Willamette Cove Upland 30% Remedial Design

February 4, 2026

Port of Portland

Metro

APEX

Agenda

- Design Objectives, Criteria, and Standards
- Design Elements
- Drawings
- Specification Outline
- Potential Concerns
- Preliminary Construction Schedule

Design Objectives, Criteria, and Standards

- RAOs
  - Prevent exposure of human receptors to soil containing COCs at concentrations exceeding individual and cumulative acceptable risk levels
  - Prevent exposure of ecological receptors to soil containing COCs at concentrations exceeding individual and cumulative acceptable risk levels
  - Remove or treat hot spots to the extent feasible and practicable
  - Prevent migration of contaminated upland soil to the river, to the extent practicable

Design Objectives, Criteria, and Standards

Remediation Goals and Hot Spot Levels

Analyte	Human Health		Ecological					
			Immobile			Mobile		
	Remediation Goal	Hot Spot	Remediation Goal	Hot Spot	Basis	Remediation Goal	Hot Spot	Basis
	Concentration in mg/kg							
Antimony	24	240	5	50	Plant	2.7	27	Mamm
Arsenic	8.8	140	18	180	Plant	83	830	Mamm
Chromium	--	--	39	39	Bkgd	87	870	Bird
Copper	11,000	110,000	70	700	Plant	82	820	Mamm
Lead	400	4,000	120	1200	Plant	33	330	Bird
Mercury	--	--	0.1	1	Invert	0.073	0.15	Bird
Nickel	--	--	38	380	Plant	23	200	Bkgd/Mamm
Selenium	--	--	0.52	5.2	Plant	1.1	11	Mamm
Zinc	--	--	120	1,200	Invert	201	2,010	Mamm
cPAHs	0.55	55	--	--	--	--	--	--
Dibenzofuran	--	--	--	--	--	0.01	0.1	Mamm
Total HPAH	--	--	18	180	Invert	5.6	56	Mamm
Total LPAH	--	--	29	290	Invert	100	1,000	Mamm
Total PCBs	0.74	40	40	400	Plant	0.098	0.98	Mamm
Dioxin/Furan TEQ	1.50E-05	1.50E-03	--	--	--	6.10E-06	6.10E-05	Mamm

Design Objectives, Criteria, and Standards

- RD Concept
  - Removal and off-site disposal of soil:
    - >HH hot spot
    - >Eco (non-dioxin) hot spot
    - >Eco (dioxin) hot spot, if practicable
    - Human health risk exceeds acceptable risk levels
    - Non-hot spot soils with higher relative ecological risks, if practicable
  - Cap residual contamination:
    - > RGs
  - Restore site to facilitate park development consistent with Metro master plan
    - Top of bank landward
    - Surface water infiltrate or sheet flow
    - Native vegetation

Design Elements

- Site Clearing
  - Native Tree Preservation
    - To be evaluated in 60% Design
    - Evaluation limited to DUs with baseline HQ<5 and HI<10 (DU-3, -37, -38, -39, -40, -43, -44)
  - Removal of Structures and Debris
    - Remove concrete slabs and pavement
    - Remove concrete foundations and wood pilings at least to limits of excavation
    - Remove smaller debris (brick, wood, metal, glass, and ceramic fragments) with soil to limits of excavation
    - Larger debris will be recycled/demolition debris landfill if it can be adequately decontaminated – otherwise debris will be disposed of with contaminated soil
  - Vegetation Clearing
    - Vegetation cut at ground surface and composted, if practicable
    - Some large native trees will be salvaged for use as LWD
      - Include root balls only if contaminated soil can be removed

Design Elements

- Hot Spot Excavation
  - Hot spots in depth range of 0-3 feet targeted for removal
  - Soil piles
    - DU-21, -30, -33, -36, -41, and -43
    - Piles will be removed to adjacent existing grade prior to hot spot excavation
  - Partial layer removal
    - DU-16, -19, -21, -24, and -28
    - DUs with decreasing trends suitable for interpolation
    - Will be verified with ISM sampling over 0.5-ft interval prior to RA
  - Buried hot spots
    - DU-1, -6, and -30
    - Overlying material stockpiled and replaced

Design Elements

- Excavation – Human Health Risk After Hot Spot Excavation
  - Residual Risks acceptable except for D/F TEQ on Central Parcel
  - Central Parcel – Exceedance driven by single DU using Surrogate Layer 3 data that will be excavated
  - No additional excavation needed

Risk Category	Exposure Area	COC	Residual Risk
Non-Carcinogenic	West Parcel	Lead	0.1
		Cumulative Risk	0.1
	Central Parcel*	Lead	0.2
		D/F TEQ	0.2
		Cumulative Risk	0.4
	East Parcel	Lead	0.1
		D/F TEQ	0.1
		Cumulative Risk	0.2
Carcinogenic	West Parcel	D/F TEQ	9.E-07
		cPAHs	1.E-06
		PCBs	2.E-07
		Cumulative Risk	2.E-06
	Central Parcel*	D/F TEQ	2.E-06
		cPAHs	1.E-06
		Cumulative Risk	3.E-06
	East Parcel	D/F TEQ	1.E-06
		cPAHs	2.E-07
		Cumulative Risk	2.E-06

Notes:

* Analysis includes excavated Layer 3 data

Shaded values exceed Acceptable Risk Level

Design Elements

- Excavation – "Higher" Eco Risk
  - Hot Spot Removal:
    - 48,000 cy
    - 70% - 97% Risk Reduction from Baseline
  - Additional Excavation to Achieve HQ<5 and HI<10:
    - Additional 20,000 cy excavation
    - 80% to 99% Risk Reduction from Baseline
  - No additional excavation proposed:
    - Additional risk reduction only 10 points at the low end and 2 points at the high end
    - Additional 20k cy excavation not practicable for marginal risk decrease given that the risk will be managed with a 3-foot cap

		Baseline	After Hot Spot Removal	After Additional Removal for Higher Eco Risk*	Risk Reduction from Baseline	
					Hot Spot (48,000 cy)	Additional* (20,000 cy)
Maximum Hazard Quotient	Plant	17	3.3	2.2	81%	87%
	Invertebrate	51	3.0	3.0	94%	94%
	Bird	340	9.9	4.9	97%	99%
	Mammal	65	9.6	4.9	85%	92%
Maximum Hazard Index	Plant	25	7.4	5.0	70%	80%
	Invertebrate	56	6.7	4.2	88%	93%
	Bird	360	17	9.4	95%	97%
	Mammal	70	14	9.3	80%	87%

Notes:

* Remove soil with HQ>5 or HI>10

Design Elements

- Residual Risk Uncertainty – Human Health Risk on Decision Unit Basis
  - Non-carcinogenic risk:
    - Acceptable on Decision Unit Basis
  - Carcinogenic risk:
    - DU risks exceed exposure area risks by factors of 1.5 to 4
    - D/F TEQ and cPAHs maximum exceedance is 2 to 4 times Acceptable Risk Level (ARL)
    - Arsenic:
      - Exceeds ARL by factor of 6 to 11 in three DUs
      - Corresponds to 1.0 to 1.8 times background
  - No additional excavation proposed:
    - Risk levels in individual DUs exceed ARL or background by factors of 4 or less
    - 10,000 cubic yards additional excavation needed
    - Additional excavation not practicable for marginal risk decrease given that the risk will be managed with a 3-foot cap

Risk Category	Exposure Area	COC	Residual Risk	Maximum Decision Unit Residual Risk
Non-Carcinogenic	West Parcel	Lead	0.1	0.3
		Cumulative Risk	0.1	0.4
	Central Parcel*	Lead	0.2	0.2
		D/F TEQ	0.2	0.3
		Cumulative Risk	0.4	0.5
	East Parcel	Lead	0.1	0.5
		D/F TEQ	0.1	0.3
		Cumulative Risk	0.2	0.7
Carcinogenic	West Parcel	D/F TEQ	9.E-07	2.E-06
		cPAHs	1.E-06	3.E-06
		PCBs	2.E-07	1.E-06
		Cumulative Risk	2.E-06	4.E-06
	Central Parcel*	D/F TEQ	2.E-06	3.E-06
		cPAHs	1.E-06	2.E-07
		Cumulative Risk	3.E-06	3.E-06
	East Parcel	D/F TEQ	1.E-06	4.E-06
		cPAHs	2.E-07	1.E-06
		Arsenic	Background	1.E-05
		Cumulative Risk	2.E-06	1.E-05

Notes:
* Exposure area residual risk analysis includes excavated Layer 3 data
Shaded values exceed Acceptable Risk Level

Design Elements

- Residual Risk Uncertainty – Human Health Exposure Area Risk Based on Data from Top 1 Foot
  - Non-carcinogenic risk:
    - Acceptable for top 1 foot
  - Carcinogenic risk:
    - No change in D/F Risk on Central Parcel
    - cPAHs on Central Parcel and D/F TEQ on East Parcel exceed ARL by factor of 2
  - No additional excavation proposed:
    - Exposure Area risk acceptable
    - Risk levels in top 1 foot exceed ARL by factor of 2
    - Risk for Central Parcel used surrogate values from Layer 3 that will be excavated – actual risks expected to be lower
    - Minor risk exceedances will be managed with a 3-foot cap

Risk Category	Exposure Area	COC	Residual Risk	Residual Risk - Top 1 Foot
Non-Carcinogenic	West Parcel	Lead	0.1	0.1
		D/F TEQ	--	0.1
		Cumulative Risk	0.1	0.3
	Central Parcel*	Lead	0.2	0.2
		D/F TEQ	0.2	0.2
		Cumulative Risk	0.4	0.4
	East Parcel	Lead	0.1	0.2
		D/F TEQ	0.1	0.2
		Cumulative Risk	0.2	0.4
Carcinogenic	West Parcel	D/F TEQ	9.E-07	1.E-06
		cPAHs	1.E-06	1.E-06
		PCBs	2.E-07	3.E-07
		Cumulative Risk	2.E-06	2.E-06
	Central Parcel*	D/F TEQ	2.E-06	2.E-06
		cPAHs	1.E-06	2.E-06
		Cumulative Risk	3.E-06	4.E-06
	East Parcel	D/F TEQ	1.E-06	2.E-06
		cPAHs	2.E-07	3.E-07
		Cumulative Risk	2.E-06	2.E-06

Notes:
* Analysis includes excavated Layer 3 data
Shaded values exceed Acceptable Risk Level

Design Elements

- Residual Risk Uncertainty – Human Health Replicate Adjusted Data
  - Non-Carcinogenic Risk:
    - Maximum cumulative risk slightly exceeds ARL for adjusted data
    - Exceeds in only two DUs on East Parcel
    - Exposure Area risks acceptable
  - Carcinogenic Risk:
    - Risks 40-90% greater using adjusted data vs. unadjusted
    - Higher risks driven primarily by arsenic at 2-3 times background in several DUs on East Parcel; exposure area concentrations for arsenic below background
    - D/F Exposure Area Risk 3E-06 and 2E-06 on Central and East Parcel, respectively
  - No additional excavation proposed:
    - NC risk generally acceptable
    - Exposure area risk exceeds ARL by factor of 2-3 times
    - Risk for Central Parcel used surrogate values from Layer 3 that will be excavated – actual risks expected to be lower
    - Minor risk exceedances will be managed with a 3-foot cap

	Maximum Decision Unit Risk Values			
	Non-Carcinogen		Carcinogen	
	Individual COC	Max Cumulative	Individual COC	Max Cumulative
Residual Risk	0.5	0.7	1E-05	1E-05
Adjusted Data Residual Risk	0.8	1.1	2E-05	2E-05

Notes:
Shaded values exceed acceptable risk level
Unacceptable risk primarily driven by arsenic at 2-3 times background

Design Elements

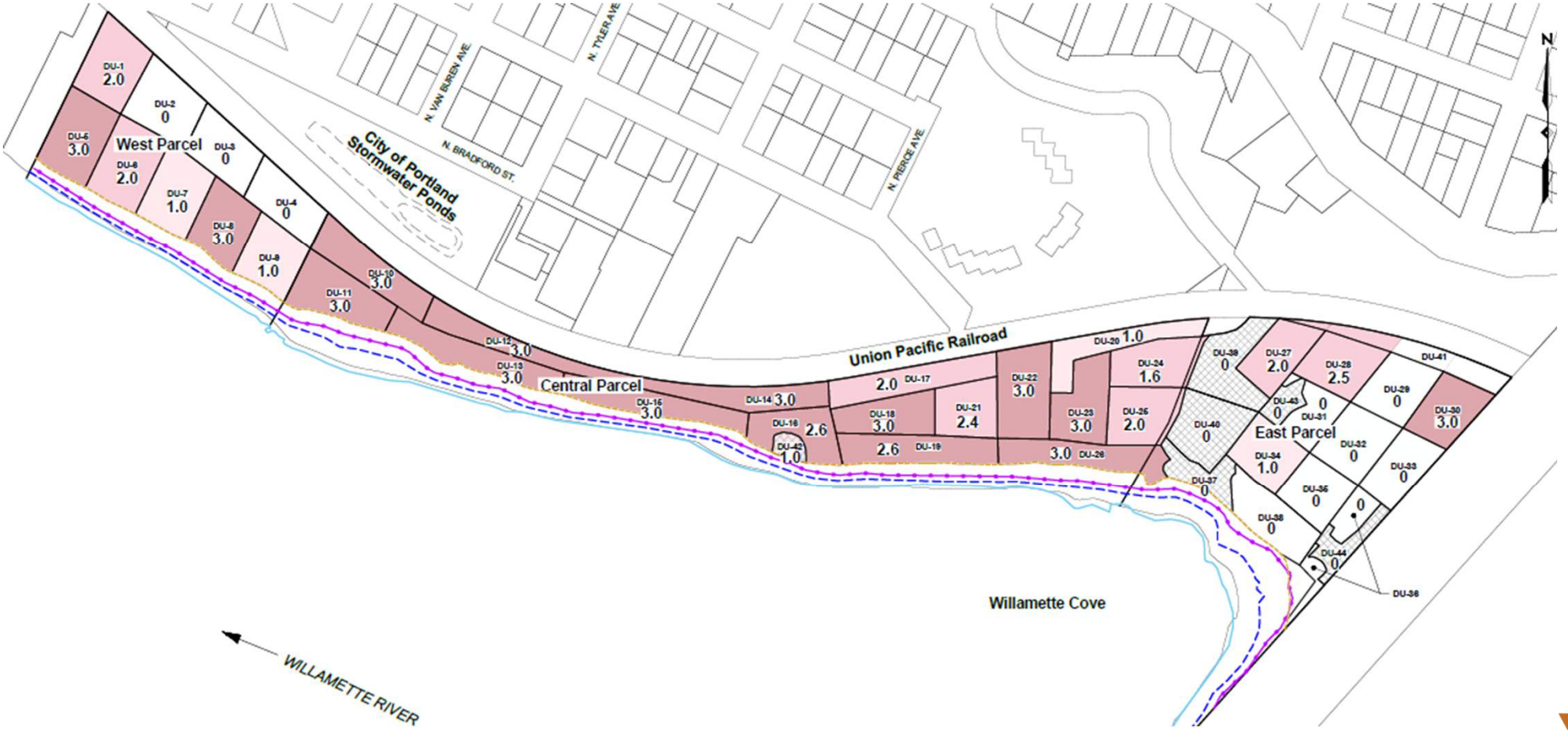
- Residual Risk Uncertainty – Ecological Replicate Adjusted Data
  - Plants/Invertebrates:
    - No substantive risk change on West/Central Parcels
    - On East Parcel, adjusted data result in approximately 50% greater risk than unadjusted data
    - Adjusted residual concentrations less than hot spot levels
  - Birds:
    - No substantive risk change on Central Parcel
    - On West and East Parcels, adjusted data result in approximately 60% greater risks than unadjusted data
    - West Parcel: 6 of 17 adjusted residual concentrations greater than hot spot (Hg), but 5 of 6 are in riverbank parcels where half the DU will be excavated during bank layback
    - East Parcel: 1 of 38 adjusted residual concentrations greater than hot spot (Hg); DU-28 that will have additional sampling
  - Mammals:
    - West Parcel:
      - Adjusted residual risks 30 to 110% greater than unadjusted
      - 1 of 17 adjusted residual concentrations greater than hot spot (PCBs)
    - Central Parcel:
      - Adjusted residual risks 30 to 60% greater than unadjusted
      - 1 of 11 adjusted residual concentrations greater than hot spot (D/F); DU-19 that will have additional sampling
    - East Parcel:
      - Adjusted residual risks 30% greater than unadjusted
      - 3 of 42 adjusted residual concentrations greater than hot spot (D/F)

Design Elements

- Residual Risk Uncertainty – Ecological Replicate Adjusted Data (Continued)
  - No additional excavation proposed:
    - No hot spot exceedances for plants/invertebrates
    - Infrequent hot spot exceedances (10% or less) for birds/mammals
    - Most of the bird exceedances will be partially excavated by riverbank layback
    - Two of the exceedances are in DUs targeted for additional sampling
    - Residual risks will be managed with a 3-foot cap

Design Elements

- Preliminary Excavation Plan



Design Elements

- Pre-Cap Site Grading
  - Subgrade Preparation
    - Grading (to be prepared in 60% design)
      - Smooth transitions between DUs with differing excavation depths
      - Create surface water flow patterns that maintain infiltration/sheet flow in the finish grade
    - Remove roots/debris that protrude above subgrade
    - Compact soft spots or loose soil

Design Elements

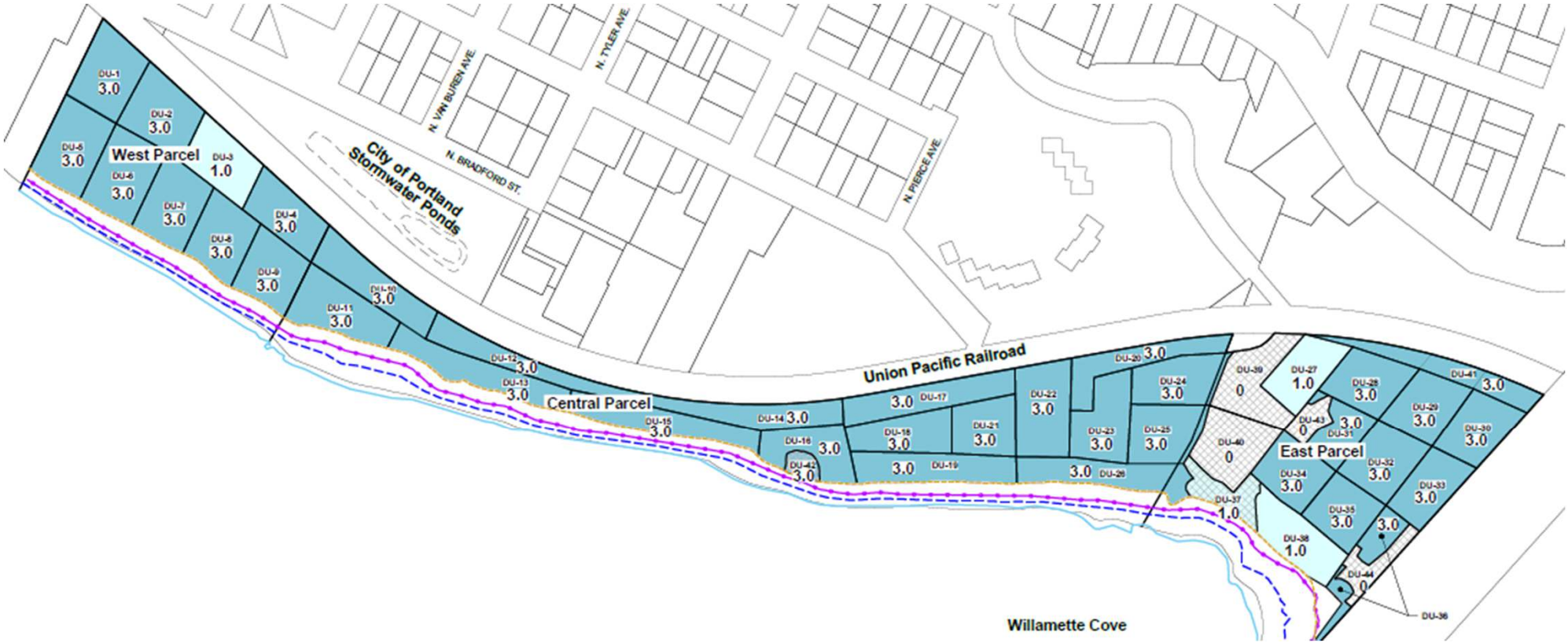
- Cap Design
  - Purpose:
    - Prevent direct contact between ecological receptors and remaining contaminated soil
    - Address human health risk uncertainty
  - Design Criteria (considering ROD requirements and future land use)
    - Cap if residual soil contamination poses risk to eco receptors (i.e., residual HI >= 1.0)
    - Support native plant and animal community
      - Upper portion consist of topsoil
    - Cap thickness correlate with residual HQ and HI

HQ, HI	Cap Thickness (ft)	Demarcation Layer?
HI<1	No Cap	No
HQ<5 and HI<10	1	No
HQ>5 or HI>10	3	Yes

    - Robust inspection/maintenance program

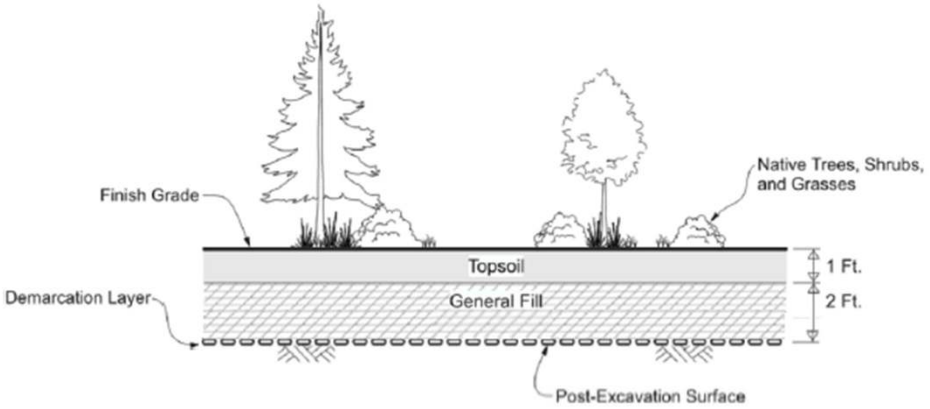
Design Elements

- Preliminary Cap Plan

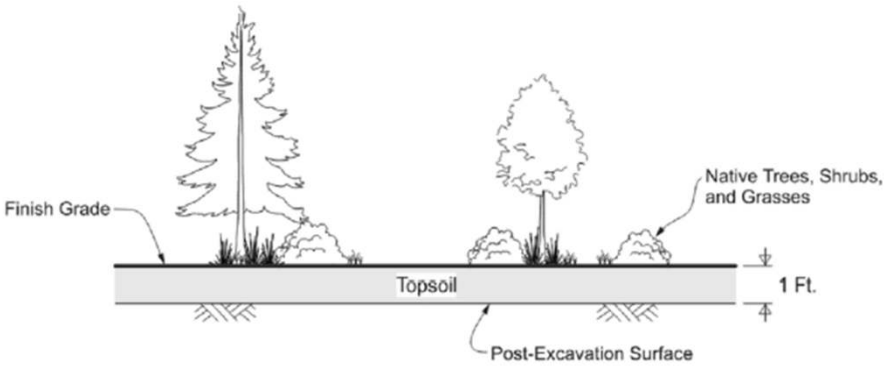


Design Elements

- Cap Details



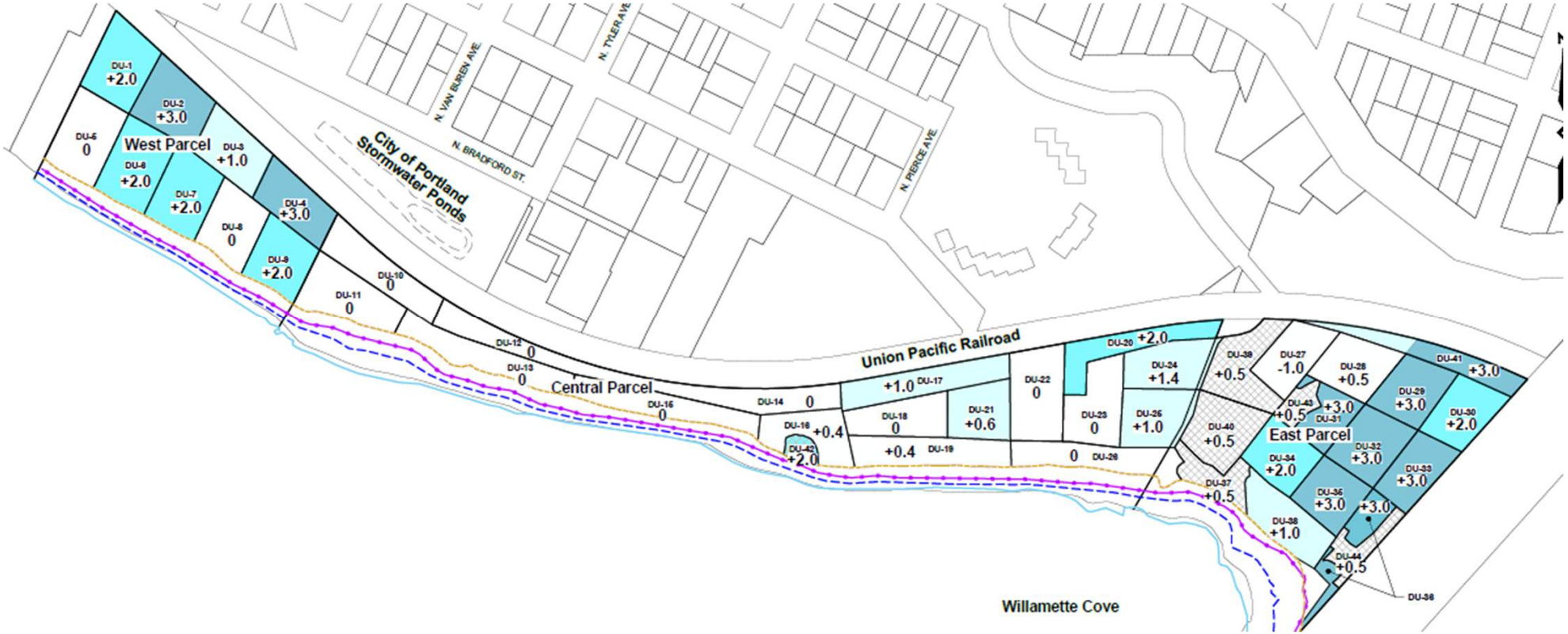
3-FOOT CAP



1-FOOT CAP

Design Elements

- Net Grade Change



Drawings

- See Drawing Set

Specification Outline

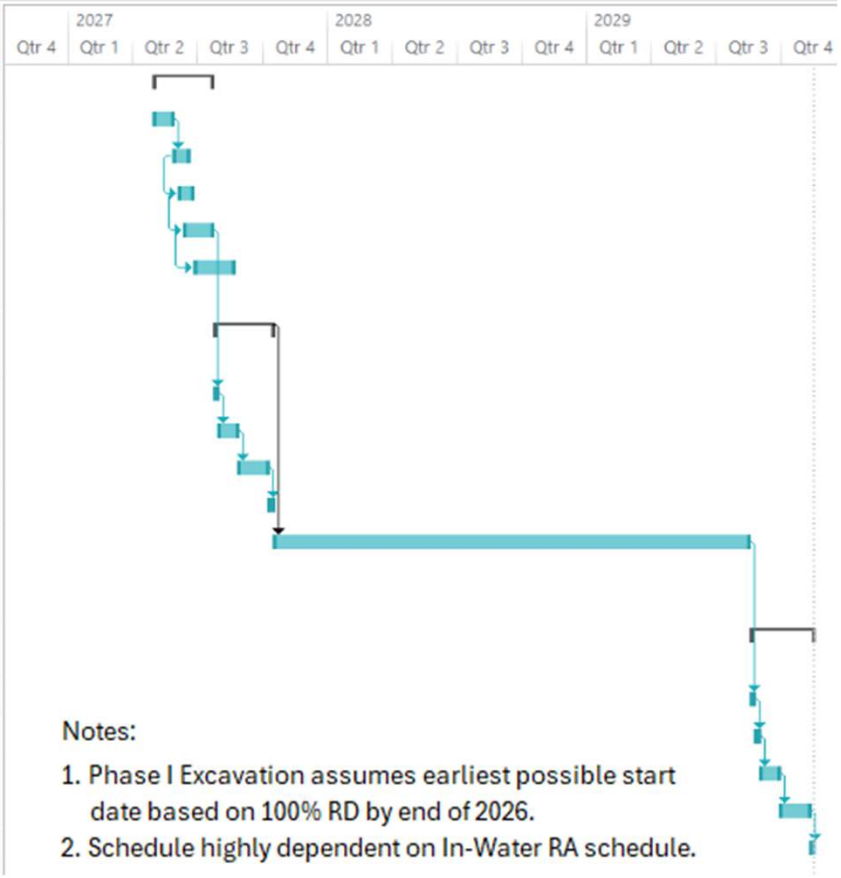
Division		Section	
Number	Title	Number	Title
00	Procurement and Contracting Requirements	00 01 15	List of Drawings
		00 11 13	Advertisement for Bids
		00 21 13	Instructions to Bidders
		00 31 00	Available Project Information
		00 41 00	Bid Form
		00 43 00	Procurement Form Supplements
		00 52 00	Agreement Form
		00 72 00	General Conditions
		00 73 00	Supplementary Conditions
		00 91 13	Addenda
01	General Requirements	01 11 00	Summary of Work
		01 12 00	Multiple Contract Summary
		01 20 00	Price and Payment Procedures
		01 22 00	Unit Prices
		01 31 00	Project Management and Coordination
		01 32 16	Construction Progress Documentation
		01 33 00	Submittal Procedures
		01 35 29	Health, Safety, and Emergency Response Procedures
		01 35 30	Cultural Resources
		01 45 00	Quality Control
		01 46 00	Remedial Construction Work Plan
		01 50 00	Temporary Facilities and Controls
		01 56 39	Tree and Plant Protection
		01 57 13	Temporary Erosion, Sedimentation, and Pollution Controls
		01 57 19	Environmental Construction Controls
		01 57 20	Construction Equipment Idling, Fuel, and Engine Standards
		01 70 00	Execution
		01 77 00	Closeout Procedures
		01 74 19	Construction Waste Management and Disposal
		01 81 00	Green Remediation Requirements
02	Existing Conditions	02 41 13	Site Demolition
31	Earthwork	31 05 13	Soils for Earthwork
		31 05 16	Aggregates for Earthwork
		31 05 19	Geotextiles for Earthwork
		31 10 00	Site Clearing
		31 23 16	Excavation
		31 23 23	Fill
32	Exterior Improvements	32 84 00	Planting Irrigation
		32 91 13	Soil Preparation
		32 91 19	Landscape Grading
		32 92 19	Seeding
		32 93 00	Trees, Shrubs, and Ground Covers

Potential Schedule Concerns

- Coordination with WC In-Water Cleanup
  - Impacts to workflow
  - Delayed implementation schedule
- Competition with Harbor Cleanup for Equipment, Labor, and Materials

Preliminary Construction Schedule

	Task Mode	Task Name	Duration	Start	Finish	Predecessors
1		**Phase I - Excavation**	**60 days**	**Mon 5/3/27**	**Fri 7/23/27**	
2		Mobilization	20 days	Mon 5/3/27	Fri 5/28/27	
3		Clearing	15 days	Mon 5/31/27	Fri 6/18/27	2
4		Debris Removal	15 days	Mon 6/7/27	Fri 6/25/27	3SS+5 days
5		Excavation	30 days	Mon 6/14/27	Fri 7/23/27	4SS+5 days
6		Riverbank/In-Water Work (by Others)	40 days	Mon 6/28/27	Fri 8/20/27	5SS+10 days
7		**Phase II - Cap and Restoration - South**	**60 days**	**Mon 7/26/27**	**Fri 10/15/27**	
8		Subgrade Preparation	5 days	Mon 7/26/27	Fri 7/30/27	5
9		Cap Placement	20 days	Mon 8/2/27	Fri 8/27/27	8
10		Planting	30 days	Mon 8/30/27	Fri 10/8/27	9
11		De-Mobilization	5 days	Mon 10/11/27	Fri 10/15/27	10
12		Hiatus - Await Completion of In-Water Work	480 days	Mon 10/18/27	Fri 8/17/29	7
13		**Phase III - Cap and Restoration - North**	**65 days**	**Mon 8/20/29**	**Fri 11/16/29**	
14		Mobilization	5 days	Mon 8/20/29	Fri 8/24/29	12
15		Subgrade Preparation	5 days	Mon 8/27/29	Fri 8/31/29	14
16		Cap Placement	20 days	Mon 9/3/29	Fri 9/28/29	15
17		Planting	30 days	Mon 10/1/29	Fri 11/9/29	16
18		De-Mobilization	5 days	Mon 11/12/29	Fri 11/16/29	17



Notes:

1. Phase I Excavation assumes earliest possible start date based on 100% RD by end of 2026.
2. Schedule highly dependent on In-Water RA schedule.

Questions?

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