - o Two pumps with a common spare will be provided
  - o All rail cars should be unloaded in less than 5 hours
  - o No vapor combustion is required

Diesel Loading

- Ship Loading – **4-6 ships per month**
  - o Diesel ship loading rate will be designed to load a 320,000 bbl. ship in less than 24 hours.

  - o One berth at the loading facility will require a single 20,000 BPH loading pump to achieve loading capacity.
  - o Vapor combustion is not required.

- Rail Loading – **240 rail cars per month**
  - o Diesel rail loading will be a 10 spot rack with individual loading arms
  - o All rail loading spot will be capable of filling rail cars at the same time
  - o All rail cars should be loaded in less than 12 hours
  - o Vapor combustion is required.
  - o Combine Rail and Truck loading VCU.

- Truck Loading – **60 trucks per month**
  - o A single (1) spot truck loading facility should be located adjacent to the diesel rail loading facilities.
  - o The rail and truck loading pumps (500 gpm) and lines should be common
  - o The truck should be loaded in less than 1 hour
  - o Vapor combustion is required.

Jet Loading - Future

- Jet product will only be transported by ship.
- Ship Loading – **2-5 ships per month (Depends on operating mode)**
  - o Jet assumed to loaded on diesel ships in segregated compartment.
  - o Ship loading rate will be designed to load an 80,000 bbl. ship volume in less than 24 hours.
  - o One berth at the loading facility will require a Jet loading 7,500 BPH single pump to achieve loading capacity
  - o Separate Jet loading line from tankage to the dock will be required.

Bleaching Earth Unloading

- Bleaching earth and filter aid will be imported by rail for use in the Pretreatment Unit
- Rail Unloading – **80 rail cars per month**
  - o A 10 spot rack with pneumatic unloading system for bleaching earth and filter aid.
  - o Rail cars will be used as temporary bulk storage and unloaded as required.
  - o Rail cars will be pneumatically unloaded to unit silo's.
  - o Design pneumatic system to unload 1 rail car in 2-3 hours.

Rail Car Storage Siding

- Rail siding will be installed to support the storage of railcars on-site.

- The rail siding linear feet is ~22,500 ft. and will consist of 5 lines.
- Two (2) rail siding lines will be dedicated to feedstock and will extend through the plant down the plant entrance access. Each line will be ~6,500 LF.

6.8 Flare System

- A flare system will be required.
- An elevated flare is preferred. Vendor to advise type of elevated flare, derrick vs guy wire.
- Flare height will be determined based on radiant heat impacts at grade. Target 500-1500 BTU/hr/ft2.
- Design will incorporate a high pressure (HP) and low pressure (LP) header design.
- A common flare knock out drum and pumps are required.

6.10 Pipelines

- An 8” Natural Gas pipeline will be designed to run down the main plant entrance road where it will need to have access to tie into an existing natural gas supply. A custody meter will be required.

- Wastewater and Stormwater will be required to be routed to an existing permitted outfall via pipeline and lift station. If there is no currently permitted outfall at the permitted facility site, NEXT will be required to obtain a NPDES permit for wastewater discharge and build a discharge outfall facility.

- Raw Water will be required via an existing water intake system.

- Pipelines to and from the plant/dock are:

    - Raw Oil – 18” electric traced and insulated
    - Diesel – 20”
    - Jet Fuel - 12”

- Routing of the Raw Oil, Diesel, and Jet Fuel lines is shown on the overall location plot plan.

- Raw Oil line will require backup electric supply to support electric tracing in case of loss of power.

7.0 UTILITIES

All utility balances and process support capacities are assumed to be preliminary and will require verification as overall plant balances are completed. Following are design criteria for the NEXT Renewable Diesel Project.

7.1 Steam/Condensate/Boiler Feed Water Systems

- The steam, condensate and BFW systems consist of:
  - Two (2) 50,000 PPH Package 600 psi steam boilers, to support Hydrogen plant startup requirements
  - An SCR is required on the Boiler.
  - Deaerator – capacity 550-600 KPPH BFW
  - 3 boiler feed water pumps, 3 – 75%, with at least one turbine drive
  - Treated Water tank
  - 2 deaerator feed pumps, 2 – 100%
  - LP Condensate flash drum
  - Desuperheater

7.2 Raw Water/BFW Treatment Systems

- A water intake system will be required. The raw water will flow through an ultrafiltration system and prior to the Raw Water storage tank. The raw water storage tank supplies water for utility water, potable water, fire water, cooling water and boiler feed water systems. The raw water makeup is estimated to be ~1850 gpm.

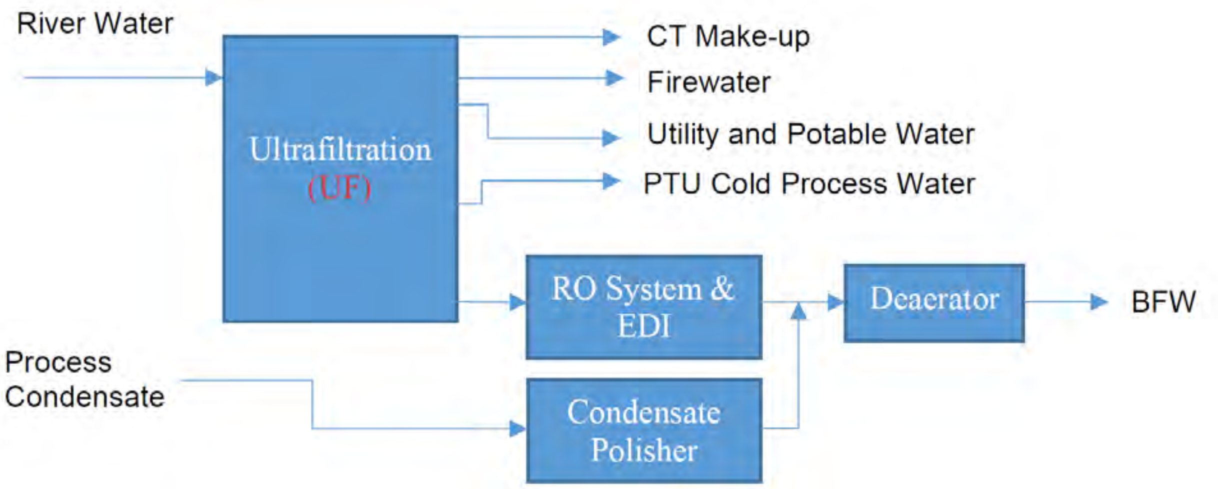
- The raw water treatment will require the following:

  - Ultra filtration systems
  - Chemical injection system, chlorination/sulfite etc.

- The Raw Water and Fire Water storage volume will be combined into one common tank – 1.2 MMgal. The tank will be a cone roof design. The basis for the tank volume is:

  - Raw Water – 1 day supply
  - Fire Water – 4 hour fire water supply at 5,000 gpm

- The boiler feed water (BFW) system will treat filtered raw water to produce 600# steam. The water treatment design is ~600 gpm input to produce ~550,000 PPH BFW. The plant condensate be processed through a condensate polisher system before being deaerated to produce BFW.



7.3 Electrical Supply

- Main power feed will need to be supplied via the specific Power Authority system that supplies the permitted location of the facility. The preliminary base load required is ~40-50 MW.
- Main sub will have 2-100% 115 to 13.8 KVA transformers.
- Internal unit subs will have dual feed and double ended design. The subs will require 4160 and 480 V step down transformers.
- Two 1500 HP emergency backup diesel generators will be required.

7.4 Natural Gas

- Natural gas supply pressure required to the facility is ~400 psig.
- Gas will need to be supplied already treated to an H2S concentration less than 0.25 grain/100 ft^3 and total sulfur less than 0.75 grain/100 $ft^{3.}$
- Natural gas will be used for heater & boiler pilots, flare pilots, building heating, Incinerator, other start-up services such as startup gas.
- A custody metering skid with analyzers will be required.
- The system will consist of a natural gas knock drum / coalescer and OSBL distribution headers.

7.5 Fuel Gas

- Gas produced at the Ecofining^{TM} Units will be amine treated to an H2S concentration of <20 ppmv and routed normally to hydrogen plant as feed but could also be routed to the fuel system as backup.
- Natural gas / fuel gas will be used as the primary fuel source for all applications unless natural gas is specifically required.

- The fuel gas system will consist of a fuel gas knock out drum / coalescer and OSBL distribution headers.

7.6 Cooling Water

- The cooling tower circulation design is ~20,000 gpm with a duty of ~206 MMBTU/hr. The tower will be induced draft, counter flow equipped with drift eliminators.
- 3x50% recirculation pumps are required; 2 operating / one spare. A letdown steam turbine should be considered for one (1) cooling tower recirculation pump driver.
- Tower drift will be controlled with enhanced drift eliminators with an estimated efficiency of 0.00050%. Target PM_{10} limit of <0.2 ton/year.
- An in-line hydrocarbon monitor in the return cooling water line to the cooling tower is required to detect hydrocarbon leaks.
- Chemical injections systems will be required.

7.7 Fire Water

- Three fire water pumps will be supplied with autostart on low fire water header pressure. Two of the pumps will be diesel driven. A jockey pump is required ~100 gpm.
- Preliminary fire water demand is 5,000 gpm.
- Firefighting equipment, deluge systems and firewater tank size will be designed to comply with NFPA requirements.
- A foam firefighting system will be required.
- Firewater and raw water will be stored in the same tank with different suction locations to ensure firewater supply.

7.8 Potable Water/Sanitary Sewer

- A potable water treatment system will be provided.
- The potable water system will be designed for ~150 people at 5 gph per person. The potable water tank will be designed for one (1) day storage.
- The sanitary grey and black water sewer systems will be segregated. Black water will be collected in a tank with vacuum truck disposal. Grey water disposal is to be routed to the wastewater treatment for final disposal.

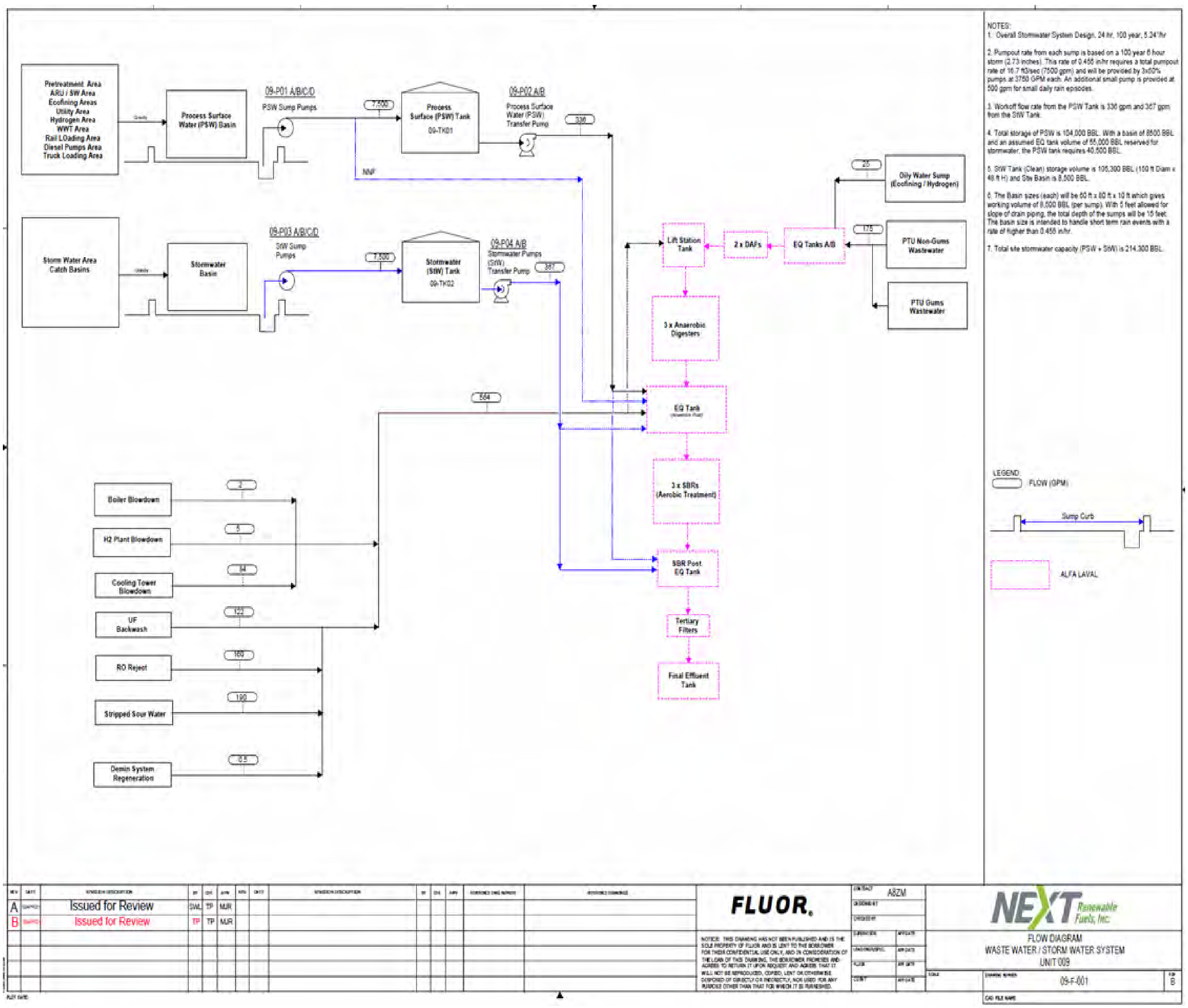
7.9 Plant / Instrument Air

- A combined plant & instrument air compressor and drier system will be provided to reduce the dew point to -40ºF. Three (3) 50% instrument/plant air systems will be installed. Both instrument and plant air will be dried.
- A plant air receiver will be installed designed for 5 min surge.

- A design margin of 115% will be built into all equipment within the Plant/Instrument Air system.

7.10 Waste Water Treatment / Water Drainage Systems

All waste water systems must meet 40 CFR 60 Subpart QQQ, Standards of Performance for VOC Emissions from Petroleum Refinery Wastewater Systems requirements. The inputs to the water treatment system is oily sewer, pretreat water, stripped sour water, cooling tower blowdown, boiler blowdown, storm water and RO reject water.



The NEXT wastewater / stormwater effluent will be comingled and require discharge to an outfall. The effluent qualities will be required to comply with any existing NPDES permit for wastewater discharge at the permitted facility site. To ensure compliance with any NPDES permit, the NEXT WWT effluent design specifications will more stringent than required by current NPDES permits. If necessary NEXT will obtain an individual NPDES permit.

Wastewater Treatment

The Renewable Diesel facility provides some unique waste treatment challenges. As the figure above highlights, the WWT flow scheme has been designed to segregate and optimize the treating of the various stream contaminants.

The WWT system will consist of the following:

- Oil/Water Separator DAF
- Equalization Tanks
- Anerobic Digestors
- Aerobic Digestors
- Post Equalization Tank
- Sludge Decanter and Dewatering Centrifuge
- Tertiary Filtration

Storm Water System

The storm water system will be designed to collect and process water for a 24-hour 100 year rain event. The design will be based on the county ordinances, utilizing the rainfall depth, of the permitted facility location.

The facility storm water's will be segregated and provided with several different types of drainage systems. These include:

- Systems for disposal of uncontaminated storm water from outside the process unit paved areas.
- Systems for collection and transfer for treatment of storm water from process and utility areas.
- An oily water system for drains from the Ecofiner equipment and vessels.

7.11 Nitrogen

Nitrogen is required in the Pretreat adsorption system. A leased liquid nitrogen tank/vaporization or VSA system will be used for normal operations. The system will be designed to supply gaseous nitrogen. Nitrogen for reactor inerting will be supplied by a pumper truck and rental trailer with an evaporation system.

7.12 DCS/SIS/UPS

A general control systems philosophy will be required. The scope of the control system philosophy should include, minimum, the following:

- Basic process control system
- Packaged equipment control system
- Safety instrument system
- Fire and gas system
- UPS and emergency power system
- Information management / Report tool system
- Redundancy and security philosophy
- Hardware and software recommendations
- Control system implementation plan.

7.13 Communications

Includes requirements for:

- Security System
- Site Radio System
- Phone, data network, and public address system
- Fiber optic communication line to facility.
- Plant data historian system

8.0 INFRASTRUCTURE DESIGN CRITERIA

8.1 Buildings

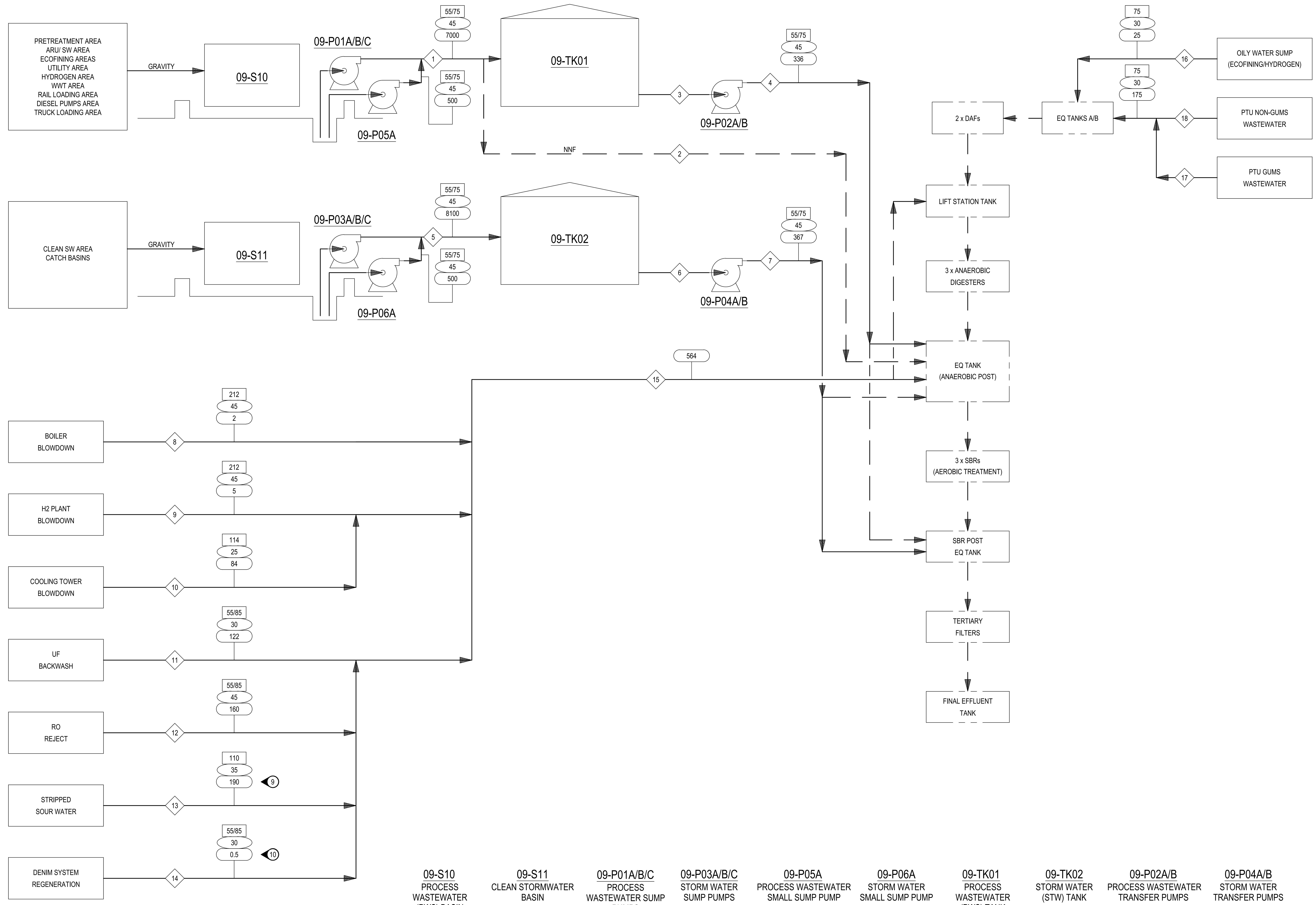
- Primary facility buildings include the following
  - Administration – 20,000 ft^2 (2 story)
  - Guard Shack – 250 ft^2
  - Maintenance Facility – 13,500 ft^2
  - Warehouse – 20,000 ft^2
  - Fire Station – 5,000 ft^2
  - DCS Control Room – 8,000 ft^2
  - Local Operator Shelters – 4 x 400ft^2
  - Change Room – 5,000 ft^2
  - Laboratory – 7,500 ft^2
  - Raw Water / RO Shelter – TBD

  - Instrument Air/Plant Air Shelter - TBD

- All buildings sizes and contents to be confirmed.
- All building overpressure design to be confirmed with blast study
- Substation buildings will be combination of MCC shelters and RIE rooms. The MCC buildings will be integral to the local operator shelters.

ATTACHMENT 2

PROCESS FLOW DIAGRAM



09-S10	09-S11	09-P01A/B/C	09-P03A/B/C	09-P05A	09-P06A	09-TK01	09-TK02	09-P02A/B	09-P04A/B
PROCESS WASTEWATER (PWS) BASIN	CLEAN STORMWATER BASIN	PROCESS WASTEWATER SUMP PUMPS	STORM WATER SUMP PUMPS	PROCESS WASTEWATER SMALL SUMP PUMP	STORM WATER SMALL SUMP PUMP	PROCESS WASTEWATER (PWS) TANK	STORM WATER (STW) TANK	PROCESS WASTEWATER TRANSFER PUMPS	STORM WATER TRANSFER PUMPS

NOTES:

1.STORMWATER SYSTEM WAS DESIGNED TO TREAT RUNOFF GENERATED BY 100-YEAR, 24-HOUR STORM (5.4IN/HR).

2.STORMWATER SYSTEM DESIGN IS BASED ON THE FOLLOWING SITE AREACALCULATIONS: PROCESS WASTEWATER (PWS) CALCULATED TO BE 33 ACRES, CLEAN STORMWATER AREAS IS APPROXIMATELY 40 ACRES, AND TANK DIKE AREAS 21 ACRES, AND OTHER AREAS WHERE RUNOFF WILL FLOW OFFSITE IS 15 ACRES, TOTAL IS 109 ACRES.

3.THE PUMPOUT RATE FROM EACH SYSTEM (PWS AND SW) IS BASED ON A 100-YEAR, 24-HOUR (5.4 IN/HR). THE PUMP OUR RATE FOR THE PWS AND SW SYSTEMS WILL BE 3 PUMPS AT 3750 GPM PER SYSTEM. AN ADDITIONAL SMALL PUMP AT 500 GPM IS PROVED TO HANDLE SMALL DAILY RAIN EVENTS.

4.FLOW RATE FROM THE PWS TANK IS 336 GPM AND 367 GPM FROM THE SW TANK

5. THE TOTAL STORAGE OF PWS IS 133,000 BBL. WITH A BASIN OF 12,825 BBL AND ASSUMED EQ TANK VOLUME OF 65,000 BBL RESERVED FOR STORMWATER, THE PWS TANK REQUIRES 65,000 BBL

6. SW TANK STORAGE VOLUME IS 125,000 BBL. AND THE BASIS IS 12,825 BBL.

7. THE BASIN SIZES (EACH) WILL BE 60' X 100' X 15' FOR A WORKING VOLUME OF 12,825 BBL. (PER SUMP). WITH 5' ALLOWED FOR SLOPE OF DRAIN PIPING, THE TOTAL DEPTH OF THE SUMP WILL BE 15'. THE BASIN SIZE IS INTEDED TO HANDLE SHORT TERM RAIN EVENTS WITH A RATE OF HIGHER THAN 0.455 IN/HR.

8. TOTAL SIZE OF STORWATER CAPACITY (PWS+SW) IS 271,000 BBL.

9. MAX STRIPPED SOUR WATER IS 216 GPM

10. MAXIMUM INSTANTEOUS FLOW ONCE PER WEEK IS 15 GPM.

LEGEND

SUMP CURB

ALFA LAVAL

STREAM NUMBER

TEMPERATURE (° F)

PRESSURE (PSIG)

LIQUID VOLUMETRIC FLOW RATE (GPM)

LIQUID MASS FLOW RATE (LB/HR)

GAS VOLUMETRIC FLOW RATE (MMSCFD)

GAS MASS FLOW RATE (LB/HR)

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV
A	04/02/21	ISSUED FOR REVIEW	SWL	TP	MJR
B	05/06/21	ISSUED FOR REVIEW	TP	TP	MJR
C	05/06/21	ISSUED FOR INFORMATION	TP	TP	MJR
0	06/14/21	ISSUED FOR DESIGN	TP	TP	MJR

REV	DATE	REVISION DESCRIPTION	BY	CHK	APPV	REFERENCE DWG NUMBER	REFERENCE DRAWINGS

FLUOR

CONTRACT ABZM
DESIGNED BY
CHECKED BY
SUPERVISOR APP DATE
LEAD ENGR/SPEC. APP DATE
FLUOR APP DATE
CLIENT APP DATE

NEXT Renewable Fuels, Inc.

PROCESS FLOW DIAGRAM

PROCESS WASTEWATER AND STORMWATER SYSTEM

SCALE NONE

DRAWING NUMBER 09-F-001 GC

REV 0

CAD FILE NAME 09-F-001.dwg

PLOT DATE: \\fdnet.com\HO_Projects\HO_ABZM\CAD\226_PROCESS_GRAPHICS\Drawings\09-F-001.dwg 05-20-21 7:08 pm Printed By: sco57212

ATTACHMENT 3

NPDES PERMIT

G, PW ENV 11-6 NPDES

Oregon
Theodore Kulongoski, Governor

Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987
(503) 229-5263
FAX (503) 229-6957
TTY (503) 229-5471

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

February 10, 2003
7001 1140 0002 3345 6188

Paul Langner
Marine Industrial Manager
Port of St. Helens
PO Box 598
St. Helens OR 97051

Re: NPDES Permit
File No. 111746
Port of St. Helens, Port Westward
Columbia County

We have completed our review of your permit application and the comments received regarding the preliminary draft permit, and have issued the enclosed National Pollutant Discharge Elimination System Permit.

This permit will be considered the final action on permit application number 986433.

If you are dissatisfied with the conditions or limitations of this permit, you have 20 days to request a hearing before the Environmental Quality Commission or its authorized representative. Any such request shall be made in writing to the Director and shall clearly state the grounds for the request.

You are urged to carefully read the permit and take all possible steps to comply with conditions established.

Should you have any questions regarding this permit, please contact Elliot Zais at 503/229-5292.

Sincerely,

Robert P. Baumgartner

Robert P. Baumgartner, Manager
Water Quality Source Control
Northwest Region

RECEIVED
BY ENGRG
FEB 20 2003

Enclosure: NPDES permit
cc: File

CC: Data Room, Port Westward file GOV REL 9, A Behbehani-Divers, A Bidwell/Environmental file, M Shively, J Mody, M Schwartz, M Livingston, K Marold, M Mikolaitis, K Marshall

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

WASTE DISCHARGE PERMIT
Department of Environmental Quality
Northwest Region Office
2020 Southwest Fourth Avenue, Portland, OR 97201-4987
Telephone: (503) 229-5263

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:

Port of St. Helens
PO Box 598
St. Helens, Oregon

SOURCES COVERED BY THIS PERMIT:

Type of Waste	Outfall Number	Outfall Location
Process Wastewater	001	RK 85 (RM 53)

PLANT TYPE AND LOCATION:

Wastewater Collection System
Port Westward Industrial Site
Clatskanie, Oregon

RECEIVING STREAM INFORMATION:

Basin: North Coast/Lower Columbia
Sub-Basin: Lower Columbia/Clatskanie
Stream: Columbia River
Hydro-code: 10=-COLU 53 D
County: Columbia

EPA REFERENCE NUMBER: OR 004085-1

Issued in response to Application No. 986433 received 26 February 2002

Robert P. Baumgartner
Robert P. Baumgartner, Manager
Water Quality Source Control, Northwest Region

2/10/2003
Date

PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to construct, install, modify or operate a waste water collection, treatment, control and disposal system and discharge to public waters adequately treated waste waters only from the authorized discharge point or points established in Schedule A and only in conformance with all the requirements, limitations, and conditions set forth in the attached schedules as follows:

Unless specifically authorized by this permit, by another NPDES or WPCF permit, or by Oregon Administrative Rule, any other direct or indirect discharge to waters of the state is prohibited, including discharge to an underground injection control system.

SCHEDULE A

1. Waste Discharge Limitations not to be Exceeded After Permit Issuance Date

a. Outfall 001: Wastewater Discharge to Columbia River

Parameter	7-Day Moving Average	30-Day Moving Average	Peak (2 hour average)
Excess Heat Load[1] 1 June – 15 October	4.46 MW	3.58 MW	----
pH	Must not be outside the range of 6.5 – 8.5	Must not be outside the range of 6.5 – 8.5	Must not be outside the range of 6.5 – 8.5
Temperature[2] 1 June – 15 October	27 °C	26 °C	32 °C

[1] Excess heat load is heat loads above the applicable criteria (68 °F (20 °C)) which shall be calculated as follows.

Heat transfer per unit time equals density of water times flow rate times specific heat times temperature difference. Heat transfer is in units of megawatts (MW) or megajoules/second (MJ/s).

$H = (1000\ kg/m^3)(Q\ m^3/s)(4182\ J/(kg\ °C))(\Delta T)(1\ W/(1\ J/s))(1\ MJ/1000\ J)$, where ΔT = effluent temperature (expressed as the 7-day or 30-day moving average temperature, as applicable) – 20 °C. If ΔT is less than or equal to zero, the excess heat load will be reported as zero for that period.

For example, the projected excess heat load at full buildout using a 7-day average temperature of 29.67 °C and an average flowrate of 5.23 cfs or 0.148097 m^3/s will be:

$H = (1000\ kg/m^3)(0.148097\ m^3/s)(4182\ J/(kg\ °C))(9.67\ °C)(1\ W/(1\ J/s))(1\ MJ/10^6 J) = 5.99\ MW$

[2] Daily average temperature is the arithmetic average of temperatures taken every 30 minutes throughout a 24-hour day. The 7-day moving average temperature is the average of 7 consecutive daily averages. If there is no flow on a given day, that day is to be skipped for the averaging. The 30-day moving average is calculated similarly.

b. The Permittee shall require all dischargers that are subject to 40 CFR Part 423 (steam electric power generators) to comply with the following conditions as applicable to their discharges upstream of the point of discharge into the Permittee's system.

i) Once Through cooling water

Parameter	Monthly Average	Daily Maximum
Total Residual Chlorine[3]	0.15 mg/L	0.38 mg/L

[3]Chlorine must not be discharged for more than two hours on any day. The permittee shall prohibit dischargers to its system from discharging cooling tower blowdown during chlorination.

ii) Cooling Tower Blowdown prior to mixing with other waste streams

Parameter	Monthly Average	Daily Maximum

Free Available Chlorine	0.15 mg/L	0.38 mg/L
Total Chromium	0.2 mg/L	0.2 mg/L
Total Zinc	1.0 mg/L	1.0 mg/L

iii) Low Volume Waste Sources[3].

Parameter	Monthly Average	Daily Maximum
Total Suspended Solids	30 mg/L	100 mg/L
Oil & Grease	15 mg/L	20 mg/L

[3] Low volume waste sources means, taken collectively as if from one source, wastewater from all sources except those for which specific limitations are otherwise established in this part. Low volume waste sources include, but are not limited to: wastewater from wet scrubber air pollution control system, ion exchange water treatment system, water treatment evaporator blowdown, floor drains, cooling tower basin cleaning wastes, and re-circulating house service water systems. Sanitary and air conditioning wastes are not included.

There must be no addition of polychlorinated biphenyl compounds to process wastewater.

2. Notwithstanding the effluent limitations established by this permit, no wastes shall be discharged and no activities shall be conducted which will violate Water Quality Standards as adopted in OAR 340-041-0202 through -0215 except in the following defined mixing zone:

The size of the mixing zone is:

30 meters horizontally in any flow direction from the diffuser.

The size of the zone of initial dilution (ZID) is:

3.5 meters horizontally in any flow direction from the diffuser.

3. Temperature Management Plan

a. The effluent limitations and other conditions in this permit related to temperature shall constitute the surface water temperature management plan (temperature management plan) required by OAR 340-041-0026(3)(a)(D) and 340-041-0120 (11)(e)(C)applicable to the permittee. Provided that the permittee complies with this temperature management plan, the permittee shall be deemed to be in compliance with the state temperature water quality standard and not be deemed to be causing or contributing to a violation of the water quality standards for temperature.

b. The permittee shall install (or require dischargers to the permittee's system to install) one or more influent/effluent heat exchangers to reduce the temperature of waste water before it is discharged. The permittee will operate (or require dischargers to the permittee's system to operate) the influent/effluent heat exchangers June 1 through October 15 each year commencing the first year that wastewater is discharged under this permit.

c. The permittee shall comply with the mitigation requirements set forth in condition D.1. Once approved by DEQ, the Mitigation Plan and Mitigation Agreement described in Condition D.1.b.B shall become part this Temperature Management Plan.

SCHEDULE B
Minimum Monitoring and Reporting Requirements (unless otherwise approved in writing by the Department)

1. Outfall Number 001

Item or Parameter	Minimum Frequency	Type of Sample
Chlorine	Continuous	Monitor
Temperature*	Continuous	Monitor
pH	Continuous	Monitor
Heat Load	Continuous	Calculated
Flow rate**	Continuous	Meter

*Half-hourly readings will be used for calculating average temperatures and heat loads as described above.

**Flow will be totalized daily. The daily flowrate will be the totatlized flow divided by the total flow time within a 24-hour period from midnight to the following midnight.

2. Discharges to Permittee's System

The Permittee will require discharges subject to Condition A.1.b to monitor and report to the Permittee the following parameters for the wastewater streams described in Condition A.1.b, as applicable:

Item or Parameter	Minimum Frequency	Type of Sample
Chlorine	Continuous	Monitor
Total Chromium	Annually	Grab
Total Zinc	Annually	Grab
Total Suspended Solids	Monthly	Grab
Oil and Grease	Monthly	Grab

The Permittee shall include the monitoring results submitted by dischargers in its monitoring reports to the Department.

SCHEDULE D
Special Conditions

1. Mitigation Conditions

a. Duty to Mitigate

During the first three years of this Permit, the Permittee shall evaluate the performance of influent/effluent heat exchangers to reduce the discharge of excess heat load. If the use of the heat exchangers is shown to be successful in reducing or eliminating excess heat load discharged to the Columbia River, the permittee can propose permit modifications with new wasteload allocations. If by December 31, 2005, the permittee demonstrates that no excess heat load will be discharged under this permit and requests in writing that the Department modify this permit to include effluent limitations that do not allow the discharge of excess heat, then the requirements of these mitigation conditions shall no longer apply. Otherwise, the Permittee shall implement a heat load mitigation project in accordance with the schedule and requirements set forth in these mitigation conditions.

b. Schedule

The permittee shall:

A. By December 31, 2005, identify a specific riparian vegetation restoration project within the watershed (Columbia River watershed within Oregon) and submit to DEQ for review a draft Mitigation Plan (as defined in Condition D.1.c), Mitigation Agreement (as defined in Condition D.1.d) and request for modification of the heat load effluent limits in this permit , consistent with the mitigation standard set forth in Condition D.1.e.

B. Develop a final Mitigation Plan and Mitigation Agreement and submit them to DEQ for approval within 30 days of receiving Department comments on the plan. Upon approval by DEQ these documents shall become part of an updated Temperature Management Plan (TMP).

C. Enter into the approved Mitigation Agreement and fully fund the mitigation project within 180 days of DEQ approval of the Mitigation Plan and Mitigation Agreement. Once the permittee has entered into the approved Mitigation Agreement and fully funded its obligations under the Mitigation Agreement, its mitigation obligations shall be fully satisfied under this permit. The Mitigation Agreement also shall satisfy any mitigation requirements in subsequent renewals of this permit for as long as the mitigation project is maintained. In the event of any changes to the discharge that increase excess heat load above the levels mitigated under these special conditions, additional mitigation shall be required by the Department only with respect to the increased heat load.

c. Mitigation Plan

The Mitigation Plan shall include the following components:

A. Description of the location of the riparian restoration project by water body, river mile and legal description.

B. A planting plan, including vicinity map, plan view drawing, cross section drawing, and plant list. Specifications for construction/installation of the riparian vegetation

C. The schedule for initial planting and riparian restoration tasks.

D. Calculations demonstrating that the mitigation standards identified below in Condition D.1.e. will be met by the mitigation project.

E. A maintenance plan describing how the plants will be maintained and providing for replacement of plants if survival rate is not as great as the survival rate assumed in the calculations described in Condition D.1.c.D above.

F. Monitoring to confirm implementation of the Mitigation Plan in accordance with its terms. The plan will specify the parameters to be monitored, which shall include a biologist's assessment of plant growth rate and survival. The initial monitoring shall be conducted in the first year following completion of the initial planting and shall be repeated in years 2, 3, 5, 8, and 10 and every 10^{th} year thereafter through the life of the mitigation project. A monitoring report will be submitted to the Department by December 31 in each year monitoring is required. The monitoring report will describe the results of the monitoring and any planting, maintenance or plant replacement conducted since the last monitoring report.

G. Description of the mechanism by which the mitigation site will be protected from uses not consistent with the intent of the mitigation, until the mitigation requirements are met.

H. A description of the real property rights that have been or will be acquired to provide access to the mitigation site, including easements, equitable servitudes, fee title or other rights.

d. Mitigation Agreement.

The permittee shall enter into a Mitigation Agreement with a reputable land or water conservation organization or governmental entity (the "Conservation Entity") to implement the Mitigation Plan. The Mitigation Agreement shall include at least the following terms:

A. A commitment by the Conservation Entity to fully implement the Mitigation Plan in accordance with its terms, including the initial planting and long-term maintenance, monitoring and reporting.

B. A provision that the Mitigation Agreement is enforceable by the Permittee and the Department and any successor agency. A breach of the Mitigation Agreement by the Conservation Entity shall not be deemed a violation of this permit by the permittee.

C. Terms describing the total amount of funding necessary for the mitigation project and the schedule and payment terms for how the permittee will provide that funding.

D. A commitment by the Conservation Entity to hold in trust the project funding and the necessary real property rights for the mitigation site for the benefit of the Department, the public and the permittee for at least the term of the mitigation project.

E. A requirement that the Conservation Entity will cause to be recorded in the county real property records a memorandum describing the Mitigation Agreement.

e. Mitigation Standards

The intent of the mitigation project is to offset the estimated aggregate excess heat load that the permittee will discharge during the water quality limited period of the Columbia River at the discharge (July, August, and September) over 40 years, which is the estimated life of the projects that initially will be discharging wastewater to the permittee for discharge under this permit.

A. The Estimated Aggregate Excess Heat Load under this permit shall be calculated as the 40-year sum of the average excess heat load over the 20°C standard projected for the temperature water quality limited season. The estimate shall be based on the temperature and heat load discharged over the first three years of this permit, adjusted to reflect projections for future operations of the sources generating (or projected to generate) the effluent discharged under this permit and long-term meteorological data. The Estimated Aggregate Excess Heat Load shall include any excess heat load actually discharged prior to date this projection is made.

B. The Projected Heat Load Reduction to the water body at the mitigation site shall be calculated as the amount of solar radiation blocked by shade trees from the surface area of the project stream over a 40-

year period. The mitigation value of the mitigation project shall be the sum of the Projected Heat Load Reduction over the 40-year life of the mitigation project, taking into consideration the time necessary for plants to mature to the point of providing the projected levels of shading.

C. The Projected Heat Load Reduction over the life of the mitigation project shall be at least as great as the 40-year Estimated Aggregate Excess Heat Load of the discharge described in paragraph D.1.e.A above.

D. Upon approval of the Mitigation Plan, the Department will modify this permit to revise the temperature and excess heat load limits set forth in Condition A.1.a consistent with the Estimated Aggregate Excess Heat Load, which modification may include the addition of a limit on aggregate excess heat load for each temperature water quality limited season.

Additional Conditions

2. An adequate contingency plan for prevention and handling of spills and unplanned discharges shall be in force at all times. A continuing program of employee orientation and education shall be maintained to ensure awareness of the necessity of good in plant control and quick and proper action in the event of a spill or accident

3. An environmental supervisor shall be designated to coordinate and carry out all necessary functions related to maintenance and operation of the collection and treatment system. This person must have access to all information pertaining to entire system, including all data generated.

4. Reopening of Permit. This permit may be reopened and modified or reissued to incorporate one or more waste load allocations (WLAs) resulting from a Total Maximum Daily Load (TMDL) for any of the parameters associated with the permittee's discharge. Nothing in this condition shall limit reopening of this permit for reasons specified in Schedule F, General Conditions. Nothing in this condition shall abridge the public process associated with permit modification or reissuance.

SCHEDULE F
NPDES GENERAL CONDITIONS

SECTION A. STANDARD CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of Oregon Revised Statutes (ORS) 468B.025 and is grounds for enforcement action; for permit termination, suspension, or modification; or for denial of a permit renewal application.

2. Penalties for Water Pollution and Permit Condition Violations

Oregon Law (ORS 468.140) allows the Director to impose civil penalties up to $10,000 per day for violation of a term, condition, or requirement of a permit.

In addition, a person who unlawfully pollutes water as specified in ORS 468.943 or ORS 468.946 is subject to criminal prosecution.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. In addition, upon request of the Department, the permittee shall correct any adverse impact on the environment or human health resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

4. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and have the permit renewed. The application shall be submitted at least 180 days before the expiration date of this permit.

The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

5. Permit Actions

This permit may be modified, suspended, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any term, condition, or requirement of this permit, a rule, or a statute;

b. Obtaining this permit by misrepresentation or failure to disclose fully all material facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the permittee for a permit modification or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. Toxic Pollutants

The permittee shall comply with any applicable effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

7. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege.

8. Permit References

Except for effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act, all rules and statutes referred to in this permit are those in effect on the date this permit is issued.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls, and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Duty to Halt or Reduce Activity

For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Bypass of Treatment Facilities

a. Definitions

(1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The term "bypass" does not include nonuse of singular or multiple units or processes of a treatment works when the nonuse is insignificant to the quality and/or quantity of the effluent produced by the treatment works. The term "bypass" does not apply if the diversion does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities or treatment processes which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Prohibition of bypass.

(1) Bypass is prohibited unless:

(a) Bypass was necessary to prevent loss of life, personal injury, or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

(c) The permittee submitted notices and requests as required under General Condition B.3.c.

(2) The Director may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, when the Director determines that it will meet the three conditions listed above in General Condition B.3.b.(1).

c. Notice and request for bypass.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior written notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in General Condition D.5.

4. Upset

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operation error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of General Condition B.4.c are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the causes(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required in General Condition D.5, hereof (24-hour notice); and

(4) The permittee complied with any remedial measures required under General Condition A.3 hereof.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

5. Treatment of Single Operational Event

For purposes of this permit, A Single Operational Event which leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation. A single operational event is an exceptional incident which causes simultaneous, unintentional, unknowing (not the result of a knowing act or omission), temporary noncompliance with more than one Clean Water Act effluent discharge pollutant parameter. A single operational event does not include Clean Water Act violations involving discharge without a NPDES permit or noncompliance to the extent caused by improperly designed or inadequate treatment facilities. Each day of a single operational event is a violation.

6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations

a. Definitions

(1) "Overflow" means the diversion and discharge of waste streams from any portion of the wastewater conveyance system including pump stations, through a designed overflow device or structure, other than discharges to the wastewater treatment facility.

(2) "Severe property damage" means substantial physical damage to property, damage to the conveyance system or pump station which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of an overflow.

(3) "Uncontrolled overflow" means the diversion of waste streams other than through a designed overflow device or structure, for example to overflowing manholes or overflowing into residences, commercial establishments, or industries that may be connected to a conveyance system.

b. Prohibition of overflows. Overflows are prohibited unless:

(1) Overflows were unavoidable to prevent an uncontrolled overflow, loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the overflows, such as the use of auxiliary pumping or conveyance systems, or maximization of conveyance system storage; and

(3) The overflows are the result of an upset as defined in General Condition B.4. and meeting all requirements of this condition.

c. Uncontrolled overflows are prohibited where wastewater is likely to escape or be carried into the waters of the State by any means.

d. Reporting required. Unless otherwise specified in writing by the Department, all overflows and uncontrolled overflows must be reported orally to the Department within 24 hours from the time the permittee becomes aware of the overflow. Reporting procedures are described in more detail in General Condition D.5.

7. Public Notification of Effluent Violation or Overflow

If effluent limitations specified in this permit are exceeded or an overflow occurs, upon request by the Department, the permittee shall take such steps as are necessary to alert the public about the extent and nature of the discharge. Such steps may include, but are not limited to, posting of the river at access points and other places, news releases, and paid announcements on radio and television.

8. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in such a manner as to prevent any pollutant from such materials from entering public waters, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Sampling and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and shall be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Director.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than $\pm$ 10 percent from true discharge rates throughout the range of expected discharge volumes.

3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

4. Penalties of Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two years, or by both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than \$20,000 per day of violation, or by imprisonment of not more than four years or both.

5. Reporting of Monitoring Results

Monitoring results shall be summarized each month on a Discharge Monitoring Report form approved by the Department. The reports shall be submitted monthly and are to be mailed, delivered or otherwise transmitted by the 15th day of the following month unless specifically approved otherwise in Schedule B of this permit.

6. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report. Such increased frequency shall also be indicated. For a pollutant parameter that may be sampled more than once per day (e.g., Total Chlorine Residual), only the average daily value shall be recorded unless otherwise specified in this permit.

7. Averaging of Measurements

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean, except for bacteria which shall be averaged as specified in this permit.

8. Retention of Records

Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records of all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

9. Records Contents

Records of monitoring information shall include:

a. The date, exact place, time and methods of sampling or measurements;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

10. Inspection and Entry

The permittee shall allow the Director, or an authorized representative upon the presentation of credentials to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, and

d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by state law, any substances or parameters at any location.

SECTION D. REPORTING REQUIREMENTS

1. Planned Changes

The permittee shall comply with Oregon Administrative Rules (OAR) 340, Division 52, "Review of Plans and Specifications". Except where exempted under OAR 340-52, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers shall be commenced until the plans and specifications are submitted to and approved by the Department. The permittee shall give notice to the Department as soon as possible of any planned physical alternations or additions to the permitted facility.

2. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. Transfers

This permit may be transferred to a new permittee provided the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of the permit and the rules of the Commission. No permit shall be transferred to a third party without prior written approval from the Director. The permittee shall notify the Department when a transfer of property interest takes place.

4. Compliance Schedule

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

5. Twenty-Four Hour Reporting

The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally (by telephone) within 24 hours, unless otherwise specified in this permit, from the time the permittee becomes aware of the circumstances. During normal business hours, the Department's Regional office shall be called. Outside of normal business hours, the Department shall be contacted at 1-800-452-0311 (Oregon Emergency Response System).

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. If the permittee is establishing an affirmative defense of upset or bypass to any offense under ORS 468.922 to 468.946, and in which case if the original reporting notice was oral, delivered written notice must be made to the Department or other agency with regulatory jurisdiction within 4 (four) calendar days. The written submission shall contain:

a. A description of the noncompliance and its cause;

b. The period of noncompliance, including exact dates and times;

c. The estimated time noncompliance is expected to continue if it has not been corrected;

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and

e. Public notification steps taken, pursuant to General Condition B.7.

The following shall be included as information which must be reported within 24 hours under this paragraph:

a. Any unanticipated bypass which exceeds any effluent limitation in this permit.

b. Any upset which exceeds any effluent limitation in this permit.

c. Violation of maximum daily discharge limitation for any of the pollutants listed by the Director in this permit.

The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

6. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under General Condition D.4 or D.5, at the time monitoring reports are submitted. The reports shall contain:

a. A description of the noncompliance and its cause;

b. The period of noncompliance, including exact dates and times;

c. The estimated time noncompliance is expected to continue if it has not been corrected; and

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

7. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

Other Information: When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Department, it shall promptly submit such facts or information.

8. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified in accordance with 40 CFR 122.22.

9. Falsification of Information

A person who supplies the Department with false information, or omits material or required information, as specified in ORS 468.953 is subject to criminal prosecution.

10. Changes to Indirect Dischargers - **[Applicable to Publicly Owned Treatment Works (POTW) only]**

The permittee must provide adequate notice to the Department of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the Clean Water Act if it were directly discharging those pollutants and;

b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

c. For the purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

11. Changes to Discharges of Toxic Pollutant - **[Applicable to existing manufacturing, commercial, mining, and silvicultural dischargers only]**

The permittee must notify the Department as soon as they know or have reason to believe of the following:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:

(1) One hundred micrograms per liter (100 μg/l);

(2) Two hundred micrograms per liter (200 μg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 μg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 μg/l);

(2) One milligram per liter (1 mg/l) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

SECTION E. DEFINITIONS

1. BOD means five-day biochemical oxygen demand.

2. TSS means total suspended solids.

3. mg/l means milligrams per liter.

4. kg means kilograms.

5. m^3/d means cubic meters per day.

6. MGD means million gallons per day.

7. Composite sample means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow.

8. FC means fecal coliform bacteria.

9. Technology based permit effluent limitations means technology-based treatment requirements as defined in 40 CFR 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-41.

10. CBOD means five day carbonaceous biochemical oxygen demand.

11. Grab sample means an individual discrete sample collected over a period of time not to exceed 15 minutes.

12. Quarter means January through March, April through June, July through September, or October through December.

13. Month means calendar month.

14. Week means a calendar week of Sunday through Saturday.

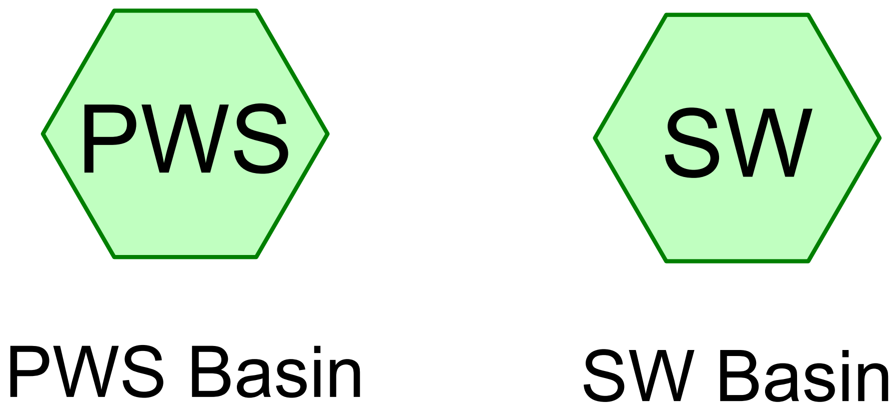
15. Total residual chlorine means combined chlorine forms plus free residual chlorine.

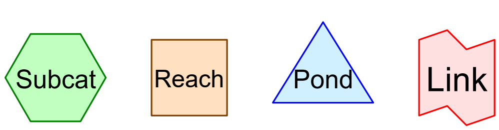
16. The term "bacteria" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and E. coli bacteria.

17. POTW means a publicly owned treatment works.

ATTACHMENT 4

HYDROCAD MODEL OUTPUT REPORT





Routing Diagram for NEXT Main Plant_post dev
Prepared by Maul Foster & Alongi, Printed 1/27/2023

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
1,355,152	98	Impervious (SW)
1,437,480	98	Impervious areas (PWS)
375,052	78	Rail/Gravel Base (SW)
3,167,683	**96**	**TOTAL AREA**

Summary for Subcatchment PWS: PWS Basin

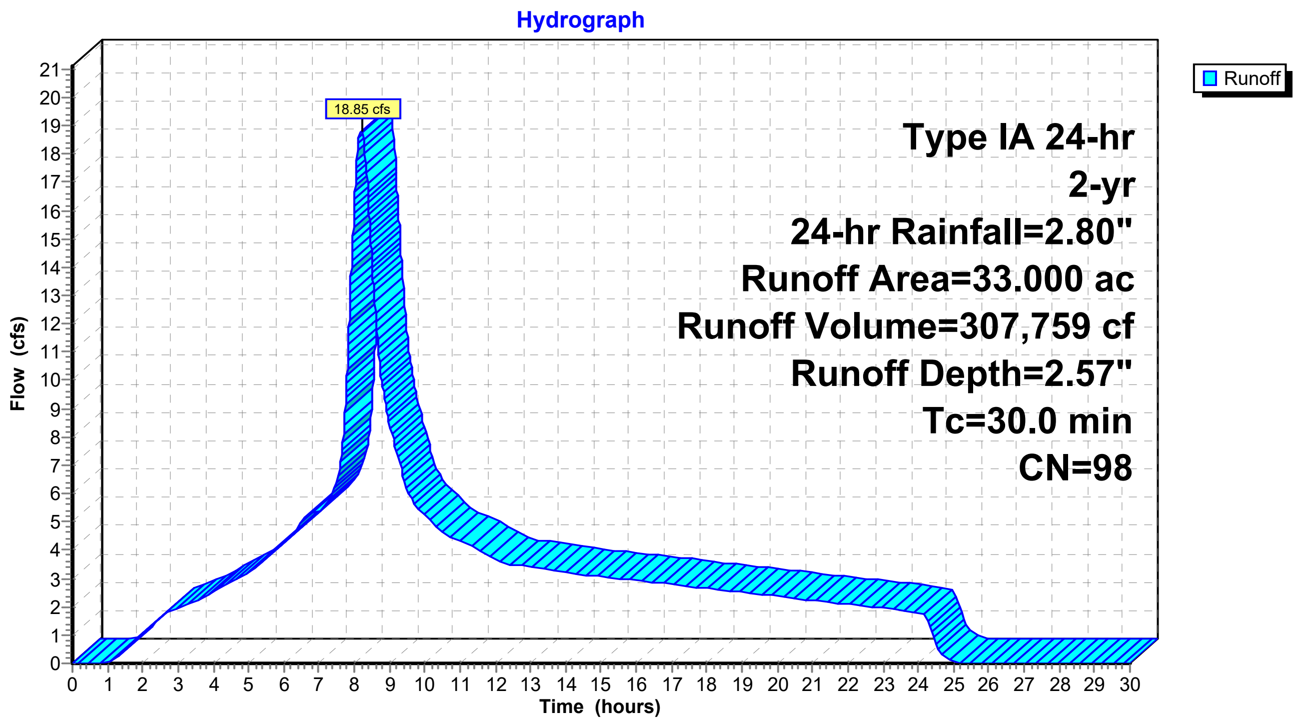
Runoff = 18.85 cfs @ 8.20 hrs, Volume= 307,759 cf, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr, 24-hr Rainfall=2.80"

	Area (ac)	CN	Description
*	33.000	98	Impervious areas
	33.000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment PWS: PWS Basin



Summary for Subcatchment SW: SW Basin

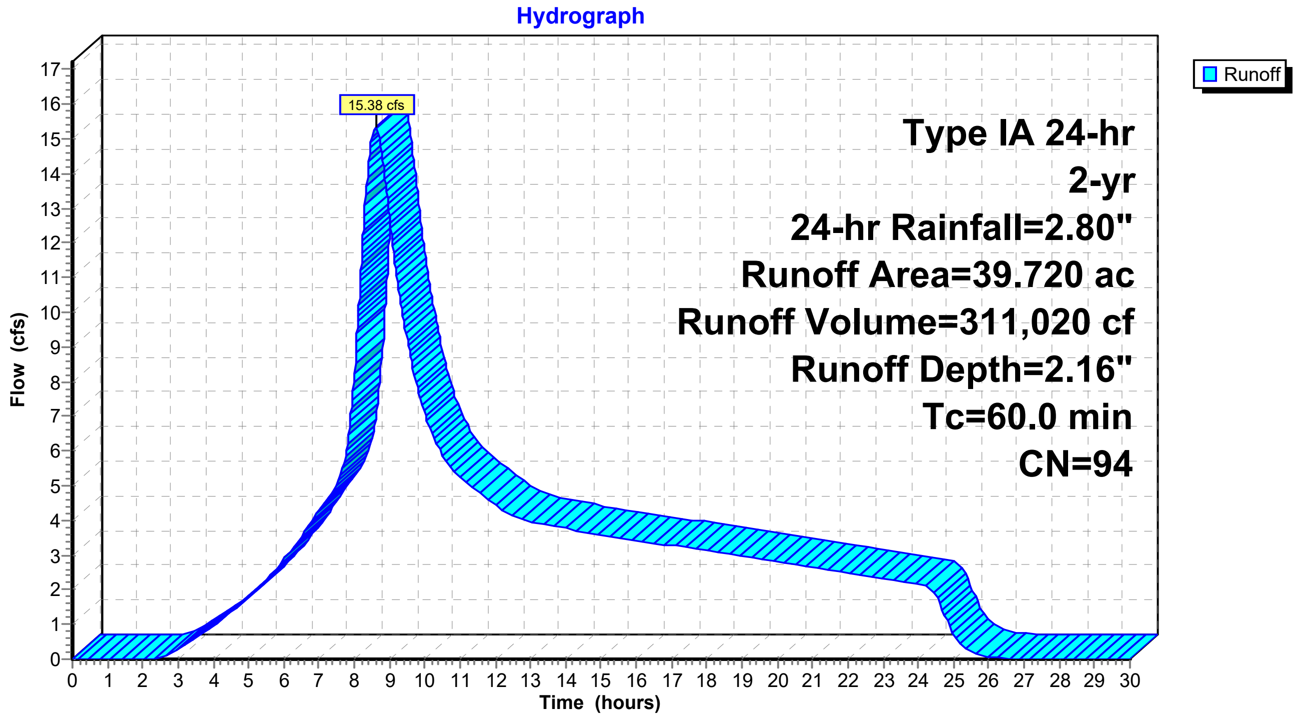
Runoff = 15.38 cfs @ 8.60 hrs, Volume= 311,020 cf, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-yr, 24-hr Rainfall=2.80"

	Area (ac)	CN	Description
*	31.110	98	Impervious
*	8.610	78	Rail/Gravel Base
	39.720	94	Weighted Average
	8.610		21.68% Pervious Area
	31.110		78.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
60.0					**Direct Entry,**

Subcatchment SW: SW Basin



Summary for Subcatchment PWS: PWS Basin

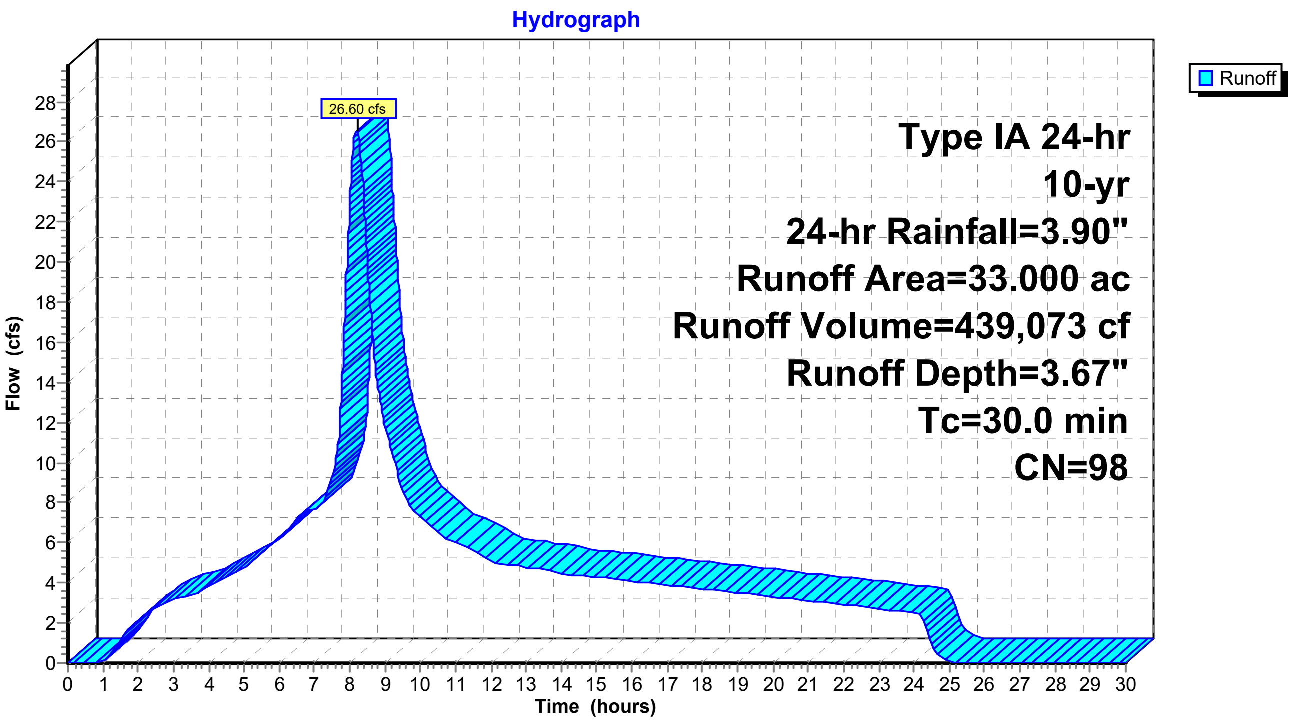
Runoff = 26.60 cfs @ 8.20 hrs, Volume= 439,073 cf, Depth= 3.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr, 24-hr Rainfall=3.90"

	Area (ac)	CN	Description
*	33.000	98	Impervious areas
	33.000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment PWS: PWS Basin



Summary for Subcatchment SW: SW Basin

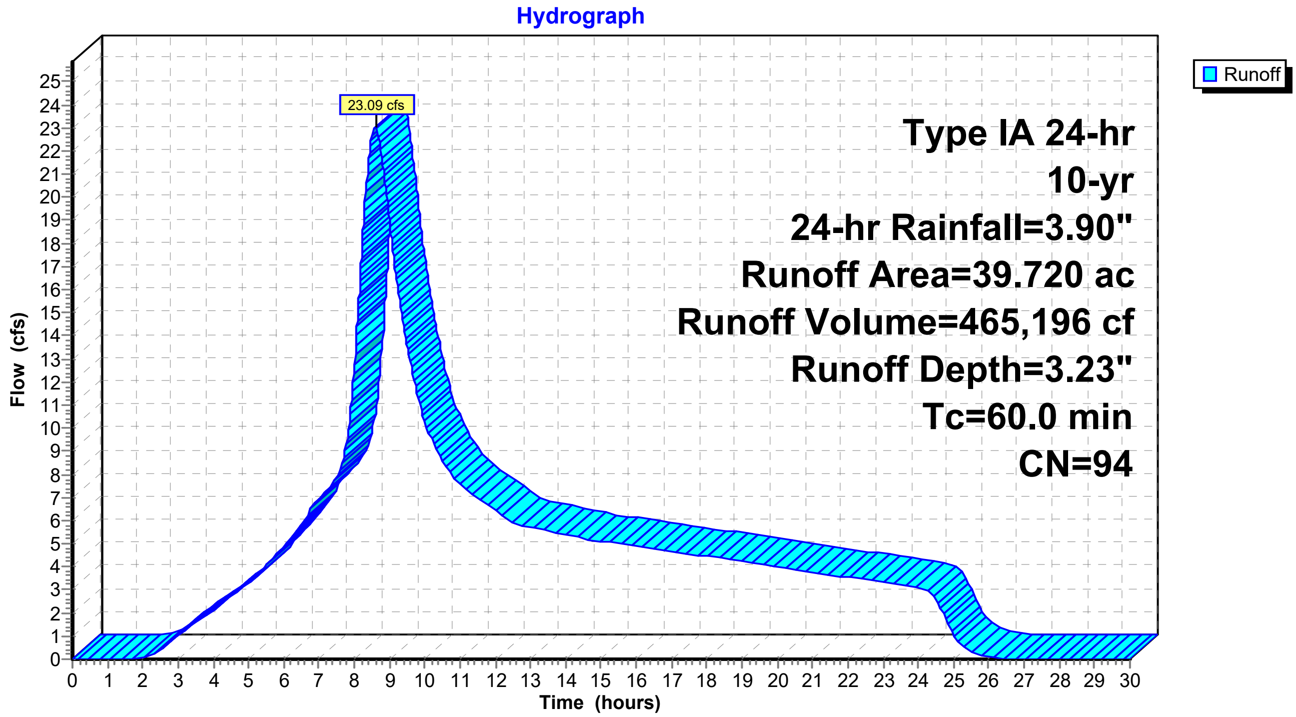
Runoff = 23.09 cfs @ 8.60 hrs, Volume= 465,196 cf, Depth= 3.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-yr, 24-hr Rainfall=3.90"

	Area (ac)	CN	Description
*	31.110	98	Impervious
*	8.610	78	Rail/Gravel Base
	39.720	94	Weighted Average
	8.610		21.68% Pervious Area
	31.110		78.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
60.0					**Direct Entry,**

Subcatchment SW: SW Basin



Summary for Subcatchment PWS: PWS Basin

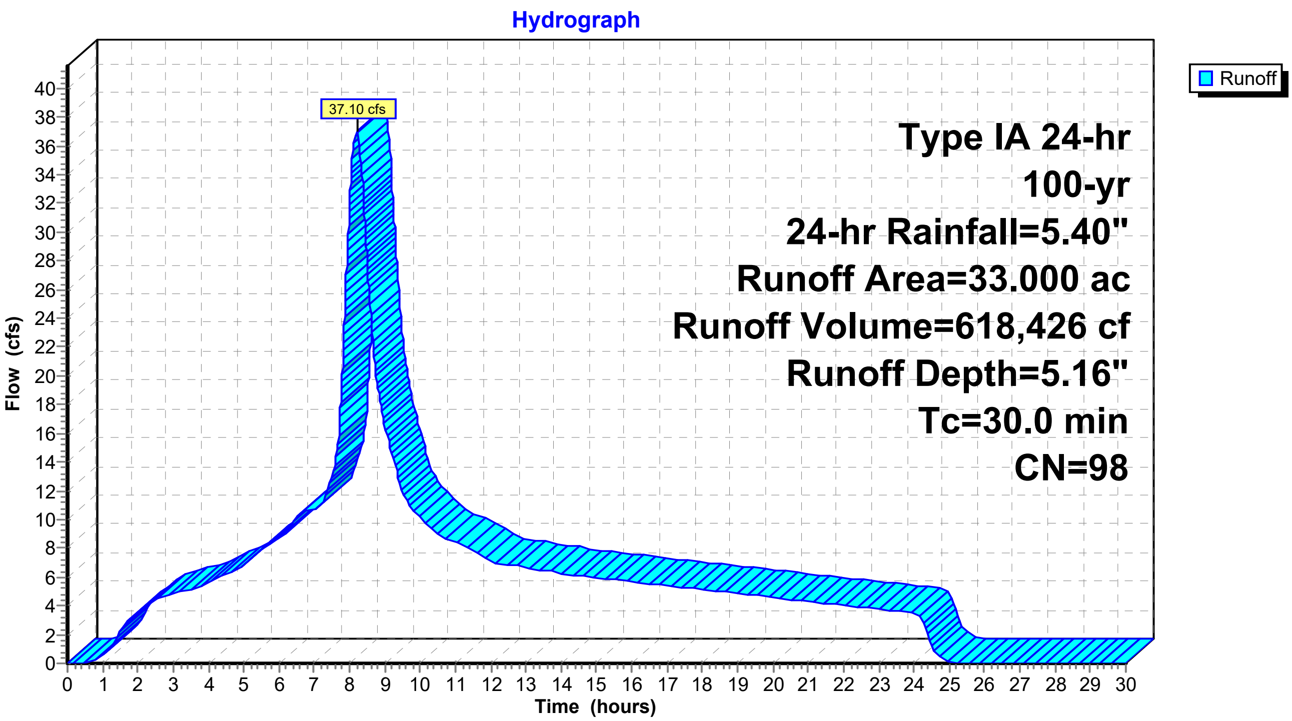
Runoff = 37.10 cfs @ 8.20 hrs, Volume= 618,426 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr, 24-hr Rainfall=5.40"

	Area (ac)	CN	Description
*	33.000	98	Impervious areas
	33.000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment PWS: PWS Basin



Summary for Subcatchment SW: SW Basin

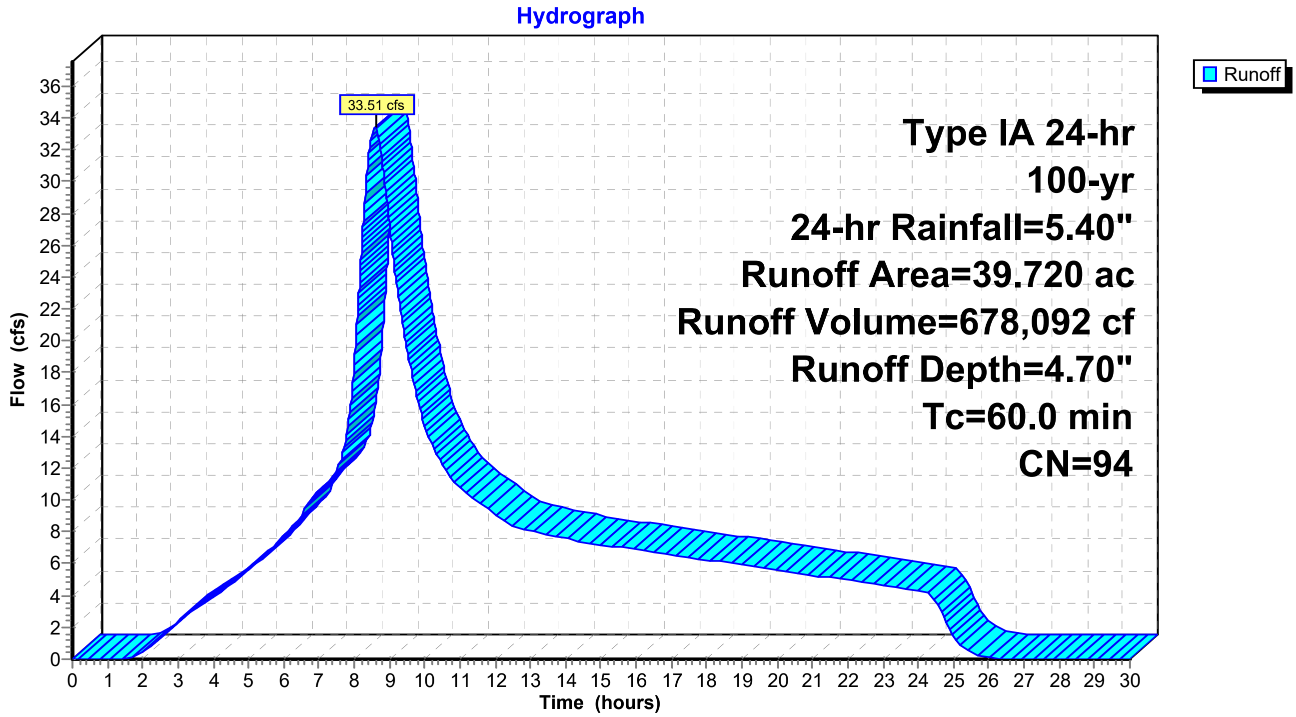
Runoff = 33.51 cfs @ 8.60 hrs, Volume= 678,092 cf, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 100-yr, 24-hr Rainfall=5.40"

	Area (ac)	CN	Description
*	31.110	98	Impervious
*	8.610	78	Rail/Gravel Base
	39.720	94	Weighted Average
	8.610		21.68% Pervious Area
	31.110		78.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
60.0					**Direct Entry,**

Subcatchment SW: SW Basin



Summary for Subcatchment PWS: PWS Basin

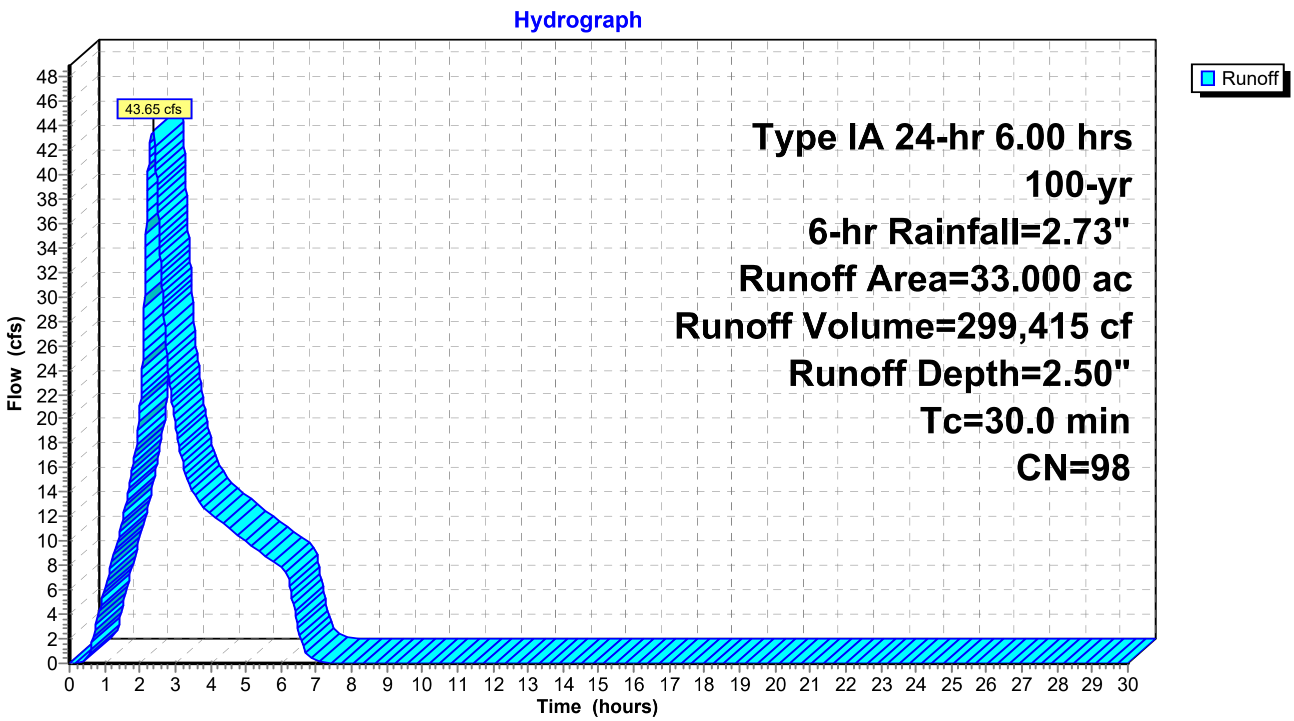
Runoff = 43.65 cfs @ 2.36 hrs, Volume= 299,415 cf, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 6.00 hrs 100-yr, 6-hr Rainfall=2.73"

	Area (ac)	CN	Description
*	33.000	98	Impervious areas
	33.000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment PWS: PWS Basin



Summary for Subcatchment SW: SW Basin

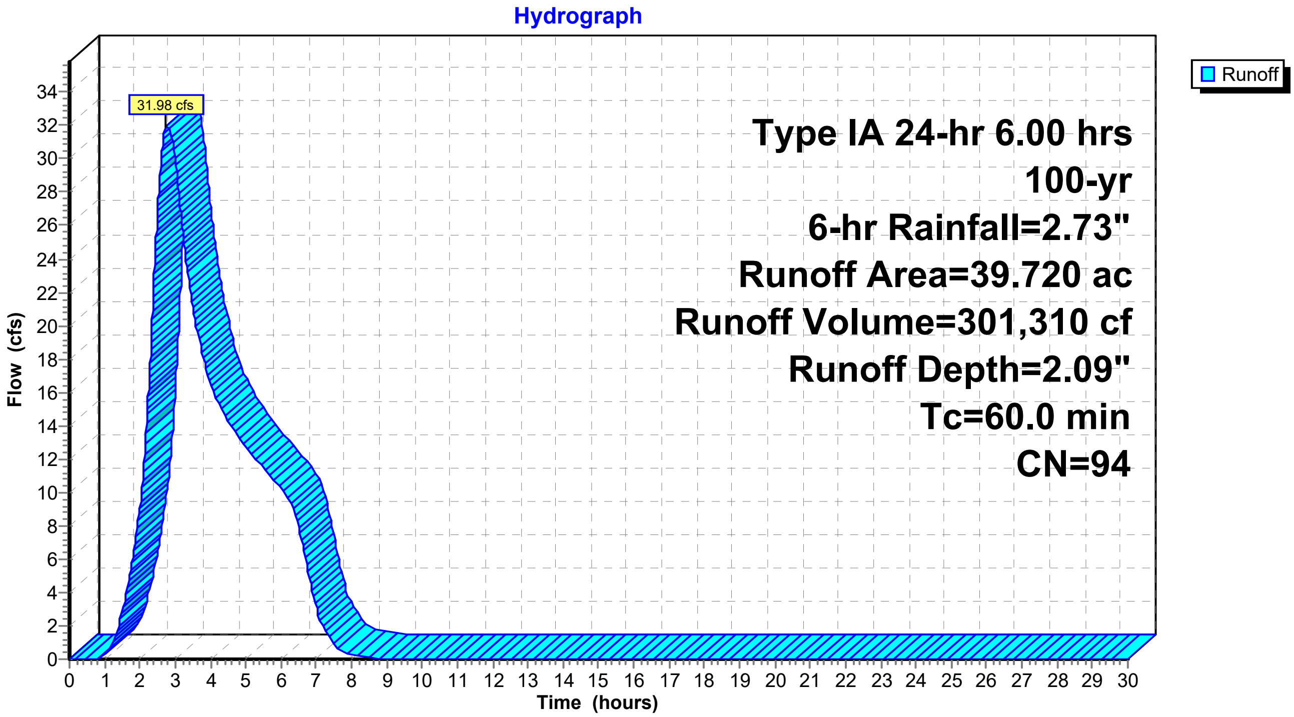
Runoff = 31.98 cfs @ 2.74 hrs, Volume= 301,310 cf, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr 6.00 hrs 100-yr, 6-hr Rainfall=2.73"

	Area (ac)	CN	Description
*	31.110	98	Impervious
*	8.610	78	Rail/Gravel Base
	39.720	94	Weighted Average
	8.610		21.68% Pervious Area
	31.110		78.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
60.0					**Direct Entry,**

Subcatchment SW: SW Basin



Summary for Subcatchment PWS: PWS Basin

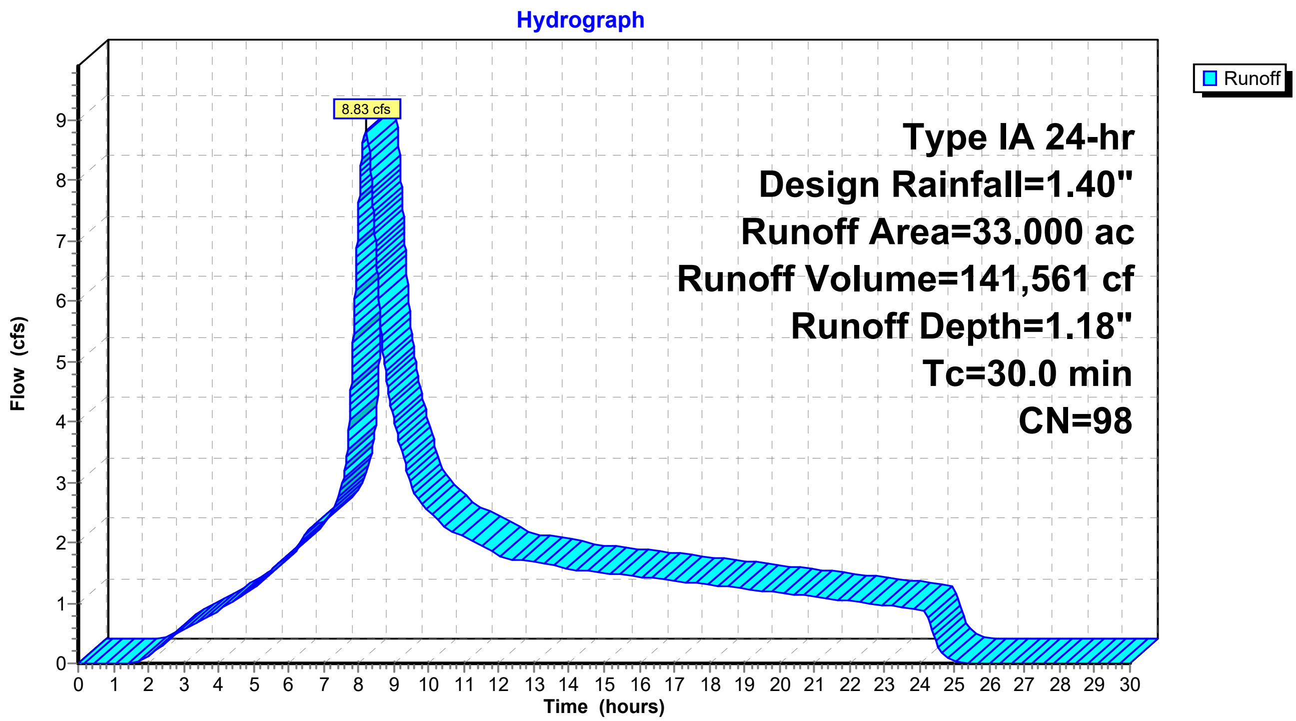
Runoff = 8.83 cfs @ 8.20 hrs, Volume= 141,561 cf, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr Design Rainfall=1.40"

	Area (ac)	CN	Description
*	33.000	98	Impervious areas
	33.000		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.0					**Direct Entry,**

Subcatchment PWS: PWS Basin



Summary for Subcatchment SW: SW Basin

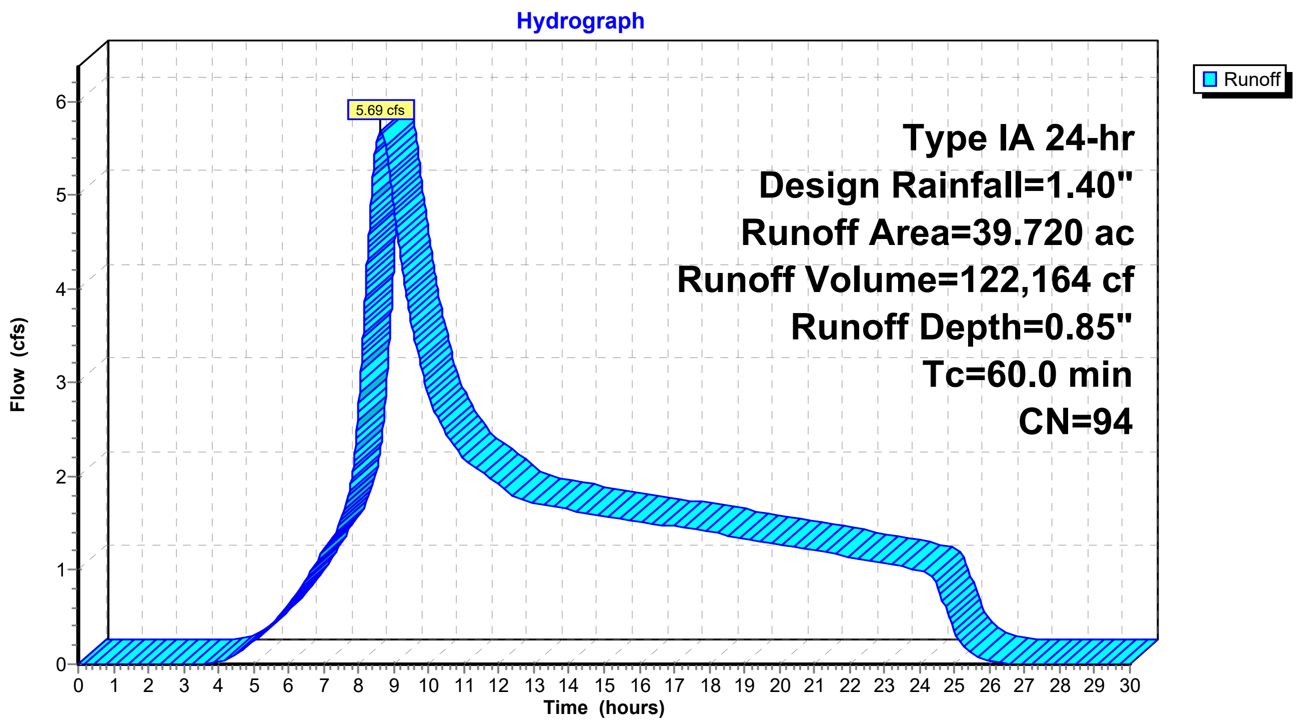
Runoff = 5.69 cfs @ 8.60 hrs, Volume= 122,164 cf, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type IA 24-hr Design Rainfall=1.40"

	Area (ac)	CN	Description
*	31.110	98	Impervious
*	8.610	78	Rail/Gravel Base
	39.720	94	Weighted Average
	8.610		21.68% Pervious Area
	31.110		78.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
60.0					**Direct Entry,**

Subcatchment SW: SW Basin



APPENDIX E

OPERATIONS AND MAINTENANCE MANUAL

OPERATIONS AND MAINTENANCE MANUAL

NEXT RENEWABLE FUELS, OREGON, INC.

Prepared for

NEXT RENEWABLE FUELS, OREGON, INC.

January 30, 2023
Project No. M1724.01.004

Prepared by
Maul Foster & Alongi, Inc.
2001 NW 19th Avenue, Suite 200, Portland OR 97209

MAUL
FOSTER
ALONGI

CONTENTS

Main Plant	the proposed NEXT Renewables renewable diesel production facility
NEXT Renewables	Next Renewable Fuels, Oregon, Inc.
O&M Manual	Operations & Maintenance Manual
1200-Z Permit	Industrial Stormwater Discharge Permit No. 1200-Z issued by the DEQ
site	property located in Port Westward Industrial Park between Kallunki Road and Hermo Road, Clatskanie, Oregon
SWMP	Post-Construction Stormwater Management Plan for Port Westward Renewable Fuels Facility
SWPCP	Stormwater Pollution Control Plan
Waterway F	an existing ditch located on the west side of Drainage Area 3 and conveys runoff from the surrounding areas

1 INTRODUCTION

Maul Foster & Alongi, Inc., has prepared this Operations and Maintenance (O&M) Manual on behalf of NEXT Renewable Fuels, Oregon, Inc. (NEXT Renewables), as part of the *Post-Construction Stormwater Management Plan for Port Westward Industrial Park NEXT Renewable Fuels Facility* (SWMP) associated with the Joint Permit Application (No. 63077 RF) and comments on the application provided by the Oregon Department of Environmental Quality. This O&M Manual addresses the anticipated O&M procedures and schedules for the stormwater conveyance system and vegetated ponds in the drainage basins referred to in the SWMP as Drainage Area 2 and Drainage Area 3. This O&M Manual may be updated during the final design phase to reflect design changes, if any, or following the construction of the facilities.

1.1 Site Description

The proposed NEXT Renewables facility will be located in the Port Westward Industrial Park between Kallunki Road and Hermo Road near Clatskanie, Oregon (site, see Figure 1). The site comprises approximately 122.5 acres and is currently undeveloped, vegetated and surrounded by wetlands and agricultural land. The development will include the construction of industrial and processing areas, as well as buildings, parking, utilities, roadways, and rail spurs to support biofuels production, storage and shipping. The general layout of the proposed site is shown on Figure 2.

Drainage Area 2 is approximately 12.2 acres located outside the proposed renewable diesel production facility (the Main Plant) and consists of a paved road, gravel laydown area, and rail yard located west of the Main Plant, as well as an aboveground pipeline and associated gravel maintenance road located northwest of the Main Plant. Drainage Area 3 is approximately 0.8 acre and consists of a rail spur located southeast of the Main Plant. Industrial activities in these areas will include vehicle and rail traffic, material loading/unloading, and transport of biodiesel products via an aboveground pipeline or cargo train cars.

1.2 Stormwater Treatment Facilities

Stormwater runoff from the rail yard and roadways in Drainage Area 2 is collected in a series of catch basins and conveyed via gravity piping into one of two proposed ponds located along the southern site boundary (see Ponds 1 and 2, Figure 2).

Industrial stormwater from the aboveground pipeline and maintenance road in the northwest portion of the site sheet flows into a pond that runs parallel to the maintenance road and is conveyed via gravity pipe to MH-DP002 (Pond 3).

The vegetated ponds provide detention, sedimentation and biofiltration. The pond outlet pipes are equipped with downturned elbows to trap oil sheen and floatables in the ponds. Absorbent booms are used to absorb sheen, if observed. Treated effluent from Ponds 1, 2, and 3 is conveyed via gravity pipes to a manhole (MH-DP002, Figure 2) prior to discharging into McLean Slough (see Discharge Point 002, Figure 2).

Stormwater runoff from the rail yard in Drainage Area 3 is collected in a catch basin and conveyed via gravity piping into a pond located along the southwest boundary of this drainage area (see Pond 4, Figure 2). The vegetated pond provides detention, sedimentation and biofiltration. The Pond 4 outlet consists of a grated catch basin (CB-DP003) equipped with a downturned elbow to trap floatables including oil sheen in the pond. Absorbent booms are used to absorb sheen, if observed.

An existing ditch (see Waterway F, Figure 2) crosses through the property on the west boundary of Drainage Area 3 and will be conveyed via a new culvert under the proposed rail to maintain the existing drainage for the surrounding area. Treated industrial runoff from the proposed Pond 4 will discharge to the existing Waterway F via Discharge Point 003 (see Figure 2).

2 OPERATION AND MAINTENANCE RESPONSIBILITIES

NEXT Renewables assumes financial responsibility for the operation and maintenance of the stormwater conveyance system and ponds and will incorporate the costs of operating and maintaining these systems into its annual budget. The maintenance tasks and schedules will be incorporated into the site-specific Stormwater Pollution Control Plan (SWPCP) and discussed during the annual stormwater training. Inspection and maintenance activities will be performed by trained NEXT Renewables staff and/or contracted maintenance service providers (e.g., landscaping contractors, vacuum truck services, pavement sweepers).

3 STORMWATER SYSTEM OPERATION

The operation of the stormwater conveyance and treatment systems in Drainage Areas 2 and 3 is described in detail in the following sections.

3.1 Conveyance System

The stormwater conveyance system in Drainage Areas 2 and 3 consists of a network of catch basins, manholes and gravity piping. Runoff from Drainage Areas 2 will be collected in a series of catch basins connected to underground piping that will convey stormwater by gravity to Ponds 1 and 2. Each catch basin will be equipped with an oil trapping outlet and sump to trap oil sheen and sediment in the sump. Runoff from Drainage 3 will be collected in a single catch basin and conveyed via gravity flow to Pond 4.

A sampling manhole MH-DP002 is located between Ponds 1 and 2. Stormwater from Ponds 1, 2, and 3 discharges into and comingles inside this manhole prior to discharging via gravity pipe to McLean

Slough via Discharge Point 002. The manhole includes a sump to facilitate collection of stormwater samples.

3.2 Detention and Treatment Ponds

The stormwater detention and treatment ponds are shown on Figure 2. Runoff from the paved access road, gravel laydown area, and rail areas southwest of the Main Plant (Drainage Area 2) will be treated in two a vegetated ponds that extends east from Hermo Road toward the Main Plant (Ponds 1 and 2).

Industrial stormwater from the aboveground pipeline and maintenance road in the northwest pipeline and maintenance road will be treated in Pond 3 that runs parallel to the maintenance road. Treated runoff from the ponds is conveyed via gravity pipes to MH-DP002, located upstream of Discharge Point 002.

Runoff from the rail area southeast of the Main Plant (Drainage Area 3) will be treated in a vegetated Pond 4 located in the southwest portion of Drainage Area 3 adjacent to the existing Waterway F.

The ponds are long and narrow. Ponds 1 and 2 have a total depth of 3.5 feet, which includes 1.5 foot for sediment storage and 2 feet for live storage (detention) and freeboard. Ponds 3 and 4 have a total depth of 2 feet, which includes 1 foot for sediment storage, 1 foot for detention and freeboard. Each pond outlet has been equipped with a downturned elbow to trap floatables, including oil sheen, in the pond and allow for use of absorbent booms to absorb the sheen.

The pond planting plan will be refined during the final design phase, in conjunction with the design of wetland mitigation facilities. Sections of the ponds adjacent to inlet pipes may be segregated using weir walls, earth berms or rock check dams to allow for frequent sediment removal without the need to replace vegetation. The lower side slopes and pond bottom will be vegetated to enhance sedimentation with biofiltration. An example of the seed mix that may be used at the bottom and lower side slopes of the ponds is the ProTime Seed Mix 440 (Native Biofilter Mix). The ProTime Seeds Mix 498 (Native Riparian Zone 2 Mix), more suitable for riparian slopes of water quality facilities, or a similar mix may be used to vegetate the upper pond side slopes. These vegetation specifications are subject to change during the final design phase, as the vegetation may be customized to better match the existing native wetland vegetation in the surrounding areas or the vegetation in the proposed wetland mitigation areas. All proposed planting will utilize native species and be selected based on the level of inundation expected (upper side slope versus lower slope and bottom).

4 INSPECTIONS AND MAINTENANCE

The stormwater management system will be inspected monthly, consistent with the inspection requirements in the Industrial Stormwater Discharge Permit No. 1200-Z (1200-Z Permit) and maintained consistent with the inspection findings and the procedures outlined in the following section.

4.1 Pond Maintenance

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash and debris	Any trash and debris that exceeds 5 cubic feet (equal to the amount of trash it would take to fill up one standard garbage can). If less than the threshold, all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from pond.
	Oil sheen	Oil sheen observed on the water surface of the ponds will be removed using absorbents (e.g., oil absorbent booms or socks).	No oil sheen observed.
Side Slopes of Pond	Erosion	Eroded damage over two inches deep where cause of damage is still present or where there is potential for continued erosion should be repaired (filled and stabilized) as soon as practicable.	Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, sediment-control booms, plantings.
Sediment Storage Areas	Excessive Sediment Accumulation	Excessive levels of accumulated sediment (one foot or more in depth) require removal.	Sediment cleaned out to designed pond shape and depth; pond replanted, if necessary to control erosion.
Piping	Clogged inlets or outlets	Accumulated sediment that affects inlet or outlet pipe condition and impedes flow requires sediment removal and may require jet cleaning of the pipe.	Remove sediment and debris from pond areas adjacent to the inlet and outlet pipes to maintain conveyance capacity.

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Vegetation	Nuisance vegetation and noxious weeds	Nuisance vegetation that may constitute a hazard to maintenance personnel or increase the risk of fire, as well as noxious weeds and non-native invasive species should be removed by trained staff or contractors.	Vegetation that generally complies with the planting plan or of other native vegetation. Complete eradication of noxious weeds may not be possible. Nuisance vegetation must be removed via mechanical measures. Herbicide use will be avoided; however, if needed herbicides will be applied in accordance with Standard Local Operating Procedures for Endangered Species (SLOPES) V regulations[1].
	Dead or strained vegetation or trees	Dead vegetation should be removed and replaced, weather permitting, to maintain vegetative cover and control erosion where soils are exposed.	Vegetation that generally complies with the planting plan or of other native vegetation. Irrigate as needed. Mulch banks as needed.
	Tall grass and vegetation	Tall grass and vegetation blocking sight lines/foot traffic or blocking inlet/outlets to convey stormwater should be mowed or pruned.	Vegetation that does not impede traffic or sight lines.

4.2 Conveyance System Maintenance

Catch basins and the manhole should be inspected monthly consistent with the 1200-Z Permit. Remove sediment, oil, and debris from catch basins when the sump is 1/3 full or when the sediment layer is within 6 inches of the outlet pipe. The manhole is not anticipated to drain stormwater with significant levels of oil sheen, sediment or debris, since it is downstream of the treatment ponds. If sheen is observed in the manhole, it will be removed using absorbent boom or socks as soon as practicable to minimize the potential of discharging stormwater impacted with sheen to McLean Slough. Debris or trash will also be removed from the manhole as soon as practicable. Sediment will be removed if the depth of sediment exceeds three inches. If sediment removal is required, the catch basin or manhole should be pressure-washed and the solids/washwater vacuumed out and disposed at an off-site permitted disposal facility or the on-site wastewater and industrial process stormwater treatment system. The washwater and solids should not be discharged into the stormwater system.

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[1] USACE. 2014. William W. Stelle, Jr. National Oceanic and Atmospheric Administration National Marine Fisheries Services. Reinitiation of the Endangered Species Act Section 7 Programmatic Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Revisions to Standard Local Operating Procedures for Endangered Species to Administer Maintenance or Improvement of Stormwater, Transportation or Utility Actions Authorized or Carried Out by the U.S. Army Corps of Engineers in Oregon (SLOPES for Stormwater, Transportation or Utilities). NWR-2013-10411. Letter to Shawn H. Zinszer and Joyce Casey, U.S. Army Corps of Engineers. March 14.

Significant sediment accumulation in the gravity piping network is not expected; however, the piping network will include cleanouts to facilitate jet cleaning of the pipes, if needed.

4.3 Maintenance Schedule

Annual maintenance schedule:

- Summer: Make any necessary structural repairs. Clear inlet and outlet pipes. Remove sediment, debris or trash from catch basins, ponds and manhole. Irrigate new (less than two years old) vegetation.
- Fall: Remove dead plants, nuisance plants and noxious or invasive species. Replace dead plants. Replace absorbent booms in ponds, as needed. Remove floating debris or trash from ponds.
- Winter: Replace absorbent booms in ponds, as needed. Remove floating debris or trash from ponds.
- Spring: Remove dead plants, nuisance plants and noxious or invasive species. Replace dead plants. Replace absorbent booms in ponds, as needed. Remove floating debris or trash from ponds.

4.4 Best Management Practices

The following best management practices should be followed to reduce pollution at the source:

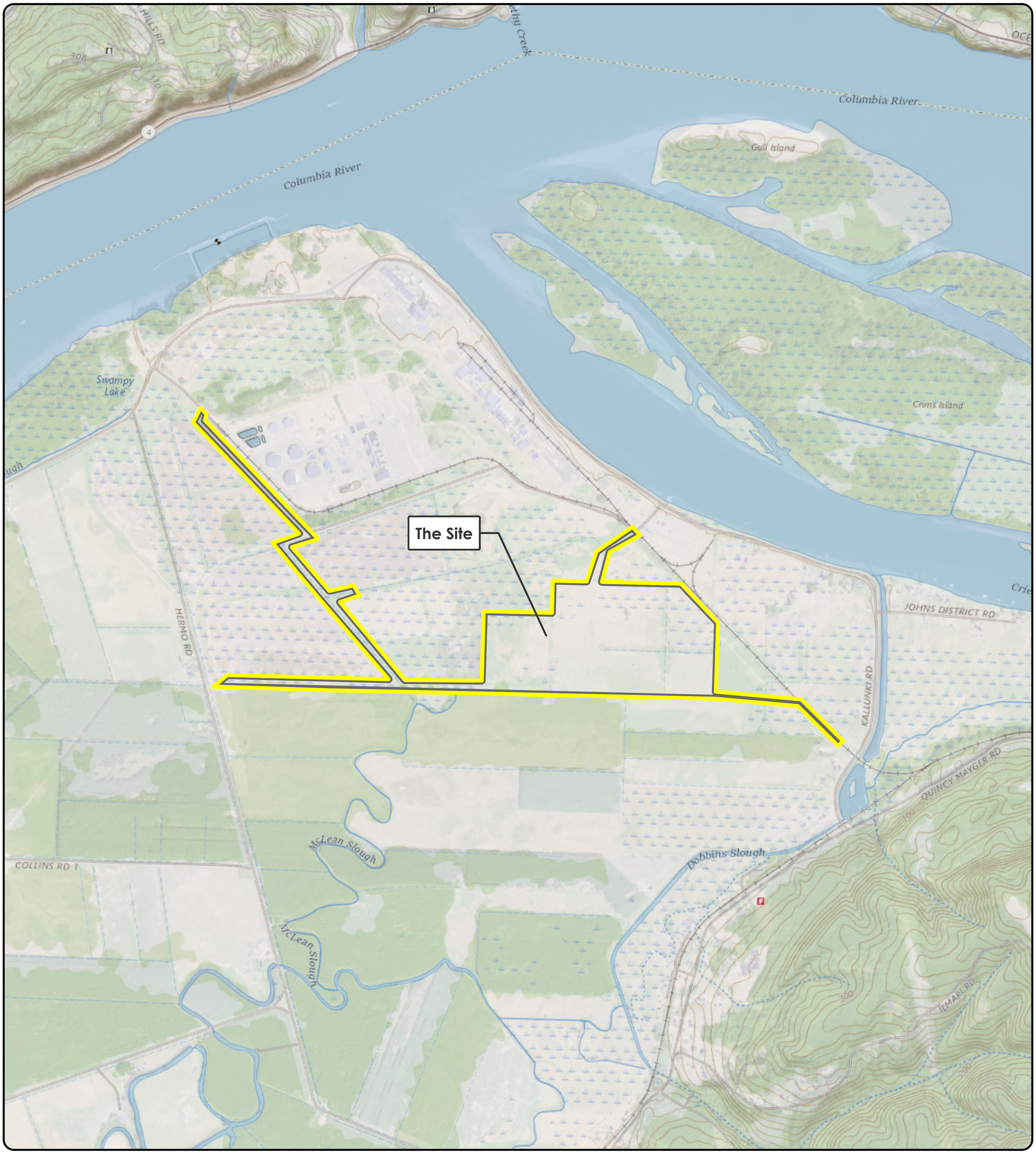
- Fertilizers, pesticides, and herbicides: Their use is strongly discouraged because of the potential for damage to downstream systems. If pesticides or herbicides are required, use products approved for aquatic use and contract with a licensed applicator.
- Vectors (mosquitoes and rats): Stormwater facilities must not harbor mosquito larvae or rodents that pose a threat to public health or that undermine facility structures. Monitor vector activity and implement vector abatement when needed. Do not use pesticides in the ponds.
- Spill Prevention and Response: Spill prevention and response measures will be outlined in a SWPCP and all employees that work in areas that are potentially subject to leaks or spills of significant materials will be trained to prevent spill and respond to them promptly and safely. Biodiesel storage will be subject to a Spill Prevention, Control and Countermeasure Plan and all employees that work in the Main Plant will be trained in the contents of this plan.
- SWPCP: Industrial stormwater BMPs, including but not limited to measures that minimize exposure of stormwater to potential pollutants, oil control measures, erosion, sediment and debris control, stormwater treatment measures, inspections and preventative maintenance, will be outlined in a SWPCP that will be updated as needed. Employees that work in areas where stormwater can be exposed to significant materials and potential pollutants will be trained on the contents of the SWPCP.

LIMITATIONS

The services undertaken in completing this manual were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This manual is solely for the use and information of our client unless otherwise noted. Any reliance on this manual by a third party is at such party's sole risk.

Opinions and recommendations contained in this manual apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this manual.

FIGURES



Notes
U.S. Geological Survey 7.5-minute topographic quadrangle (2021): Oak Point.
Township 8 north, range 4 west, sections 21-23.

Legend

Site Boundary

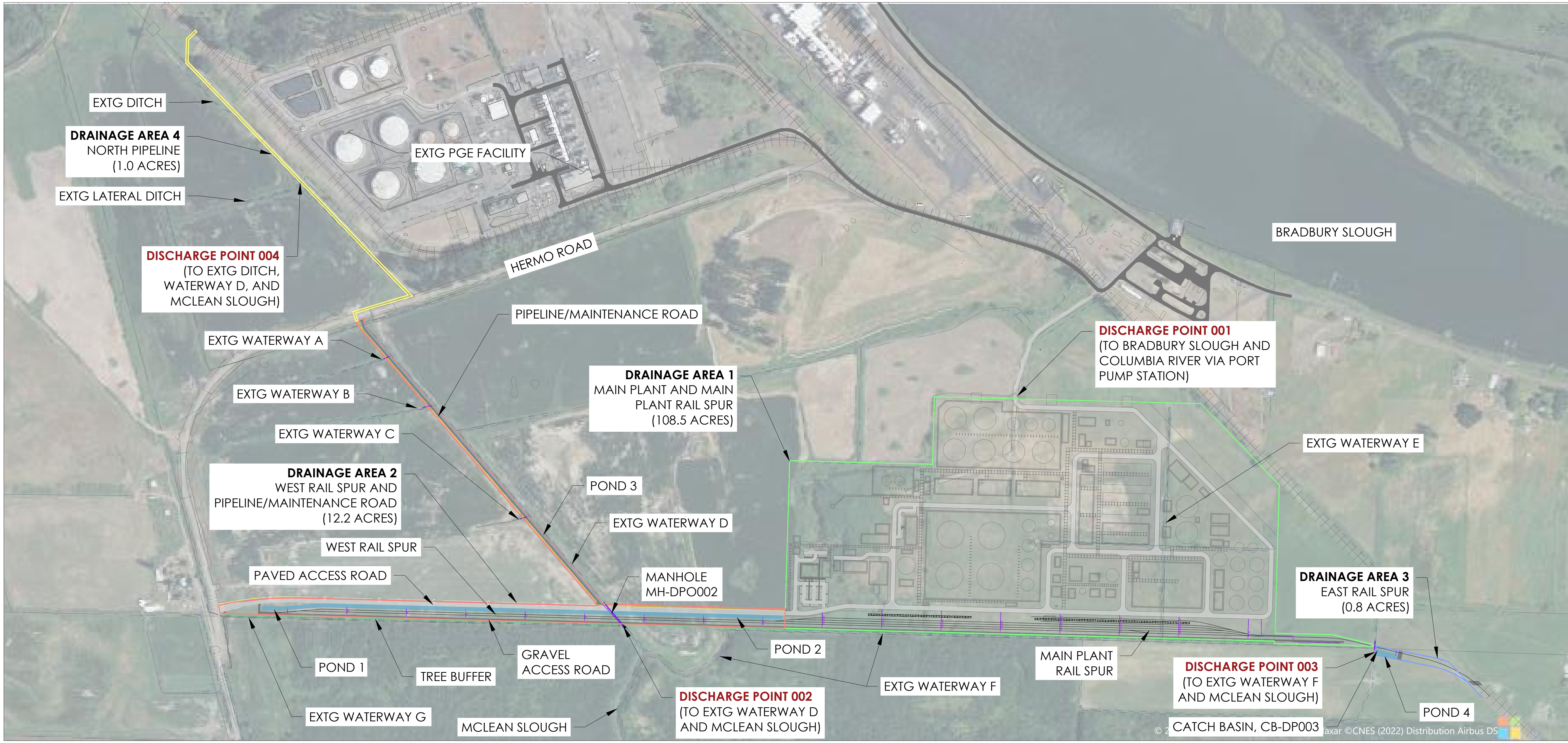
Figure 1
Site Location

NEXT Renewable Fuels, Inc.
Port Westward, OR

0 1,000 2,000
Feet

MAUL FOSTER ALONGI
p. 971 544 2139 | www.maulfoster.com

Project: M1724.01.004 Produced By: jroberts Reviewed By: apoliski Print Date: 1/19/2023 Path: X:\1724.01 CONFIDENTIAL - NEXTEnergy_04\Projects\Pro\M1724_01_004.aprx



LEGEND

STORMWATER POND	RAIL SPUR
PAVED ROAD	PIPE RACK
GRAVEL	STORM PIPE
TREE BUFFER	CATCH BASIN
DRAINAGE AREA BOUNDARY	EXISTING WATERWAY/DITCH

MFA JOB #:	M1724.01
ISSUE DATE:	1/19/2023
CHECKED:	A. AGUIRRE
DRAWN:	L. DANIEL

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www.maulfoster.com

NEXT Renewable Fuels, Inc.

SITE LAYOUT

NEXT RENEWABLE FUELS OREGON

NEXT RENEWABLE FUELS, INC.
PORT WESTWARD, OREGON

0 700' 1400'

NOTE: BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

FIGURE
2

Filepath:G:\00_MFA Civil 3D\00_PROJECTS\1724.01 NEXT Renewable Fuels, Inc\EXHIBIT\Figure 2_SWMP.dwg

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