5.6 Air Quality

Air quality is essential to human and environmental health, and is protected by federal, state, and local regulations. Air pollution can harm humans, plants, animals, and structures. Ambient air quality can be affected by climate, topography, meteorological conditions, and pollutants emitted from natural or human sources.

This section describes air quality in the study area. It then describes impacts on air quality that could result from construction and operation of the Proposed Action and No-Action Alternative. This section also presents the measures identified to mitigate impacts resulting from the Proposed Action. Fugitive emissions from coal dust, which can also affect air quality, are addressed separately in Section 5.7, *Coal Dust*.

5.6.1 Regulatory Setting

Laws and regulations related to air quality are summarized in Table 5.6-1.

Table 5.6-1. Regulations, Statutes, and Guidelines for Air Quality

Regulation, Statute, Guideline	Description
Federal	
Clean Air Act and Amendments	Enacted in 1970, as amended in 1977 and 1990, requires EPA to develop and enforce regulations to protect the public from air pollutants and their health impacts.
National Ambient Air Quality Standards (U.S. Environmental Protection Agency)	Specifies the maximum acceptable ambient concentrations for seven criteria air pollutants: CO, O_3, NO_2, SO_2, lead, PM2.5, and PM10. Primary NAAQS set limits to protect public health, and secondary NAAQS set limits to protect public welfare. Geographic areas where concentrations of a given criteria pollutant exceed a NAAQS are classified as nonattainment areas for that pollutant.
State	
Washington State General Regulations For Air Pollution Sources (WAC 173-400) and Washington State Clean Air Act (RCW 70.94)	Establish the rules and procedures to control or prevent the emissions of air pollutants. Provides the regulatory authority to control emissions from stationary sources, reporting requirements, emissions standards, permitting programs, and the control of air toxic emissions.
Washington State Operating Permit Regulation (WAC 173-401)	Establishes the elements for the state air operating permit program.
Washington State Controls for New Sources of Toxic Air Pollutants (WAC 173-460)	Establishes the systematic control of new or modified sources emitting toxic air pollution to prevent air pollution, reduce emissions, and maintain air quality that will protect human health and safety.
Washington State Ambient Air Quality Standards (WAC 173-476)	Establishes maximum acceptable levels in the ambient air for particulate matter, lead, SO_2, NO_2, O_3, and CO. Washington State adopts current federal NAAQS in state regulations.

Regulation, Statute, Guideline	Description
Local	
Southwest Clean Air Agency (SWCAA 400)	Regulates stationary sources of air pollution in Clark, Cowlitz, Lewis, Skamania, and Wahkiakum Counties.

Notes:
EPA = U.S. Environmental Protection Agency; CO = carbon monoxide; O_3 = ozone; NO_2 = nitrogen oxides; SO_2 = sulfur dioxide; PM2.5 = particulate matter less than or equal to 2.5 micrometers in size; PM10 = particulate matter less than or equal to 10 micrometers in size; NAAQS = National Ambient Air Quality Standards; WAC = Washington Administrative Code; RCW = Revised Code of Washington; SWCAA = Southwest Clean Air Agency

5.6.1.1 Federal and State Ambient Air Quality Standards

Federal and state regulations govern maximum concentrations for criteria air pollutants, which are key indicators of air quality (Table 5.6-2).

The federal standards, referred to as National Ambient Air Quality Standards (NAAQS), were established by the U.S. Environmental Protection Agency (EPA) under authority of the Clean Air Act to protect the public from air pollution. The NAAQS consist of primary standards and secondary standards. Primary standards are designed to protect public health, including sensitive populations such as asthmatics, children, and the elderly. Secondary standards are designed to protect public welfare from effects such as visibility reduction, soiling, and nuisance (e.g., preventing air pollution damage to vegetation).

States are required to meet the national standards. A state can set more stringent ambient air quality standards within the state. Washington State adopts current federal NAAQS in state regulations (Chapter 173-476 WAC, Ambient Air Quality Standards). Under the federal Clean Air Act, states are authorized to administer monitoring programs in different areas to determine if those areas are meeting the NAAQS.

EPA regulates nonroad mobile sources under the Clean Air Act to control emissions from nonroad engines (such as construction equipment, locomotives, and vessels). Regulations relevant to the Proposed Action include locomotive emission standards for new and rebuilt locomotive engines and the North America Emission Control Area for marine vessels limiting the sulfur content in fuel oil for marine vessels.

Table 5.6-2. State and Federal Ambient Air Quality Standards

Pollutant	Primary	Secondary
Carbon monoxide		
8-hour average[a]	9 ppm	No standard
1-hour average[a]	35 ppm	No standard
Ozone		
8-hour average[b,c]	0.070 ppm	0.070 ppm
Nitrogen dioxide		
1-hour average[d]	100 ppb	No standard
Annual average	53 ppb	53 ppb
Sulfur dioxide		
3-hour average[e]	No standard	0.50 ppm
1-hour average[f]	75 ppb	No standard
Lead		
Rolling 3-month average	0.15 μg/m^3	0.15 μg/m^3
PM10		
24-hour average[g]	150 μg/m^3	150 μg/m^3
PM2.5		
Annual average[h]	12 μg/m^3	15 μg/m^3
24-hour average[i]	35 μg/m^3	35 μg/m^3

Notes:

[a] Not to be exceeded on more than 1 day per calendar year as determined under the conditions indicated in 173 WAC 476.

[b] In December 2015, EPA lowered the federal standard for 8-hour ozone from 0.075 ppm to 0.070 ppm.

[c] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.070 ppm.

[d] 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years.

[e] Not to be exceeded more than once per calendar year.

[f] 99th percentile of 1-hour daily maximum concentrations averaged over 3 years.

[g] Not to be exceeded more than once per year average over 3 years.

[h] Annual mean averaged over 3 years.

[i] 98th percentile averaged over 3 years.

Source: 173 WAC 476; U.S. Environmental Protection Agency 2012.

ppm = parts per million; ppb= parts per billion; PM10 = particulate matter with a diameter of less than or equal to 10 micrometers; PM2.5 = particulate matter with a diameter less than or equal to 2.5 micrometers; μg/m^3 = micrograms per cubic meter

5.6.1.2 Federal and State Air Toxics

Under the federal Clean Air Act, EPA controls air toxics, which are pollutants known or suspected to cause cancer or other serious health effects, such as birth defects or reproductive effects. Examples of air toxics include benzene, formaldehyde, and toluene. EPA has identified 188 air toxics, which it refers to as hazardous air pollutants (HAPS). No ambient air quality standards have been established for HAPS, and instead EPA has identified all major industrial stationary sources that emit these pollutants and developed national technology-based performance standards to reduce their emissions. The performance standards are designed to ensure that major sources of HAPS are controlled, regardless of geographic location.

An action that requires a Notice of Construction application under WAC 173-400-110 is subject to the review requirements of controls for new sources of toxic air pollutants except if either of the following criteria are met: (1) emissions before control equipment of each toxic air pollutant from a new source are less than the applicable *de minimis* emission threshold for the toxic air pollutant listed in WAC 173-460-150; or (2) the increase in emissions from each modification is less than the applicable *de minimis* emission threshold for the toxic air pollutant listed in WAC 173-460-150. Southwest Clean Air Agency has a separate list of pollutants that may apply to emissions from this stationary source. The purpose is to establish the systematic control of new or modified sources emitting toxic air pollutants to prevent air pollution to the extent reasonably possible and maintain levels of air quality to protect human health.

5.6.2 Study Area

The study area for direct impacts on air quality is the area in and near the project area that could be affected by construction and operation activities in the project area. The study area for indirect impacts includes Cowlitz County and accounts for rail operations in Cowlitz County, and vessel activity on the Columbia River. An assessment of air quality impacts from Proposed Action-related trains and vessels for the routes in Washington State is also provided.

For inhalation health risks related to diesel particulate matter, the study area for direct impacts is the area that could be affected by terminal operations in the project area. The study area for indirect impacts is the area that could be affected by terminal and rail operations in Cowlitz County.

5.6.3 Methods

This section describes the sources of information and methods used to evaluate the potential impacts on air quality associated with the construction and operation of the Proposed Action and No-Action Alternative. Sources from outside of Washington State were used when no applicable state or local methods or guidance were available.

5.6.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the Proposed Action and the No-Action Alternative on air quality in the study area.

- Data and information on coal export terminal construction and operation (URS Corporation 2015)
- Northwest International Air Quality Environmental Science and Technology Consortium for existing conditions data (2015)
- California's Air Resource Board vessel transit emissions study (California Air Resources Board 2011)
- California Environmental Protection Agency's guidance manual for preparation of health risk assessments (California Environmental Protection Agency 2003)
- National Climatic Data Center Longview, Washington climate data (National Climatic Data Center 2011)
- U.S. Environmental Protection Agency air pollutant emissions factors (U.S. Environmental Protection Agency 1995a, 1995b, 1995c, 1996)

- U.S. Environmental Protection Agency's air modeling guidance (U.S. Environmental Protection Agency 2004, 2014)
- U.S. Environmental Protection Agency's vessel fuel consumption data (U.S. Environmental Protection Agency 2000)
- U.S. Environmental Protection Agency's NONROAD Model (U.S. Environmental Protection Agency 2009)
- U.S. Environmental Protection Agency's vessel exhaust emission standards (U.S. Environmental Protection Agency 2012)
- U.S. Environmental Protection Agency's national-scale air toxic assessment (U.S. Environmental Protection Agency 2011)
- Washington State Department of Ecology statewide emissions inventory levels (Washington State Department of Ecology 2014)

5.6.3.2 Impact Analysis

The following methods were used to evaluate the potential impacts of the Proposed Action and No-Action Alternative on air quality.

The analysis evaluated emissions from construction and operations of the Proposed Action. Air emissions were estimated for the criteria air pollutants carbon monoxide, nitrogen oxides, sulfur dioxide, particulate matter less than or equal to 2.5 micrometers in diameter (PM2.5), and particulate matter less than or equal to 10 micrometers in diameter (PM10). Also included were volatile organic compounds (VOCs), an important precursor to ozone. Total suspended particles and diesel particulate matter were also estimated. Because construction emissions are temporary and have a short period of activity, these emissions were only evaluated in comparison with emissions thresholds. Operations emissions, however, were evaluated with respect to their impacts on air quality. Diesel particulate matter was evaluated with respect to the potential to increase inhalation cancer risk.

Construction

The Applicant has identified three construction-material-delivery scenarios: delivery by truck, rail, or barge.

- **Truck.** If material is delivered by truck, it is assumed approximately 88,000 truck trips would be required over the construction period. Approximately 56,000 truck trips would be needed during the peak construction year.
- **Rail.** If material is delivered by rail, it is assumed approximately 700 train trips would be required over the construction period. Approximately two-thirds of the rail trips would occur during the peak construction year.
- **Barge.** If material is delivered by barge, it is assumed approximately 1,130 barge trips would be required over the construction period. Approximately two-thirds of the barge trips would occur during the peak construction year. Because the project area does not have an existing barge dock, the material would be unloaded at an existing dock elsewhere on the Columbia River and transported to the project area by truck.

The emissions for all three scenarios were analyzed to determine the scenario with the highest emissions. Emissions were estimated for the peak construction year in each scenario.

The following sources of emissions were evaluated.

- Construction equipment operations
- Fugitive dust from earthwork activity
- Vehicle delays at at-grade rail crossings
- Construction worker vehicles commuting to the project area
- Truck emissions associated with delivery of construction supplies and materials
- Locomotive emissions associated with delivery of construction supplies and materials by rail
- Tug emissions associated with delivery of construction supplies by barge

Emissions were estimated based on frequency and duration of use and fuel types using EPA emissions data or the EPA NONROAD model for nonroad construction equipment activity. The *SEPA Air Quality Technical Report* (ICF 2017a) provides detailed information on the methods used to calculate emissions for the peak year of construction.

Operations

The air quality model assessed emissions from operation of the Proposed Action and their impact on local air quality. The air quality modeling method followed general EPA protocols used in air quality permitting. Representative background concentrations for the study area (Northwest International Air Quality Environmental Science and Technology Consortium 2015)[1] were used to determine background concentrations in air quality analyses since no representative monitoring data are available with the exception of PM2.5.[2]

The transfer and storage of coal at the coal export terminal would create fugitive emissions of coal dust. Emissions were estimated for the following operations.

- Unloading coal from rail cars
- Transferring coal on conveyors
- Piling coal onto storage piles
- Storing[3] coal in stockpiles
- Loading coal onto vessels

Fugitive coal dust emissions during rail transport from loaded and unloaded trains were also estimated.

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[1] The Northwest International Air Quality Environmental Science and Technology Consortium (NW AIRQUEST) developed background design value estimates for 2009 through 2011 based on model-monitor interpolated products that provide realistic background design value estimates where nearby ambient monitoring data are unavailable. The work is sponsored by EPA Region 10, Ecology, and others.

[2] Representative PM2.5 background air monitoring data for 2013 through 2016 from Ecology's Longview PM2.5 monitor were used to determine the PM2.5 background concentration.

[3] Fugitive emissions from coal stockpiles would occur as a result of wind erosion.

In addition, the assessment considered emissions from the following operations.

- Locomotives idling during coal unloading and moving Proposed Action-related trains travelling to and from the project area
- Docked cargo vessels idling during coal loading (vessel hoteling) and transiting to and from the project area
- Tugs transiting to and from the project area and assisting cargo vessels with maneuvering, docking, undocking at the proposed docks
- Operations, maintenance and emergency equipment
- Employee vehicles
- Vehicles idling during delays caused by Proposed Action-related trains at at-grade crossings along the Reynolds Lead and BNSF Spur

Emissions were evaluated using EPA's standard regulatory air dispersion model, AERMOD (Version 15181). To assess impacts associated with the Proposed Action, the model was used to predict the increase in criteria air pollutant concentrations. The model's maximum incremental increases for each pollutant and averaging time were added to applicable background concentrations and compared to the federal and state ambient air quality standards presented in Table 5.6-2.

An inhalation-only[4] health risk assessment was performed using the AERMOD dispersion model to assess the increased cancer risk associated with the Proposed Action-related increase in diesel particulate matter emissions. The assessment was performed per California Environmental Protection Agency guidance using Ecology's (2008) evaluation and selection of available guidelines. The results from the modeling are discussed in terms of increased inhalation cancer risk per million people. Because no baseline inhalation cancer risk for Cowlitz County that accounts for diesel particulate matter is available,[5] the California EPA Office of Environmental Health Hazard Assessment cancer potency value was applied to the EPA (2011) average Cowlitz County diesel particulate matter concentration (1.14 $\mu g/m^3$) to establish a baseline for comparison in this analysis. The resulting countywide average inhalation cancer risk from diesel particulate matter emissions is approximately 300 cancers per million. Additional information on the methods used is provided in the *SEPA Air Quality Technical Report*.

Annual locomotive and vessel emissions for Proposed Action-related trains and vessels were estimated for Cowlitz County and Washington State and compared to existing annual emissions to provide context for potential air quality impacts in these areas. The *SEPA Air Quality Technical Report* provides detailed information on the methods used to calculate and model emissions during operations.

Additional details regarding the methods and assumptions of the emissions estimates from the different sources are provided below.

[4] The risk assessment only considered the cancer risk by the inhalation pathway because the risk contributions by other pathways of exposure are difficult to quantify and are known to be negligible relative to the inhalation pathway.

[5] Because the EPA 2002 health assessment document for diesel engine exhaust does not find data sufficient to quantitatively determine the diesel cancer potency factor.

- **Coal Storage and Handling.** The tandem rotary unloaders and approximately one-third of conveyors would be enclosed. Unenclosed transfer activities at the coal stockpiles would have systems in place for dust control (watering or dry fogging). Watering of the coal stockpiles would help to reduce wind erosion. In general, the combination of these control systems would be expected to provide a high level of dust control (up to 99%). However, because not all transfer and conveyor operations would be fully enclosed, a more conservative effectiveness assumption of 95% was used in this analysis.
- **Locomotives.** The impact analysis approach for rail operations used EPA-projected emissions factors for line-haul locomotives, which are based on projected changes in locomotive fleet over the next 30 years (U.S. Environmental Protection Agency 2009). These emissions were based on locomotive engine load and associated fuel consumption during transport to and from the coal export terminal and during unloading of coal from train cars. It was assumed that all locomotives would use ultra-low-sulfur diesel (15 parts per million [ppm] sulfur).
- **Vessels.** The impact analysis approach for vessel operations assumed that each cargo vessel receiving coal would need three tugs for maneuvering, and would require 3 hours total time to assist with docking and departing operations. Further, it was estimated that an average of 13 hours would be needed to load each vessel with coal, and during this period of time, the vessel would be using auxiliary engines. To comply with International Maritime Organization 2016 Emission Control Areas for North America, all vessels were assumed to use the maximum allowed sulfur content marine distillate fuel of 0.1% (1,000 ppm). It was also assumed that all tugboats would use ultra-low-sulfur diesel (15 ppm sulfur).

5.6.4 Existing Conditions

This section describes the existing environmental conditions in the study area related to air quality that could be affected by the construction and operation of the Proposed Action and the No-Action Alternative.

5.6.4.1 Attainment Status

EPA and Ecology designate regions as being attainment or nonattainment areas for regulated air pollutants. Attainment status indicates that air quality in an area meets the federal, health-based ambient air quality standards. Nonattainment status indicates that air quality in an area does not meet those standards. Cowlitz County is currently in attainment for all NAAQS. This designation means that EPA and Ecology expect the area to meet air quality standards.

5.6.4.2 Air Quality Conditions

This section describes climate, meteorological, and air quality conditions in the study area.

Climate and Meteorological Conditions

The project area is located along the Columbia River in southwestern Washington, approximately 50 miles east of the Pacific Ocean. The region is characterized as a mid-latitude, west coast marine-type climate. The Cascade Range to the east has a large influence on the climate in Cowlitz County. The Cascade Range forms a barrier from continental air masses originating over the Columbia River Basin. The Cascades also induce heavy amounts of rainfall; as moist air from the west rises, it is forced to rise up the mountain slopes, which produces heavier rainfall on the western slopes of the Cascades and moderate rainfall in the low-lying areas, such as Longview.

Summers in the region are mild and dry. Winters are cool, but typically wet and cloudy with a small range in daily temperature. The average annual precipitation in Longview is approximately 48 inches, with most precipitation falling from November through March (National Climate Data Center 2011). Average annual rain events, taken as days with more than 0.01 inch of rainfall, occur approximately 175 days per year, based on National Climatic Data Center summaries.

Temperatures are usually mild in the Lower Columbia River Basin. Days with maximum temperatures above 90 degrees Fahrenheit (°F) occur about seven times per year on average. Days with a minimum temperature below 32°F occur about 57 times per year on average, and temperatures below 0°F occur only very rarely (none recorded between 1931 and 2006). Mean high temperatures range from the high 70s in the summer to mid-40s (°F) in winter, while average lows are generally in the low 50s in summer and mid-30s in winter.

Meteorological data collected by the Weyerhaeuser meteorological tower at the nearby Mint Farm Industrial Park between 2001 and 2003 (URS Corporation 2015) indicates that the prevailing winds near the project area are from the west-northwest and southeast, following along the alignment of the Columbia River. In the fall and winter (October through March), the winds are primarily from the southeast and east; the winds are typically from the west-northwest in the spring and summer (April through September).

Cowlitz County

Cowlitz County is in attainment or unclassified for all criteria air pollutants, indicating that air quality near the project area meets the federal and state ambient air quality standards.

The only available local air pollutant monitoring is for PM2.5, at a station approximately 1.5 miles east of the project area. The monitoring data show that PM2.5 levels meet the PM2.5 air quality standards. Although no other monitoring data are available, concentrations of other criteria air pollutants in the study area also are expected to meet air quality standards.

The Longview air toxics study showed measured levels of toxic air pollutants were below levels of concern for short-term and long-term exposures (Southwest Clean Air Agency 2007). The study found that, of the air toxics that could be directly monitored, the air toxics of most concern for potential health risk in Longview are acetaldehyde, arsenic, benzene, manganese, and formaldehyde, while diesel particulate matter was identified as the most likely contributor to cancer risk in Washington State. No further studies on air toxic monitoring in the Longview-Kelso area have been conducted since that time.

Toxic air releases from manufacturers and others are reported annually in Washington as part of the federal Emergency Planning and Community Right-to-Know Act. This inventory is publicly available and allows the public to see what types of pollutants are released into the environment by large industrial sources. Additionally, EPA compiles a comprehensive National Emissions Inventory every 3 years. This inventory includes emissions of air toxics from industrial, commercial, mobile, and area sources, and is used by EPA in their National Air Toxics Assessment (NATA). The most recent (2011) NATA showed Cowlitz County had an overall inhalation cancer risk of 30 cancers per million, which is lower than the state average of 40 cancers per million, as well as below the national averages of

40 cancers per million (U.S. Environmental Protection Agency 2011). However, NATA does not quantify cancer risk associated with exposure to diesel particulate matter.[6]

Air Quality along Transportation Routes

Rail Traffic

The broader study area includes the rail transportation routes for Proposed Action-related trains in Washington State. Figure 5.1-1 in Section 5.1, *Rail Transportation*, illustrates the routes expected to be used by Proposed Action-related trains. Loaded and empty BNSF Railway Company (BNSF) trains would be expected to travel the same route between the Washington–Idaho State line and Pasco. West of Pasco, westbound loaded trains would be expected to travel to the project area along the Columbia River Gorge route, through Vancouver to Longview Junction on the BNSF main line, and then along the BNSF Spur and Reynolds Lead to the project area. Empty trains would be expected to travel from the project area along the Reynolds Lead and BNSF Spur to Longview Junction, on the BNSF main line to Auburn, over Stampede Pass, then through Yakima and back to Pasco. Union Pacific Railroad (UP) trains would travel in Washington State between Vancouver and the project area.

Air quality on the rail route from the Idaho border to Pasco is generally good. Spokane is a maintenance area[7] for carbon monoxide, but has not had an exceedance of the standard in more than 10 years. High winds in this region between spring and fall can combine with dry weather conditions to create dust storms, which can lead to extremely high levels of PM10. Air quality through the Columbia Gorge is generally good, with the primary concern focused on visibility impairment and regional haze issues; standards established to protect visibility are much lower than for health effects. The air quality from Vancouver to Longview is generally good. The few days with higher levels of particulates mostly occur during the home heating season.

The return rail route passes through Tacoma to Auburn, over the Cascades via Stampede Pass, then back to Pasco via Yakima and onward to Spokane. The area east of Auburn experiences some of the highest ozone levels in western Washington, although these levels are still below the NAAQS. The ozone monitoring site near Enumclaw has shown exceedances of the 8-hour ozone standard during the past 3 years (Washington State Department of Ecology 2015). Air quality from Stampede Pass through Yakima and back to Pasco is generally good. Recent monitoring data in the Yakima area has shown higher than usual levels of PM2.5 containing nitrate. In Yakima, much of the PM2.5 comes from wood burning, with the highest levels in winter as a result of increased wood burning along with stagnant air conditions (Washington State Department of Ecology 2015). Nitrate accounts for up to 25% of the wintertime PM2.5 in the Yakima area. High levels of daily PM2.5 are found in Ellensburg for 2 to 3 weeks each year.

Ecology (2011) estimated inhalation cancer risk from all existing sources of air pollutants based on 2005 NATA assessment.[8] Updating this assessment using the 2011 NATA data shows that Vancouver and Spokane, the major population centers along the rail route, have a cancer risk of up to 1,000 and 500 cancers per million, respectively. For the smaller communities along the rail route (Kelso,

[6] Development of a cancer risk baseline associated with diesel particulate matter exposure is described in Section 5.6.3 *Methods.*

[7] A maintenance area is one that has been in nonattainment but currently meets air quality standards.

[8] Including quantifying the cancer risk for diesel particulate matter.

Longview, Yakima, and Pasco), cancer risks ranged from less than 75 cancers per million to 500 cancers per million.

Vessel Traffic

Vessel traffic would traverse the Columbia River between the project area and the mouth of the river. Wahkiakum and Pacific Counties in Washington State on the Columbia River are also designated as attainment areas for criteria air pollutants.

5.6.5 Impacts

This section describes the potential impacts on air quality that would result from construction and operation of the Proposed Action and No-Action Alternative.

5.6.5.1 Proposed Action

This section describes the potential impacts that could occur in the study area as a result of construction and operation of the Proposed Action. The analysis and discussion of direct and indirect impacts are combined.

Construction

Construction-related activities associated with the Proposed Action could result in direct and indirect impacts as described below. As described in Chapter 2, *Project Objectives, Proposed Action, and Alternatives,* construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and dock, and constructing supporting infrastructure (i.e., conveyors and transfer towers).

The construction material delivery scenario with the highest emissions would be the barge scenario, which would deliver construction materials via barge and truck. Haul truck emissions are included for the truck trips needed to make deliveries of construction material from the barge dock to the project area. Maximum annual construction emission estimates for the peak construction year are shown in Table 5.6-3. Table 5.6-4 illustrates the maximum daily construction emission estimates.[9]

[9] The estimated emissions shown assume that best management practices would be followed, including measures to reduce idling and dust generated by soil disturbance, and the application of water along access roads to minimize track-out of soil. Maximum daily emissions are relevant to short-term air quality standards that may be of concern for a long-term construction project. Construction emissions were based on a construction schedule of 5 days per week with maximum activity levels for construction and earth movement equipment.

Table 5.6-3. Estimated Maximum Annual Construction Emissions

	Construction Emissions (tons per year)								
Source	**CO**	**NO_X**	**SO_2**	**PM2.5**	**PM10**	**VOCs**	**TSP**	**HAPS**	**DPM**
Combustion Sources									
Equipment (in project area)	9.04	24.60	0.95	1.93	1.93	2.23	2.34	0.05	2.34
Haul trucks (in project area)	0.88	4.06	0.01	0.13	0.19	0.18	0.23	0.004	0.23
Haul trucks (in study area)[a]	2.04	9.37	0.03	0.31	0.44	0.41	0.54	0.010	0.54
Barges (in study area)[b]	15.68	59.0	0.028	1.06	1.06	1.51	1.29	0.03	1.29
Passenger commute vehicles/crossing-delay (in study area)[a]	7.5	0.05	0.010	0.04	0.22	0.13	0.22	0.001	<0.001
Total Combustion Sources (in project area)	**9.92**	**28.66**	**0.96**	**2.06**	**2.12**	**2.41**	**2.57**	**0.05**	**2.57**
Total Combustion Sources (all study area)[c]	**19.5**	**38.1**	**1.0**	**2.4**	**2.8**	**2.95**	**3.3**	**0.07**	**3.1**
Fugitive Sources									
Fugitive earthwork (project area)	—	—	—	1.22	5.87	—	12.00	—	—
Total Fugitive Sources	**—**	**—**	**—**	**1.22**	**5.87**	**—**	**12.00**	**—**	**—**
Total									
Construction emissions sources (project area)	**9.9**	**28.7**	**0.96**	**3.28**	**7.99**	**2.41**	**14.6**	**0.05**	**2.6**
All construction emissions sources[c]	**19.5**	**38.1**	**1.0**	**3.6**	**8.7**	**2.95**	**15.3**	**0.07**	**3.1**
PSD significance thresholds (40 CFR 52.21)	**100**	**40**	**40**	**10**	**15**	**40**	**—**	**—**	**—**

Notes:

[a] Not in the project area but in Cowlitz County.

[b] Not in the project area. Based on barge maneuvering time for docking of 0.5 hour in and 0.5 hour out; does not include transit on the Columbia River.

[c] Rounded. Does not include barge emissions, but does include haul truck emissions to the project area.

CO = carbon monoxide; NO_X = nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 = particulate matter less than or equal to 2.5 micrometers in diameter; PM10 = particulate matter less than or equal to 10 micrometers in diameter; VOCs = volatile organic compounds; TSP = total suspended particles; HAPS = hazardous air pollutants; DPM = diesel particulate matter; Fugitive Sources = emissions that are not directly vented through a stack, chimney, vent, or other functionally equivalent opening; PSD = prevention of significance deterioration

Table 5.6-4. Estimated Maximum Daily Construction Emissions

	Construction Emissions (pounds per day)								
Source	**CO**	**NO_x**	**SO_2**	**PM2.5**	**PM10**	**VOCs**	**TSP**	**HAPS**	**DPM**
Combustion Sources									
Equipment (in project area)	82.89	229.60	8.67	17.66	17.66	20.40	21.49	0.42	21.50
Haul trucks (in project area)	14.40	54.70	0.20	2.60	5.00	3.10	6.10	0.10	6.12
Haul trucks (in study area)[a]	24.00	110.48	0.33	3.66	5.21	4.81	6.34	0.12	6.34
Barges (in study area)[b]	120.80	454.70	0.21	8.14	8.14	11.6	9.90	0.61	9.90
Passenger commute and crossing delay (in study area)[a]	20.00	1.43	0.03	0.11	0.58	0.35	0.58	0.01	<0.001
Total Combustion Sources (in project area)	**97.29**	**284.3**	**8.87**	**20.26**	**22.66**	**23.50**	**27.59**	**0.52**	**27.62**
Total Combustion Sources (all study area)[c]	**141.29**	**396.2**	**9.23**	**24.0**	**28.5**	**28.7**	**34.5**	**0.65**	**34.0**
Fugitive Sources									
Fugitive earthwork (in project area)	—	—	—	6.80	32.6	—	66.7	—	—
Total Fugitive Sources	—	—	—	**6.80**	**32.6**	—	**66.7**	—	—
Total									
Construction emissions sources (project area)	**97.29**	**284.3**	**8.87**	**27.1**	**55.3**	**23.5**	**94.3**	**0.52**	**27.6**
All construction emissions sources[c]	**141.29**	**396.2**	**9.23**	**30.8**	**61.1**	**28.7**	**101.21**	**0.65**	**34.0**

Notes:

[a] Not in the project area but in Cowlitz County.

[b] Not in the project area. Based on barge maneuvering time for docking of 0.5 hour in and 0.5 hour out; does not include transit on the Columbia River.

[c] Rounded. Does not include barge emissions, but does include haul truck emissions to the project area.

CO = carbon monoxide; NO_X= nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 = particulate matter less or equal to than 2.5 micrometers in diameter; PM10 = particulate matter less than or equal to 10 micrometers in diameter; VOCs = volatile organic compounds; TSP = total suspended particles; HAPS = hazardous air pollutants; DPM = diesel particulate matter; Fugitive Sources = emissions that are not directly vented through a stack, chimney, vent, or other functionally equivalent opening

The maximum annual construction-related emissions would be below the prevention of significance deterioration (PSD) thresholds[10] established by EPA, as shown in Table 5.6-3. This means that although emissions of criteria air pollutants would occur during construction, they would not be expected to cause a substantial change in air quality or adversely affect sensitive receptors[11] near the project area.[12]

Operations

Sources of emissions during operations would include coal handling equipment; coal storage piles; maintenance, operation, and emergency equipment; employee commute vehicles; and Proposed Action-related rail and vessel operations.

Table 5.6-5 presents emissions from coal export terminal operations and related rail and vessel operations in the study area. As shown in Table 5.6-5, rail and vessel transport would be the largest sources of emissions. The Proposed Action would produce small quantities of air pollutants from maintenance, operations, and emergency equipment. The table also shows fugitive emissions related to coal transfer and storage.

Table 5.6-5. Maximum Annual Average Emissions from Operations

	Maximum Annual Average Emissions (tons per year)								
Source	**CO**	**NO_x**	**SO_2**	**PM2.5**	**PM10**	**TSP**	**VOCs**	**HAPS**	**DPM**
Fugitive Sources									
Coal transfer (except coal storage piles)									
Material handling	—	—	—	0.28	1.84	5.25	—	—	—
Coal storage piles									
Wind erosion	—	—	—	0.40	2.59	3.05	—	—	—
Material handling	—	—	—	0.14	0.92	2.62	—	—	—
Mobile Sources									
Maintenance/operations/emergency equipment									
Combustion	1.45	4.36	0.20	0.31	0.31	0.38	0.37	0.01	0.38
Employee commute and crossing delay	2.05	0.13	0.003	0.02	0.08	0.08	0.04	0.01	<0.01
Locomotive									
Combustion (study area)[a]	10.18	23.3	0.036	0.48	0.50	0.60	0.80	0.11	0.60
Fugitive dust (study area)[a]	—	—	—	0.13	0.88	1.03	—	—	—
Combustion (project area)	5.04	14.0	0.02	0.29	0.30	0.36	0.56	0.05	0.27
Fugitive dust (project area)	—	—	—	0.48	3.13	3.68	—	—	—

[10] The PSD significance levels are the lowest thresholds that would define the emissions as less than a major modification to a major stationary source. This applies to areas in attainment with the National Ambient Air Quality Standards (NAAQS).

[11] Sensitive air quality receptors were defined as a facility or land use that houses or attracts members of a population who are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples of sensitive receptors include schools, hospitals, day care centers, convalescent facilities, senior centers, and parks or recreational facilities.

[12] While the study area is not a major stationary source subject to federal PSD rules (40 CFR 52.21), the emission threshold levels were used to evaluate potential impact from construction.

Source	Maximum Annual Average Emissions (tons per year)								
	CO	NO_x	SO_2	PM2.5	PM10	TSP	VOCs	HAPS	DPM
Vessels									
Combustion (study area)[a]	37.9	24.8	3.04	1.64	1.78	2.17	14.1	0.03	0.00
Combustion (project area)	65.9	23.3	4.52	1.02	1.05	1.27	15.3	0.08	0.56
Total: All Mobile Sources, Project Area, Study Area	122.5	89.89	7.82	4.37	8.03	9.57	31.17	0.29	1.82
Total Project Area Sources	70.94	37.30	4.54	1.79	4.48	5.31	15.86	0.13	0.83
Fugitive Dust Only, Project Area	—	—	—	1.43	9.36	15.63	—	—	—
Mobile Combustion Sources, Project Area	72.4	41.66	4.74	2.10	4.79	5.69	16.23	0.14	1.21

Notes:
[a] Study area beyond the project area.
CO = carbon monoxide; NO_X = nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 **=** particulate matter less or equal to than 2.5 micrometers in diameter**;** PM10 = particulate matter less or equal to than 10 micrometers in diameter**;** TSP = total suspended particles; VOCs = volatile organic compounds; HAPS = hazardous air pollutants; DPM = diesel particulate matter

Criteria Air Pollutants

An analysis was performed with the AERMOD dispersion model and the results were compared with the NAAQS. Two sets of emissions were developed for use in the impact assessment. The first set was used to model annual average concentrations, reflecting emissions over an entire year with train and vessel arrivals spread across the year to simulate the average anticipated activity at the coal export terminal. The second set of emissions was used to determine the short-term concentrations (24-hour or less concentrations), reflecting peak emissions that could occur during the course of an hour. Peak activity at the coal export terminal included a coal train unloading, a vessel loading with coal, and a second vessel docking. Tables 5.6-6, 5.6-7, and 5.6-8 present the modeling results.

Table 5.6-6 summarizes the maximum predicted criteria air pollutant concentrations due to maintenance and operations of the coal export terminal. This includes handling and moving the coal, coal storage piles, tandem rotary unloaders, mobile source equipment, and employee vehicles. Coal export terminal-only estimated emissions, in combination with the background concentrations, would not exceed any NAAQS.

The highest percentage increase in concentration due to terminal-only operations is the 24-hour PM10 impact, an increase of 88 $\mu g/m^3$, or approximately 59% of the PM10 NAAQS. The largest source of this increase is fugitive emissions from the coal piles, followed closely by material handling of the coal, and, to a lesser extent, by the unloading of the coal train. The next highest increase in concentration due to terminal-only operations is the 24-hour PM2.5 impact, an increase of 11.2 $\mu g/m^3$, or approximately 32% of the PM2.5 NAAQS. This increase is mostly from the coal piles, but material handling and fuel combustion from locomotives and vehicles also contribute. Similarly, the 1-hour NO_2 impact would increase 18.8 $\mu g/m^3$, approximately 10% of the NO_2 NAAQS. Emissions of all other pollutants would increase less than 2% of the relevant NAAQS.

Table 5.6-6. Maximum Modeled Concentrations from Operation of the Coal Export Terminal[a]

Pollutant	Averaging Period	Modeled Impact (μg/m^3)	Background[b,c] (μg/m^3)	Total Predicted Concentration (μg/m^3)	NAAQS (μg/m^3)
CO	1 hour[d]	12.8	827	840	40,000
	8 hour[d]	5	600	605	10,000
NO_2	1 hour[e,f]	18.8	56.6	75.4	188
	Annual[f,g]	0.4	5.3	5.7	100
SO_2	1 hour[h]	1.2	14.7	15.9	196
	3 hour[i]	0.75	11.5	12.3	1,300
PM2.5	24 hour[j]	11.2	19.3	30.5	35
	Annual[k]	0.23	6.2	6.4	12
PM10	24 hour[l]	88	23	111	150

Notes:
[a] Coal export terminal operation sources include coal handling and movement; coal storage piles; rotary rail unloaders; mobile operation, maintenance, and emergency equipment; and employee vehicles.
[b] Background design value estimates for 2009 through 2011, based on model-monitor interpolated products (except PM2.5) sponsored by EPA Region 10, Ecology, and others. From NW AIRQUEST tool, Washington State University (http://www.lar.wsu.edu/nw-airquest/lookup.html.)
[c] PM2.5 background based on Ecology's Kelso Monitor (2013 through 2016). The reported 24-hour values are the maximum of the 3-year average of the yearly 98th percentile of the daily concentration.
[d] Modeled impact is the highest second high for each calendar year over the 3 modeled years.
[e] The NO_2 1-hour modeled impact is the 3-year average of the annual 98th percentile of 1-hour daily maximum concentrations.
[f] Modeled NO_2 impacts applied the Tier III Ozone Limiting Method (OLM), using an ozone background of 42 ppb, as per the NW AIRQUEST tool. For additional information regarding the modeling methods, see the *SEPA Air Quality Technical Report*.
[g] The NO_2 annual modeled impact is the maximum annual mean over the 3 modeled years.
[h] The SO_2 1-hour modeled impact is the 3-year average of the 99th percentile of the 1-hour daily maximum concentrations.
[i] The SO_2 3-hour modeled impact is not to be exceeded more than once per year.
[j] The PM2.5 24-hour modeled impact is the 98th percentile of daily concentrations averaged over 3 years.
[k] The PM2.5 annual modeled impact is the 3-year average of the annual mean.
[l] The PM10 24-hour modeled impact is the 2nd highest concentration over a 3-year period. This is more conservative than the NAAQS compliance methodology of the 3-year average of the highest 2nd high concentration for each year.

μg/m^3 = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards; CO = carbon monoxide; NO_2 = nitrogen dioxide; SO_2 = sulfur dioxide; PM2.5 **=** particulate matter less than or equal to 2.5 micrometers in diameter**;** PM10 = particulate matter less than or equal to 10 micrometers in diameter

Table 5.6-7 presents the modeling results for all operations in the project area, including the terminal operation activities and rail[13] and vessel[14] operations in the project area. Estimated emissions from all project area operations, in combination with background concentrations, would not exceed any NAAQS.

[13] Locomotive emissions from idling during unloading and from transport in the project area.
[14] Vessel hoteling during loading, docking and undocking, and tug emissions during maneuvering.

Table 5.6-7. Maximum Modeled Concentrations from All Operations in the Project Area[a]

Pollutant	Averaging Period	Modeled Impact (μg/m³)	Background[b,c] (μg/m³)	Total Predicted Concentration (μg/m³)	NAAQS (μg/m³)
CO	1 hour[d]	223	827	1,050	40,000
	8 hour[d]	51	600	651	10,000
NO_2	1 hour[d,e]	94.3	56.6	151	188
	Annual[f,g]	13.7	5.3	19	100
SO_2	1 hour[h]	10.6	14.7	25.3	196
	3 hour[i]	10.2	11.5	21.7	1,300
PM2.5	24 hour[j]	11.9	19.3	31.2	35
	Annual[k]	0.81	6.2	7.0	12
PM10	24 hour[l]	92.6	23	116	150

Notes:

a Sources include all coal export terminal operations as well as locomotive, and vessel operations in the project area.

b Background design value estimates for 2009 through 2011, based on model-monitor interpolated products (except PM2.5) sponsored by EPA Region 10, Ecology, and others. From NW AIRQUEST tool, Washington State University (http://www.lar.wsu.edu/nw-airquest/lookup.html.)

c PM2.5 background based on Ecology's Kelso Monitor (2013 through 2016). The reported 24-hour values are the maximum of the 3-year average of the yearly 98th percentile of the daily concentration.

d Modeled impact is the highest second high for each calendar year over the 3 modeled years.

e The NO_2 1-hour modeled impact is the 3-year average of the annual 98th percentile of 1-hour daily maximum concentrations.

f Modeled NO_2 impacts applied the Tier III Ozone Limiting Method (OLM), using an ozone background of 42 ppb, as per the NW AIRQUEST tool. For additional information regarding the modeling methods, see the *SEPA Air Quality Technical Report*.

g The NO_2 annual modeled impact is the maximum annual mean over the 3 modeled years.

h The SO_2 1-hour modeled impact is the 3-year average of the 99th percentile of the 1-hour daily maximum concentrations.

i The SO_2 3-hour modeled impact is not to be exceeded more than once per year.

j The PM2.5 24-hour modeled impact is the 98th percentile of daily concentrations, averaged over 3 years.

k The PM2.5 annual modeled impact is the 3-year average of the annual mean.

l The PM10 24-hour modeled impact is the 2nd highest concentration over a 3-year period. This is more conservative than the NAAQS compliance methodology of the 3-year average of the highest 2nd high concentration for each year.

μg/m³ = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards; CO = carbon monoxide; NO_2 = nitrogen dioxide; SO_2 = sulfur dioxide; PM2.5 = particulate matter less than or equal to 2.5 micrometers in diameter; PM10 = particulate matter less than or equal to 10 micrometers in diameter

The highest increase in concentrations due to all project area operations is the 24-hour PM10 impact: 92.6 μg/m³, or approximately 62% of the PM10 NAAQS. The largest source of this increase is the fugitive emissions from the coal piles, followed closely by material handling of the coal, and, to a lesser extent, by the unloading of the coal train. The next highest concentration increase is the 1-hour NO_2 impact: 94.3 μg/m³, or approximately 50% of the NO_2 NAAQS. Similarly, the 24-hour PM2.5 would increase 11.9 μg/m³, or approximately 34% of the PM2.5 NAAQS. All other pollutants would increase less than approximately 15% of the relevant NAAQS.

Table 5.6-8 presents the modeling results for all operations in the study area, including terminal operations, rail[15] and vessel[16] operations and vehicle delay at at-grade rail crossings in the study area. Estimated emissions from all study area operations, in combination with the background concentrations, would not exceed any NAAQS.

Table 5.6-8. Maximum Modeled Concentrations from All Operations in the Study Area[a]

Pollutant	Averaging Period	Modeled Impact (μg/m³)	Background[b,c] (μg/m³)	Total Predicted Concentration (μg/m³)	NAAQS (μg/m³)
CO	1 hour[d]	377	827	1,204	40,000
	8 hour[d]	99	600	699	10,000
NO_2	1 hour[d,e]	94.3	56.6	151	188
	Annual[f,g]	13.7	5.3	19.0	100
SO_2	1 hour[h]	10.6	14.7	25.3	196
	3 hour[i]	10.2	11.5	21.7	1,300
PM2.5	24 hour[j]	12.5	19.3	31.8	35
	Annual[k]	0.83	6.2	7.0	12
PM10	24 hour[l]	93.6	23	117	150

Notes:

[a] Sources include all coal export terminal operations as well as locomotive and vessel operations and vehicle delay at at-grade rail crossings in the study area.

[b] Background design value estimates for 2009 through 2011, based on model-monitor interpolated products (except PM2.5) sponsored by EPA Region 10, Ecology, and others. Source: NW AIRQUEST tool. Washington State University (http://www.lar.wsu.edu/nw-airquest/lookup.html.)

[c] PM2.5 background based on Ecology's Longview Monitor (2013 through 2016). The reported 24-hour values are the maximum of the 3-year average of the yearly 98th percentile of the daily concentration.

[d] Modeled impact is the highest 2nd high for each calendar year over the 3 modeled years.

[e] The NO_2 1-hour modeled impact is the 3-year average of the annual 98th percentile of 1-hour daily maximum concentrations.

[f] Modeled NO_2 impacts applied the Tier III Ozone Limiting Method, using an ozone background of 42 ppb, as per the NW AIRQUEST tool. For additional information regarding the modeling methods, see Section 2.1.2.2, *Operations Impact Analysis Approach*.

[g] The NO_2 annual modeled impact is the maximum annual mean over the 3 modeled years.

[h] The SO_2 1-hour modeled impact is the 3-year average of the 99th percentile of the 1-hour daily maximum concentrations.

[i] The SO_2 3-hour modeled impact is not to be exceeded more than once per year.

[j] The PM2.5 24-hour modeled impact is the 98th percentile of daily concentrations, averaged over 3 years.

[k] The PM2.5 annual modeled impact is the 3-year average of the annual mean.

[l] The PM10 24-hour modeled impact is the 2nd highest concentration over a 3-year period. This is more conservative than the NAAQS compliance methodology of the 3-year average of the highest 2nd high concentration for each year.

μg/m³ = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standards; CO = carbon monoxide; SO_2 = sulfur dioxide; NO_2 = nitrogen dioxide; PM2.5 = particulate matter less than or equal to 2.5 micrometers in diameter; PM10 = particulate matter less than or equal to 10 micrometers in diameter

[15] Locomotive emissions from idling during unloading and from transport in the study area.

[16] Vessel hoteling during loading, tug assistance during docking and undocking, and cargo and tug transits in the study area.

These results are similar to those for project area sources. The highest increase in concentrations due is the 24-hour PM10 impact at 93.6 $\mu g/m^3$, or approximately 62% of the PM10 NAAQS. The largest source of this increase is the fugitive emissions from the coal piles, followed closely by material handling of the coal, and, to a lesser extent, by the unloading of the coal train. The next highest concentration increase is the 1-hour NO_2 impact, which would increase 94.3 $\mu g/m^3$, or approximately 50% of the 1-hour NO_2 NAAQS. This increase is almost exclusively due to the line-haul locomotive emissions, but the switch locomotive engines also contribute. The 24-hour PM2.5 impact would increase 12.5 $\mu g/m^3$, or approximately 36% of the PM2.5 NAAQS. All other pollutants would increase less than approximately 15% of the relevant NAAQS.

Diesel Particulate Matter

Diesel particulate matter is defined in state regulations as a toxic air pollutant (WAC 173-460-150). An inhalation-only health risk assessment was performed using the AERMOD dispersion model to assess increased cancer risk associated with increased diesel particulate matter emissions related to the Proposed Action. Increased diesel particulate matter exposure during operations would be primarily from Proposed Action-related train locomotive diesel emissions. The risk assessment only considers the cancer risk by the inhalation pathway because the risk contributions by other pathways of exposure are difficult to quantify and are known to be negligible relative to the inhalation pathway.

The assessment looked at two scenarios.

- **Fixed emissions scenario.** Assumes diesel particulate matter emissions in 2028 when the coal export terminal reaches maximum capacity.
- **Average lifetime emissions scenario.** Averages diesel particulate matter emissions starting in 2018, reaching full capacity in 2028, and continuing at full capacity to reflect the cleaner Tier 4 locomotive engines gradually entering the fleet each year as older locomotives are retired.

A risk level of 1 cancer per million implies a likelihood that one person, out of 1 million people exposed to the same concentration of the same pollutant, would contract cancer if exposed continuously (24 hours per day/7 days per week) to that specific concentration over 70 years (an assumed lifetime)[17] per EPA (2016) guidance. This cancer risk would be in addition to any existing risk.

The cancer risk analysis follows standard approaches including use of the conservative assumption of continuous lifetime exposure. This overstates cancer risk even for residential locations where people typically spend more time, because individuals are mobile, spending time in locations other than their residence on an average day and even changing residences over a lifetime. Cancer risk is further overstated for land uses where people spend less time, such as commercial and industrial locations where people typically spend even less time than at residential locations.

New stationary sources of air pollution are subject to WAC 173-460 (Controls of New Sources of Toxic Air Pollutants). This regulation establishes limits for toxic air pollutants. If a new stationary source is likely to exceed the Acceptable Source Impact Levels for one or more toxic air pollutants (such as diesel particulate matter) but the increased risk is less than 10 cancers per million, then the new source may be recommended for approval. While this regulation applies to stationary sources,

[17] Consistent with EPA (2016) assumption for purposes of NATA risk characterization.

not mobile sources such as rail locomotives, the health impacts from increased risk are the same for stationary and mobile sources. Therefore, an increased risk of 10 cancers per million is considered a significant and adverse impact whether from a stationary or mobile source.

To provide context for the increased cancer risk related to diesel particulate matter, results can be compared with the countywide baseline of 300 cancers per million, developed for purposes of the analysis, as described in Section 5.6.3.2, *Impact Analysis*. For example, an increased risk of 10 cancers per million would represent an approximately 3% increase over existing levels. Similarly, an increased risk of 30 cancers per million would represent an approximately 10% increase over existing levels.

Fixed Emissions Scenario (2028)

This section presents the cancer risk based on the fixed emissions scenario. Figure 5.6-1 depicts increased inhalation cancer risk related to diesel particulate matter emissions from coal export terminal sources (i.e., diesel-powered operation, maintenance, and emergency equipment). The contour for increased risk of 1 cancer per million extends across the width of the Columbia River and approximately 4 miles west of the project area and approximately 2.5 miles east of the project area. The 10 cancers per million risk contour is not shown on the figure because no locations would experience increased risk levels at or above 10 cancers per million.

Figure 5.6-2 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operation sources (i.e., terminal, rail, and vessel) in the project area. The contour for increased risk of 10 cancers per million extends across the Columbia River, approximately 1.3 mile southwest of the project area and approximately 0.1 mile northeast of the project area, and crosses Industrial Way near the northwest boundary of the project area. Portions of residential areas are within this contour.

Figure 5.6-3 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operation sources (terminal, rail, and vessel) in the Kelso-Longview area. The contour for increased risk of 10 cancers per million covers most of Longview south of Ocean Beach Highway as well as a portion of Kelso along the I-5 corridor. The contour for increased risk of 30 cancers per million along the Reynolds Lead is approximately 3,000 feet across and extends into the Highlands neighborhood. The highest increased risk level, 50 cancers per million, extends approximately 1,000 feet along portions of the Reynolds Lead and borders the Highlands neighborhood.

Figure 5.6-4 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operations (terminal, rail, and vessel) in Cowlitz County. The contour for increased risk of 10 cancers per million along the BNSF main line is approximately 2 miles across throughout Cowlitz County. The contour for increased risk of 30 cancers per million extends approximately 0.5 mile (or 0.25 mile on either side of the BNSF main line).

For further context, increased cancer risk related to emissions of diesel particulate matter from rail locomotives can be compared to that of diesel trucks. For example, the increased risk of 30 cancers per million at 0.25 mile from the Reynolds Lead and BNSF Spur (a 7.1-mile segment of rail line) resulting from the locomotive emissions from 16 Proposed Action-related train trips per day would be equivalent to the increased risk resulting from the emissions from approximately 1,100 diesel truck[18] trips per day along the same segment (i.e., 23 trucks per hour travelling in each direction).

[18] Assumes current fleet heavy-duty trucks traveling at 55 miles per hour.

Figure 5.6-1. Increased Diesel Particulate Matter Cancer Risk from Coal Export Terminal Sources—Fixed Emissions Scenario

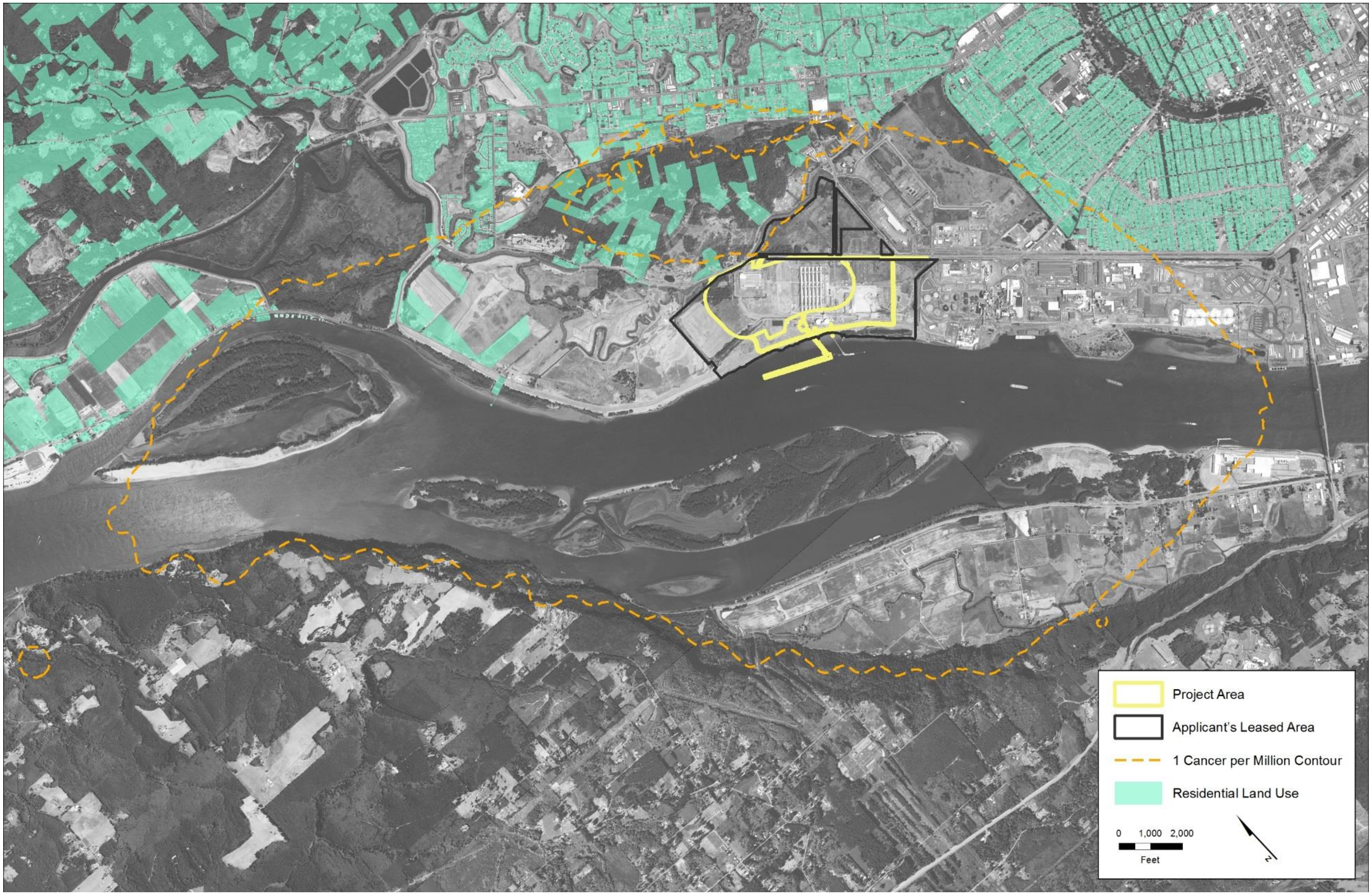


Figure 5.6-2. Increased Diesel Particulate Matter Cancer Risk from All Operations in the Project Area—Fixed Emissions Scenario

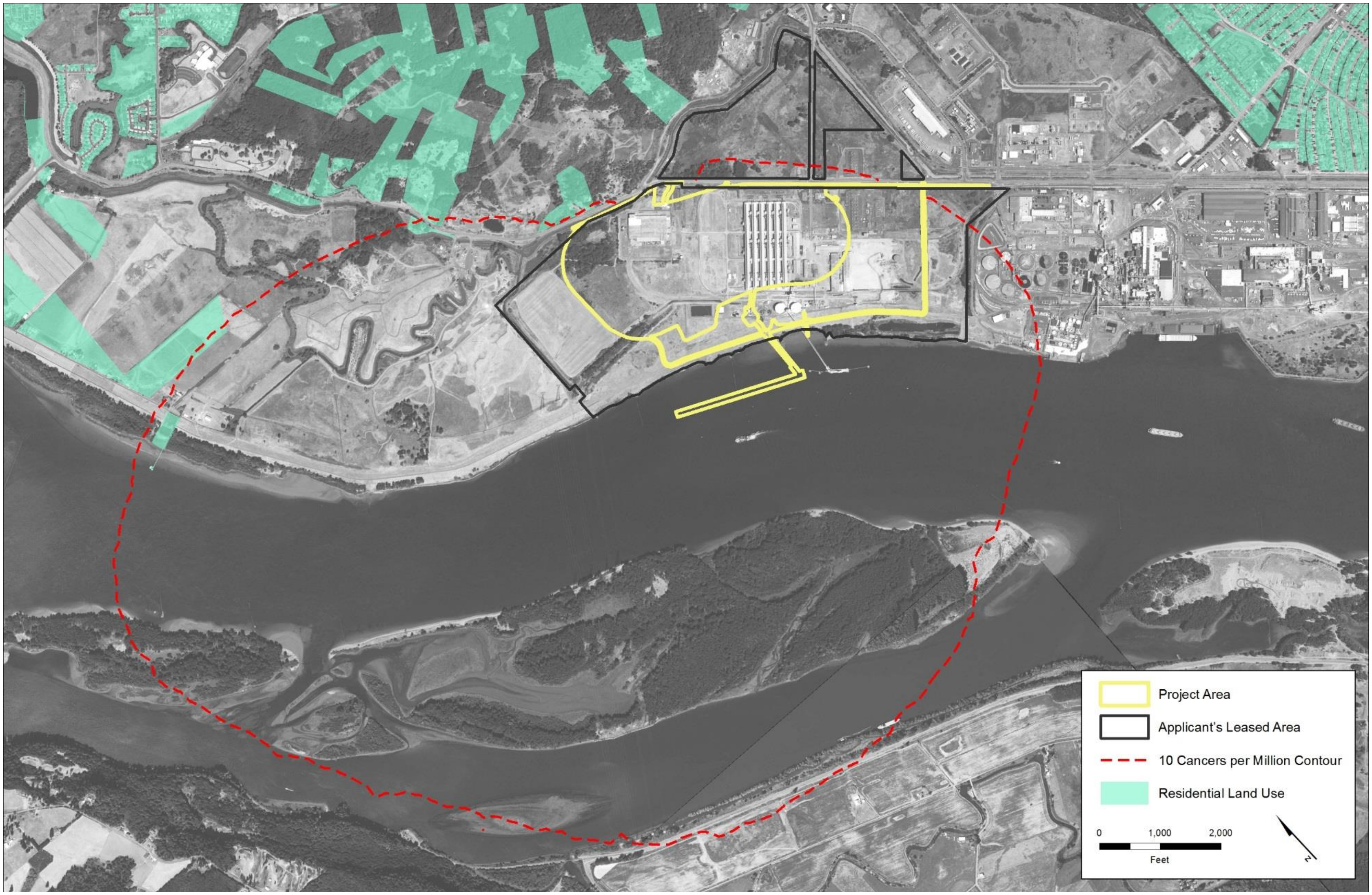


Figure 5.6-3. Increased Diesel Particulate Matter Cancer Risk from All Operation Sources in the Kelso-Longview Area—Fixed Emissions Scenario

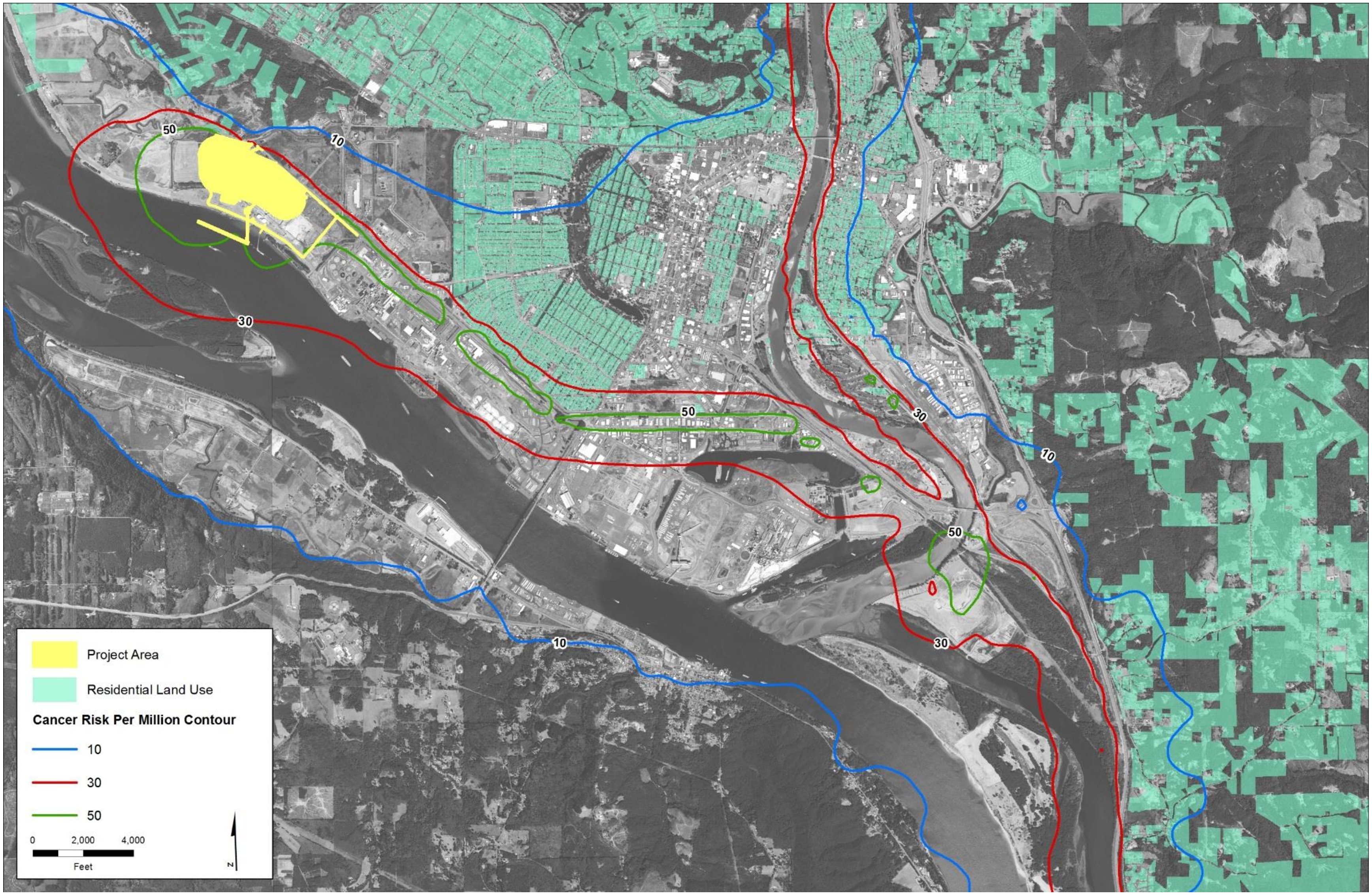
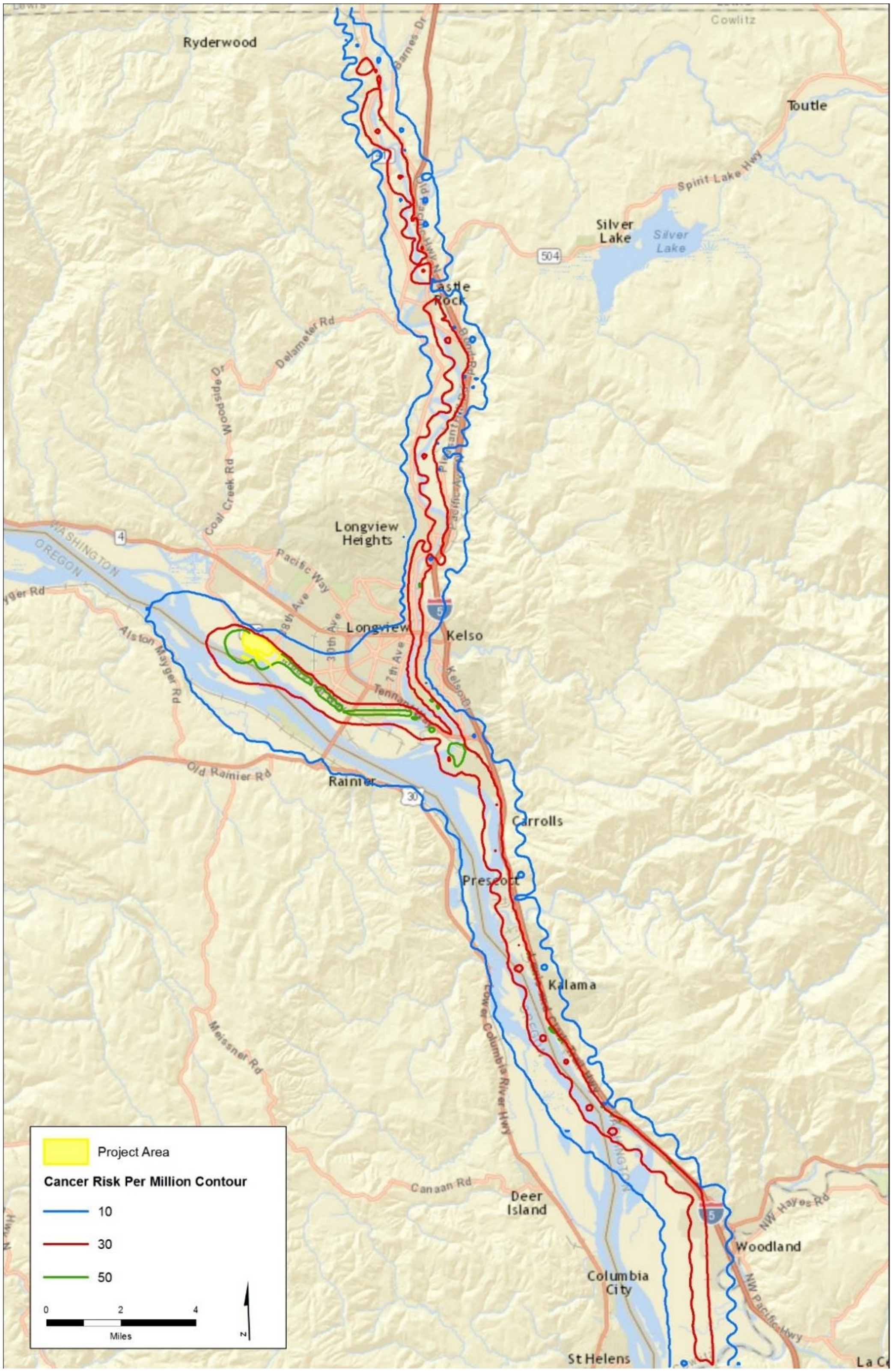


Figure 5.6-4. Increased Diesel Particulate Matter Cancer Risk from All Operation Sources in Cowlitz County—Fixed Emissions Scenario



Average Lifetime Emissions Scenario

This section presents cancer risk based on the average lifetime emissions scenario. Figure 5.6-5 depicts increased inhalation cancer risk related to diesel particulate matter emissions from coal export terminal sources (i.e., diesel-powered operations, maintenance, and emergency equipment). The contour for increased risk of 1 cancer per million extends across the width of the Columbia River, approximately 4 miles west of the project area, and approximately 2.5 miles east of the project area. These results are essentially the same as depicted for the fixed emission scenario in Figure 5.6-1, because changes in the emissions are estimated to be minimal for coal export terminal sources.

Figure 5.6-6 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operation sources (i.e., terminal, rail, and vessel) in the project area. The contour for increased risk of 10 cancers per million extends across the Columbia River including most of Lord Island, extends approximately 0.25 mile to the southeast of the project area, and crosses Industrial Way near the northwest boundary of the project area. Residential land uses are within this contour.

Figure 5.6-7 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operation sources (i.e., terminal, rail, and vessel) in the Kelso-Longview area of Cowlitz County. The contour for increased risk of 10 cancers per million covers Longview south of Washington Way as well as a portion of Kelso along the I-5 corridor. The contour for increased risk of 30 cancers per million along the Reynolds Lead is approximately 2,000 feet across and extends up to approximately 600 feet into the Highlands neighborhood. The highest increased risk level, 50 cancers per million, extends approximately 500 feet across along three small portions of the Reynolds Lead, approximately 1,200 feet across at the junction of the BNSF Spur and BNSF main line, and approximately 0.3 mile to the west and southwest of the project area boundary.

Figure 5.6-8 depicts increased inhalation cancer risk related to diesel particulate matter emissions from all operation sources (i.e., terminal, rail, and vessel) in Cowlitz County. The contour for increased risk of 10 cancers per million along the BNSF main line is approximately 1.5 miles across throughout Cowlitz County. The contour for increased risk of 30 cancers per million along the BNSF main line is up to approximately 0.4 mile wide (0.2 mile on either side of the main line).

For further context, increased cancer risk related to emissions of diesel particulate matter from rail locomotives can be compared to that of diesel trucks. For example, the increased risk of 30 cancers per million at 1,000 feet away from the Reynolds Lead and BNSF spur (a 7.1-mile segment of rail line) resulting from the locomotive emissions from 16 Proposed Action-related trains trips per day would be equivalent to the increased risk resulting from the emissions from approximately 860 diesel truck[19] trips per day along the same segment (i.e., 18 trucks per hour travelling in each direction).

[19] Assumes current fleet heavy-duty trucks traveling at 55 miles per hour.

Figure 5.6-5. Increased Diesel Particulate Matter Cancer Risk from Coal Export Terminal Sources—Average Lifetime Emissions Scenario

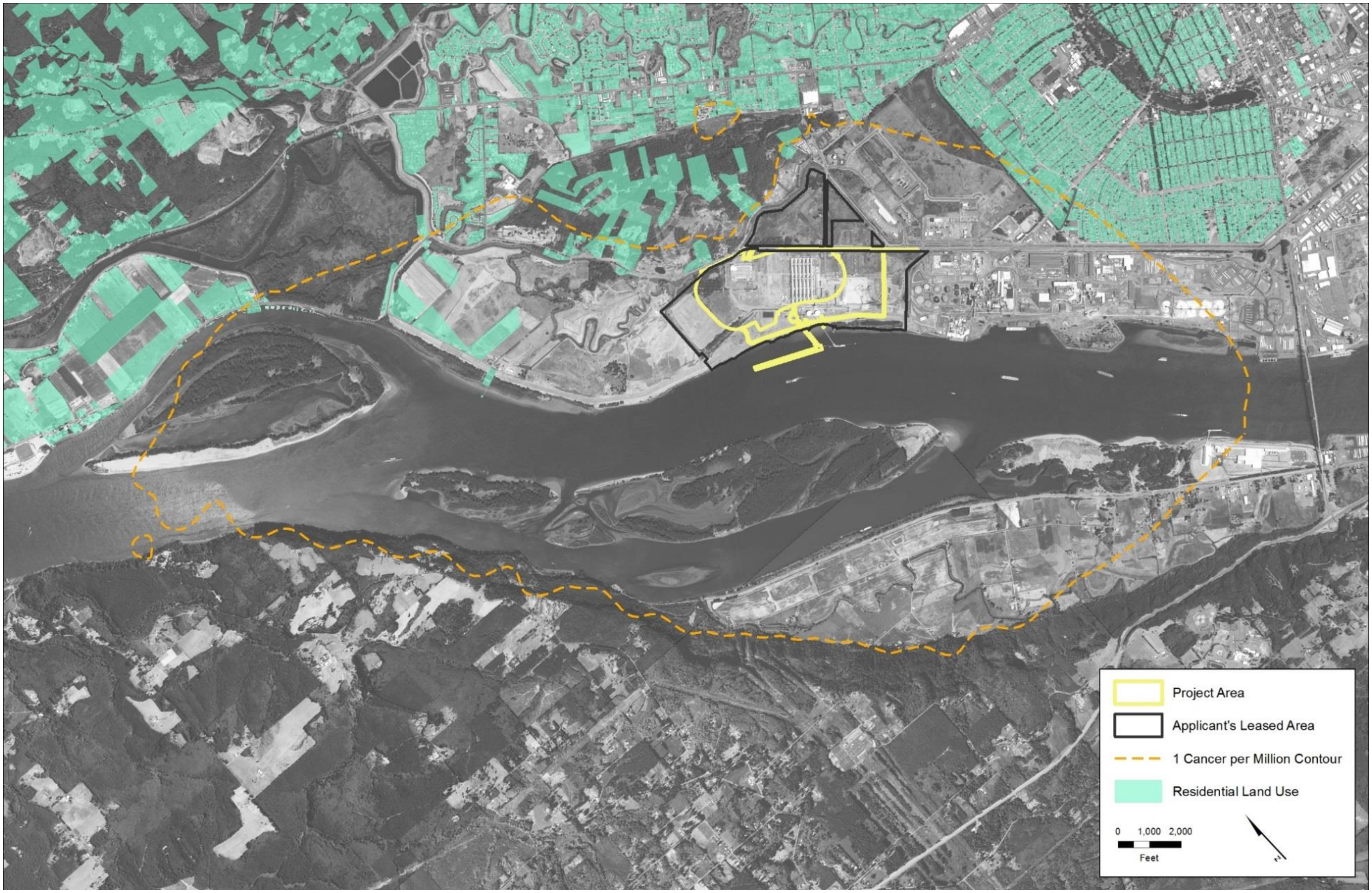


Figure 5.6-6. Increased Diesel Particulate Matter Cancer Risk from All Operations in the Project Area—Average Lifetime Emissions Scenario

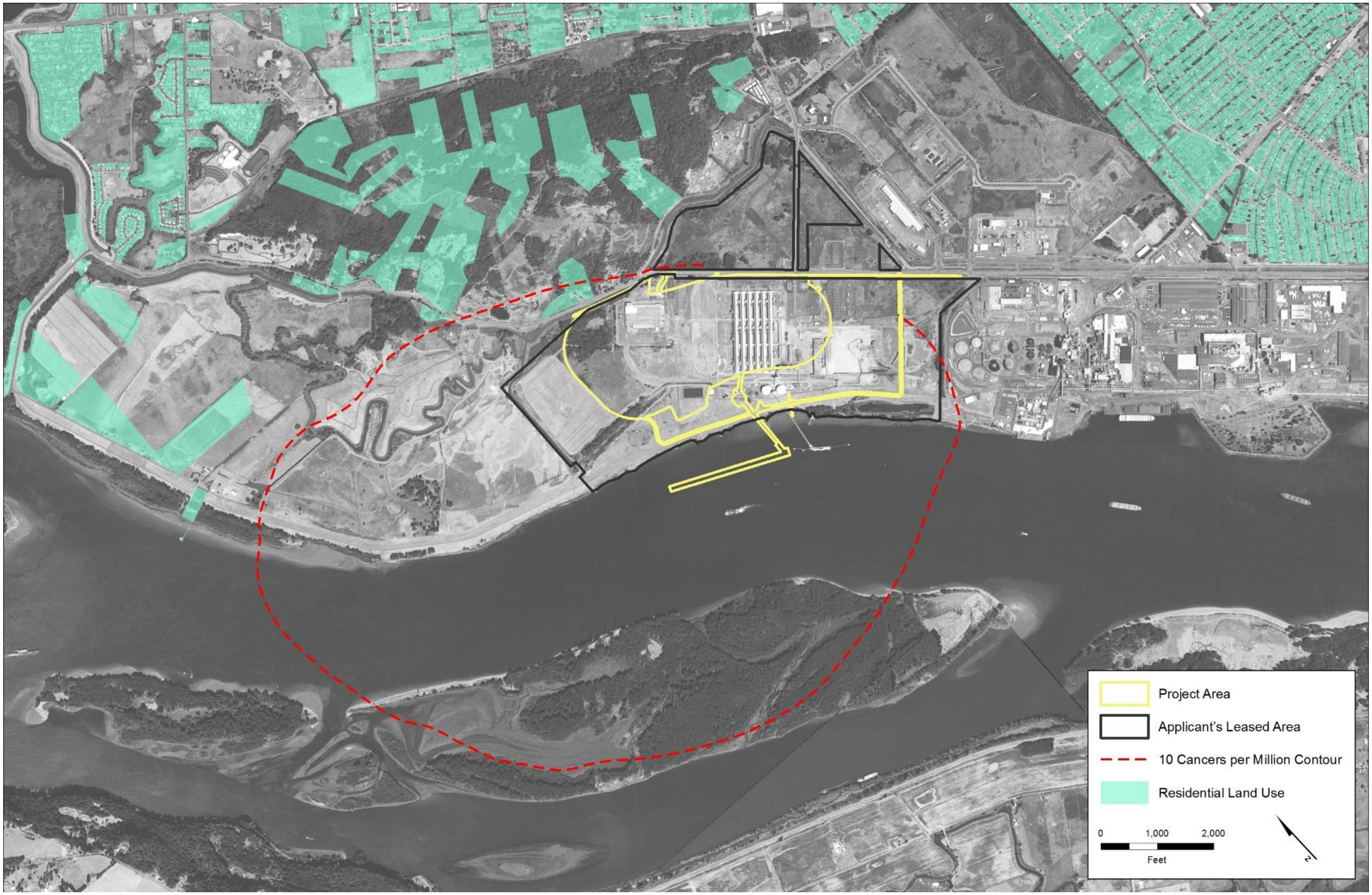


Figure 5.6-7. Increased Diesel Particulate Matter Cancer Risk from All Operation Sources in the Kelso-Longview Area—Average Lifetime Emissions Scenario

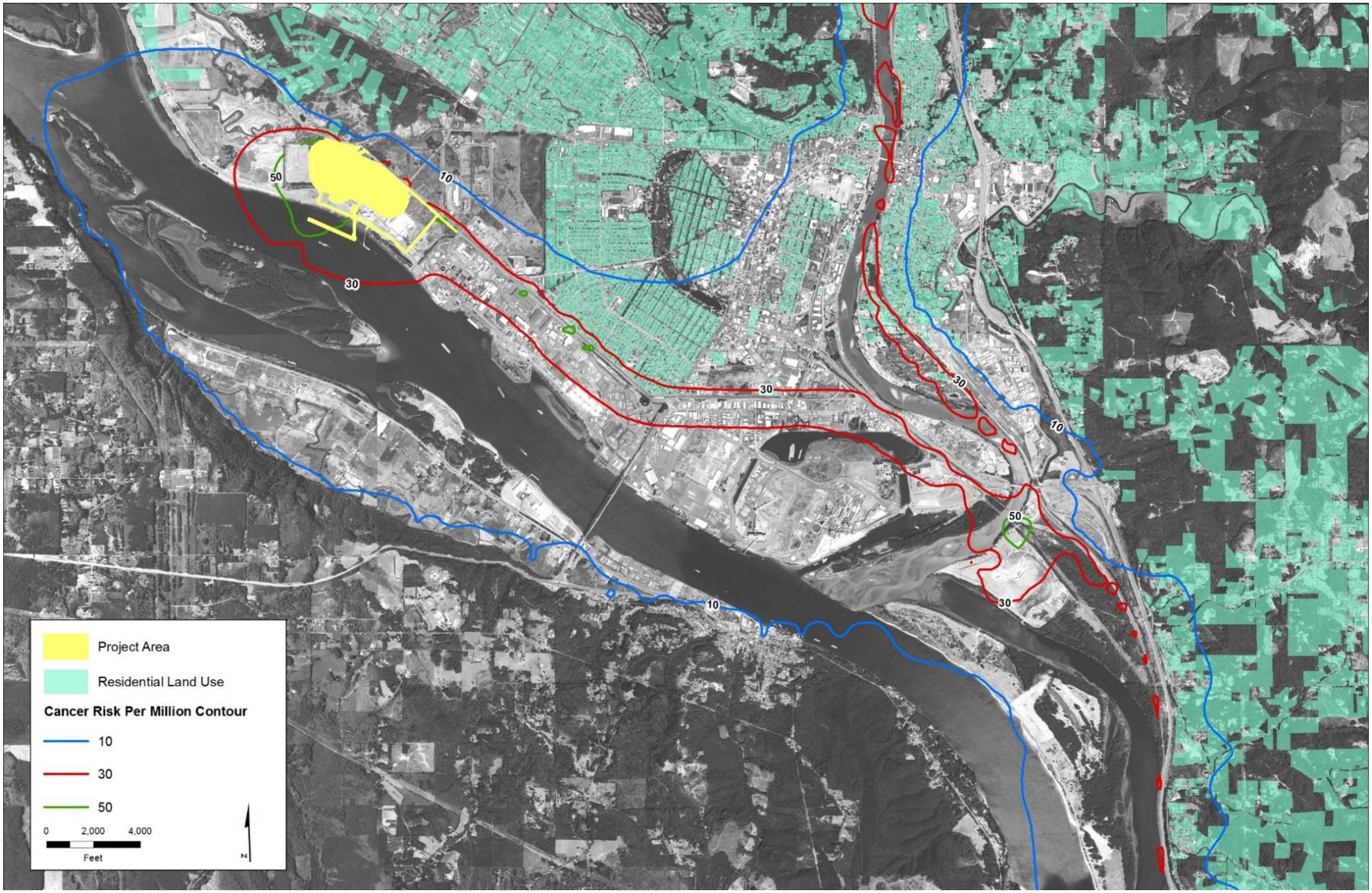
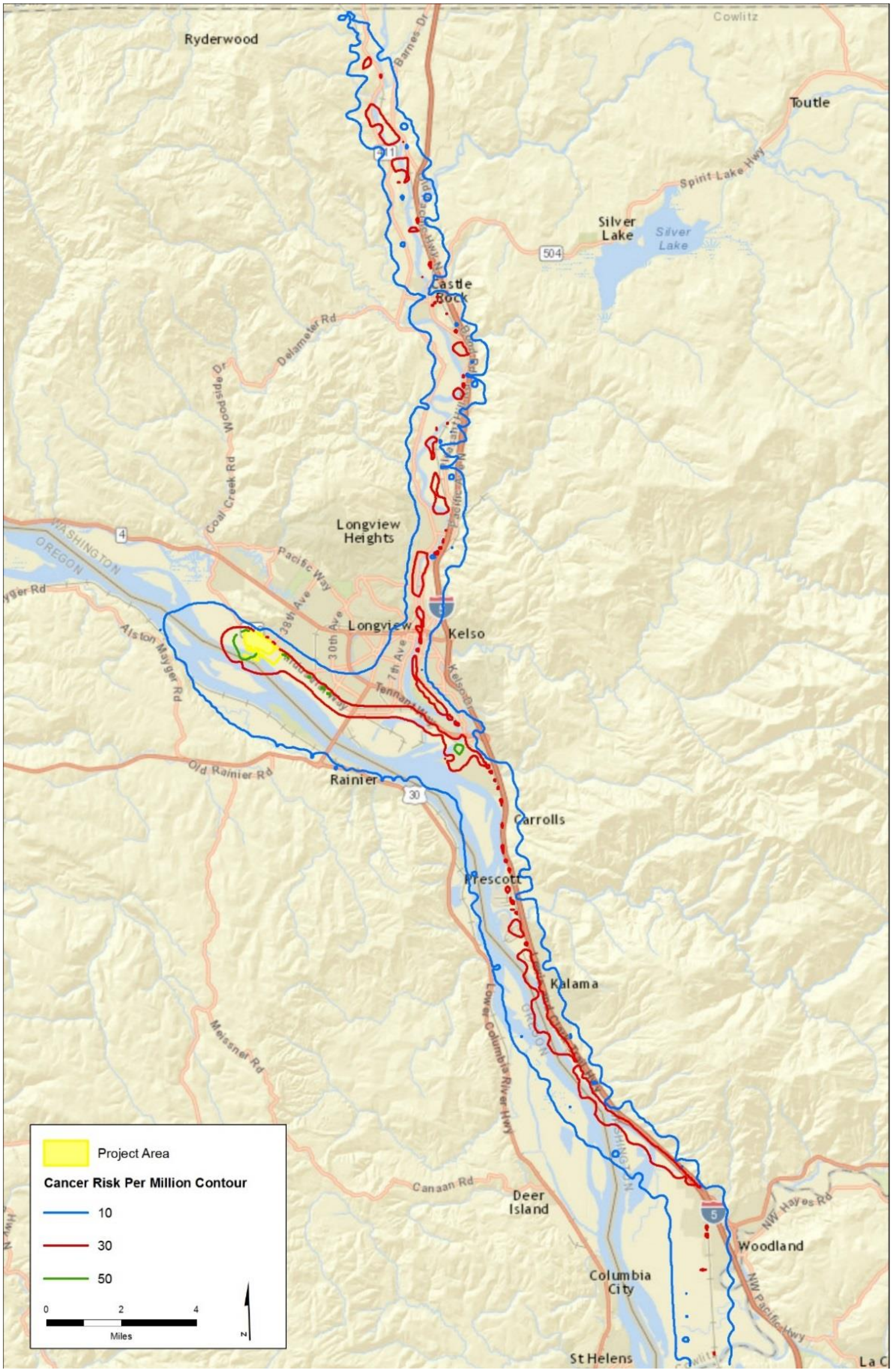


Figure 5.6-8. Increased Diesel Cancer Risk from All Operation Sources in Cowlitz County—Average Lifetime Emissions Scenario



Locomotive and Vessel Emissions in Context

This section compares annual emissions from Proposed Action-related rail and vessel operations in Cowlitz County and Washington State to total annual rail and vessel emissions in Cowlitz County and Washington State.

Cowlitz County

Annual Cowlitz County emissions from Proposed Action-related trains and vessels are shown in Table 5.6-9. This table also provides the 2011 Washington statewide emissions for locomotives and commercial marine vessels. Locomotive emissions would occur in the project area, on the Reynolds Lead and BNSF Spur, and on the BNSF main line in Cowlitz County. Vessel emissions would occur in the project area and on the Columbia River in Cowlitz County.

Table 5.6-9. Estimated Maximum Annual Average Emissions in Cowlitz County for Proposed Action-related Locomotives and Vessels Compared with the 2011 Cowlitz County Emissions Inventory

	Maximum Annual Average Emissions (tons per year)						
	CO	NO_x	SO_2	PM2.5	PM10	VOCs	DPM
Locomotives							
Proposed Action-related Locomotive Emissions	20	51	0.07	1.5	3.7	1.9	1.15
2011 Cowlitz County Locomotive Emissions	137	789	6	23	23	43	23
Commercial Marine Vessels							
Proposed Action-related Vessel Emissions	104	48	7.6	2.7	2.8	29	0.6
2011 Cowlitz County Commercial Marine Vessel Emissions	150	1,109	199	34	37	46	34

Notes:
Source of 2011 Cowlitz County locomotive and commercial marine vessel emissions: Washington State Department of Ecology 2014.
CO = carbon monoxide; NO_X= nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 = particulate matter less than 2.5 micrometers in diameter; PM10 = particulate matter less than 10 micrometers in diameter; VOCs = volatile organic compounds; DPM = diesel particulate matter

The largest locomotive emissions increase (as a percentage of existing rail emissions in Cowlitz County) for a single pollutant would be for PM10, which would increase by approximately 16%. The largest vessel emissions increase (as a percentage of existing commercial marine vessel emissions in Cowlitz County) for a single pollutant would be carbon monoxide and VOCs, which would increase approximately 69% and 63%, respectively. The increase in carbon monoxide emissions is primarily due to use of the auxiliary engines while vessels are docked. While this emission increase represents a substantial increase relative to the commercial marine vessel category, overall it represents a small increase (0.28% and 0.17%) in the total Cowlitz County carbon monoxide and VOC emissions.

Washington State

Annual statewide emissions from Proposed Action-related trains and vessels are shown in Table 5.6-10. This table also provides the 2011 Washington statewide emissions inventory totals for locomotives and commercial marine vessels. Locomotive emissions in Washington State would occur along the rail routes described in Section 5.1, *Rail Transportation*. Vessel emissions in the study area would occur along the Columbia River between the project area and out to 3 nautical miles beyond the mouth of the Columbia River. The largest increase in locomotive emissions for any one pollutant (as a percentage of 2011 statewide locomotive emissions) would be for carbon monoxide at 39%, followed by nitrogen oxides at a 15% increase.[20] For commercial marine vessels, the relative increase is smaller with a maximum increase of 12% for VOC and just under 11% for carbon monoxide.

Table 5.6-10. Estimated Maximum Annual Average Emissions in Washington State for Proposed Action-Related Locomotives and Vessels in Comparison with the 2011 Statewide Emissions Inventory

	Maximum Annual Average Emissions (tons per year)						
	CO	NO_x	SO_2	PM2.5	PM10	VOCs	DPM
Locomotives							
Proposed Action-related Locomotive Emissions	984	2,261	3	47	51	78	58
2011 Statewide Locomotive Emissions	2,536	15,026	95	428	430	810	428
Commercial Marine Vessels							
Proposed Action-related Vessel Emissions	276	161	21	10	11	93	10
2011 Statewide Commercial Marine Vessel Emissions	2,521	20,486	11,529	1,021	1,213	782	1,021

Notes:
Source of 2011 statewide emissions inventory is Washington State Department of Ecology 2014.
CO = carbon monoxide; NO_X= nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 = particulate matter less than 2.5 micrometers in diameter; PM10 = particulate matter less than 10 micrometers in diameter; VOCs = volatile organic compounds; DPM = diesel particulate matter

Sulfur Dioxide and Mercury Emissions

Combustion of Proposed Action-related coal in Asia could result in impacts on Washington State related to sulfur dioxide and mercury emissions. An analysis was conducted to determine the amount of sulfur dioxide and mercury emissions in Washington State, specifically attributable to the sulfur and mercury emitted from coal combustion in Asia from coal that passed through the coal export terminal. Appendix I, *Sulfur Dioxide and Mercury Emissions*, summarizes the methods, analyses, and findings. A full description of methods, analyses, and findings of the sulfur dioxide and mercury emissions analysis is provided in the *SEPA Coal Technical Report* (ICF 2017b).

Using data from models based on different market scenarios, the maximum Proposed Action coal source contribution of just the Asian sulfate[21] concentration in Washington State in 2040 would be

[20] The larger increase in carbon monoxide emissions reflects that no regulatory standards have been promulgated to reduce carbon monoxide emissions from locomotive engines since 1999, while extensive multi-tier federal regulatory standards have been implemented to substantially reduce nitrogen oxide locomotive emissions by 2028.

[21] Sulfur dioxide emitted from coal combustion is converted into compounds called sulfates. These may be carried through the troposphere and deposited in Washington State.

less than 0.2%. This assumes that overall growth in coal combustion in Asia will reduce sulfur dioxide emissions due to application of additional control technology.

Combustion of coal in Asia could result in impacts on Washington State related to mercury emissions. Appendix I, *Sulfur Dioxide and Mercury Emissions,* shows the annual mercury deposition amounts associated with coal exported from the coal export terminal over Washington State, starting in 2025. In the first 5 years, the deposition amounts vary only slightly across the scenarios. All scenarios show an increase in mercury deposition by 2040, with a maximum deposition amount of 7.6 milligrams per year per square kilometer. This deposition amount represents less than 0.3% of the total Asian-sourced mercury deposition over Washington State as estimated by Strode et al. (2008) at 2,900 milligrams per year per square kilometer. For more information, see Appendix I, *Sulfur Dioxide and Mercury Emissions*.

5.6.5.2 No-Action Alternative

Under the No Action Alternative, the Applicant would not construct the Proposed Action and impacts on air quality related to construction and operation of the Proposed Action would not occur. The Applicant would continue with current and future increased operations in the project area. The project area could be developed for other industrial uses, including an expanded bulk product terminal or other industrial uses. The Applicant has indicated that, over the long term, it would expand the existing bulk product terminal and develop new facilities to handle more products such as calcine petroleum coke, coal tar pitch, and cement.

Expanded bulk terminal operations and maintenance would result in increased emissions of air pollutants. Emissions were estimated for planned future rail and vessel operations and emissions associated with truck transport to the nearby Weyerhaeuser facility (Table 5.6-11). The largest emissions for any single air pollutant would be nitrogen oxides at 4.4 tons per year. These emissions are lower than the Proposed Action, which were shown not to cause a substantial change in air quality or adversely affect nearby population areas.

Table 5.6-11. Estimated No-Action Alternative Annual Average Emissions from Rail, Vessel, and Haul Trucks

	Maximum Annual Average Emissions (tons per year)								
Source	**CO**	**NO_X**	**SO_2**	**PM2.5**	**PM10**	**VOCs**	**TSP**	**HAPS**	**DPM**
Locomotive combustion	1.4	3.1	0.01	0.06	0.07	0.11	0.08	0.01	0.06
Vessel combustion	2.6	1.1	0.19	0.06	0.06	0.63	0.08	0.003	0.02
Haul trucks	0.1	0.2	0.002	0.01	0.04	0.02	0.04	0.001	0.04
Total	**4.1**	**4.4**	**0.20**	**0.13**	**0.17**	**0.76**	**0.20**	**0.014**	**0.12**

Notes:
CO = carbon monoxide; NO_X= nitrogen oxide; SO_2 = sulfur dioxide; PM2.5 = particulate matter less than or equal to 2.5 micrometers in diameter; PM10 = particulate matter less than or equal to 10 micrometers in diameter; VOCs = volatile organic compounds; TSP = total suspended particles; HAPS = hazardous air pollutants; DPM = diesel particulate matter

5.6.6 Required Permits

The following permit would be required for the Proposed Action.

- **Notice of Construction—Southwest Clean Air Agency.** Businesses and industries that cause, or have the potential to cause, air pollution are required to receive approval from the local air agency prior to beginning construction. These are requirements of Washington's Clean Air Act and apply statewide (Chapter 70.94 Revised Code of Washington [RCW]). Businesses located in Cowlitz County are regulated by the Southwest Clean Air Agency. The agency rules generally require an air permit for stationary sources emitting more than 0.75 ton per year of PM10 or 0.5 ton per year of PM2.5.[22] It is anticipated that these levels would be exceeded and the Applicant would need to file a permit application and receive an approved Notice of Construction air permit prior to constructing, installing, establishing, or modifying any equipment or operations that may emit air pollution.

5.6.7 Proposed Mitigation Measures

Project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action would reduce air quality impacts. Proposed mitigation for coal dust emissions is described in Section 5.7, *Coal Dust*.

5.6.7.1 Other Measures to be Considered

Other measures that could be implemented to mitigate impacts on air quality that occur as a result of Proposed Action-related elements outside the control of the Applicant include the following. These measures are provided for consideration by agencies, organizations, and others for permitting or planning.

- To reduce potential cancer risk from diesel emissions in the Highlands area, it is recommended that Tier 4 locomotives[23] be used by all BNSF and UP Proposed Action-related trains. Cleaner burning Tier 4 locomotives have been available since 2015. However, due to the long life of railroad engines, these cleaner burning engines may take decades to substantially reduce emissions.

5.6.8 Unavoidable and Significant Adverse Environmental Impacts

Project design measures, best management practices, and compliance with environmental permits, plans, and authorizations that are assumed as part of the Proposed Action would reduce air quality impacts related to construction and operation of the coal export terminal. Based on the inhalation-only health risk assessment, diesel particulate matter emissions primarily from Proposed Action-related train locomotives traveling along the Reynolds Lead, BNSF Spur, and BNSF main line in Cowlitz County would result in areas of increased cancer risk at or above 10 cancers per million which would represent an unavoidable and significant adverse impact.

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[22] Other criteria air pollutants have higher emission thresholds.

[23] Locomotives that are compliant with EPA locomotive emissions standards that went into effect in 2015.