MILLENNIUM BULK TERMINALS—LONGVIEW SEPA ENVIRONMENTAL IMPACT STATEMENT

SEPA GROUNDWATER TECHNICAL REPORT

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Acronyms and Abbreviations

AFY	acre-feet per year
Applicant	Millennium Bulk Terminals—Longview, LLC
BMPs	best management practices
BNSF	BNSF Railway
CDID	Consolidated Diking and Improvement District
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
cPAH	carcinogenic PAHs
CRB	Columbia River basalt
CVI	Chinook Ventures Inc.
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
LMC	Longview Municipal Code
gpm	gallons per minute
MCL	maximum contaminant level
MTCA	Model Toxics Control Act
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
PAH	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
Reynolds facility	Reynolds Metals Company facility
RCW	Revised Code of Washington
RI/FS	Remedial Investigation/Feasibility Study
SEPA	Washington State Environmental Policy Act
SPL	spent potliner
TPH	total petroleum hydrocarbons
UP	Union Pacific Railroad
USC	United States Code
WAC	Washington Administrative Code
WRIA	Water Resource Inventory Area

Chapter 1
Introduction

This technical report assesses the potential groundwater impacts of the proposed Millennium Bulk Terminals—Longview project (Proposed Action) and No-Action Alternative. For the purposes of this assessment, groundwater refers to subsurface waters held in soils or interstitial spaces of rocks of the project area. This report describes the regulatory setting, establishes the method for assessing potential groundwater impacts, presents historical and current groundwater conditions in the study area, and assesses the potential for impacts on groundwater.

1.1 Project Description

Millennium Bulk Terminals—Longview, LLC (Applicant) proposes to construct and operate a coal export terminal in Cowlitz County, Washington, along the Columbia River (Figure 1). The coal export terminal would receive coal from the Powder River Basin in Montana and Wyoming and the Uinta Basin in Utah and Colorado via rail, then load and transport the coal by ocean-going ships via the Columbia River and Pacific Ocean to overseas markets in Asia. The coal export terminal would be capable of receiving, stockpiling, blending, and loading coal by conveyor onto ships for export. Construction of the coal export terminal would begin in 2018. For the purpose of this analysis, it is assumed the coal export terminal would operate at full capacity in 2028.

The following subsections present a summary of the Proposed Action and No-Action Alternative. For detailed information on these alternatives, see the Washington State Environmental Policy Act (SEPA) Alternatives Technical Report (ICF International 2016a).

1.1.1 Proposed Action

The Proposed Action would develop a coal export terminal on 190 acres (project area). The project area is located within an existing 540-acre area currently leased by the Applicant at the former Reynolds Metals Company facility (Reynolds facility), and land currently owned by Bonneville Power Administration. The project area is adjacent to the Columbia River in unincorporated Cowlitz County, Washington near Longview city limits (Figure 2).

The Applicant currently and separately operates, and would continue to separately operate, a bulk product terminal on land leased by the Applicant. Industrial Way (State Route 432) provides vehicular access to the Applicant's leased land. The Reynolds Lead and the BNSF Spur, both operated by Longview Switching Company (LVSW),[1] provide rail access to the Applicant's leased area from a point on the BNSF Railway Company (BNSF) main line (Longview Junction, Washington) located to the east in Kelso, Washington. Ships access the Applicant's leased area via the Columbia River and berth at an existing dock (Dock 1) operated by the Applicant in the Columbia River.

[1] The Longview Switching Company (LVSW) is jointly owned by the BNSF Railway Company (BNSF) and Union Pacific Railroad (UP).

Figure 1. Project Vicinity

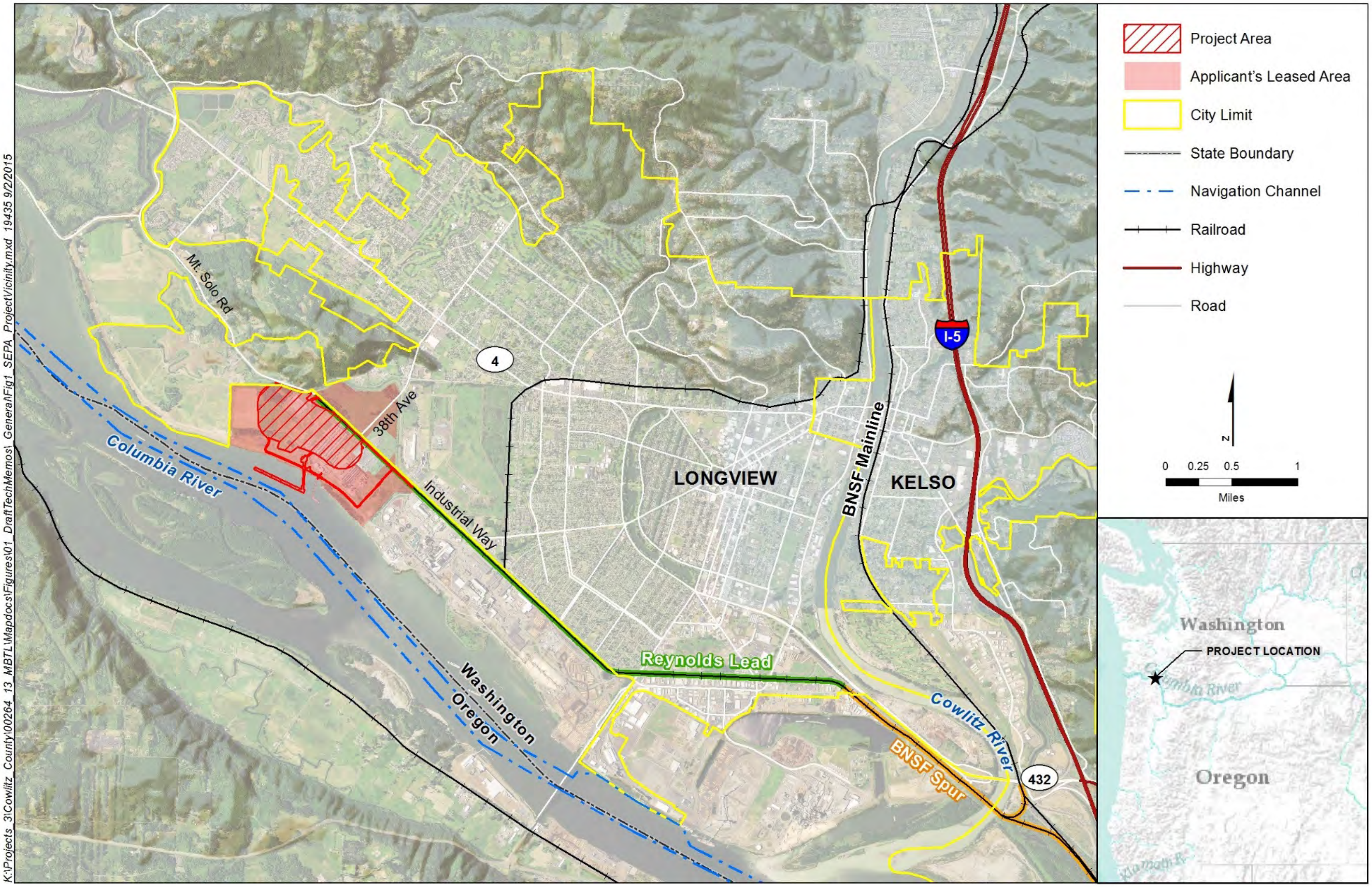
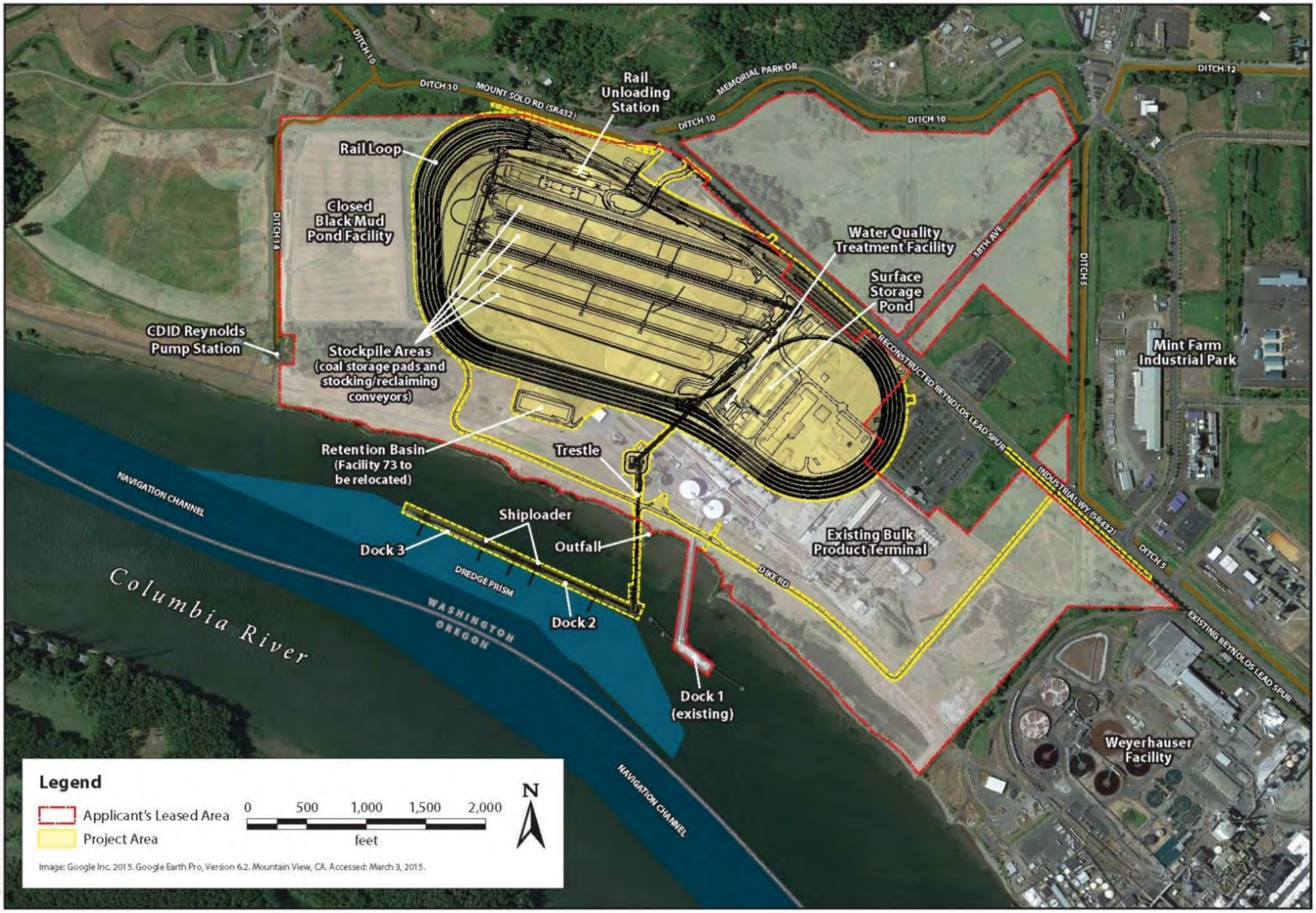


Figure 2. Proposed Action



Under the Proposed Action, BNSF or Union Pacific Railroad (UP) trains would transport coal in rail cars from the BNSF main line at Longview Junction, Washington, to the project area via the BNSF Spur and Reynolds Lead. Coal would be unloaded from rail cars, stockpiled and blended, and loaded by conveyor onto ocean-going ships at two new docks (Docks 2 and 3) on the Columbia River for export.

Once construction is complete, the Proposed Action would have an annual throughput capacity of up to 44 million metric tons.[2] The coal export terminal would consist of one operating rail track, eight rail tracks for the storage of rail cars, rail car unloading facilities, stockpile areas for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks 2 and 3), and ship-loading facilities on the two docks. Dredging of the Columbia River would be required to provide access to and from the Columbia River navigation channel and for berthing at the two new docks.

Vehicles would access the project area from Industrial Way (State Route 432). Ships would access the project area via the Columbia River and berth at one of the two new docks. Terminal operations would occur 24 hours per day, 7 days per week. The coal export terminal would be designed for a minimum 30-year period of operation.

1.1.2 No-Action Alternative

Under the No-Action Alternative, the proposed export terminal would not be constructed. Current operations of the bulk product terminal, which include the storage and transport of alumina and up to 150,000 metric tons per year of coal. Importing of alumina would continue and increase in the project area using Dock 1. The Applicant could expand the existing bulk product terminal onto the 190-acre project area, developing storage and shipment facilities to bulk product terminal operations. Coal and alumina would continue to be stored, transferred, and shipped. Additional bulk product transfers activities involving products such as calcine pet coke, coal tar pitch, cement, fly ash, and sand or gravel could also be pursued, and new or revised permits could be required. These operations would involve storage and upland transfer of bulk products, which would use existing or new buildings. Construction of new buildings could involve demolition and replacement of existing buildings and new or modified permits. Any new construction would be limited to uses allowed under existing Cowlitz County development regulations and federal and state permits.

1.2 Regulatory Setting

Various jurisdictions have responsibility for the protection and regulation of groundwater. These jurisdictions and the regulations, statutes, and guidelines that apply to groundwater are summarized in Table 1.

[2] A metric ton is the U.S. equivalent to a tonne per the International System of Units, or 1,000 kilograms or approximately 2,204.6 pounds.

Table 1. Regulations, Statutes, and Guidelines for Groundwater

Regulation, Statute, Guideline	Description
Federal	
National Environmental Policy Act (42 USC 4321 *et seq.*)	Requires the consideration of potential environmental effects. NEPA implementation procedures are set forth in the President's Council on Environmental Quality's Regulations for Implementing NEPA (49 CFR 1105).
Clean Water Act (33 USC 1251 *et seq.*)	Establishes the basic structure for regulating discharges of pollutants into waters of the United States and regulating quality standards for surface waters but not groundwater.
Safe Drinking Water Act	Requires the protection of groundwater and groundwater sources used for drinking water. Also, requires every state to develop a wellhead protection program.
National Pollutant Discharge Elimination System Permit	Authorized by the Clean Water Act, the permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Surface water in the study area interacts with groundwater.
State	
Washington State Environmental Policy Act (WAC 197-11, RCW 43.21C)	Requires state and local agencies in Washington to identify potential environmental impacts that could result from governmental decisions.
Water Code (RCW 90.03)	Establishes rules for regulating and controlling water rights, and defines beneficial uses.
Regulation of Public Groundwaters (RCW 90.44)	Regulates and controls groundwater. Extends application of surface water statutes (90.02 RCW) to groundwater.
Water Quality Standards for Groundwaters of the State of Washington (WAC-173-200)	Groundwater standards intended to preserve a level of quality for groundwater capable of meeting current state and federal safe drinking water standards.
Drinking Water/Source Water Protection (RCW 43.20.050)	Requires that the Washington State Department of Health assure safe and reliable public drinking water supplies in cooperation with local health departments and water purveyors.
Model Toxics Control Act (RCW 70.105D)	Requires potentially liable persons to assume responsibility for cleaning up contaminated sites.
State Water Pollution Control Law (RCW 90.48)	Grants Ecology the jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland water, salt waters, watercourses, and other surface and groundwater in the state.
Water Resources Act of 1971 (RCW 90.54)	Sets forth fundamental policies for the state to insure that waters of the state are protected and fully utilized for the greatest benefit.
Washington State Oil and Hazardous Substance Spill Prevention and Response (90.56 RCW)	Requires notification of releases of hazardous substances and establishes procedures for response and cleanup

Regulation, Statute, Guideline	Description
Model Toxic Control Act Cleanup Regulations (173-340 WAC).	Establishes procedures for investigation and site cleanup actions. Requires potentially liable persons to assume responsibility for cleaning up contaminated sites
Local	
Cowlitz County SEPA Regulations (CCC 19.11)	Provide for the implementation of SEPA in Cowlitz County.
Cowlitz County Critical Areas Ordinance (CCC 19.15)	Designates critical areas and development regulations to assure the conservation of such areas in accordance with best available science.
Cowlitz County Critical Aquifer Recharge Area (CCC 19.15.160)	Designates critical areas and development regulations to assure the conservation of such areas in accordance with best available science.
Longview Water Supply Protection Ordinance (LMC 17.100)	Establishes a Wellhead Protection Program to minimize the risk of groundwater contamination

NEPA = National Environmental Policy Act; CFR = Code of Federal Regulations; USC = United States Code; RCW = Revised Code of Washington; SEPA = Washington State Environmental Policy Act; WAC = Washington Administrative Code; EPA = U.S. Environmental Protection Agency; Ecology = Washington State Department of Ecology, CCC = Cowlitz County Code; LMC = Longview Municipal Code

1.3 Study Area

The study area for direct impacts on groundwater is the project area for the Proposed Action. The study area for indirect impacts is the 540-acre Applicant's leased area (Figure 2).

Chapter 2
Existing Conditions

This chapter explains the methods for assessing the existing conditions and determining impacts, and describes the existing conditions in the study area as they pertain to groundwater resources.

2.1 Methods

This section describes the methods used to characterize the existing conditions and assess the potential impacts related to hazardous material under the Proposed Action and No-Action Alternative.

2.1.1 Data Sources

The following sources of information were used to characterize and evaluate groundwater conditions in the study area.

- *Remedial Investigation Report* (Anchor Environmental, LLC 2007)
- *Former Reynolds Metals Reduction Plant—Longview, Draft Remedial Investigation and Feasibility Study* (Anchor QEA 2014a).
- *Millennium Coal Export Terminal Longview, Washington, Water Resources Report* (URS Corporation 2014a)
- *Millennium Coal Export Terminal Longview, Washington, Water Resource Report* (URS Corporation 2014b)
- *Millennium Coal Export Terminal Longview, Washington, Surface Water Memorandum* (URS Corporation 2014c).
- *Millennium Coal Export Terminal Longview, Washington Surface Water Memorandum, Second Supplement to Water Resource Report Water Collection and Drainage* (URS Corporation 2014d)
- City of Longview, Mint Farm Regional Water Treatment Plant, Preliminary Design Report, Part 2A, Hydrogeologic Characterization, March 2010.)
- Other scientific literature as cited in the text.

2.1.2 Impact Analysis

This impact analysis evaluates the changes the Proposed Action and No-Action Alternative could have on existing groundwater conditions and how existing groundwater conditions could affect the project area.

Potential groundwater impacts have been evaluated with respect to several general parameters, including groundwater discharge and recharge, groundwater quality, and groundwater withdrawal and how the Proposed Action and No-Action Alternative may affect these parameters. The assessment of impacts is also based on regulatory controls and the assumption that the Proposed Action would include the following elements.

- An individual National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharges for the stormwater improvements.
- Remediation of any existing soil and groundwater contamination in the project area prior to and concurrently with project construction.
- Long-term monitoring as part of the remediation of the existing groundwater contamination to verify remedy effectiveness and natural attenuation of groundwater contamination.

2.2 Existing Conditions

The existing conditions related to groundwater in the study area are described below.

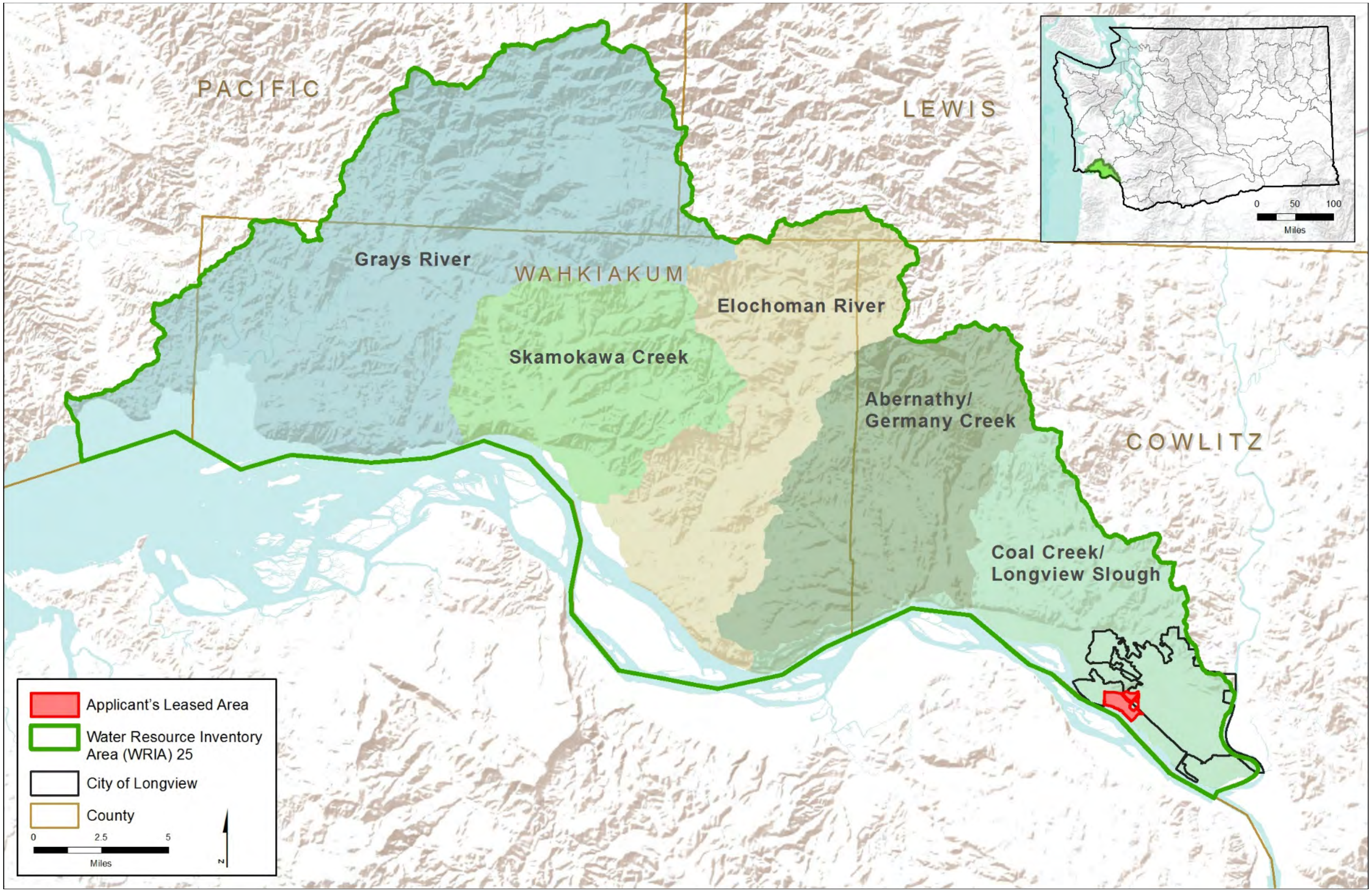
Groundwater can be described as water that is collected or flows beneath the Earth's surface, filling the porous spaces in soil, sediment, and rocks. Groundwater largely originates from rain or melting snow and ice, and is the source of water for aquifers, springs, and wells (Washington State Department of Ecology 2014a). An aquifer is the underground soil or rock through which groundwater can easily move. The amount of groundwater that can flow through soil or rock depends on the size of the spaces in the soil or rock and how well the spaces are connected. Aquifers that consist of gravel, sand, sandstone, or fractured rock such as limestone are made of materials that are permeable (or porous) and allow water to flow through. Aquifers that contain materials such as clay or shale have many small pores that are not well connected and are considered impermeable with restricted groundwater flow (U.S. Geological Survey 2001). An unconfined aquifer is recharged directly by infiltration of precipitation or surface water (e.g., rivers). Confined aquifers are overlain by low-permeability material that limits the vertical flow of water into or out of the aquifer. Landowners access groundwater from wells that tap into an aquifer. Most groundwater is better protected from quick contamination than surface water, depending on a contaminant's ability to permeate the overlying soils or rock.

2.2.1 Regional Setting

The project area and Applicant's leased area are within Water Resource Inventory Area (WRIA) 25, also known as the Grays-Elochoman watershed. This watershed encompasses approximately 296,000 acres and is defined by five subbasins: Grays River, Skamokawa Creek, Elochoman River, Abernathy/Germany Creek, and the Coal Creek/Longview Slough. The project area is within the Coal Creek/Longview Slough subbasin. (HDR and EES 2006). Figure 3 depicts the Grays-Elochoman watershed, the five subbasins, and the project area within the Coal Creek/Longview Slough subbasin.

The principal hydrogeological units that yield the largest quantities of groundwater to wells within WRIA 25 are the unconsolidated sediments (Alluvium Unit) that occur in the valleys of the Cowlitz and Grays river systems and along the Columbia River (HDR and EES 2006). This unit consists of unconsolidated to poorly consolidated Quaternary-age sand, gravel, and silt that form undissected terrace deposits and floodplain deposits within major river and stream valleys. The thickness of this unit is highly variable, commonly ranging from less than 5 feet to more than 100 feet (Lower Columbia Fish Recovery Board 2001).

Figure 3. Watershed Map



Other water-bearing units present in this watershed include tertiary continental sedimentary rocks and the Columbia River basalt (CRB) group. The tertiary continental sedimentary rocks are composed of mainly moderately to well-indurated fluvial (river/stream deposits) sediments, consisting of sandstone, conglomerates, and siltstones, volcaniclastic sediments, and minor paldual (swamp/marsh) and lacustrine (lake) deposits. The tertiary continental sedimentary rocks occur in the eastern portion of the watershed and can reach more than 2,000 feet thick. The CRB group represents the distal portions of a series of continental flood basalt flows that emanated from linear vent systems in northeastern Oregon, southeastern Washington, and western Idaho between approximately 6 and 17 million years ago. The total thickness of this group is highly variable, ranging from 50 feet to more than 400 feet (Lower Columbia Fish Recovery Board 2001).

2.2.1.1 Coal Creek/Longview Slough Subbasin

The project area is in the Coal Creek/Longview Slough subbasin. The principal aquifers mapped in this subbasin are the alluvium and the CRB group. The alluvial aquifer is most extensive in the lower elevations of the subbasin, along streams and their tributaries. The sediments that compose the alluvial aquifer are generally highly permeable. Groundwater in the alluvial aquifer is generally unconfined. Production wells, which produce groundwater for human consumption, are screened in the alluvial aquifer and generally have high yields (to greater than 1,000 gallons per minute [gpm]). The alluvial aquifer is recharged in part by the Columbia and Cowlitz Rivers and tributaries such as Coal Creek (Lower Columbia Fish Recovery Board 2001).

The CRB group is present in the higher elevations of the Coal Creek subbasin. This aquifer is recharged by precipitation, seasonal gains from rivers and streams, and inflow from deeper bedrock aquifers. The number of wells completed in aquifers in the CRB group is unknown; however, groundwater use values presented in the *WRIA 25/26 Grays-Elochoman and Cowlitz Watershed Planning Documents Level 1 Assessment* indicate that significant water withdrawal from the basalt water-bearing zones is not currently occurring. The bulk of the groundwater withdrawal in the Coal Creek/Longview Slough subbasin is currently occurring from the alluvial aquifers where most of the population resides (Lower Columbia Fish Recovery Board 2001).

2.2.2 Local Setting

The project area for the Proposed Action is located on the northeast shore of the Columbia River. Groundwater resources in the study area include an upper alluvium aquifer (i.e., shallow groundwater) and a deeper confined aquifer from which industries, small farms, and domestic well users withdraw groundwater. Shallow groundwater is present in the upper 25 to 100 feet of alluvium and is in direct hydraulic communication with the Columbia River. Preliminary hydrogeologic investigations conducted for the City of Longview indicate that shallow, unconfined groundwater does not significantly contribute to the deeper aquifer as the lower aquifer is primarily recharged by deeper aquifers below the Columbia River (Anchor QEA 2014b).

2.2.2.1 Shallow Aquifer

Shallow groundwater (shallow aquifer) flow in the Longview area is affected by operation of the Consolidated Diking and Improvement District (CDID) #1 drainage ditch system and, to a lesser extent, the stage of (i.e., water surface elevation) the Columbia River. Groundwater and stormwater discharged to the ditches are actively pumped from the ditches by the CDID #1 to maintain surface-water levels below those in the Columbia River. Water from the CDID #1 ditches is discharged to the

Columbia River. Near the project area, a CDID #1 pump station is located near the southwest corner of the Applicant's leased area (Figure 2).

2.2.2.2 Deep Aquifer

The City of Longview conducted a pumping test at a production well for the Mint Farm Regional Water Treatment Plant, located approximately 6,000 feet east of the eastern boundary of the Applicant's leased area (Figure 2), to characterize the deep aquifer. The test results indicate that the Columbia River recharges the deep aquifer at the Mint Farm site and suggest similar recharge of the deep aquifer in the project area. Overall, recharge to the deep aquifer in the project area is expected to be primarily driven by deeper aquifers below the Columbia River and insignificantly from shallow, unconfined aquifers (Anchor QEA 2014b). Discharge from the deep aquifer is from seepage back to the Columbia River, direct discharge to the shallow aquifer, and pumpage from wells (URS Corporation 2014b).

2.2.2.3 Columbia River

The Columbia River flows along the entire south/southwest boundary of both project area and water levels fluctuate with the tides. The mean annual flow of the Columbia River, measured at the Beaver Army Terminal at river mile 53.8 near Quincy, Oregon, is approximately 236,000 cubic feet per second. The river's annual discharge rate fluctuates with precipitation, snowmelt, and reservoir releases, ranging from 63,600 cubic feet per second in a low water year to 864,000 cubic feet per second in a high water year (U.S. Geological Survey 2014). Tributaries to the Columbia River basin are primarily snow-fed (i.e., precipitation falls mainly as snow). These tributaries typically have low winter flows and strong spring and summer peaks with snowmelt, which concentrates about 60% of the natural runoff to the Columbia River during May, June, and July (URS Corporation 2014b). Tidal influences tend to propagate farthest in the coarse-grained deep aquifer and to a much lesser degree within the shallow aquifer (Anchor QEA 2014a).

2.2.2.4 CDID #1 Ditch System

The CDID #1 is a secondary permittee on the Cowlitz County/Kelso/Longview Municipal NPDES permit. The CDID #1 system is a series of levees and ditches. It consists of approximately 35 miles of drainage ditches for the purpose of flood protection from external flooding (rivers), internal flooding (storm drainage runoff), and flooding from lands adjacent to the levee system (groundwater). Additionally, the U.S. Army Corps of Engineers (Corps) constructed a CDID #1 flood control levee in the 1920s along the Columbia River shoreline at the southern boundary of the project area, referred to herein as the Columbia River levee (Figure 2). This levee is part of the larger network of levees designed to protect properties in the Longview area from Columbia River flooding (Anchor QEA 2014a).

The CDID #1 ditch system surrounding the project area controls flooding from the Columbia River and maintains surface water levels below the water surface elevation of the Columbia River, which subsequently influences the shallow aquifer. The CDID #1 ditch system also discharges to the Columbia River through a network of pump stations and valves. As a result of the CDID #1 ditch system, coupled with the higher water surface elevation of the Columbia River, groundwater flows away from the river (to the north, east, and west) and toward the CDID #1 ditches (Anchor QEA 2014a), except for one localized area: groundwater flow south of the axis of the Columbia River levee is toward the Columbia River (Anchor Environmental 2007).

2.2.2.5 Project Area

As discussed above, the project area is located on the northeast shore of the Columbia River. At the project area, groundwater movement in the shallow aquifer is relatively slow. Groundwater in the shallow aquifer flows north from the Columbia River levee then proceeds northwest toward the regional CDID #1 ditch system (Figure 4) (Anchor Environmental 2007). In areas farther from the CDID #1 ditches, shallow groundwater, fed by precipitation, moves downward into the deep aquifer. In areas near the CDID #1 ditch system, groundwater in the deep aquifer moves upward into the shallow aquifer. The levee recharges the shallow groundwater to the north, while the Columbia River recharges the groundwater south of the levee. Discharge of the shallow aquifer occurs from seepage back to the Columbia River, CDID #1 ditch system extraction, evapotranspiration, and pumping from shallow wells (URS Corporation 2014a).

Localized groundwater recharge and quality in the project area are influenced by the Columbia River, the CDID #1 ditch system, and the NPDES ditch system in the Applicant's leased area. The project area is not considered a significant source of groundwater recharge through infiltration due to the hydrology discussed below under *Drainage Basins and Stormwater System*.

Similar to the shallow aquifer, groundwater in the deep aquifer flows from the Columbia River levee northward, then proceeds northwest toward the CDID Ditch 14 (Figure 4) (Anchor Environmental 2007). The one exception to this localized flow of deep groundwater away from the Columbia River (at least seasonally) is an area south of the levee where it flows toward the river.

As discussed above, shallow groundwater that is recharged from precipitation moves downward into the deep aquifer if it is not intercepted by the CDID #1 ditches. However, in areas near the CDID #1 ditches an upward vertical gradient exists, causing groundwater in the deep aquifer to move upward into the shallow aquifer (Anchor Environmental 2007).

Drainage Basins and Stormwater System

The NPDES drainage ditch system collects all stormwater runoff in the Applicant's leased area. The system includes 12 drainage basins and five outfalls that the Applicant manages under the NPDES permit (WA-000008-6) for the existing bulk product terminal. The outfalls discharge treated stormwater to the CDID #1 ditches and the Columbia River. One of the five outfalls, 004, has been closed since 1991. The major collection and treatment systems, drainage basins, outfalls, and discharge locations currently managed under the NPDES program are described in the following sections, based on the *Millennium Coal Export Terminal Longview, Washington Surface Water Memorandum* (URS Corporation 2014c), and shown on Figures 5 and 6.

Figure 4. Groundwater Gradients and Flow Direction

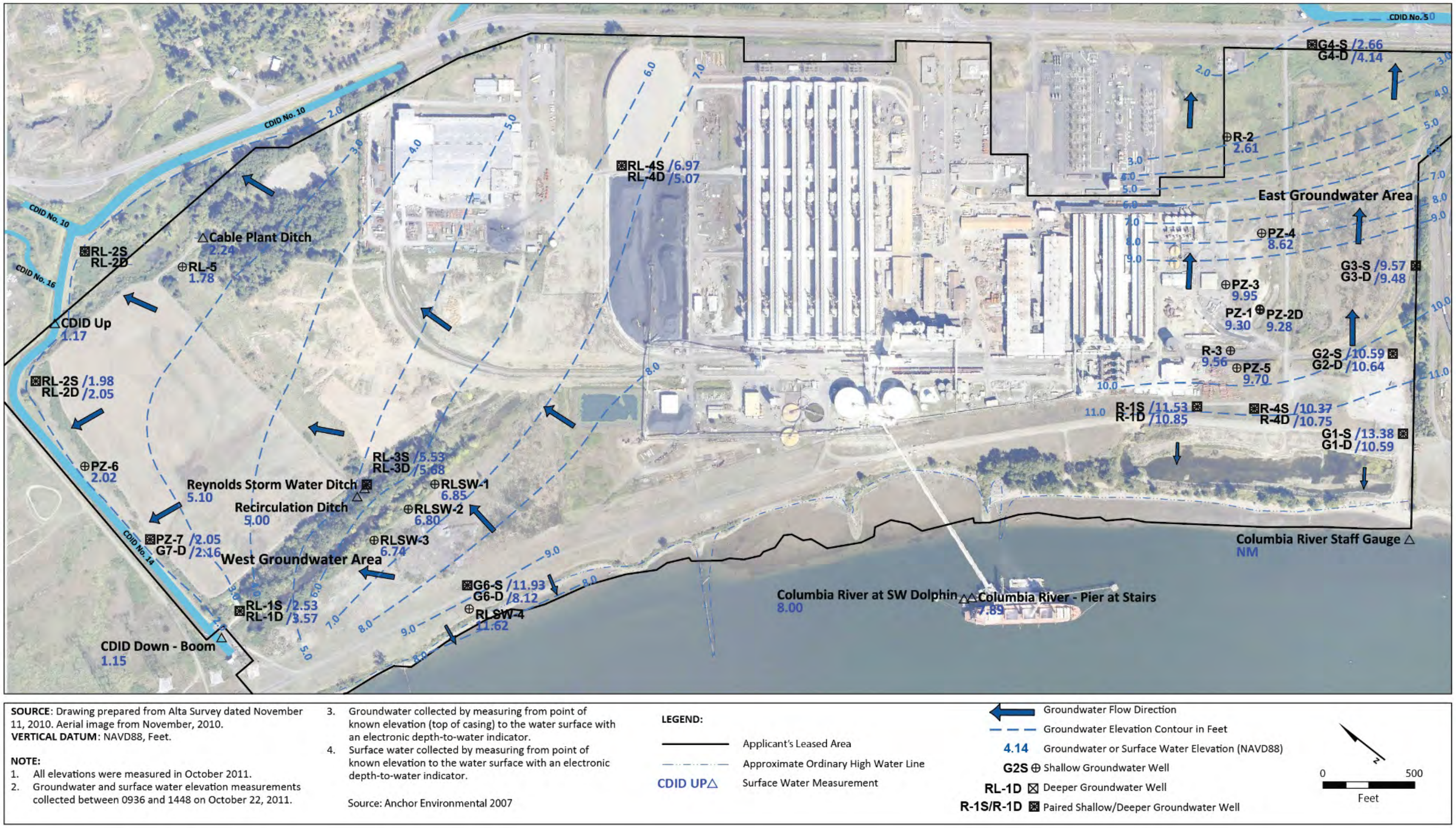


Figure 5. Water Management System in the Project Area

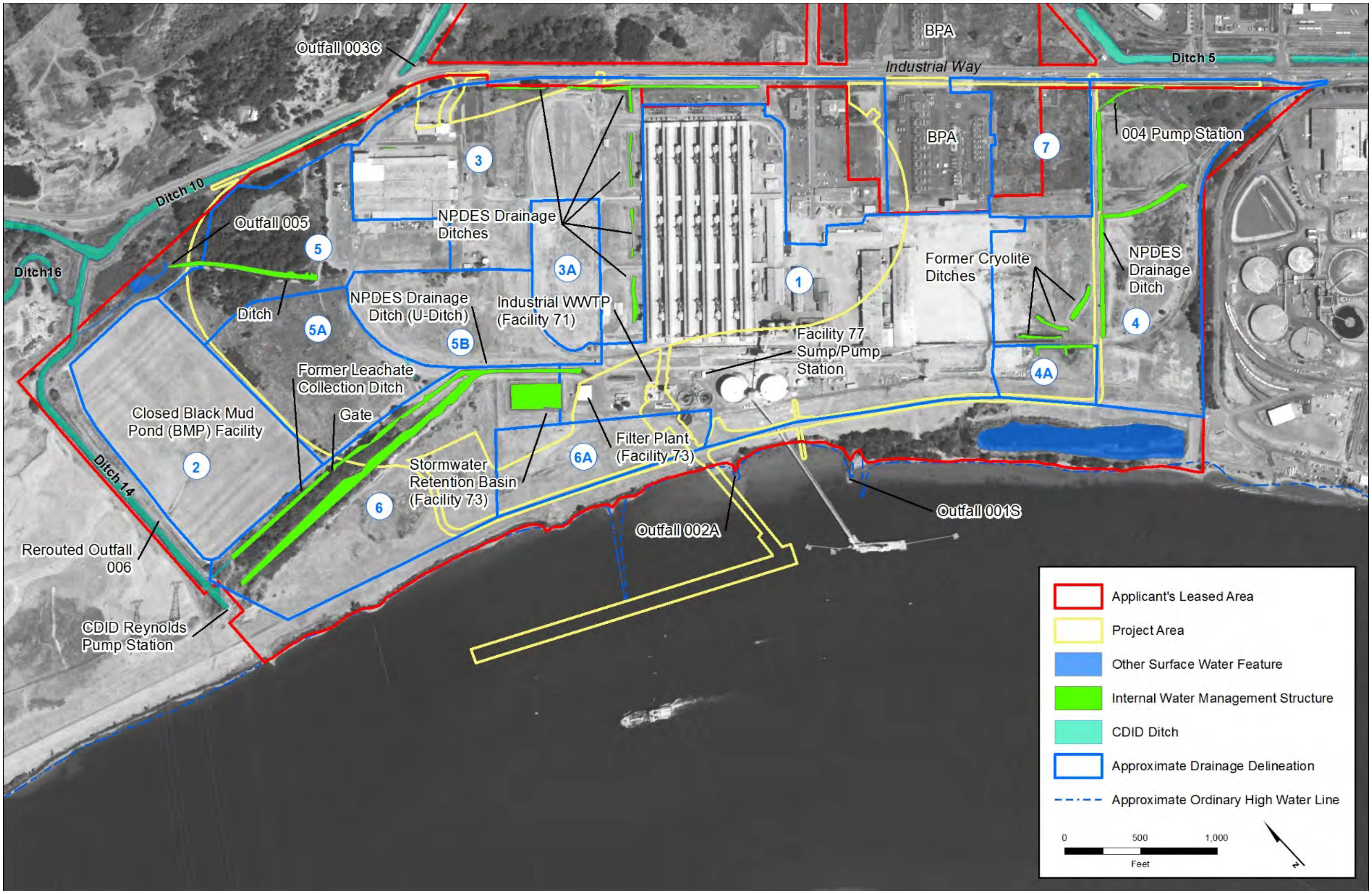
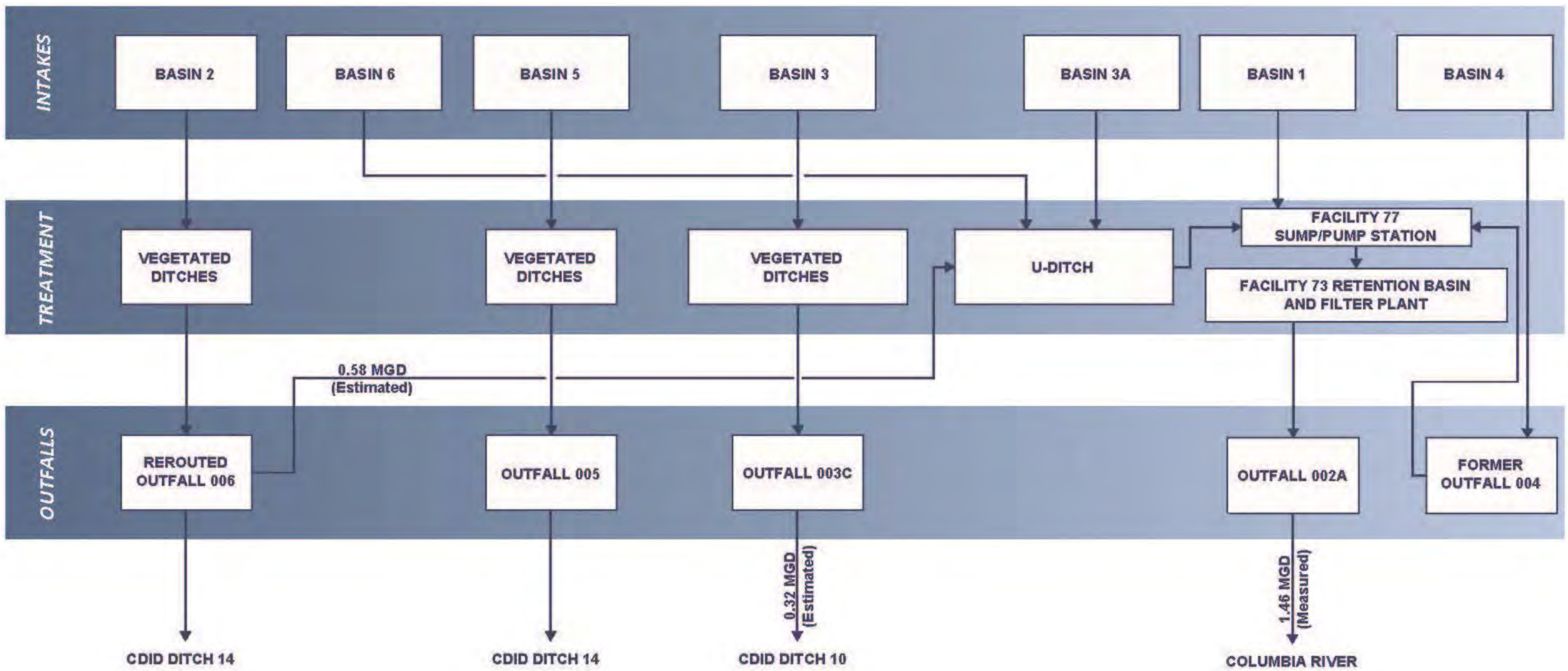


Figure 6. Schematic of Stormwater Flow in the Project Area



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Source: Anchor QEA. 2014. Engineering Report for NPDES Permit Application. July.

Basins 1 and 3a

Waters collected from Basins 1 and 3a (approximately 89 and 9 acres, respectively) are collected from facility pumps and ditches and directed to the Facility 77 Sump/Pump Station. An average of approximately 99 million gallons per year of stormwater from Basins 1 and 3a is routed into Facility 77, treated through Facility 73, and then pumped through Outfall 002A to the Columbia River.

Basin 2

Basin 2 (approximately 40 acres) collects stormwater runoff from the top of the cap of the closed Black Mud Pond facility into a sump, where it is routed through a pump station to drainage ditches that gravity flow via the U-Ditch into Facility 77. Approximately 17 million gallons per year (97% of the stormwater runoff from Basin 2) are routed into Facility 77. During heavy storm events, stormwater from off the closed Black Mud Pond facility cap may overflow the Outfall 006 Sump/Pump Station and flow to CDID Ditch 14. No discharge has been observed through Outfall 006 since the sump/pump station was installed in 2012. Waters collected at Facility 77 are directed to Facility 73 for treatment and then discharged to the Columbia River through Outfall 002A.

Basins 3 and 5

Stormwater generated in Basins 3 and 5 (27 acres and 62 acres, respectively) discharge by gravity drainage to the CDID Ditches 10 and 14, respectively. Ditches 10 and 14 are located at the north and west edges of the Applicant's leased area, respectively. An average of approximately 72 million gallons per year of stormwater flows to the CDID #1 ditches from these areas.

Basin 4

Waters collected from the cryolite area ditches (see *Cryolite Area Ditches* below) are directed to a pump and sent to Facility 71 (Industrial Wastewater Treatment Plant) for treatment. Treated water exiting Facility 71 is then discharged through internal Outfall 002B to Facility 77 where it is comingled with other waters and routed to treatment at Facility 73, eventually discharging to the Columbia River via Outfall 002A.

Stormwater runoff generated in Basin 4, other than in the cryolite area ditches, drains to gravity ditches that convey the flows to Pump Station 004, which discharges to Facility 77. An average of approximately 30 million gallons per year of stormwater from Basin 4 is collected and eventually discharges to the Columbia River via Outfall 002A.

Basins 4A, 5A, 5B, 6A, and 7

Stormwater from Basins 4A, 5A, 5B, 6A, and 7 may pond in these areas and then evaporate or infiltrate into the soil. These basins represent a combined area of approximately 71 acres and generate approximately 37 million gallons per year of stormwater.

Basin 6

Minor amounts of stormwater from Basin 6 may pond locally and evaporate or infiltrate into the soil. During storm events, stormwater from Basin 6 (an area of approximately 40 acres), is collected in the U-Ditch and conveyed to the Facility 77 Sump/Pump Station. An average of approximately 21 million gallons per year of stormwater from Basin 6 is conveyed to Facility 77. Process water and stormwater collected at Facility 77 is treated through Facility 73 and then discharges to the Columbia River through Outfall 002A.

Facility 71

Facility 71, installed in 1988, is the site's industrial wastewater treatment system.[3] Treated wastewater from Facility 71 is discharged through Internal Outfall 002B to the Facility 77 Sump/Pump Station and is then comingled with the other waters, treated through Facility 73, and discharged through Outfall OO2A to the Columbia River.

Facility 73 (Stormwater Treatment System)

Facility 73, the stormwater treatment system, is used to achieve water quality standards required by the existing NPDES permit (WA-000008-6). Facility 73 is located in the southwest portion of the Applicant's leased area and consists of a 1.98-million-gallon retention basin (Figure 5), oil and grease removal, multi-media filters, and a discharge pump station (Pump Station C). The retention basin is sized to handle flows up to 6,000 gpm (8.64 million gallons per day). The retention basin is equipped with an oil and grease removal system. Flows exiting the retention basin are discharged through a 20-inch line to Pump Station C. Pump Station C includes three alternating pumps with a combined discharge capacity of 6,000 gpm under peak flow conditions. Pump Station C pumps the water through an 18-inch line where an in-line turbidity monitor located downstream measures the outgoing water's turbidity. If the turbidity reading is below the turbidity set point, the water in the 18-inch line discharges into the 30-inch Outfall 002A line and then to the Columbia River. If the turbidity reading is above the turbidity set point, a solenoid valve routes the water through multimedia filters before tying back into the 18-inch line for discharge to the Outfall 002A line.

Facility 77 (Sump and Pump Station)

Facility 77 is a large central collection sump and pump station that is the primary stormwater discharge point for the majority of all basins within the southern property of the Applicant's leased area (except for Basins 3 and 5). Facility 77 is outfitted with four operating pumps with varying capacities of up to 2,700 gpm each. The pumps at Facility 77 previously discharged directly to the Columbia River through Outfall 002A; however, since the mid-1990s flows collected at Facility 77 are pumped through a 16-inch line to the stormwater treatment system (Facility 73) before being discharged through Outfall 002A.

Outfall 002A

Outfall 002A is a 30-inch outfall to the Columbia River that discharges the water it receives from Facility 73. As described above, treated wastewater from Facility 71 is discharged through Internal Outfall 002B to Facility 77 and is then comingled with the other waters and treated through Facility 73. The average amount of stormwater runoff generated by the basins discharging to Outfall 002A is 166.3 million gallons per year. The combined average flow to the Columbia River through Outfall 002A is 1.46 million gallons per day or 532.9 million gallons per year.

Outfall 003C

Outfall 003C drains through a 2,500-linear foot vegetated conveyance ditch to CDID Ditch 10.

[3] Facility 71 was destroyed in a fire in June 2011 and reconstructed in February 2012.

Former Outfall 004

Former Outfall 004 was rerouted to Facility 77 with the installation of Pump Station 004, and the outfall was closed in 1991. From Facility 77, the water is routed to Facility 73 for treatment and then discharged to the Columbia River through Outfall 002A.

Outfall 005

Outfall 005 drains to CDID Ditch 14. Stormwater runoff from improved areas ponds locally and infiltrates or evaporates. Runoff from larger events may gravity drain to a vegetated ditch and discharge to CDID Ditch 14.

Rerouted Outfall 006

Outfall 006 was created after the current NPDES permit was issued in 1990 and is not described in NPDES permit WA-000008-6. Outfall 006 has been in multiple NPDES renewal applications submitted to the Washington State Department of Ecology (Ecology) since the Outfall was created. Treatment occurs through stormwater passing through the vegetated conveyance swale. Stormwater flows from Outfall 006 are routed to the U-Ditch and then to Facility 77 where the stormwater is pumped to Facility 73 for treatment and then discharged to the Columbia River through Outfall 002A. Treated stormwater runoff from events larger than the 6-month, 24-hour storm may overflow the Outfall 006 Sump/Pump Station and discharge directly into CDID Ditch 14.

Cryolite Area Ditches

Additionally, a series of ditches, referred to as cryolite area ditches, which are not part of the CDID #1 or NPDES system, is located on the east side of the Applicant's leased area (Figure 5). These ditches were constructed to control stormwater and perched shallow groundwater. Although the ditches used to discharge into the CDID #1 system, they are now isolated from it; water from these ditches is pumped via Pump Station 004 (Anchor Environmental 2007) to Facility 77 where it is pumped to Facility 73 for treatment prior to discharge through Outfall 002A.

2.2.3 Groundwater Quality

Groundwater data in WRIA 25 are extremely fragmented and exist for only a few localized areas near Kelso and Longview (Lower Columbia Fish Recovery Board 2001).

2.2.3.1 Regional

Alluvial (Shallow) Aquifers

According to the Lower Columbia Fish Recovery Board (2001), chemical quality of groundwater ranges from excellent to poor in the alluvium units. Shallow wells near streams and rivers typically have excellent water quality, while deeper wells and/or wells located farther from streams and rivers often produce groundwater of lower quality. The problem constituents are typically iron, manganese, and total dissolved solids found at levels that produce undesirable aesthetic/cosmetic (taste, odor, color, discoloration) effects, but do not necessarily pose health risks (Lower Columbia Fish Recovery Board 2001). The source of these elevated constituents is assumed to arise from bedrock groundwater recharge to the alluvial aquifer and/or long residence time for groundwater within the alluvial aquifer, which allows leaching of these constituents from the sediment that hosts the aquifer.

Another groundwater quality problem associated with alluvial aquifers in this area is the potential presence of phenol compounds. These phenol compounds are produced by the decomposition of vegetative materials as a result of dewatering volcanic lahars/debris flows[4].

Tertiary Continental Sedimentary Rock Unit

Limited data exist on the chemical quality of groundwater from the formations found in this aquifer unit. The available data suggest that the chemical quality is often poor. The problem constituents are typically iron and manganese found at levels that produce undesirable aesthetic/cosmetic (taste, odor, color, discoloration) effects, but do not necessarily pose health risks. Similar to the alluvium unit, the likely source of these elevated constituents is due to groundwater from older bedrock units that is entering this aquifer and/or long residence time for groundwater within this aquifer, which would allow leaching of these constituents from the sediment that hosts the aquifer (Lower Columbia Fish Recovery Board 2001).

Columbia River Basalt Group

No data on the chemical quality of groundwater from the Columbia Basin Basalt Group were available at the time of preparation of this document. However, the flood basalt flows of this group often serve as good aquifers capable of producing groundwater of typically good chemical quality (Lower Columbia Fish Recovery Board 2001).

2.2.3.2 Local

Kennedy/Jenks Consultants (2010) completed a water quality and environmental risk assessment as part of the preliminary design report for the Mint Farm Regional Water Treatment Plant. The risk assessment included sampling and water quality analysis of the groundwater from the deeper aquifer of six wells. This study found no chemicals in the groundwater above their respective human health screening levels. Kennedy/Jenks Consultants (2012a) repeated the water quality analysis from the same wells in November 2012 and found manganese and iron at levels above the Washington State Department of Health secondary water quality standards and arsenic in one of the wells but at levels below thresholds established by the U.S. Environmental Protection Agency (EPA) for drinking water quality standards). These levels were found to be naturally occurring and are characteristic of the regional water supply aquifer (Anchor QEA 2014a). Groundwater gradients and monitoring well locations are shown in Figures 7 and 8.

[4] Lahar is an Indonesian term that describes a hot or cold mixture of water and rock fragments flowing down the slopes of a volcano and/or river valleys. As lahars move downstream form a volcano, their size, speed, and amount of water and rock debris/mudflow is constantly changing as it deposits rocks, boulders, and vegetation across the river valley it enters (USGS 2013).

Figure 7. Shallow Aquifer Groundwater Map

Figure 8. Deep Aquifer Groundwater Map

2.2.3.3 Project Area

Historical and Existing Sources of Groundwater Contamination

Industrial use of the Applicant's leased area began in 1941 with the development of the aluminum production operations by Reynolds Metals Company. The manufacturing capabilities were expanded in the 1960s and the operations focused primarily on aluminum production. Historical operations in the Applicant's leased area included aluminum production facilities, cable plant operations, cryolite recovery plant operations, and industrial landfills. Figure 9 shows the facilities in the Applicant's leased area. The SEPA Hazardous Materials Technical Report provides a complete description of the history of contamination in the Applicant's leased area (ICF International 2016b).

Aluminum Production Facilities

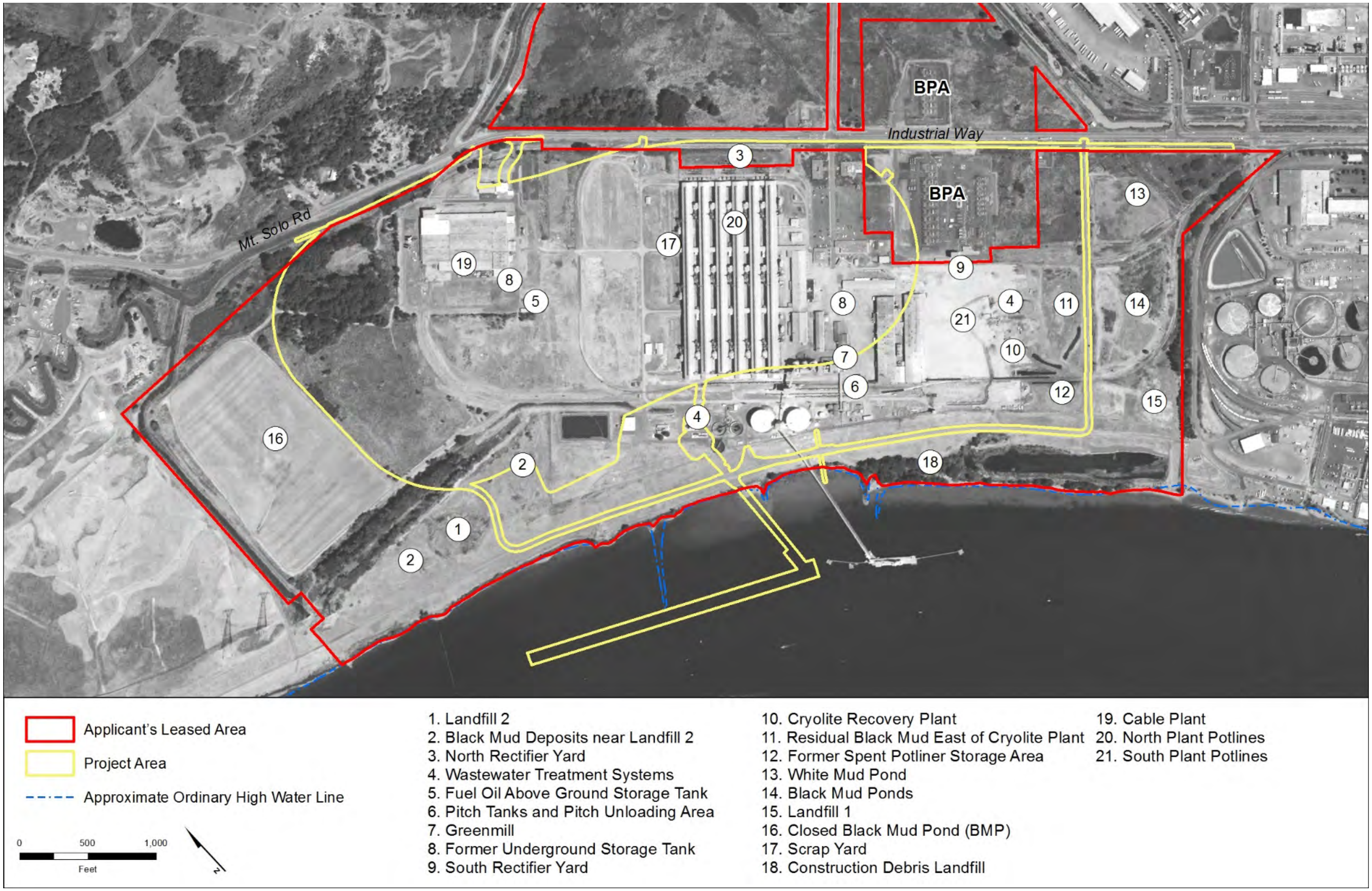
Initial industrial operations in the Applicant's leased area began with the Reynolds Metals aluminum reduction plant in 1941. The plant is located in the eastern portion of the Applicant's leased area (referred to as South Plant) and was used for aluminum smelting and casting operations (Figure 9). In 1967, Reynolds developed the North Plant in the center of the Applicant's leased area for additional aluminum production (Anchor QEA 2014a).

Smelter operations required an extensive dry-materials handling system for raw materials. Raw materials included alumina ore, petroleum coke, coal tar pitch, anthracite coal, cryolite, and aluminum fluoride. Liquid coal tar was unloaded by rail and transferred into storage tanks, which connected to the greenmill by distribution lines. At the greenmill, pitch (which contains polycyclic aromatic hydrocarbons [PAHs]) was used as a raw material for anode and cathode construction. Pitch was also placed on the ground near the rail unloading area (Anchor Environmental 2007). Smelter operations in the Applicant's leased area have been associated with elevated concentrations of fluoride in soils or solid media (Anchor QEA 2014a). Figure 9 shows the location of the aluminum manufacturing facilities: North Plant and South Plant lie within the project area, while the pitch tanks and unloading area lie near the southern boundary of the project area.

Former Cable Plant Operations

The cable plant, constructed in the late 1960s, was located west of the aluminum production facilities and within the project area boundary (Figure 9). The cable plant produced electrical cable products, including aluminum wire, rods, and insulated (polyethylene and polyvinyl) low- and medium-voltage cable. It received molten aluminum from the aluminum production facilities and processed it in three furnaces: a continuous ingot caster, a rolling mill, and wire drawers. Ancillary structures associated with the cable plant included office buildings, a parking lot, and a sanitary wastewater treatment plant.

Figure 9. Former and Existing Facilities in the Applicant's Leased Area



Cryolite Recovery Plant

The cryolite recovery plant was constructed in 1953 in the South Plant area (Figure 9). The plant was used as a spent potliner (SPL) recovery and recycling facility for the Reynolds facility and other northwest aluminum reduction plants. SPL is a byproduct of the aluminum manufacturing process. It contains fluoride and PAH compounds and, potentially, varying levels of cyanide. The cryolite recovery plant also recovered reusable fluoride compounds, called underflow solids that were eventually used to control air emissions that occurred during the aluminum manufacturing process. The underflow solids were collected in clarifiers (a type of tank) at two unspecified locations in the Applicant's leased area (Anchor Environmental 2007).

The cryolite recovery process involved multiple steps, resulting in a "black mud," which was disposed of in several fill deposits in the Applicant's leased area. The process also required lime to produce the sodium hydroxide solution. After the 1970s, the spent lime facility was combined and managed with the residual carbon facility.

With the increase in regulatory requirements associated with SPL stockpiling and handling in the 1980s, Reynolds began to bury and cover the stockpiled SPL and install groundwater monitoring wells to address concerns regarding potential impacts on groundwater in the area (Anchor QEA 2014a).

In May 1990, the cryolite recovery plant ceased operation. The SPL generated during aluminum manufacturing was removed and shipped to permitted treatment, storage, and disposal facilities. The cryolite recovery plant facilities were removed in May 1990; the area where they once sat is now vacant (Anchor Environmental 2007). No deposits of SPL are known to remain in the Applicant's leased area (Anchor QEA 2014a).

Residual carbon was generated during the cryolite recovery process. Residual carbon typically includes calcium carbonate, alumina, carbon, fluoride compounds, sodium, iron, and sulfate (URS Corporation 2014b). Test results revealed that shallow groundwater at the former location of the cryolite recovery plant contained fluoride-containing solid media and fluoride and alkalinity releases as a result of the cryolite plant's operations (URS Corporation 2014b). Additional investigations, findings, and cleanup of the residual carbon deposits are discussed below (*Remedial Actions* and *Remedial Investigation Findings*).

Industrial Landfills

Three historical landfills are located in the Applicant's leased area, outside the project area boundary

- Floor sweeps landfill (Landfill 1) is located east of the former cryolite recovery plant.
- The old industrial landfill (Landfill 2) is located on the southwest side of the former Reynolds facility.
- The construction debris landfill (Landfill 3) is located between the Columbia River levee and the Columbia River.

Landfill 1 received dry materials gathered from floors in the potlines, including alumina, bath, cryolite, and aluminum fluoride. By the mid-1970s, Landfill 1 was no longer in use and Landfill 2 began operation. Landfill 2 accepted scrap coke, ore, cryolite, aluminum fluoride, bath, brick, concrete, and debris from miscellaneous maintenance activities. Landfill 3 contains concrete debris and other plant wastes, similar to Landfill 2. Use of these landfills ceased in the 1980s prior to implementation of more restrictive regulations. The landfills are still present in the Applicant's leased area; additional investigations, findings, and cleanup are discussed below (*Remedial Actions* and *Remedial Investigation Findings*). Figure 9 shows the locations of the cryolite recovery plant and the three landfills.

Historical Uses after Closure of the Reynolds Facility

In 2000, Alcoa purchased Reynolds Metals Company, which became a wholly owned subsidiary. As part of this transaction, Reynolds was required to divest of its facility on the Applicant's leased area. It sold the facility to Longview Aluminum in 2001 but retained ownership of the land. Longview Aluminum immediately ceased aluminum production operations, and the facility has not produced aluminum since 2001.

In December 2004, Chinook Ventures Inc. (CVI) purchased the Applicant's leased area assets from a bankruptcy trustee, which took over operations after Longview Aluminum declared bankruptcy in 2003. CVI entered into a long-term ground lease with Reynolds that ran until September 2005 when ownership of the land transferred from Reynolds to Northwest Alloys, both of which are wholly owned subsidiaries of Alcoa.

CVI was sole operator of the facility and associated Northwest Alloys–owned properties between 2004 and 2011. CVI operated a terminal for the import, handling, and export of dry bulk materials, such as alumina, coal, green petroleum coke, cement, fly ash, slag, and other materials. During this time, CVI also decommissioned the majority of the facilities associated with aluminum manufacturing operations and recycled materials from smelters, which were being decommissioned throughout the northwest region. These activities included the removal and disposal or recycling of alumina, electrolyte bath, coal, and carbon products.

On January 11, 2011, CVI sold its Applicant's leased area assets to the Applicant, which has subsequently removed most of the structures constructed by CVI and has continued facility decommissioning, removal, and cleanup activities.

Remedial Action (Cleanup) Process

In January 2015 a remedial investigation/feasibility study (RI/FS) (Anchor QEA 2014a) was prepared per the requirements of the Model Toxics Control Act (MTCA), which is implemented by Ecology. Under the MTCA, the RI/FS included two parts: completion of the investigation of potential contaminants in the Applicant's leased area and evaluation of the potential options for cleanup. The selection of a final cleanup action occurs in a separate step and will be documented in an MTCA cleanup action plan.[5]

Prior to preparation of the RI/FS, an initial site assessment was performed by Ecology, which reviewed available data and established the agency's priority ranking for the site investigation and cleanup. During this phase, Ecology ranked the former site as a 5, the lowest priority on its five-point scale.

Since completion of the initial assessment and site ranking, a number of investigations and cleanup actions have been completed in coordination with Ecology. The previously completed cleanup actions prior to preparation of the RI/FS have resolved cleanup issues for a number of areas within

[5] According to Ecology (2014b), a draft cleanup action plan will be completed for the Reynolds Metals Aluminum Smelter in 2015.

the Applicant's leased area. Extensive quantities of materials have been appropriately reused, recycled, or disposed of at permitted facilities. These actions have improved safety of the Applicant's leased area and helped to return the property to productive reuse.

After Ecology reviewed information from the previous investigation, cleanup, and closure activities, it defined focus areas for further evaluation and defined specific data gaps and testing requirements to be addressed in the RI/FS. Figure 10 shows the locations of the resulting testing that was implemented as part of the RI/FS. The RI/FS included multiple phases of investigation activity, the scope of which was developed and approved by Ecology (Anchor QEA 2014a).

Final cleanup decisions are to be specified in an MTCA cleanup action plan. Design and implementation of the cleanup action will be performed after finalization of the cleanup action plan and court approval of the consent decree. Long-term management to monitor and/or clean up persistent water quality issues will be addressed in the cleanup action plan.

The RI/FS provides a detailed description of cleanup and remedial actions conducted in the Applicant's leased area (Anchor QEA 2014a). Figure 11 shows the locations of previous cleanup and removal activities and remedial investigation focus areas.

Remedial Investigation Findings

The following sections summarize the RI/FS (Anchor QEA 2014a).

Screening Levels

The groundwater contained in the fill soil and shallow silt/clay/soils of the upper alluvium or shallow aquifer in the Applicant's leased area is not used as a source for drinking water. Furthermore, the fine-grained texture and low hydraulic conductivities of the upper alluvium, in conjunction with the upward groundwater gradients between the lower water supply shallow aquifer and the upper alluvium, severely limit the potential for this shallow groundwater to affect potential sources of drinking water. Regardless, the RI/FS screening levels included consideration of regulatory requirements applicable to groundwater that is used as a drinking water source and include the following.

- **MTCA Method A Groundwater Cleanup Levels**. These levels consider risks associated with ingestion of drinking water.
- **State Drinking Water Maximum Contaminant Levels**. These levels assume drinking water as the highest beneficial use of groundwater and are typically more stringent than the national drinking water standards.
- **Natural Background**: MTCA regulations consider background chemical concentrations as part of data screening and development of cleanup levels for groundwater.

Table 2 shows the RI/FS screening levels for groundwater for the relevant chemicals of concern discussed below. This table lists the relevant chemicals of concern discussed below in *Source Areas and Chemicals of Concern*. For a list of all parameters tested in the Applicant's leased area, refer to the RI/FS (Anchor QEA 2014a).

Figure 10. Overview of Remedial Investigation Testing Locations in the Applicant's Leased Area

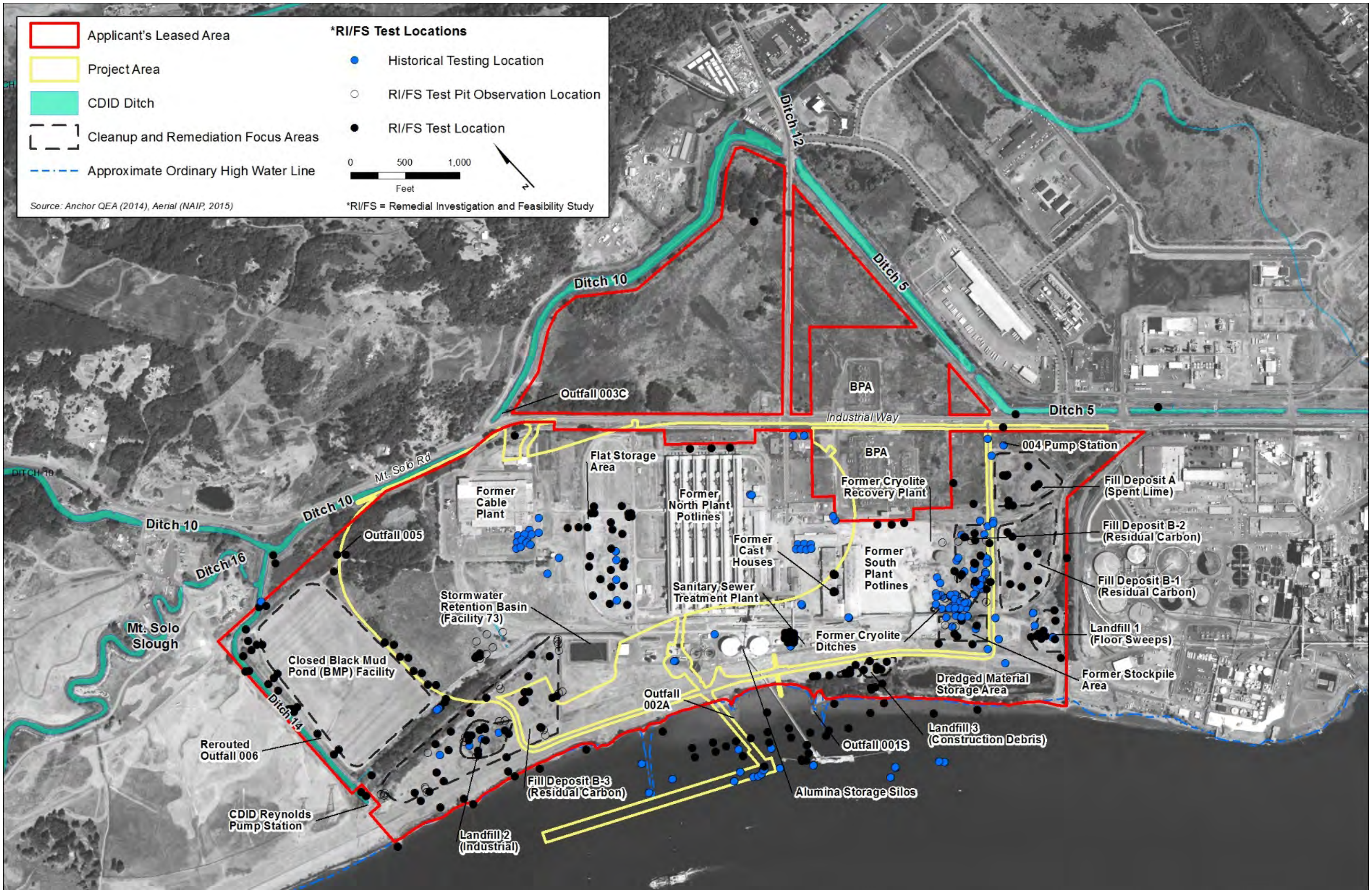


Figure 11. Previous Cleanup, Removal Areas, and Remedial Investigation Areas in the Applicant's Leased Area

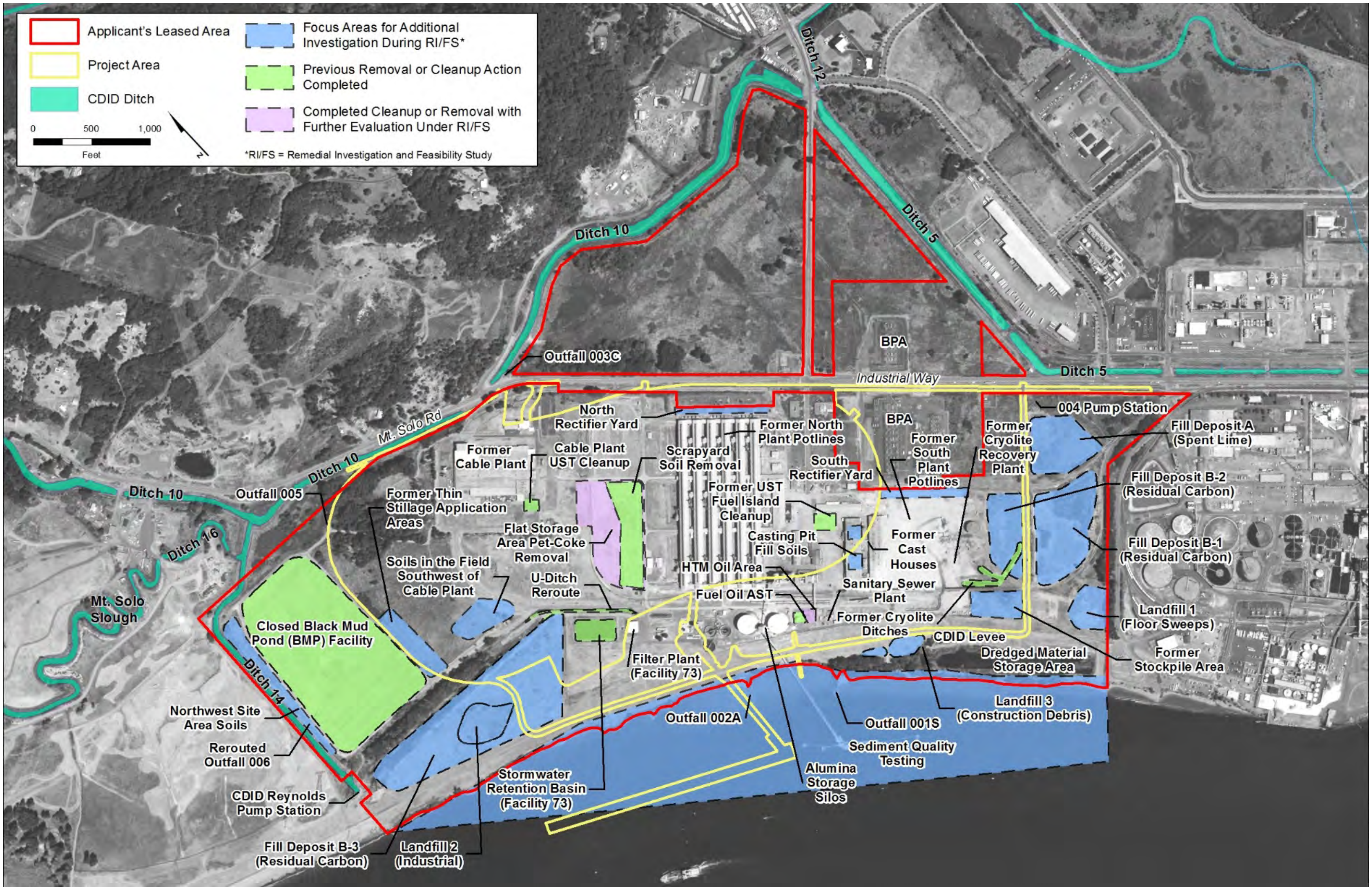


Table 2. Screening Levels for Groundwater

Parameter	Screening Level	Unit[a,b]	ARAR[c,d]
Cyanide	0.2	mg/L	MCL
Fluoride	4.0	mg/L	MCL
Total cPAHs	0.1	µg/L	MTCA Method A
Total PCB Aroclors	0.1	µg/L	MTCA Method A
TPH-Diesel	500	µg/L	MTCA Method A

[a] mg/L = milligrams per liter
[b] µg/L = micrograms per liter
[c] ARAR = Applicable, Relevant, and/or Appropriate Requirement.
[d] MCL = State Drinking Water Maximum Contaminant Level

Source Areas and Chemicals of Concern

Testing of groundwater was conducted over a series of multiple sampling events primarily occurring in September and October 2006, July 2011, October 2011, and October 2012 and primarily outside the boundaries of the project area (Anchor QEA 2014a). Specific testing parameters varied by sampling event and were consistent with Ecology testing requirements defined in the RI/FS Work Plan and Addenda (Anchor QEA 2014a).

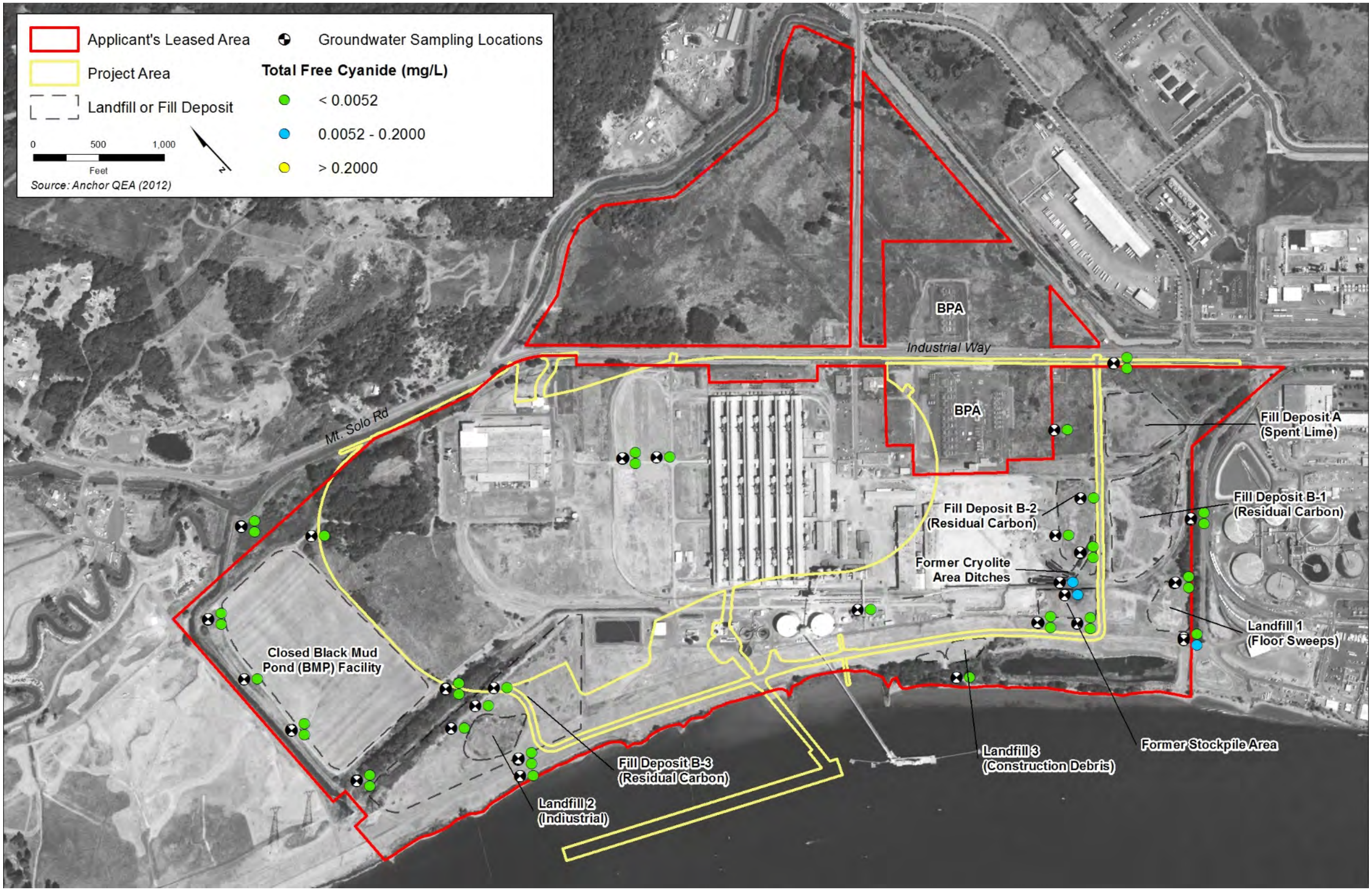
Cyanide

Groundwater cyanide concentrations in the study area are very low and have been decreasing over time. None of the groundwater samples collected in the western portion of the study area near the closed Black Mud Pond facility and Fill Deposit B-3 exceeded the groundwater maximum contaminant level (MCL) for free cyanide. As shown on Figure 12, 2012 free cyanide concentrations in all samples taken in the western portion of the Applicant's leased area were below the groundwater screening level of 0.2 milligrams per liter.

Groundwater cyanide concentrations in samples collected in the eastern portion of the Applicant's leased area have also been decreasing over time. One of the groundwater samples (located near the Former Stockpile Area in the southeast corner of the project area) slightly exceeded the groundwater MCL in 2006, but concentrations decreased significantly by the 2011 and 2012 sampling events. As shown on Figure 12, the 2012 free cyanide[6] concentrations in most of the eastern portion of the Applicant's leased area were below the groundwater screening level.

[6] Free cyanide refers to the sum of hydrogen cyanide (HCN) and cyanide ion (CN^-) in a sample. Free cyanide is bioavailable and toxic to organisms in aquatic environments.

Figure 12. 2012 Groundwater Testing Results in the Applicant's Leased Area—Total Free Cyanide



Fluoride

Groundwater fluoride concentrations in most of the Applicant's leased area are below the groundwater screening levels. The exceptions are the shallow groundwater located in or immediately adjacent to the landfills and fill deposits (Anchor QEA 2014a). Data from the most recent sample event in 2012 for fluoride are summarized on Figure 13. Green data symbols represent groundwater fluoride concentrations that are below thresholds established for the drinking water MCL.

In the western portion of the Applicant's leased area, the highest concentrations of fluoride are measured in wells located in Fill Deposit B-3 and adjacent to Landfill 2 (industrial landfill), and in the wells located immediately downgradient of the closed Black Mud Pond facility.

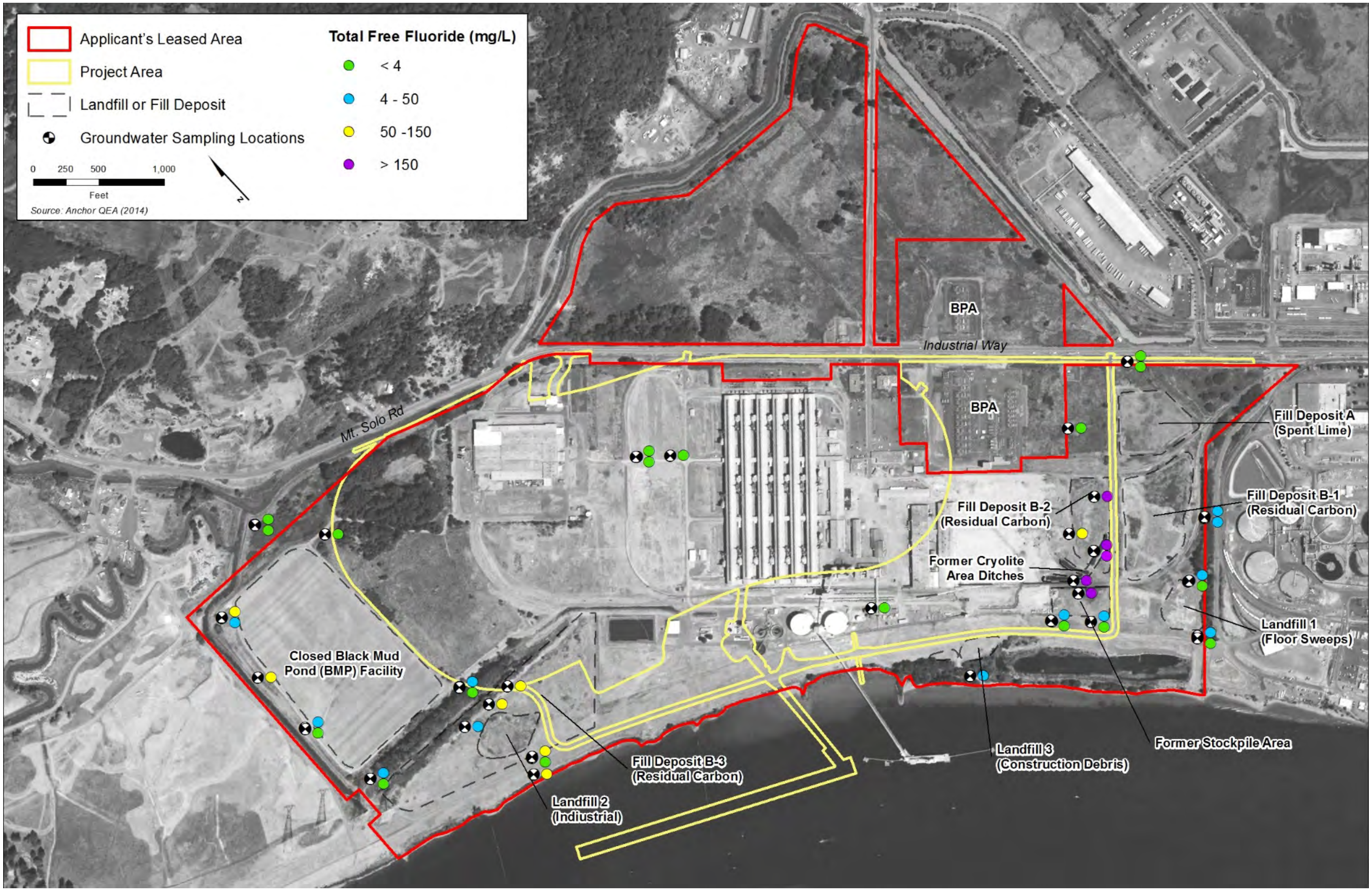
In the eastern portion of the Applicant's leased area outside of the project area boundary, groundwater monitoring data show that fluoride concentrations attenuate rapidly with distance from the fill and landfill deposits (Anchor QEA 2014a), which are summarized as follows.

- **Fill Deposit A (spent lime) and B-1 (residual carbon).** Groundwater fluoride concentrations immediately downgradient of these deposits comply with the groundwater MCL. This is more than 10-fold to 20-fold lower than the fluoride concentrations measured in the fill deposits.
- **Landfill 1 (floor sweeps).** Two well pairs are located immediately adjacent to this landfill (less than 10 feet from the landfill contents). In both well pairs, the deeper groundwater samples comply with the groundwater fluoride concentration MCL, and the fluoride concentration in the shallower groundwater samples slightly exceed the MCL.
- **Fill Deposit B-2 (residual carbon).** The highest groundwater fluoride concentrations in the Applicant's leased area are located in Fill Deposit B-2, located just east of the former cryolite recovery plant. The groundwater wells in this area are located in the fill deposit and immediately adjacent to the former stockpile area and the cryolite area ditches. Groundwater in this area has elevated alkalinity, which enhances fluoride solubility. In contrast, the groundwater fluoride concentrations immediately downgradient of this deposit are consistently below the MCL, showing that fluoride in this area is relatively immobile.

In consideration with other RI/FS monitoring data, the groundwater data for fluoride concentrations demonstrate that the closure of the closed Black Mud Pond facility has been effective, and that the elevated fluoride concentrations present in shallow groundwater adjacent to the other landfill and fill deposits are localized and relatively immobile. The higher concentrations of fluoride present within Fill Deposit B-2 appear to be a function of the fill deposits and the geochemical properties of this area, including the elevated alkalinity of groundwater (Anchor QEA 2014a).

Groundwater fluoride concentrations attenuate rapidly with depth and with distance laterally from these landfills and fill deposits. This has been observed in all parts of the Applicant's leased area, including the areas near Fill Deposit B-2. Surface water monitoring demonstrates that the fluoride present in the shallow groundwater is not affecting water quality in the adjacent CDID Ditches 10, 5, or 14 (Anchor QEA 2014a).

Figure 13. 2012 Groundwater Testing Results in the Applicant's Leased Area—Total Free Fluoride



Polycyclic Aromatic Hydrocarbons

At the request of Ecology, groundwater samples from selected locations were analyzed for PAHs. Figure 14 shows the maximum concentration of carcinogenic PAHs (cPAH)[7] measured during each of the sampling events (2007, 2011, and 2012). None of the measured cPAH concentrations from the western portion of the Applicant's leased area exceeds groundwater screening levels. In the eastern portion of the Applicant's leased area, and outside the project area boundaries, cPAH concentrations during the 2012 sampling events were below the groundwater screening levels in all locations except for the wells located immediately within or adjacent to fill deposits. These three localized areas (purple circles on Figure 14) include wells located immediately adjacent to Landfill 1 and Fill Deposit B-2. The cPAH concentrations in wells located farther downgradient were less than the groundwater screening level and the surface water screening level.

Polychlorinated Biphenyls

As part of the RI/FS testing program, Ecology required testing for polychlorinated biphenyls (PCBs) in groundwater at wells located immediately downgradient of the landfills and fill deposits. No PCBs were detected in any of the groundwater samples analyzed (Anchor QEA 2014a).

Heavy Metals

Sampling for heavy metals in groundwater was performed during 2011 and 2012 at selected locations identified by Ecology. Test findings indicate that groundwater heavy metals concentrations are below applicable screening levels.

Volatile Organic Compounds

No volatile organic compounds were detected in any of the groundwater samples analyzed.

Total Petroleum Hydrocarbons

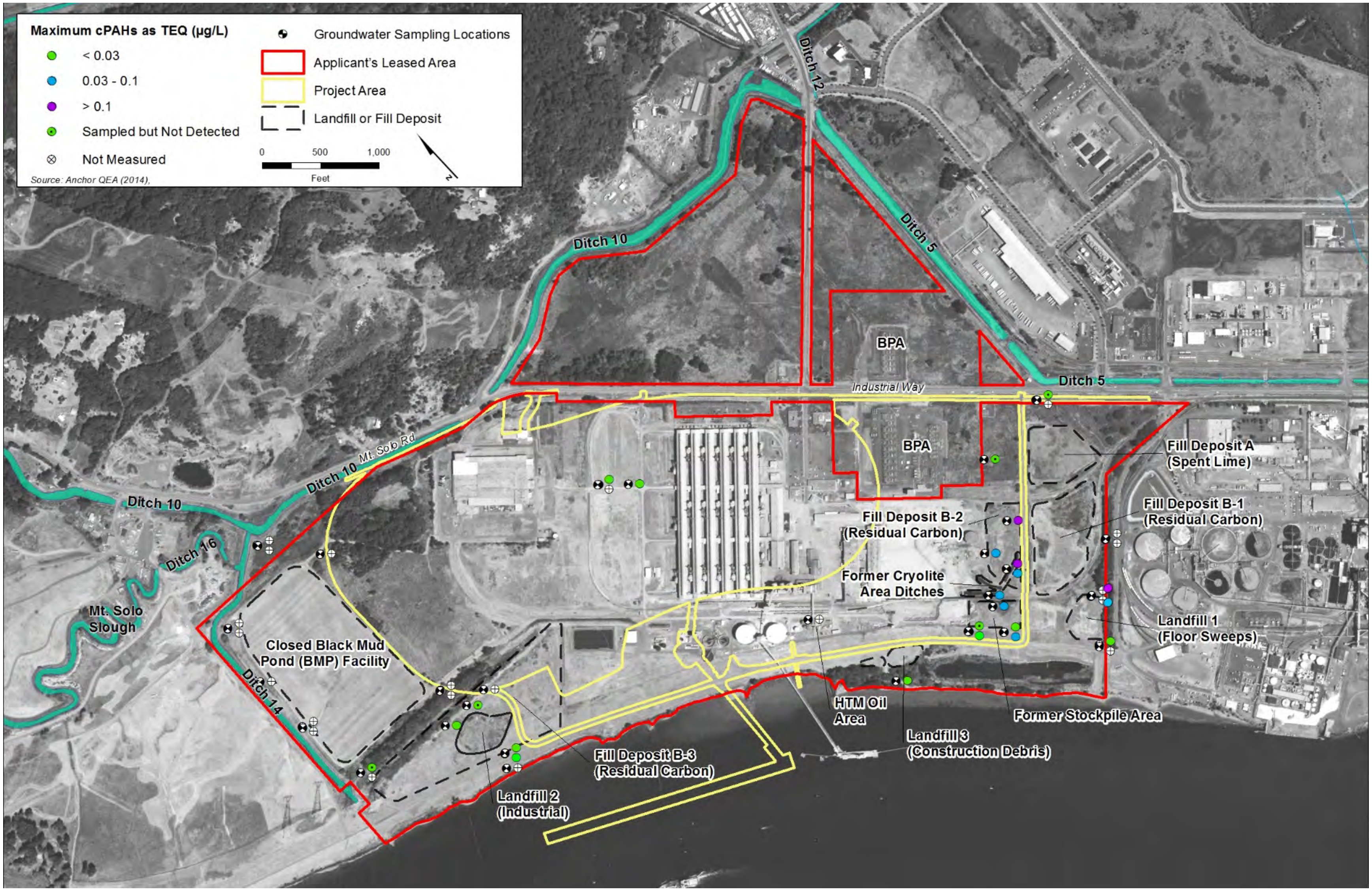
The RI/FS testing program included analysis for total petroleum hydrocarbons (TPHs) in the HTM Oil Area. All samples collected were below groundwater screening levels.

Distribution and Movement of Chemicals of Concern

As discussed above, the fluoride and cyanide levels found in the shallow groundwater within or immediately adjacent to Landfills 1, 2 and 3 have limited mobility and are not affecting downgradient groundwater or surface water quality (Anchor QEA 2014a). Groundwater contamination by fluoride and cyanide could occur during leaching when soils or solid media come into contact with the groundwater. However, the upward hydraulic gradients in the shallow aquifer cause dispersion of fluoride and cyanide and prevent migration into the north-south groundwater flows. This subsequently protects groundwater, surface water, and the Columbia River and limits fluoride and cyanide from traveling to the CDID #1 ditches. Fluoride and cyanide concentrations have been decreasing over time, since the closure of the Reynolds facility. Thus, it is unlikely that fluoride and cyanide in the Applicant's leased area affect the surrounding groundwater (Anchor QEA 2014a).

[7] cPAHs were used in the RI/FS because they have the most stringent screening levels.

Figure 14. 2007–2012 Groundwater Testing Results in the Applicant's Leased Area—Total cPAHs as Toxic Equivalents



Final Cleanup Actions

As discussed in the RI/FS (Anchor QEA 2014a), the cleanup action plan for the project area and the Applicant's leased area would be protective of human health and the environment, meet state cleanup standards, and comply with other applicable state and federal laws. Cleanup standards will be consistent with the current and anticipated future land use, which will be based on industrial criteria. Although a final cleanup action plan has not been determined, this section discusses the site-specific cleanup action requirements applicable to all the cleanup alternatives.

Table 3 shows the proposed cleanup levels, remediation levels, and conditional points of compliance for groundwater to be implemented as part of the cleanup action plan (Anchor QEA 2014a). Cleanup levels were based on MTCA equations or Applicable or Relevant and Appropriate Requirements to protect groundwater resources for the highest beneficial use (i.e., drinking water) (Anchor QEA 2014a).

Table 3. Groundwater Cleanup Standards

Chemical of Potential Concern	Groundwater Cleanup Level	Protection Basis	Point of Compliance
Fluoride (dissolved)	4 mg/L	State Drinking Water MCL	Conditional point of compliance at property line and groundwater-ditch boundary
Free cyanide (dissolved)	200 µg/L	State Drinking Water MCL	Wells adjacent to where remedial action will occur
cPAHs	0.1 µg/L	MTCA Method A Standard Value	
TPH-D	500 µg/L	MTCA Method A Standard Value	
TPH-O	500 µg/L	MTCA Method A Standard Value	

Source: Anchor QEA 2014a
TPH-D = total petroleum hydrocarbon – diesel
TPH-O = total petroleum hydrocarbon – oil

2.2.4 Water Supply

The following discussion provides a summary of the water supply for the Proposed Action.

2.2.4.1 Regional

Communities in WRIA 25 rely upon a variety of systems to meet their needs for domestic, commercial, industrial, and agricultural water supply. These systems include large municipal systems, small public water systems, individual domestic wells, and wells and diversions owned by self-supplied industrial and agricultural users. In general, water needs throughout WRIA 25 are met by a combination of both surface and groundwater supplies (HDR and EES 2006). Note that the proposed project will not withdraw any water from the Columbia River. All water supply needs will be met through existing on-site groundwater wells and above ground water storage facilities.

2.2.4.2 City of Longview

The Mint Farm Regional Water Treatment Plant began operation in January 2013, and replaced the Longview water treatment plant (which was located on the shore of the Cowlitz River and treated surface water drawn from the Cowlitz River for municipal water use). The Mint Farm plant is located in the Mint Farm Industrial Park, approximately 6,000 feet east of the project area for the Proposed Action. While the study area does not extend to the Mint Farm Regional Water Treatment Plant, the project area is within the Wellhead Protect Area (i.e., the 5-year Wellhead Protection Plan Source Area); thus, the Mint Farm Regional Water Treatment Plant is considered. Groundwater is tapped from wells in the Mint Farm Industrial Park. The water treatment plant consists of four high-capacity (4,000 gpm) groundwater wells (and associated treatment infrastructure) and supplies the City of Longview and the Cowlitz County Public Utility District with municipal water.

The treatment plant ultimately may have as many as six groundwater production wells at the Mint Farm Industrial Park, although the current operation includes four well casings and four well pumps, each capable of pumping approximately 4,000 gpm. Groundwater modeling conducted to evaluate the sustainability of long-term pumping from the wellfield, which draws from the deep aquifer, calculated approximately 6 feet of drawdown to meet the City's 50-year maximum daily demand. Test pumping of a production well showed no drawdown impact 60 feet or more away from the well. The source of water to the wellfield was found to be the Columbia River (Kennedy/Jenks 2010). A water rights permit has been issued for the treatment plant, which has an instantaneous maximum withdrawal rate of 28,250 gpm and a maximum annual withdrawal rate of 13,500 acre-feet per year (Permit No. G2-30521, priority date June 8, 2009).

Under a Water Service Agreement, the three water purveyors in the Longview/Kelso urban area (City of Longview, Cowlitz County Public Utility District No. 1, and the City of Kelso) have a long-term arrangement whereby the three agencies can share each other's facilities when necessary. This agreement provides backup resources in case of emergency, natural disaster, and for scheduled maintenance outages (City of Longview 2006).

2.2.4.3 Project Area

The Applicant currently holds several water rights to extract groundwater from the deep aquifer (Kennedy/Jenks 2012b). Water use in the State of Washington is subject to the "first in time, first in right" clause, historically established by western water law and adopted into Washington State law (Revised Code of Washington [RCW] 90.44.050). A senior right cannot be impaired by a junior right. Seniority is established by the date an application was filed for a permitted or certificated water right (priority date) or the date that water was first put to beneficial use in the case of claims and exempt groundwater withdrawals. The Columbia River basin is not closed to new water rights, surface or hydraulically connected groundwater, in this reach. When the Reynolds facility was initially developed in 1941, Reynolds was responsible for developing nine water supply wells, and their names are currently listed on the water rights claims and the water rights certificates. In 1945, the state groundwater code was enacted, which required a water right permit or certificate, unless the user was exempt from state permitting requirements. Three of the water rights claims were acquired in 1941, prior to the 1945 requirements; therefore, these claims are not accompanied with a certificate. Details of the water rights claims and certificates, along with the instantaneous and annual withdrawal amounts are provided in Table 4. It is estimated that the Applicant has an existing demand of 1.53 million gallons per day or 1,994 acre-feet per year (AFY) (Chaney pers.

comm). As, shown in Table 4, the existing demand is well within water right[8] limits for groundwater pumping. However, if the Applicant does not fully beneficially use each water right within a 5-year period, the Applicant would relinquish the unused portion (RCW 19.14.160).

Table 4. Water Rights Claims and Certificates

Record Number	Certificate Number	Withdrawal: Instantaneous (gpm)	Withdrawal: Annual (acre-feet/year)	Priority Date
G2-006572CL	-	2,500	2,340	-
G2-006573CL	-	2,500	2,340	-
G2-006574CL	-	2,500	1,614	-
G2-*02244CWRIS	01571	2,500	4,033	1951
G2-*08309CWRIS	06184	2,500	4,000	1966
G2-*08310CWRIS	06185	2,500	4,000	1966
G2-*08367CWRIS	06186	3,000	4,800	1966
G2-*08368CWRIS	06187	3,000	4,800	1966
G2-*09127CWRIS	06427	2,150	3,440	1967
	Total	**23,150**	**31,367**	

Source: URS Corporation 2014d.

2.2.4.4 Private Wells

Local industries, small farms, and domestic well users withdraw groundwater from private wells near the project area. These include the Weyerhaeuser Timber Company and many small farms and exempt domestic well users. The groundwater permit exemption allows certain users of small quantities of groundwater (most commonly, single residential well owners) to construct wells and develop their water supplies without obtaining a water right permit from Ecology (RCW 90.44.050). Any user whose water use that exceeds the exemption limits must apply for and obtain a water right permit before water use is allowed.

A review of Ecology's online Water Rights Tracking System indicated 31 water rights applications were pending in WRIA 25. However, none of these applications was located in the Sections and Townships bordering the project area (Washington State Department of Ecology 2015).

2.2.4.5 Wellhead Protection Areas and Sanitary Control Areas

The Safe Drinking Water Act requires every state to develop a wellhead protection program. The Washington State Department of Health administers the wellhead protection program in the State of Washington.

Most public water supply wells are located in or near communities. Washington's wellhead protection requirements are designed to prevent contamination of groundwater used for drinking water. A wellhead protection area is the surface and subsurface area around a well or wellfield that

[8] The Applicant is responsible for maintaining water rights. The Technical Report did not verify water rights are current.

a community or water system manages to protect groundwater-based drinking water supplies from contamination.

In Washington, wellhead protection areas are based on horizontal time-of-travel rates for groundwater. Depending on the rate of travel, the wellhead protection area is broken into management zones that correspond to an established time-of-travel rate for water within the aquifer. Each of the management zones represents an interval between the time a particle of water is introduced at the zone boundary and its eventual arrival at the well. These zones create an early warning system that gives a public water system time to respond to a contaminant moving within an aquifer before it arrives at the water supply well. A typical wellhead protection area has four or five management zones (Washington State Department of Health 2010).

- Sanitary control area
- Primary zones, based on 1-, 5-, and 10-year time-of-travel rates
- Buffer zone (if necessary)

The management zones are described in more detail below (Washington State Department of Health 2010).

Sanitary Control Area

The sanitary control area is the area immediately around the wellhead. This area should be tightly controlled to minimize any direct contamination at the wellhead. The purpose of this area is to reduce the possibility of surface flows reaching the wellhead and traveling down the well casing. All public water systems are encouraged to enclose wells in a well house and secure them in a fenced area to help protect individual wells from direct introduction of contaminants.

Zone 1

Zone 1 is based on the 1-year horizontal time-of-travel for groundwater. The purpose of Zone 1 is to protect the drinking water supply from viral, microbial, and direct chemical contamination. Literature suggests that bacteria and viruses survive less than 1 year in groundwater Because of Zone 1's proximity to the sanitary control area, it includes an additional 6-month time-of-travel boundary.

Zone 2

Zone 2 is based on the 5-year time-of-travel for groundwater. The purpose of Zone 2 is to control potential impacts on groundwater from chemical contaminants. The primary difference between potential contaminant sources in Zones 1 and 2 is the time available to respond to a release. A release in Zone 2 presents a less acute crisis than a release in Zone 1. All potential contaminant sources within Zone 2 must be identified and managed in a manner that facilitates pollution prevention and risk reduction. Zone 2 also provides information that local planners use to site future high-risk and medium-risk potential contamination sources.

Zone 3

Zone 3 is based on the 10-year time-of-travel for groundwater. Zone 3 is the outer boundary of the wellhead protection area if a Buffer Zone is not present. In Zone 3, potential high- and medium-risk contaminant sources receive increased regulatory oversight and technical assistance, with emphasis on pollution prevention and risk reduction. This allows the community to plan and site future high-risk and medium-risk contamination sources outside the wellhead protection area. It is also used as an educational tool for industry, the public, and others to understand the source of their drinking water and how actions may affect drinking water wells.

Buffer Zone

The buffer zone, if present, is an area of added protection, which helps compensate for error when calculating the time-of-travel boundaries for Zones 1 through 3.The primary goal of the Buffer Zone is to provide information to planners on activities or facilities outside Zone 3 that could release contaminants into the wellhead protection area.

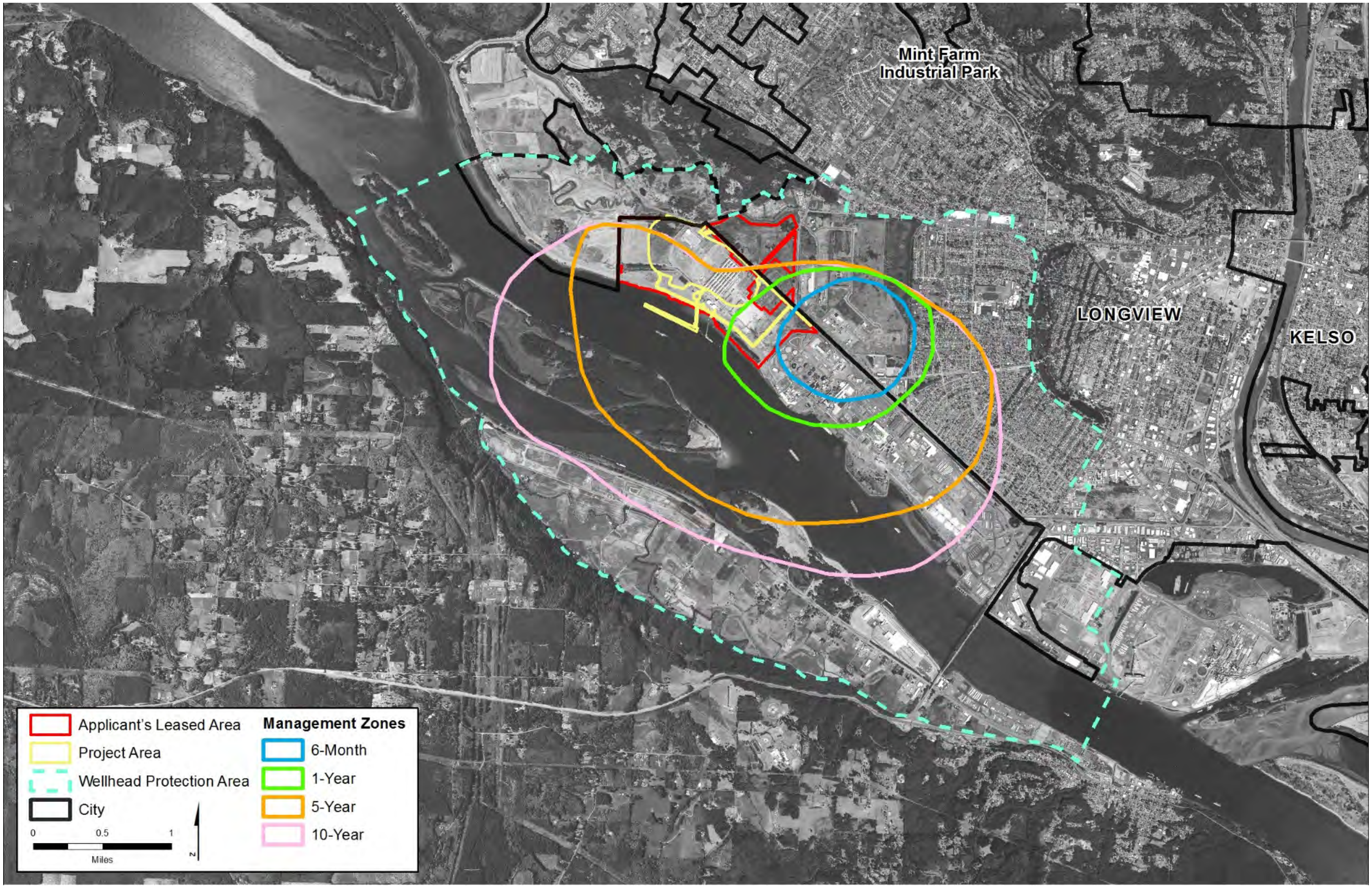
The Washington State Department of Health administers the Wellhead Protection Program, while other state agencies, such as Ecology and the Department of Agriculture, integrate wellhead protection into their programs. Local agencies, such as planning and health departments, play a major role by helping water systems protect their community's drinking water supply and coordinating wellhead protection measures.

2.2.4.6 City of Longview Wellhead Protection Areas

As discussed above, two distinct groundwater systems are present at the city's wellfield: a shallow aquifer and a deep aquifer. A confining unit consisting of clay and silt ranging in thickness from approximately 100 to 200 feet separates the two systems below the project area. The confining unit becomes appreciably thinner beyond the project area, to the north and east near residential areas. Groundwater modeling indicates the source for the deep aquifer is the Columbia River, with a travel time to the wellfield of between 2 and 35 years (Kennedy/Jenks Consultants 2012b). The Columbia River is within approximately 300 feet of the project area's southern boundary.

In 2012, the City of Longview approved its Wellhead Protection Program and established the wellhead protection area, which encompasses and extends beyond the management zones (Figure 15). As shown in Figure 15, the southeast portion of the project area is within Zone 1 (1-year); most of the project area is within Zones 2 and 3 (5- and 10-year, respectively).

Figure 15. City of Longview Wellhead Protection Area



Chapter 3
Impacts and Mitigation

This chapter describes the impacts on groundwater that could result from construction and operation of the Proposed Action or the ongoing activities of the No-Action Alternative.

3.1 Impacts

This section describes the impacts on groundwater that could result from the Proposed Action and No-Action Alternative. The Applicant identified the following design features and best management practices (BMPs) to be implemented as part of the project, and to be considered when evaluating potential impacts of the Proposed Action.

- The pads and berms would be made of low-permeability engineered material. The use of low-permeability engineered materials for formation of the pads and berms would control water from entering subsurface soil or groundwater.

3.1.1 Proposed Action

Potential impacts on groundwater from the Proposed Action are described below.

The following construction activities could affect groundwater.

- Disturbance of surface soils during construction.
- Release of hazardous and non-hazardous materials during construction.
- Disturbance of previously contaminated sites.
- Use of groundwater for dust control.

The following operations activities could affect geology and soils.

- Alteration of surface runoff patterns.
- Use of groundwater for dust control, equipment washdown, and cleanup.
- The water would then be pumped to a surface storage pond. The surface storage pond would have an approximate capacity of 3.6 million gallons and would be used to store the water for reuse. The capacity of the pond would include a reserve of 0.36 million gallons for fire suppression.

3.1.1.1 Construction: Direct Impacts

Construction of the Proposed Action would result in the following direct impacts.

Affect Groundwater Recharge during Construction

Construction of the Proposed Action would involve preloading and installation of vertical wick drains that would direct groundwater from the shallow aquifer upward toward the surface during pre-loading, where it would discharge. Ground-disturbing activities (excavations, grading, filling, trenching, backfilling, and compaction) could temporarily disrupt the existing drainage and groundwater recharge patterns in the study area. However, as described above, the major sources of groundwater recharge in the project area are the Columbia River, the regional CDID #1 ditch system, and the NPDES ditch system. The study area is not considered a major source of groundwater recharge of the deep aquifer through infiltration as the majority of stormwater runoff is managed by the existing NPDES stormwater collection and treatment system with nominal infiltration and evaporation. Therefore, construction of the Proposed Actionwould not be expected to have a measurable impact on groundwater recharge patterns of the deep aquifer.

Construction activities could have an impact on to the shallow water aquifer. Poured concrete, cement, mortars, and other Portland cement or lime containing construction material can alter the pH of stormwater, which affect the shallow aquifer water quality. The shallow water aquifer in the project area is recharged by stormwater and discharges groundwater to the CDID #1 ditches. Water from the CDID #1 ditches is discharged to the Columbia River. During construction, the grades of impervious surfaces would be sloped to convey surface water to collection sumps on the project area. The collected stormwater would then be conveyed to water collection facilities and discharged through a monitored internal outfall to existing facilities within the project area for treatment prior to discharge to the Columbia River. For more information on the project construction NPDES permit, see the SEPA Water Quality Technical Report (ICF International 2016c). Therefore, drainage and groundwater recharge patterns are expected to be similar to those of the existing conditions, with runoff directed to collection and treatment facilities and minimal infiltration to groundwater. Construction of the Proposed Actionwould have no measurable impact on groundwater recharge patterns.

Degrade Groundwater Quality during Construction

Construction of the Proposed Action could release contaminants to the ground through leaks and spills, which could be introduced to groundwater through stormwater runoff, thus degrading groundwater quality. However, as discussed above, the majority of stormwater generated during construction would be collected and treated in compliance with the project construction NPDES permit prior to discharge. For more information on the project construction NPDES permit, see the SEPA Water Quality Technical Report (ICF International 2016c). The existing water treatment plant (Facility 73) is anticipated to be adequate to handle the water generated during construction, including removing contaminants and sediment loads from stormwater prior to discharge. In addition, construction of the coal export terminal would adhere to the BMPs developed by the Applicant as part of the project proposal to avoid and minimize potential impacts on surface and groundwater resources. BMPs would include, but not be limited to, the following actions.

- BMP C153: Material delivery, storage, and containment would be used to prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage, including the following.
    - Storage of on-site hazardous materials would be minimized to the extent feasible.
    - Materials would be stored in a designated area, and secondary containment would be installed where needed.
    - Refueling would occur in designated areas with appropriate spill control measures.
- BMP C154: A concrete washout area would be constructed near the entrance to the project area to prevent or reduce the discharge of pollutants to stormwater from concrete waste by

conducting washout offsite, or performing on-site washout in a designated area to prevent pollutants from entering surface waters or ground water.

Site preparation activities would involve preloading and installation of vertical wick drains to aid in the consolidation of low consistency silt and low-density sand. Wick drains would direct groundwater from the shallow aquifer upward toward the surface during pre-loading, where it would discharge. Water discharged from the wick drains would be captured, tested for contaminants, and treated prior to discharge to any surface waters. These activities could take place adjacent to areas where known groundwater contamination exists and the contaminated groundwater could penetrate these areas. However, the permeability of the earth materials affected by preloading would be relatively low and thus would not be particularly susceptible to the infiltration of contaminated groundwater.

In addition, as described in the SEPA Hazardous Materials Technical Report (ICF International 2016b), construction of the Proposed Action could encounter previously contaminated areas on the project area that could result in degradation of groundwater quality. However, with the exception of two small areas —the eastern corner of the Flat Storage Area and the northeastern portion of Fill Deposit B-3 (Figure 10)—no remedial actions are mandated as part of the final cleanup action plan for the project area. For the two areas where overlapping construction and remediation activities could occur, the activities would be coordinated to reduce conflicts and minimize exposure to the environment. Also, as mentioned above, fluoride and cyanide levels found in shallow groundwater have limited mobility and are not affecting downgradient groundwater or surface water quality. Furthermore, the final cleanup action plan would include minimum thresholds for cleanup, which would be protective of the environment, comply with applicable state and federal laws, and provide for future compliance monitoring. Therefore, construction of the Proposed Action would not result in groundwater degradation as a result of disturbing previously contaminated areas on the project area.

Construction of the Proposed Action is not expected to affect the wellfield at the Mint Farm Industrial Park. Although construction-related spills of hazardous materials are not uncommon, the potential consequences of such spills are generally relatively small due to the small, localized, and short-term nature of the releases. The volume of the spills would be relatively small because the volume in any single vehicle is generally less than 50 gallons, and fuel trucks are limited to 10,000 gallons or less. Any spill would be contained on site and cleaned up to the extent feasible and therefore would not be likely to reach the City of Longview wellhead protection area. In addition, as discussed above, existing on-site contamination from former Reynolds facility activities has limited mobility in shallow groundwater and is not affecting downgradient groundwater or surface water quality. Therefore, it is not anticipated that existing contamination originating in the study area would adversely affect the wellhead protection area as a result of construction.

Affect Groundwater Supply during Construction

Construction of the Proposed Action would require groundwater use for dust suppression. The maximum amount of water that would be used for dust suppression is estimated to be less than 40,000 gallons per day (44.8 AFY). Combined with demand from existing activities in the project area of 1,994 AFY, the total demand for groundwater during construction would be approximately 2,039 AFY. As described above, the Applicant holds water rights for instantaneous extraction from on-site wells of about 23,000 gpm or 31,367 AFY.

A production well from the new Mint Farm Regional Water Treatment Plant was tested by the City of Longview to characterize the deeper confined aquifer. The subsurface conditions within the Mint Farm site are similar to those expected at the Applicant's 540-acre leased area. The production well was drilled to a depth of 385 feet below ground surface and is located approximately 6,000 feet southeast of the Applicant's leased area. The constant rate pumping tests results from this well calculated that the transmissivity values of the aquifer ranged from 3.3 million to 4.5 million gallons per day, per foot, while the hydraulic conductivity values from recovery water level data ranged from 20,000 to 28,000 gallons per day, per foot (2,600 to 3,600 feet per day). The study observed a recharge influent of the Columbia River on the deep aquifer at the production well; this became apparent after approximately 1.5 days of pumping, when drawdown curves became virtually flat (Kennedy/Jenks 2010 in URS 2014). The Mint Farm Regional Water Treatment Plant has water rights for an instantaneous maximum withdrawal rate of 28,250 gallons per minute and a maximum annual withdrawal rate of 13,500 acre-feet per year (Permit No. G2-30521, priority date June 8, 2009) (URS 2014). In 2011, the projected average daily demand was 6.7 million gallons per day with a maximum daily demand of 14.06 million gallons per day.

Construction and existing water demand would represent approximately 6.5% of the Applicant's groundwater extraction rights. Construction of the Proposed Action is expected to have negligible impacts on groundwater supply, based on the Mint Farm constant rate pumping test results and when compared to existing groundwater use.

Trenching activities may intersect groundwater in low-lying areas. Dewatering of trenches may result in temporary fluctuations in local groundwater levels. Dewatering effluent would be pumped to temporary containment tanks for settling, where it will be tested for pollutants before being discharged to receiving waters. If pollutants are encountered during testing, dewatering would be suspended and Ecology would be notified. Contaminated water would be treated before being discharged to receiving waters.

3.1.1.2 Construction: Indirect Impacts

Construction of the Proposed Action would not result in indirect impacts on groundwater.

3.1.1.3 Operations: Direct Impacts

Operation of the Proposed Action would result in the following direct impacts.

Affect Groundwater Recharge during Operations

A nominal amount of groundwater recharge occurs under existing conditions and is expected to be similar during operations. Operations would not be expected to measurably affect groundwater recharge. Ground compaction, in the form of pre-loading, would occur during construction. Groundwater flow is expected to be similar to existing conditions, but may be increased at greater depths and/or slow near the surface. The direction and volume of groundwater recharge is expected to remain relatively constant. Under the Proposed Action, the Applicant would be required to obtain a separate NPDES permit and would develop a separate system of stormwater collection and discharge regulated by this permit. The project area would absorb some of the existing drainage basins in the project area, effectively eliminating a portion of the runoff volume that is presently handled under the Applicant's existing NPDES permit. Excess water from the project area would be collected and treated on the project area, then routed to a new internal outfall that would be monitored under the new NPDES Permit. The outfall would tie into the existing Facility 77 sump, and all waters from the project area would go through Facility 73 for water quality treatment. The existing discharge line from Facility 73 would continue to discharge to the Columbia River through the existing Outfall 002A. Therefore, operation of the Proposed Action is not expected to substantially change groundwater recharge patterns associated with surface waters on the site.

Degrade Groundwater Quality during Operations

Runoff from the study area would be directed to on-site drainage systems and would be treated and reused on site, or discharged in accordance with the new NPDES permit. The water being reused on site would be brought to Washington State Class A Reclaimed Water standards (URS Corporation 2014c). Excess water not reused on site would be further treated and tested prior to being discharged through the NPDES permitted outfalls (i.e., Outfall 002A) and finally discharged to the Columbia River. Discharge of water to the Columbia River during project operations would mostly occur during the rainy season when excess surface water is more likely to be generated on site.

Furthermore, as discussed in the SEPA Water Quality Technical Report (ICF International 2016c), the following BMPs would be part of the Proposed Action design to maximize the protection of surface-water quality (and thus groundwater via infiltration).

- Enclosed conveyor galleries.
- Enclosed rotary unloader building and transfer towers.
- Washdown collection sumps for settlement of sediment.
- Regular cleanout and maintenance of washdown collection sumps.
- Containment around refueling, fuel storage, chemicals, and hazardous materials.
- Oil/water separators on drainage systems and vehicle washdown pad.
- Requirement that all employees and contractors receive training, appropriate to their work activities, in the BMPs.
- Design of docks to contain spillage, with rainfall runoff and washdown water contained and pumped to the upland water treatment facilities.
- Design of systems to collect and treat all runoff and washdown water for on-site reuse (dust suppression, washdown water or fire system needs) or discharge off site.

Since collected waters would be treated before reuse or discharge to the Columbia River under permits, groundwater quality is not expected to be affected by operation of the Proposed Action. The potential for infiltration of surface water containing coal dust would be relatively low based on the low recharge rates of the soil characteristics that exist in the study area. Thus, the potential for coal dust to infiltrate and affect groundwater quality is relatively low. Additionally, the potential for constituents of coal to become soluble and infiltrate is also relatively low. Most coal dust would be washed away prior to the constituents becoming soluble in surface water and infiltrating to groundwater. Toxic constituents of coal include PAHs and trace metals, which are present in coal in variable amounts and combinations dependent on the type of coal. The coal type, along with mineral impurities in the coal and environmental conditions, determine whether these compounds can be leached from the coal. Some PAHs are known to be toxic to humans and aquatic animals.

Metals and PAHs could also potentially leach from coal to the pore water of sediments. However, the low aqueous extractability and bioavailability of the contaminants minimizes the potentially toxic effects. Furthermore, the type of coal anticipated to be exported from the terminal (i.e., Powder River Basin coal) is alkaline and low in sulfur and trace metals; in addition, the conditions to produce concentrations in pore waters are not present in a dynamic riverine environment. This would further support the view of Ahrens and Morrisey (2005) that the bioavailability of such toxins would likely be low. Thus, there would be a low likelihood for such toxins to affect groundwater quality.

In summary, the potential risk for exposure to toxic chemicals contained in coal (e.g., PAHs, trace metals) would be relatively low, as these chemicals tend to be bound in the matrix structure and not quickly or easily leached. Further, particles would likely be transported downstream by the flow of the river and either carried out to sea or distributed over a sufficiently broad area as not to be problematic. See the SEPA Water Quality Technical Report and the SEPA Coal Technical Report for more information. In addition, operation of the Proposed Action would not encounter or disturb existing groundwater contamination areas in the study area. Operation of the Proposed Action would occur concurrently with environmental remediation and monitoring as required in the Final Cleanup Action Plan for the Former Reynolds facility, as described in the SEPA Hazardous Materials Technical Report (ICF International 2016b). The remedial and monitoring activities would be carried out in accordance with all relevant and appropriate regulations, and would be coordinated to avoid further exposure to the environment. Furthermore, the impact of the cleanup activities would result in bringing previously contaminated groundwater to levels that are protective of human health and the environment thereby reducing the potential for exposure for sensitive receptors.

Affect Groundwater Supply during Operations

Process water uses would include dust control, equipment washdown, and cleanup. Water for dust suppression would be applied on the main stockpiles, within unloading and conveying systems, and at the docks. Excess water from dust suppression and washdown would be collected for reuse. Process water supply would come from two sources: the on-site water management system during the wet season and on-site groundwater wells during the dry season.

The on-site water management system would provide process water in the following ways.

- Stormwater and surface water (washdown water) would be collected from the stockpile areas, rail loop, office areas, docks, and other paved surfaces in the project area and directed to a series of vegetated ditches and ponds, then to a collection basin or sump.
- The collected water would be pumped to an on-site treatment facility consisting of retention pond(s) with flocculent addition to promote settling as required.
- The water would then be pumped to a surface storage pond. The surface storage pond would have an approximate capacity of 3.6 million gallons and would be used to store the water for reuse. The capacity of the pond would include a reserve of 0.36 MG for fire suppression.

It is anticipated that approximately 1,200 gpm during the wet season and approximately 2,000 gpm during the dry season (approximately 2,034 AFY) would be required on average for dust suppression. Water from the on-site groundwater wells would provide approximately 635 gpm (1,025 AFY) to maintain minimum water levels in the storage pond to meet process water demands during the dry season. Water from the storage pond would also be used for the fire hydrant, sprinklers and deluge systems, watering of landscaping and other non-recyclable uses. As mentioned above, the Applicant holds water rights for instantaneous extraction of 23,150 gpm up to

31,367 AFY. Combined with the groundwater demand from existing activities in the Applicant's leased area (approximately 1,994 AFY), the total demand on groundwater supplies during operation of the Proposed Action would be approximately 3,019 AFY. This estimate does not account for any future projects that the Applicant may construct within the Applicant's leased area that could require groundwater pumping; however, since the Proposed Action combined with the existing demand would account for less than 10% of the maximum pumping limits, operation of the Proposed Actionwould have a negligible impact on groundwater supply. The Applicant would ensure that water rights are current before withdrawing any water for construction or operations; water rights would be maintained for ongoing groundwater use during operation of the Proposed Action.

3.1.1.4 Operations: Indirect Impacts

Operation of the Proposed Action would result in the following indirect impact on groundwater related to increased rail traffic (up to 240 unit trains[9] arriving and departing per month) on the Reynolds Lead spur.

Degrade Groundwater Quality during Operations

Operation of the Proposed Action is not expected to affect the wellfield at the Mint Farm Industrial Park because all surface water generated in the study area would be reused on site or treated before discharge to the Columbia River. As mentioned above, all process water reused on site would be brought to Washington State Class A Reclaimed Water standards. Excess water not reused on site would be further treated and tested prior to being discharged through the internal NPDES permitted outfalls and finally discharged to the Columbia River. Therefore, degradation of groundwater quality would be unlikely to occur as a result of operation of the Proposed Action. Furthermore, the majority of the study area is located within what is referred to as Zone 2 of the wellhead protection and sanitary control areas.[10] Should a release of a potential groundwater contaminant occur during operations, cleanup would occur before there would be any potential risk to the wellfield at the Mint Farm Industrial Park.

Degrade Groundwater Quality as a Result of a Collision or Derailment

Spills of fuel or other potentially hazardous materials (i.e., lubricants, hydraulic fluids) could occur if rail cars were to collide and/or derail within the study area. Similar to day-to-day rail operations, any materials released to the ground resulting from such collision or derailment could be introduced to groundwater through stormwater runoff or surface infiltration and thereby degrade groundwater quality. As discussed in the SEPA Hazardous Materials Technical Report (ICF International 2016b), if a release of hazardous materials were to occur, the rail operator would implement emergency response and cleanup actions as required by Occupational Safety and Health Administration rules (29 Code of Federal Regulations [CFR] 1910.120); the Washington State Oil and Hazardous Substance Spill Prevention and Response regulations (90.56 RCW) and the Model Toxic Control Act Cleanup Regulations (Chapter 173-340 Washington Administrative Code [WAC]). In addition, Federal Railroad Administration accident reporting requirements (49 CFR 225) include measures to avoid or minimize the potential for a spill of fuel or other potentially hazardous materials from

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[9] A unit train consists of approximately 125 rail cars and three to four locomotives.

[10] In Washington State, wellhead protection areas are based on horizontal time-of-travel rates for groundwater. Zone 2 areas are based on a 5-year time-of-travel for groundwater.

affecting groundwater quality, through quick response, containment and cleanup. Thus, a release of potentially hazardous materials would not be expected to affect groundwater.

3.1.2 No-Action Alternative

Under the No-Action Alternative, the Applicant would not construct the coal export terminal and would continue with current operations in the Applicant's leased area. The project area could be developed for other industrial uses including an expanded bulk product terminal or other industrial uses that would not require a permit from the Corps (i.e., would not affect waters of the U.S.). Because existing industrial import and export activities would be expanded, potential impacts on water quality of groundwater would be similar to those described for the Proposed Action with respect to potential oils and grease spills from equipment or other raw materials shipped from the terminal. The existing NPDES permit would remain in place, maintaining the water quality of existing stormwater discharges to the Columbia River. This would maintain water quality of groundwater.

Any new or expanded industrial uses would trigger a new NPDES or modified permit. Upland buildings could be demolished and replaced for new industrial uses. Ground disturbance would not result in any impacts on waters of the United States and would not require a permit from the Corps. Any new impervious surface area would generate stormwater, but all stormwater would be collected and treated to meet state and federal water quality requirements prior to discharge to the Columbia River. Groundwater recharge in the study area is primarily from the Columbia River; thus, maintaining water quality in the Columbia River would be expected to maintain water quality of groundwater within the study area.

3.2 Mitigation

Based on the findings in this technical report, the co-lead agencies (Cowlitz County and Washington State Department of Ecology) developed potential Applicant mitigation measures. The SEPA Draft EIS presents these mitigation measures.

Chapter 4
Required Permits

The Proposed Action would require the following permits related to groundwater.

- Cowlitz County Critical Areas permit to address compliance with the County's Critical Areas Ordinance related to the presence and protection of Critical Aquifer Recharge Areas located on site.
- Clean Water Act Section 401 Water Quality Certification would be required to ensure no potential contamination of groundwater resources associated with project construction and operations stormwater discharge.
- NPDES Permit would be required for any new stormwater discharges during construction and operation of the export terminal.
- Water Rights—The Applicant would ensure their existing water rights are current prior to use of those rights. If the Applicant's water rights are current, the Applicant must maintain those water rights. If the Applicant's water rights are not current, the Applicant must apply for and obtain the necessary water rights

Chapter 5
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