5.4 Groundwater

Groundwater, often stored in aquifers[1] formed of permeable rock or soil material, provides water for human and environmental well-being. Groundwater quality refers to the physical, chemical, biological, and aesthetic characteristics of water, which are used to measure the ability of water to support aquatic life and human uses. Groundwater quality can be degraded by contaminants introduced by domestic, industrial, and agricultural practices.

This section describes the groundwater resources in the study area and the impacts on groundwater likely to result from construction and operation of the proposed export terminal.

5.4.1 Regulatory Setting

Laws and regulations relevant to groundwater are summarized in Table 5.4-1.

Table 5.4-1. Regulations, Statutes, and Guidelines for Groundwater

Regulation, Statute, Guideline	Description
Federal	
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 discharging pollutants into waters of the United States. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Surface waters in the study area interacts with groundwater.
State	
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.
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.
Drinking Water/Source Water Protection (RCW 43.20.050)	Requires the Washington State Department of Health assure safe and reliable public drinking water supplies in cooperation with local health departments and water purveyors.

[1] An aquifer consists of underground layers of rock saturated with water that can be brought to the surface through natural springs or by pumping.

Regulation, Statute, Guideline	Description
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, water courses, 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 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.
Model Toxic Control Act Cleanup Regulations (Chapter 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 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.
Longview Water Supply Protection Ordinance (LMC 17.100)	Establishes a wellhead protection program to minimize the risk of groundwater contamination.
City of Longview Critical Areas Ordinance (Off-Site Alternative only) (LMC 17.10)	Identifies resource lands of long-term significance; designates and protects critical resource areas, including wetlands, geologically hazardous areas, critical aquifer recharge areas, fish and wildlife habitat, and frequently flooded areas.

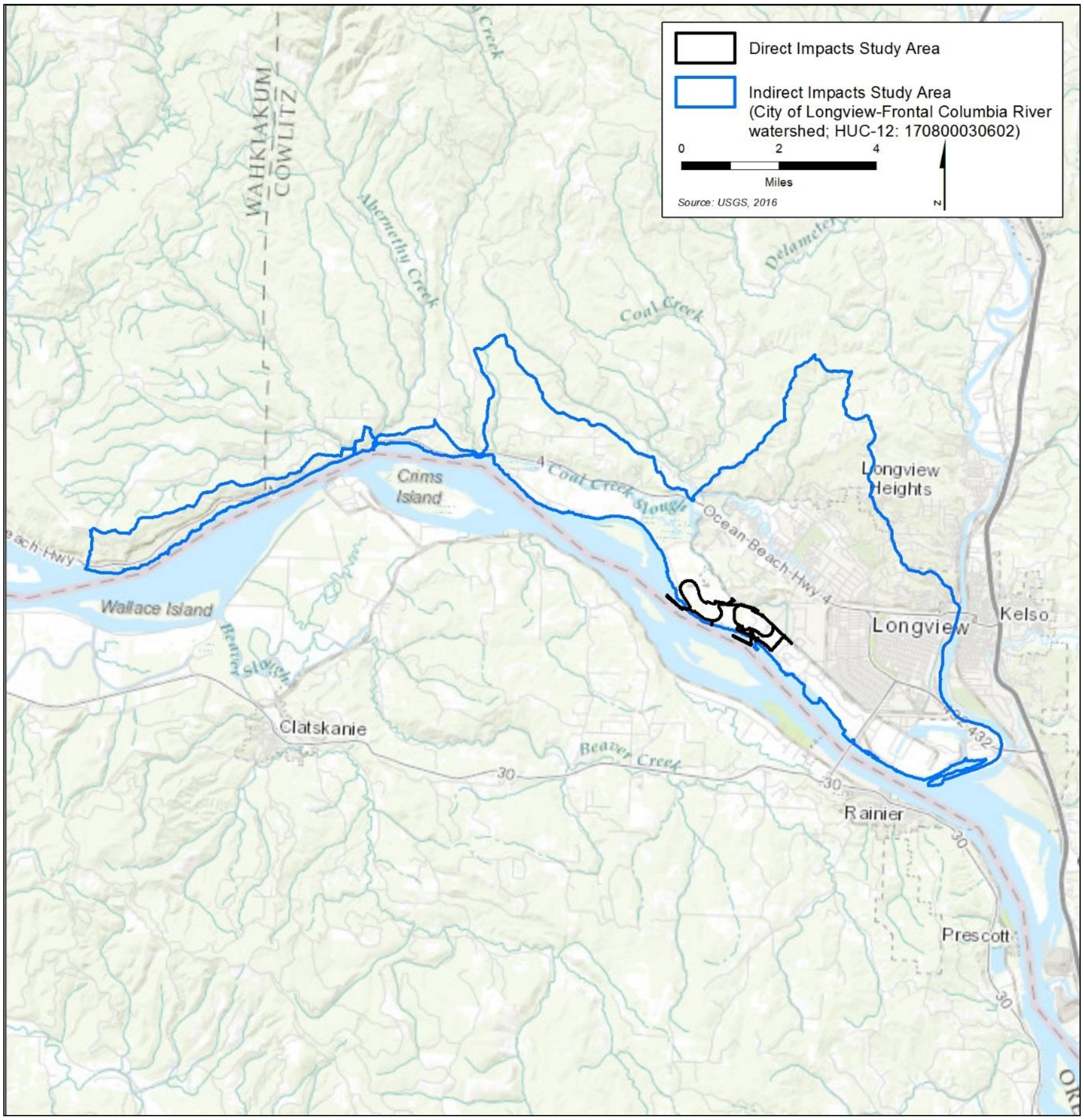
Notes:
USC = United States Code; WAC = Washington Administrative Code; RCW = Revised Code of Washington; Ecology = Washington State Department of Ecology, CCC = Cowlitz County Code; LMC = Longview Municipal Code

5.4.2 Study Area

The study areas for the On-Site Alternative and Off-Site Alternative are described below. These study areas are based on the Corps' Memorandum for Record (MFR), dated February 14, 2014, and then adjusted to reflect groundwater characteristics in and near the project areas.

The study area for direct impacts on groundwater for each alternative is the project area. The study area for indirect impacts for both alternatives is the City of Longview-Frontal Columbia River watershed (Hydrologic Unit Code [HUC]-12: 170800030602) (Figure 5.4-1).

Figure 5.4-1. Groundwater Study Areas for the On-Site Alternative and Off-Site Alternative



5.4.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on groundwater associated with construction and operation of the proposed export terminal. For direct impacts, the analysis assumes best management practices were incorporated into the design, construction, and operations of the terminal. More information about best management practices can be found in Chapter 8, *Minimization and Mitigation*, and Appendix H, *Export Terminal Design Features*.

5.4.3.1 Information Sources

The following sources of information were used to identify and analyze potential impacts of the proposed export terminal on groundwater.

- *Remedial Investigation Report* (Anchor Environmental, LLC 2007)
- *Former Reynolds Metals Reduction Plant—Longview, Draft Remedial Investigation and Feasibility Study* (Anchor QEA 2014)
- *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)
- *Millennium Coal Export Terminal Longview, Washington, Off-Site Alternative – Barlow Point, Appendix M, Water Resource Report* (URS Corporation 2014e)
- *Mint Farm Regional Water Treatment Plant, Preliminary Design Report, Part 2A, Hydrogeologic Characterization* (City of Longview 2010)

5.4.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the proposed export terminal on groundwater. Although the indirect impacts study area includes the City of Longview-Frontal Columbia River watershed, impacts on groundwater were determined to be limited to the project area and along the rail spurs that would provide access to the project area.

Potential groundwater impacts have been evaluated in terms of groundwater discharge and recharge, groundwater quality, and groundwater withdrawal. The assessment of impacts is based on the assumption the On-Site Alternative and Off-Site Alternative would include the following actions and authorizations.

On-Site Alternative

- National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit and Industrial Stormwater Permit for stormwater discharges.

- Remediation of any existing soil and groundwater contamination in the Applicant's leased area.
- Long-term monitoring as part of the remediation of the existing groundwater contamination to verify remedy effectiveness and natural attenuation of groundwater contamination.

Off-Site Alternative

- Individual NPDES Construction Stormwater General Permit and Industrial Stormwater Permit for stormwater discharges.

5.4.4 Affected Environment

This section describes the environment in the study areas related to groundwater potentially affected by construction and operation of the proposed export terminal.

5.4.4.1 On-Site Alternative

Groundwater Resources

The project area is situated within the Longview-Kelso basin, a topographic and structural depression formed by the Cascadia subduction zone (Anchor 2013 in URS Corporation 2014a). The Longview-Kelso basin is composed of unconsolidated alluvium (silt, fine-grained sand, and clay) underlain by alluvium (coarse-grained sand and gravel). Groundwater resources in the study areas include an upper alluvium aquifer (shallow aquifer) and a deeper-confined aquifer from which industries, small farms, and domestic well users withdraw groundwater. An aquifer is the underground soil or rock through which groundwater can easily move. The amount of groundwater able to 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 consisting of gravel, sand, sandstone, or fractured rock such as limestone are relatively permeable (or porous) materials.

In the vicinity of the On-Site Alternative project area, a confining, impervious unit consisting of clay and silt ranging in thickness from approximately 100 to 200 feet separates the two aquifer systems below the project area. The confining unit becomes appreciably thinner beyond the project area, to the north and east near residential areas. Shallow groundwater is hydraulically connected with the Columbia River. Preliminary hydrogeologic investigations conducted for the City of Longview indicate shallow, unconfined groundwater does not contribute significantly to the deeper aquifer as the lower aquifer is primarily recharged by deeper aquifers below the Columbia River (Anchor QEA 2014). The project area is not considered a significant source of groundwater recharge by infiltration because of the low recharge rates of the soils in the study area (URS Corporation 2014c).

Shallow Aquifer

Groundwater in the shallow aquifer is found at depths less than 5 feet below the ground surface (bgs) (Anchor QEA 2014). Groundwater flow in the shallow aquifer in the study area is complex due to the competing influences of the Consolidated Diking and Improvement District (CDID #1) system and, to a lesser extent, the tidally influenced Columbia River (Anchor 2014). Groundwater and stormwater discharged to the CDID #1 ditches are pumped from these ditches by the CDID #1 to maintain surface-water levels below those in the Columbia River. Water from CDID #1 is discharged to the Columbia River. A CDID #1 pump station is located near the southwest corner of the project-area boundary.

Deep Aquifer

The deep aquifer is located at an approximate depth of 200 feet bgs, with sand coarsening to gravel to a depth of 400 feet bgs (Anchor QEA 2014). The deep aquifer is a source of drinking water in the study area. Recharge to the deep aquifer in the project area is expected to be driven primarily by deeper aquifers below the Columbia River and insignificantly from shallow, unconfined aquifers (Anchor QEA 2014). 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 2014a).

Mint Farm Regional Water Treatment Plant

The Mint Farm Regional Water Treatment Plant is approximately 6,000 feet east of the eastern boundary of the project area. While the direct impacts study area does not extend to the Mint Farm Regional Water Treatment Plant, the indirect impacts study area includes the treatment plant, and both the direct and indirect impacts study areas include the treatment plant's wellhead protection area. The treatment plant consists of four 4,000 gallons per minute (gpm) groundwater wells and supplies the City of Longview and the Cowlitz County Public Utility District with municipal water. The plant draws from the same deep aquifer that underlies the project area, recharged by the Columbia River. 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 human health screening levels. Kennedy/Jenks Consultants (2012) 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. Groundwater gradients and monitoring well locations at the Mint Farm Regional Water Treatment Plant are shown in Figures 5.4-2 and 5.4-3.

Surface Water Interaction with Groundwater

This section addresses how and where surface water interacts with groundwater in the study areas.

Columbia River

The Columbia River flows along the entire south/southwest boundary of the project area. Tidal influences on groundwater tend to propagate farthest in the coarse-grained deep aquifer and to a much lesser degree within the shallow aquifer (Anchor QEA 2014).

Consolidated Dike Improvement District #1 System

The CDID #1 system was developed to control local flooding and depress the groundwater elevation in lower elevation areas (e.g., the project area) near the Columbia River to facilitate development on low-lying properties (URS Corporation 2014a). Water levels in the CDID #1 ditches are maintained below the water surface elevation of the Columbia River, which influences groundwater flow direction in the shallow aquifer.

Figure 5.4-2. Shallow Aquifer Groundwater Gradients and Monitoring Well Locations

Figure 5.4-3. Deep Aquifer Groundwater Gradients and Monitoring Well Locations

At the project area, this results in a flow of shallow groundwater away from the Columbia River (to the north, east, and west) (Figure 5.4-4) and toward the CDID #1 ditches (Anchor QEA 2014) except for one localized area: groundwater flow south of the axis of the Columbia River levee is toward the Columbia River (Anchor Environmental 2007). Groundwater that discharges into the CDID #1 ditches and stormwater that is collected within the CDID #1 ditches are actively pumped by the CDID #1 system to the Columbia River through a network of pump stations and valves to maintain water levels below the level of the Columbia River. Some groundwater from the deep aquifer may be discharged into the CDID #1 ditches because an upward vertical gradient also exists in areas near the CDID #1 ditches, causing groundwater in the deep aquifer to move upward into the shallow aquifer (Anchor Environmental 2007).

Drainage Basins and Stormwater System

The on-site drainage system collects stormwater in 12 drainage basins and five outfalls (Section 5.2, *Surface Water and Floodplains*, Figure 5.2-5), which the Applicant manages under NPDES Industrial Stormwater Permit WA-000008-6. The outfalls discharge treated stormwater to CDID #1 ditches and the Columbia River. One of the five outfalls, Outfall 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 more detail in Section 5.2, *Surface Water and Floodplains*.

Groundwater Quality

Local groundwater quality in the study area is good, with no identified pollutant concentrations above human health screening levels. Samples taken from the study area contain manganese, iron, and arsenic levels above the Washington State Department of Health secondary water quality standards, 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 Contamination

Historical operations in the study area have included the operation of various facilities, e.g., an aluminum production facility, a cable plant, cryolite recovery, and industrial landfills (Figure 5.4-5).[2] Chapter 4, Section 4.6, *Hazardous Materials*, provides a history of contamination in the study areas. In the project area, groundwater samples show the presence of cyanide, fluoride, polycyclic aromatic hydrocarbons, heavy metals and petroleum hydrocarbons.

In January 2015, a remedial investigation/feasibility study (RI/FS) (Anchor QEA 2014) was prepared per the requirements of Washington State's Model Toxics Control Act (MTCA), which is administered by the Washington State Department of Ecology (Ecology). The RI/FS provides a detailed description of cleanup and remedial actions in the study area (Anchor QEA 2014). Figure 5.4-5 shows the locations of previous cleanup and removal activities and remedial investigation focus areas.

[2] Landfills include six areas referred to as Landfills and Fill Deposits associated with the operation of the Reynolds aluminum smelter and were used for depositing such things as industrial waste, residual carbon, construction debris, floor sweeps and spent lime. Cleanup of these features is ongoing as a separate project.

Figure 5.4-4. Groundwater Gradients and Flow Direction

SOURCE: Drawing prepared from Alta Survey dated November 11, 2010. Aerial image from November, 2010.
VERTICAL DATUM: NAVD88, Feet.

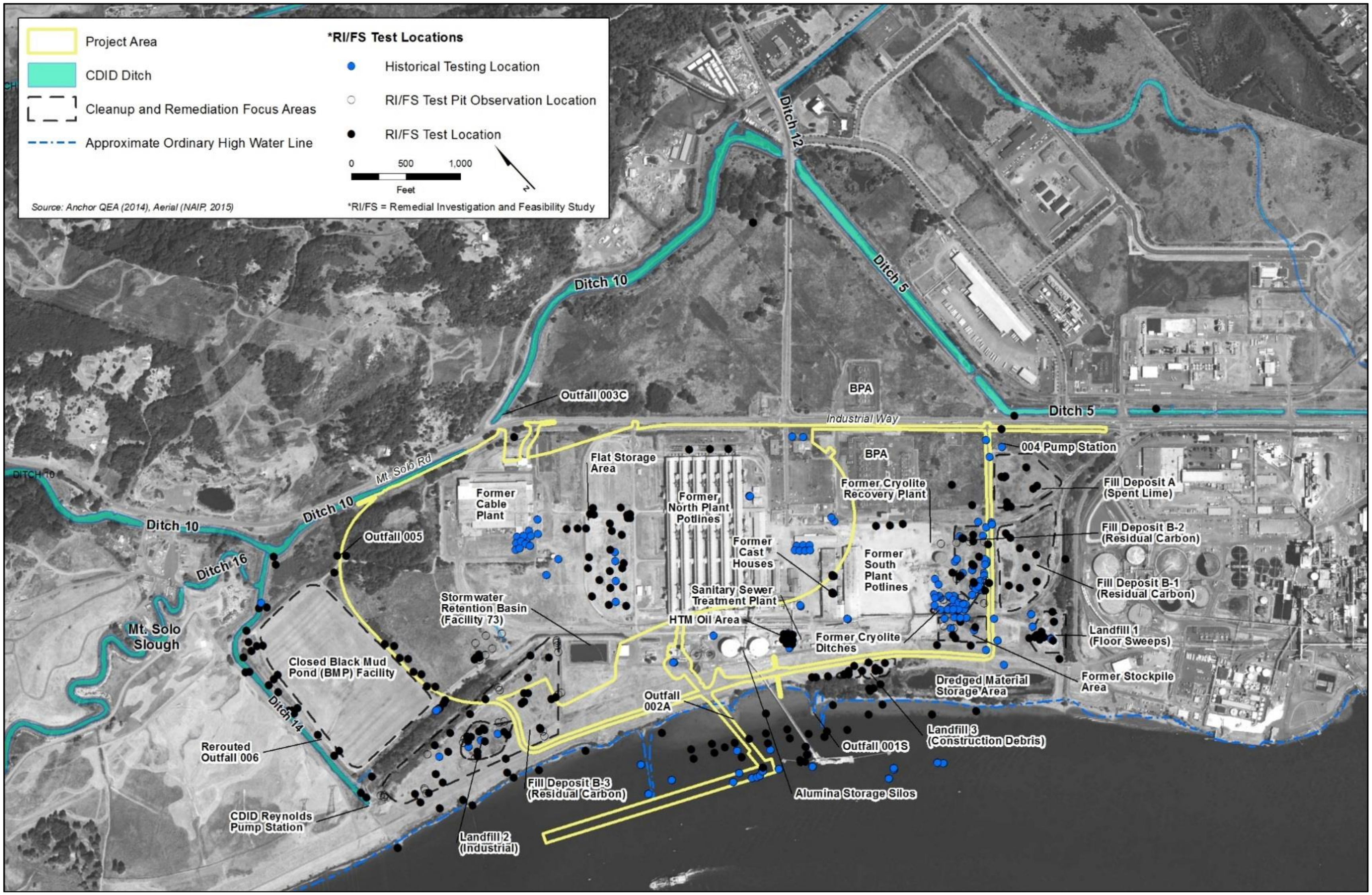
NOTE:
1. All elevations were measured in October 2011.
2. Groundwater and surface water elevation measurements collected between 0936 and 1448 on October 22, 2011.
3. Groundwater collected by measuring from point of known elevation (top of casing) to the water surface with an electronic depth-to-water indicator.
4. Surface water collected by measuring from point of known elevation to the water surface with an electronic depth-to-water indicator.

Source: Anchor Environmental 2007

LEGEND:
- Applicant's Leased Area
- Approximate Ordinary High Water Line
- CDID UP△ Surface Water Measurement
- Groundwater Flow Direction
- Groundwater Elevation Contour in Feet
- 4.14 Groundwater or Surface Water Elevation (NAVD88)
- G2S ⊕ Shallow Groundwater Well
- RL-1D ⊠ Deeper Groundwater Well
- R-1S/R-1D Paired Shallow/Deeper Groundwater Well

0 500
Feet

Figure 5.4-5. Remedial Investigation Environmental Testing (Geologic, Hydrogeologic, and Geochemical) Locations



Source Areas and Chemicals of Concern (Deep and Shallow Aquifers)

Cyanide

Groundwater cyanide concentrations in the study area are very low and have been decreasing over time. Free cyanide concentrations in all samples taken in the western portion of the study areas were below the groundwater screening level of 0.2 milligram per liter.

Groundwater cyanide concentrations in samples collected in the eastern portion of the study areas have also been decreasing over time. One groundwater sample, located near the Former Stockpile Area in the southeast corner of the study areas in Figure 5.4-5, exceeded the groundwater Maximum Contaminant Level in 2006, but concentrations decreased significantly by the 2011 and 2012 sampling events. Free cyanide[3] concentrations in most of the eastern portion of the study areas were below the groundwater screening level.

Fluoride

Fluoride concentrations in most of the Applicant's leased area are below groundwater screening levels. The exceptions are the shallow groundwater located in or immediately adjacent to Landfills 1 and 2 and fill deposits A, B-1, B-2 and B-3. Surface-water monitoring suggests the fluoride present in the shallow groundwater is not affecting water quality in the adjacent CDID Ditches 10, 5, or 14 (Anchor QEA 2014).

Carcinogenic Polycyclic Aromatic Hydrocarbons

Carcinogenic polycyclic aromatic hydrocarbon (CPAH) concentrations from the western portion of the Applicant's leased area do not exceed groundwater screening levels. In the eastern portion of the Applicant's leased area, and outside the project area boundaries, CPAH concentrations were below groundwater screening levels in all locations except for wells located immediately within or adjacent to fill deposits. Three localized areas (purple dots in Figure 5.4-6) include wells located immediately adjacent to Landfill 1 and Fill Deposit B-2. CPAH concentrations in wells located farther downgradient were lower than the groundwater screening level and the surface water screening level.

Polychlorinated Biphenyls

No polychlorinated biphenyls (PCBs) were detected in any of the groundwater samples analyzed.

Heavy Metals

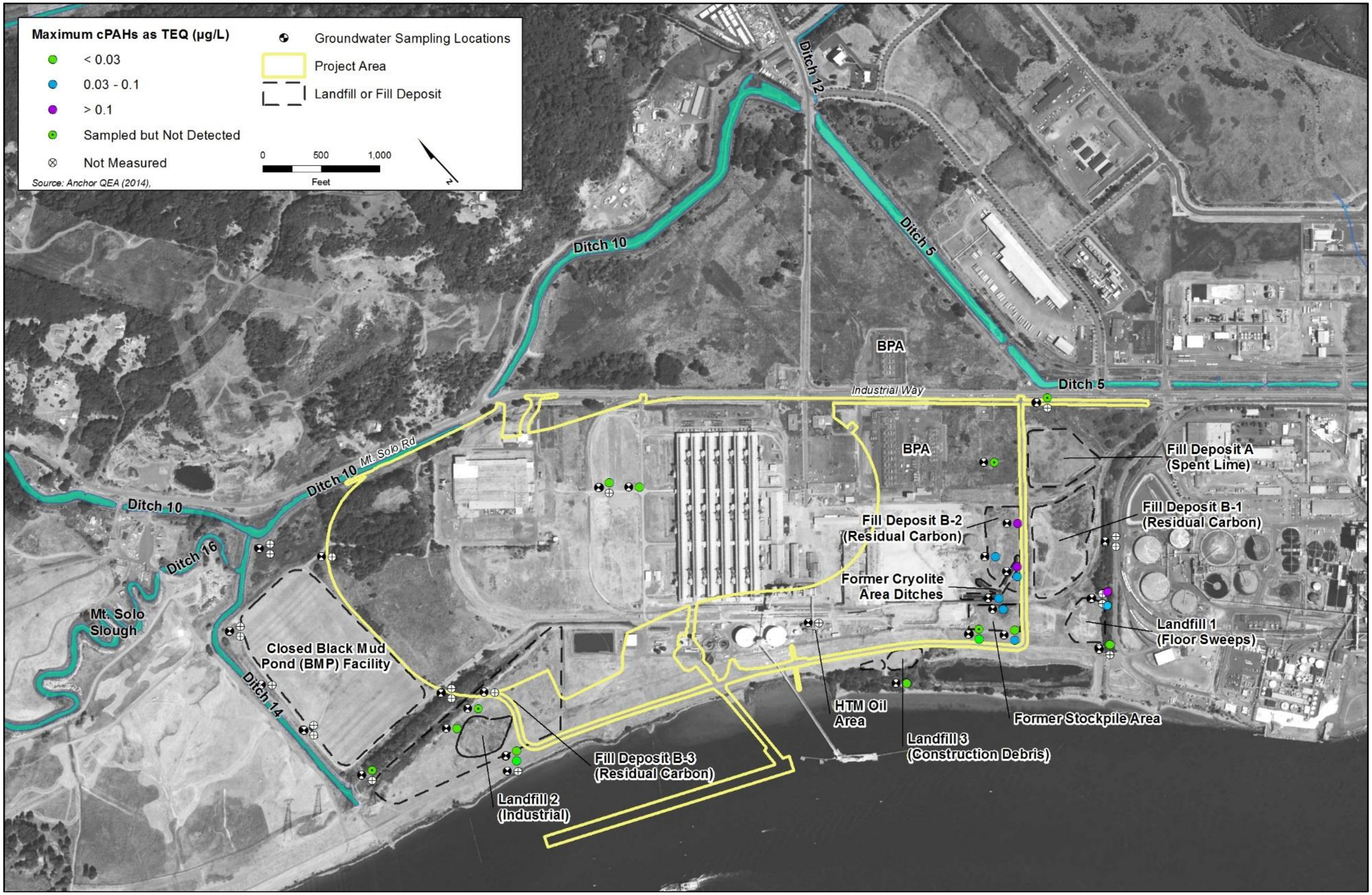
Test findings indicate groundwater heavy metals concentrations are below applicable screening levels.

Volatile Organic Compounds

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

[3] 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 5.4-6. 2007–2012 Groundwater Testing Results (Total CPAHs as Toxic Equivalents)



Total Petroleum Hydrocarbons

The RI/FS testing program included analysis for total petroleum hydrocarbons (TPHs) in the HTM Oil Area (Figure 5.4-6). All samples collected were below groundwater screening levels.

Distribution of Chemicals of Concern

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 (Anchor QEA 2014). Groundwater contaminated with 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 former Reynolds Metals Company facility (Reynolds facility). It is unlikely fluoride and cyanide in the study area affect the surrounding groundwater (Anchor QEA 2014).

Final Cleanup Actions

A draft MTCA Cleanup Action Plan for the study area, released in January 2016, describes proposed cleanup actions to protect human health and the environment, meet state cleanup standards, and comply with other applicable state and federal laws. Cleanup standards would be consistent with the current and anticipated future land use. Ecology's comment period on the *Draft MTCA Cleanup Action Plan* ended March 18, 2016, and issuance of a final plan is pending. Cleanup is estimated to be completed between 2019 and 2020.

Applicant's Water Rights

The Applicant currently holds several water rights to extract groundwater from the deep aquifer (Kennedy/Jenks 2012), which have been held since at least 1967. The total instantaneous withdrawal volume allowance under these water rights is 23,150 gpm and the total annual withdrawal allowance is 31,367 acre-feet per year (AFY). It is estimated the Applicant has an existing demand of 1.53 million gallons per day (Chaney pers. comm.), which is well within the Applicant's water rights[4] limits for groundwater pumping. However, if the Applicant does not fully beneficially use each water right within a 5-year period, the Applicant must relinquish the unused portion (Revised Code of Washington [RCW] 90.14.160).

5.4.4.2 Off-Site Alternative

The project area for the Off-Site Alternative is also on the northeast shore of the Columbia River. The project area is undeveloped and vegetated, with grassy areas extending to the shoreline of the Columbia River. A portion of the eastern side of the project area is an agricultural use, while another portion of the area appears to have been used by recreational off-road vehicles.

[4] The Applicant is responsible for maintaining water rights. The Draft EIS did not verify water rights are current.

Surrounding land uses include the residential neighborhoods of Barlow Point, Memorial Park, and West Longview to the north and east of the project area, and the closed Mount Solo Landfill immediately north-northeast of the project area. The nearest residential community is the West Longview neighborhood located 1 mile north of the project area. The next nearest residential communities, located 1 to 2 miles east of the project area toward the Longview city center include the Olympic West, Highlands, and Columbia Valley Gardens neighborhoods.

Groundwater conditions are assumed to be similar to those described for the On-Site Alternative because the CDID #1 system borders both project areas. Thus, the shallow aquifer groundwater flow gradient beneath the Off-Site Alternative is assumed to be similar to the On-Site Alternative. There may be a slight groundwater gradient from the closed Mount Solo Landfill toward the Off-Site Alternative project area within the shallow aquifer, based on local topography. Therefore, the CDID #1 system may have a reduced impact on the shallow aquifer in terms of groundwater gradient in this isolated area.

The Mount Solo Slough is a privately owned drainage ditch forming the northern boundary of the project area and near the closed Mount Solo Landfill. It is a highly meandering drainage that has been historically managed as a drainage ditch. It connects to CDID Ditch 14 to the east and CDID Ditch 16 to the north, both of which connect to CDID Ditch 10.

Groundwater quality information for the Off-Site Alternative project area was not available at the time of preparation of this document. Although there are no known sources of environmental contamination in the Off-Site Alternative project area, farming of agricultural lands and operations and maintenance of the former motocross/off-road vehicle trails may have included the use of pesticides, herbicides, fuels, and other related contaminants, which have the potential to affect soil, surface water, and groundwater. It is unknown if any residual chemicals remain in the Off-Site Alternative project area.

No groundwater wells have been recorded for the Off-Site Alternative project area.

5.4.5 Impacts

This section describes the potential direct and indirect impacts related to groundwater that would result from construction and operation of the proposed export terminal.[5]

5.4.5.1 On-Site Alternative

This section describes the impacts potentially occurring in the study areas as a result of construction and operation of the proposed export terminal at the On-Site Alternative location.

Construction site preparation activities would involve preloading and installing vertical wick drains to aid with consolidation of low consistency silt and low-density sand (i.e., unconsolidated materials). Wick drains would direct groundwater from the shallow aquifer upward toward the surface during preloading, 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.

[5] Acreages presented in the impacts analysis were calculated using Geographic Information System (GIS), thus, specific acreage of impacts are an estimate of area based on the best available information.

Process water supply for construction and operation of the On-Site Alternative would come from two sources: the on-site water management system during the wet season and onsite groundwater wells during the dry season. Process water uses on the project area 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.

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 operational activities could affect groundwater.

- Alteration of surface runoff patterns
- Use of groundwater for dust control, equipment washdown, and cleanup

Construction—Direct Impacts

Construction-related activities associated with the On-Site Alternative could result in direct impacts as described below. As explained in Chapter 3, *Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (e.g., conveyors and transfer towers).

Groundwater Recharge

Construction would involve preloading and installing vertical wick drains to direct groundwater from the shallow aquifer upward toward the surface during preloading, 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. The study area is not considered a major source of groundwater recharge of the deep aquifer. During construction, drainage and groundwater recharge patterns are expected to be similar to those of the existing conditions, with wick drain effluent and runoff directed to collection and treatment facilities and minimal infiltration to groundwater of the deep aquifer. Therefore, construction of the On-Site Alternative would not be expected to have a measurable impact on groundwater recharge patterns of the deep aquifer.

The shallow water aquifer in the project area is only minimally recharged by stormwater through surface infiltration due to the low recharge rates of soils in the study area (URS Corporation 2014c). During construction, impervious surfaces would be sloped to convey stormwater 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 (Outfall 002A). Therefore, construction of the terminal at the On-Site Alternative location would be expected to slightly reduce groundwater recharge in the shallow aquifer.

For more information on the NPDES Construction Stormwater General Permit for the On-Site Alternative, see Section 5.5, *Water Quality*.

Groundwater Quality

Any construction-related contaminant accidentally released on the ground could infiltrate groundwater and temporarily degrade groundwater quality if the contaminant were to reach groundwater. This would be a concern primarily for the shallow aquifer and not the deep aquifer because there is a confining, impervious soil unit consisting of clay and silt that separates the two aquifer systems, and the deep aquifer is primarily recharged by deeper aquifers below the Columbia River (Anchor QEA 2014) rather than surface infiltration. Poured concrete, cement, mortars, and other Portland cement- or lime-containing construction material could alter the pH of stormwater, which could infiltrate into the ground and affect the shallow aquifer water quality. Petro-chemicals could also be released through leaks and accidental spills, which could infiltrate into the ground and potentially reach groundwater. However, the likelihood of a large contaminant spill would be low with implementation of the best management practices required as part of the NPDES Construction Stormwater General Permit. In addition, cleanup efforts would begin immediately after an accidental contaminant release, so it would be unlikely for a large amount of contaminant would reach groundwater and impair water quality. Therefore, construction is not expected to result in groundwater degradation as a result of an accidental contaminant release and no long-term effects are anticipated.

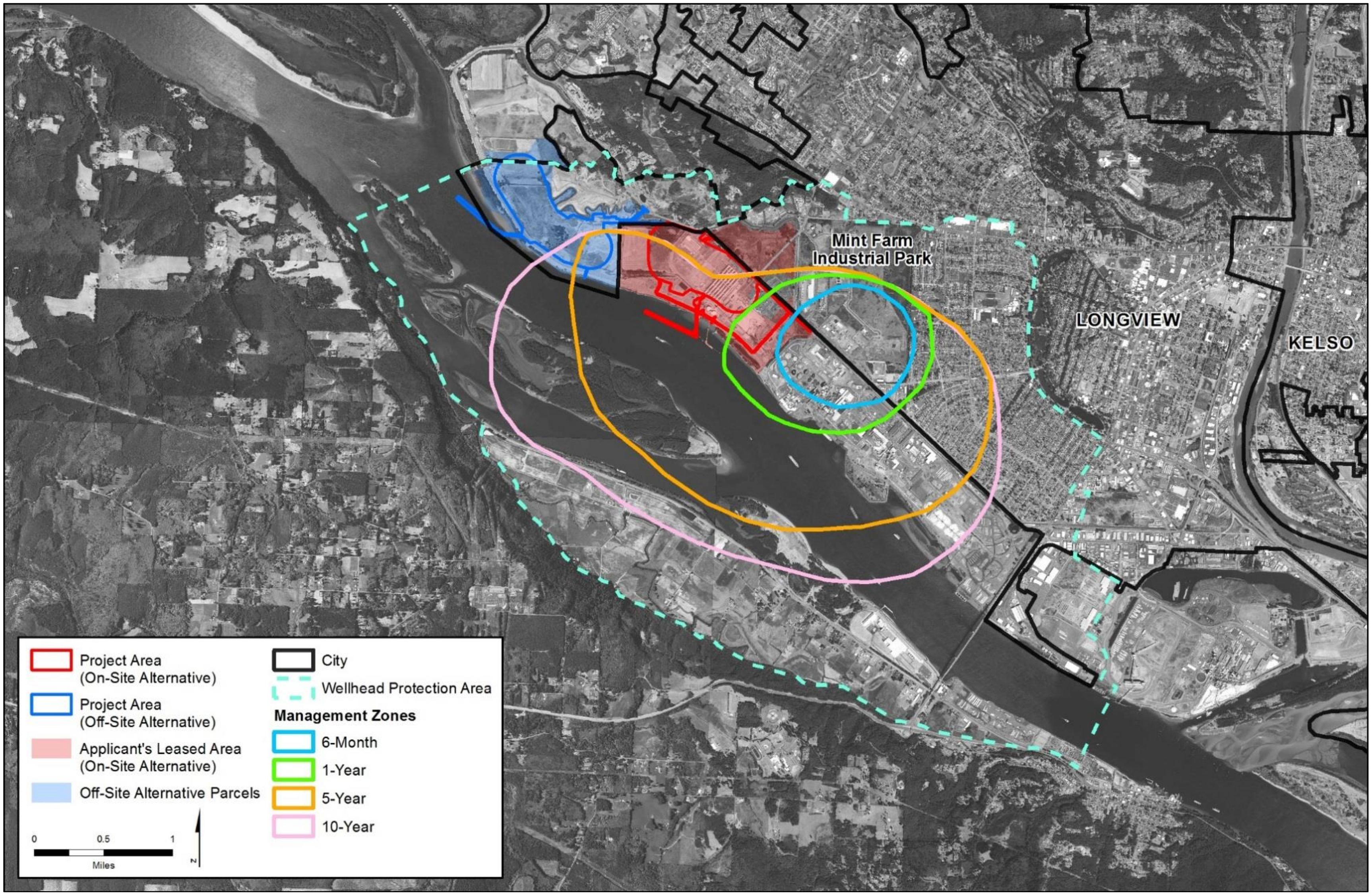
Site preparation activities would involve preloading and installation of vertical wick drains to aid in the consolidation of low consistency silt and low-density sand (i.e., unconsolidated materials). Wick drains would direct groundwater from the shallow aquifer upward toward the surface during preloading, where it would discharge. 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 soil materials affected by preloading would be relatively low, and thus, would not be particularly susceptible to the infiltration of contaminated groundwater. Water discharged from the wick drains would be captured, tested for contaminants, and treated prior to discharge to any surface waters. Therefore, construction is not expected to result in groundwater degradation as a result of preloading and vertical wick drains and no long-term effects are anticipated.

Construction could encounter previously contaminated areas currently being addressed by the MTCA Cleanup Action Plan, which could degrade 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 5.4-5)—cleanup actions are not recommended in the draft Cleanup Action Plan for the project area. For the Flat Storage Area and Fill Deposit B-3, construction and remediation activities would be coordinated to reduce conflicts and minimize any environmental impact. Fluoride and cyanide levels found in shallow groundwater have limited mobility and do not affect downgradient groundwater or surface water quality. Therefore, construction at the On-Site Alternative location is not expected to result in groundwater degradation as a result of disturbing previously contaminated areas.

Construction would be unlikely to affect the wellfield at the Mint Farm Industrial Park, which is located in the indirect impacts study area, and is upgradient and approximately 1.14 miles (6,000 feet) away. However, the direct impacts study area is located within Zone 2 of the Mint Farm Industrial Park's wellhead protection and sanitary control areas (Figure 5.4-7).[6]

[6] 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.

Figure 5.4-7. City of Longview Wellhead Protection Area



The wellfield draws water from the deep aquifer, which is protected by a confining, impervious soil unit consisting of clay and silt that separates the two aquifer systems, and the deep aquifer is primarily recharged by deeper aquifers below the Columbia River. So it would be unlikely that contaminants from a spill would ever reach the groundwater withdrawn by the wellfield.

Groundwater Supply

Construction would require groundwater for dust suppression. The maximum amount of water to be used for dust suppression is estimated to be 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 23,150 gpm or 31,367 AFY. Water demand for construction-related activities and existing operations, together, would represent only 6.5% of the Applicant's current groundwater extraction rights and would be an increase of approximately 2% over current groundwater extraction. Therefore, construction of the On-Site Alternative would have a negligible impact on groundwater supply.

It is possible excavation activities could intercept groundwater in low-lying areas, which could result in temporary fluctuations in shallow groundwater in the immediate area. 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.

Construction—Indirect Impacts

Construction at the of the propsed export terminal at the On-Site Alternative location would not result in indirect impacts on groundwater because construction would be limited to the project area and would not occur later in time or be farther removed in terms of distance than the direct impacts.

Operations—Direct Impacts

Operation of the proposed export terminal at the On-Site Alternative location would result in the following direct impacts. Operations-related activities are described in Chapter 3, *Alternatives*.

Groundwater Recharge

Operation of the terminal could permanently reduce infiltration due to soil compaction and new impermeable surfaces (e.g., roads and buildings). The project area would occupy some of the existing drainage basins in the project area (Figure 5.5-3), effectively eliminating a portion of the runoff presently handled under the Applicant's existing NPDES Industrial Stormwater Permit. (The Applicant would be required to obtain a separate NPDES Industrial Stormwater Permit for a separate system of stormwater collection and discharge.) However, the project area is not an important source of groundwater recharge due to relatively impermeable soils (URS Corporation 2014c). In addition, runoff is currently collected in a ditch system and operating the proposed terminal would not substantively change these conditions; the primary source of shallow groundwater recharge in the project area would continue to be the Columbia River. Overall, operation of the terminal at the On-Site Alternative location would not substantially change shallow groundwater recharge volumes or patterns in the project area.

Operations would not be expected to measurably affect groundwater recharge for the deeper aquifer because the deep aquifer is primarily recharged by deeper aquifers below the Columbia River (Anchor QEA 2014).

Groundwater Quality

Contaminants and coal dust generated during operations could degrade groundwater quality if contaminated runoff were to infiltrate into the ground and reach groundwater. However, as described under *Groundwater Recharge* above, the project area is not considered a significant source of groundwater recharge through infiltration because of the low recharge rates of the soil characteristics in the study area (URS Corporation 2014c), limiting contaminant movement into the ground. In addition, runoff from the study area, and any contaminants in that runoff, would be directed to on-site drainage systems, treated, and either reused on site or discharged in accordance with the NPDES Industrial Stormwater Permit for the proposed terminal. Water reused on site would be brought up 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 routed to permitted outfalls and discharged to the Columbia River. Discharge of water to the Columbia River during operation of the terminal would mostly occur during the rainy season when excess surface water would be more likely to be generated on site.

The potential for coal dust to affect groundwater would be relatively low due to the low permeability of soils in the study area, the propensity for soil to filter out coal dust suspended in water, and treatment of on-site stormwater runoff. Thus, it would be unlikely coal dust would come in contact with groundwater.

The potential for toxic constituents of coal to reach groundwater would also be relatively low. Toxic constituents of coal include CPAHs 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 (see Section 5.5 *Water Quality*, for coal constituents of Powder River Basin and Uinta Basin coal). The potential risk for exposure to toxic chemicals contained in coal would be relatively low as these chemicals tend to be bound in the matrix structure and not quickly or easily leached. See Section 5.5, *Water Quality*, and Chapter 6, Section 6.7, *Coal Dust*, for more information.

Operation of the terminal would not encounter or disturb previously contaminated areas being addressed by the MTCA Cleanup Action Plan. Remediation activities would be carried out in accordance with relevant regulations and coordinated to avoid exposure to the environment.

Overall, operation of the proposed terminal would not degrade groundwater quality due to the low recharge rates of soils in the area. Surface runoff treatment would minimize any infiltration of contaminant-laden runoff into the ground.

Groundwater Supply

Process water, i.e., water to be used during operations for dust control and equipment washdown, would be supplied 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 onsite treatment facility consisting of retention pond(s) with flocculent added 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 (MG), including a reserve of 0.36 MG for fire suppression.

Approximately 1,200 gpm during the wet season and 2,000 gpm during the dry season (approximately 2,034 AFY) would normally be required for dust suppression. 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. The Applicant holds water rights for instantaneous extraction of 23,150 gpm up to a total volume of 31,367 AFY. Combined with the groundwater demand from existing activities in the study area (approximately 1,994 AFY), operation of the terminal at the On-Site Alternative location would require approximately 3,019 AFY, an increase of approximately 51% over existing groundwater demands, which is less than 10% of the pumping limit. Therefore, operation of the terminal would have a negligible impact on groundwater supply.

Operations—Indirect Impacts

Operation of the proposed export terminal at the On-Site Alternative location would result in the following indirect impacts on groundwater related to operations in the direct impacts study area and increased rail traffic on the BNSF Spur and Reynolds Lead within the direct and indirect study areas. Operations-related activities are described in Chapter 3, *Alternatives*.

Groundwater Quality

The On-Site Alternative likely would not affect groundwater at the Mint Farm Industrial Park because the wellfield draws water from the deep aquifer, and as previously mentioned, there is a confining, impervious layer of clay and silt separating the two aquifers. So it would be unlikely contaminants from a spill during operations would ever reach the wellfield. The majority of the study area is located within Zone 2 of the Mint Farm Industrial Park's wellhead protection and sanitary control areas (Figure 5.4-7). Although it would be highly unlikely a contaminant would ever reach the deep aquifer, should a contaminant release occur during operations, cleanup would occur rapidly. In addition, surface water generated on the study area would be collected and reused on site or treated before discharge to the Columbia River, further minimizing the potential for contaminants to infiltration into the ground.

Spills of fuel or other potentially hazardous materials could occur along the rail spur if rail cars were to collide and/or derail within the study areas. The indirect impacts study area begins at the west side of the Cowlitz River where the rail line crosses into the City of Longview-Frontal Columbia River watershed. Materials released onto the ground as a result of a fuel spill could degrade groundwater quality. As discussed in Chapter 4, Section 4.6, *Hazardous Materials*, if a release of hazardous materials occurred, 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/or 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 prevent a spill of fuel or other potentially hazardous material from affecting groundwater quality through quick response, containment and cleanup. Overall, a release of potentially hazardous materials would not be expected to affect groundwater.

5.4.5.2 Off-Site Alternative

This section describes the impacts potentially occurring in the study areas as a result of construction and operation of the proposed export terminal at the Off-Site Alternative location. Construction and operational activities would be the same or similar to those described for the On-Site Alternative.

Construction—Direct Impacts

The Off-Site Alternative would result in the following direct impacts.

Groundwater Recharge

Construction would involve ground-disturbing activities that would permanently alter the existing drainage and groundwater recharge patterns in the study area. The project area is currently undeveloped. Therefore, groundwater recharge, assumed to occur at the site, would largely be eliminated by a terminal dominated by impervious surfaces.

During construction, a majority of stormwater runoff would be collected and treated prior to discharge to the Columbia River, which is the major source of groundwater recharge in the area. Although construction of the terminal would essentially eliminate groundwater recharge at the Off-Site Alternative location, treated runoff would be discharged to the Columbia River, where it would be available for groundwater recharge.

Groundwater Quality

Due to the absence of site-specific groundwater-related information, the quality of groundwater associated with the Off-Site Alternative project area is unknown. Farming and operations and maintenance of the former motocross/off-road vehicle trails may have included the use of pesticides, herbicides, fuels, and other related contaminants, which have the potential to affect groundwater. It is unknown whether any residual chemicals remain in the soil. It is expected impacts on groundwater quality would be minimal due to the required implementation of a construction stormwater pollution prevention plan and best management practices to protect surface waters from discharge of polluted stormwater. The majority of the stormwater would be collected and treated prior to discharge to any surface water, reducing the potential for pollutants to enter the Columbia River and affect groundwater quality.

Construction could release contaminants into the ground through leaks and spills during construction. Construction activities would be required to comply with a construction stormwater pollution prevention plan and implement best management practices to prevent any discharge of polluted stormwater.

Preparation of the project area for construction would involve installation of vertical wick drains, which could create a temporary groundwater gradient, or increase an existing gradient, toward the project area. Due to the proximity of the project area to the closed Mount Solo Landfill, groundwater quality could be affected. If contaminant concentrations in groundwater are found to be above MTCA screening levels established by Ecology, groundwater expelled through wick drains would need to be evaluated and treated prior to disposal or discharge.

Construction is not expected to affect the wellfield at the Mint Farm Industrial Park. While construction-related spills of hazardous materials could occur, the potential risks of groundwater contamination resulting from such accidents generally would be low due to the likely small size of the spills and the localized and short-term nature of an accidental release. Impacts would be the same as, or similar to, those described for the On-Site Alternative.

Groundwater Supply

Construction would require less than 40,000 gallons per day of groundwater for dust control and other construction-related uses. To meet this demand, groundwater would need to be obtained from a new well or from an off-site source during construction. A new groundwater supply well(s) at the Off-Site Alternative property would require hydrogeology studies and a grant of water rights prior to construction to ensure that groundwater supplies would not be adversely affected.

Construction—Indirect Impacts

No indirect impacts have been identified for groundwater related to construction of the Off-Site Alternative.

Operations—Direct Impacts

Operation of the Off-Site Alternative would result in the following direct impacts.

Groundwater Recharge

Full build-out of the proposed terminal would substantially increase impervious surfaces compared to existing conditions. Stormwater otherwise recharging groundwater through infiltration would be collected and conveyed to a treatment system for reuse or discharged to the Columbia River. Operation of the terminal would permanently modify surface water drainage and groundwater recharge patterns at the project area to some extent. However, treated runoff discharged to the Columbia River would be available for groundwater recharge because of the hydrologic connection between the river and the shallow groundwater in the project area.

Groundwater Quality

Operation of the terminal could release contaminants onto the ground, which could infiltrate to groundwater and degrade groundwater quality. Potential impacts would be similar to those described above for the On-Site Alternative. Overall, operation of the terminal would not degrade groundwater quality due to collection and on-site treatment of runoff.

Groundwater Supply

Operation of the terminal would require process water, which would be drawn, in part, from a new groundwater well. About 334 million gallons per year (MGY) (1,025 AFY) of groundwater would be needed to augment the surface supply. While a new well would tap groundwater supplies, pumping would not be expected to measurably affect groundwater levels given the proximity of the Off-Site Alternative location to the Columbia River and expected recharge rates in the area. In addition, any new wells proposed for the Off-Site Alternative would require an evaluation of the groundwater hydrology at the site, and application and approval for new water rights to ensure there would be no adverse impacts on groundwater supply.

Operations—Indirect Impacts

Potential impacts on groundwater quality during operations of the proposed export terminal and from accidental train collisions or derailments would be the same as those described for the On-Site Alternative. A release of potentially hazardous materials would not be expected to affect groundwater.

5.4.5.3 No-Action Alternative

Under the No-Action Alternative, the Corps would not issue a Department of the Army permit authorizing construction and operation of the proposed export terminal. As a result, impacts resulting from constructing and operating the export terminal would not occur. In addition, not constructing the export terminal would likely lead to expansion of the adjacent bulk product business onto the export terminal project area. The following discussion assesses the likely consequences of the No-Action Alternative related to groundwater.

Continued use of groundwater would occur under the approved water rights for the existing on-site groundwater wells. The existing NPDES Industrial Stormwater Permit would remain in place, maintaining the water quality of existing stormwater discharges to the Columbia River, which would maintain water quality of groundwater. Any new or expanded industrial uses would trigger a new or modified NPDES permit. Thus, potential impacts on groundwater could occur under the No-Action Alternative similar to those described for the On-Site Alternative, but the magnitude of the impact would depend on the nature and extent of the future expansion.

5.4.6 Required Permits

The following permits would be required related to groundwater.

- **Cowlitz County Critical Areas Permit—Cowlitz County**. The Cowlitz County Critical Areas permit would be needed 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—Washington State Department of Ecology.** This certification would be required to ensure impacts on groundwater quality from construction and operation of the proposed export terminal woud not violate state water quality standards.
- **National Pollution Discharge Elimination System Construction Stormwater General Permit—Washington State Department of Ecology.** The NPDES Construction Stormwater General Permit would be required for stormwater discharges during construction of the On-Site Alternative.

- **National Pollution Discharge Elimination System Industrial Stormwater Permit—Washington State Department of Ecology**. The NPDES Industrial Stormwater Permit would be required for stormwater discharges related to operation of the On-Site Alternative.
- **Water Rights—Washington State Department of Ecology.** The Applicant would ensure existing water rights are current prior to using those rights. If the Applicant's water rights are current, the Applicant must maintain those water rights. If the Applicant's water rights are partially relinquished, the Applicant must apply for and obtain the necessary water rights.
- **Critical Areas Permit—City of Longview (Off-Site Alternative only)**. Critical Areas permit from the City of Longview would be required to address compliance with the City's Critical Areas Ordinance should Critical Aquifer Recharge Areas be located on or adjacent to the Off-Site Alternative.