Chapter 7
Economics, Social Policy, and Cost-Benefit Analysis

The City of Hoquiam State Environmental Policy Act (SEPA) policies and procedures (Hoquiam Municipal Code [HMC] 11.10.160) require that, in addition to the state rules adopted by reference (HMC 11.10.140), an environmental impact statement must address economic considerations, social policy implications, and the costs and benefits associated with the proposed action and the no-action alternative. As noted in HMC 11.10.160, these elements are "provided for the purpose of EIS content but do not add to the criteria for threshold determinations or perform any other function or purpose." Based on this regulatory requirement, this analysis focuses primarily on resources under the purview of the City of Hoquiam that could be affected by the proposed action alone.

This chapter is organized as follows.

- Section 7.1, *Economics,* provides the regional (statewide and countywide) economic context for the proposed action and economic impacts.
- Section 7.2, *Social Policy,* presents impacts on elements related to social elements in the study area.
- Section 7.3, *Cost-Benefit Analysis*, provides an analysis of the costs and benefits of the proposed action, relevant to the City of Hoquiam.

7.1 Economics

This section describes the regional (state- and countywide) economic conditions in the study area, as well as the economic impacts that could result under the no-action alternative or as a result of construction and routine operation[1] of the proposed action.

7.1.1 What is the study area for economics?

The study area for economics consists of the Washington State economy and the Grays Harbor County[2] economy that could be affected by construction[3] and routine operation of the proposed action. Routine operation of the proposed action encompasses onsite operations, rail transport along the Puget Sound & Pacific Railroad (PS&P)rail line,[4] and vessel transport through Grays Harbor out to 3 nautical miles from the mouth of the harbor.

[1] Chapter 4, *Environmental Health and Safety*, addresses the potential environmental impacts from increased risk of incidents (e.g., storage tank failure, train derailments, vessel collisions) and related consequences (e.g., release of crude oil).

[2] For operation of the proposed action, the economic region was defined as Grays Harbor County, because most economic activity associated with operation is expected to occur there.

[3] For the construction phase, the economic region was defined as Washington State because most construction-related purchases are likely to occur within the state, but many of them would occur outside Grays Harbor County and the adjacent counties.

[4] The PS&P rail line refers to the rail line between Centralia and the project site.

7.1.2 How were impacts on economic conditions evaluated?

This section describes the methods used to evaluate impacts.

Regional economic impacts of the proposed action were analyzed by ECONorthwest using the Impact Analysis for Planning Model (IMPLAN) as presented in Appendix O, *Economic Impact Analysis.* This analysis focused on the employment, income (including benefits), and economic output that would be generated in the region by the proposed action during construction and operation. Economic output measures the total value of economic transactions related to the proposed action. IMPLAN is a leading input-output modeling system that describes the flow of goods and services between industrial sectors in regions usually defined as a county, a group of counties, or a state. The IMPLAN databases contain county-level, inter-industry trade flows for hundreds of commodities estimated based on nationwide production functions; that is, relationships showing the average amounts of various goods and services required to produce a unit of each commodity. ECONorthwest customized the IMPLAN data based on proprietary information describing trade flows in Washington State and Grays Harbor County and on information about the proposed action provided by the applicant.

Input-output models estimate not only the employment and income generated to construct and operate a project (*direct* effects) but also the increased employment and income in industries linked to the project (*indirect* effects). The model also estimates the increased purchases that workers in the directly and indirectly affected industries make due to their increased income (*induced* effects). The sum of the direct, indirect, and induced effects is called the *total* effect, and the ratio of the total effect to the direct effect is called a *multiplier*.

7.1.3 What are the economic conditions in the study area?

This section describes the regional economic conditions that could be affected by construction and routine operation of the proposed action.

7.1.3.1 Regional Population

Between 2000 and 2012, the state population increased by 17% (Table 7-1). In 2010, Grays Harbor County ranked 17th in population out of Washington's 39 counties (U.S. Census Bureau 2014a). Although the county population increased by 6.7% between 2000 and 2012 (Table 7-1), it actually decreased by 1,105 individuals during the last 2 years of that period (U.S. Census Bureau 2014a). Table 7-1 presents regional population, labor force, income, unemployment, and poverty rates for 2000 and 2012.

Table 7-1. Population, Labor Force, Median Household Income, Unemployment Rate, and Poverty Rate for Washington and Grays Harbor County (2000 and 2012)

	Washington State			Grays Harbor County		
Statistic	2000	2012	Percent Change	2000	2012	Percent Change
Population	5,894,121	6,897,012	17.0	67,194	71,692	6.7
Labor force	2,979,824	3,556,836	19.4	30,120	31,514	4.6
Median household income ($)	45,776	57,573	25.8	34,160	42,057	23.1
Unemployment rate (%)	6.1	8.6	39.3	8.3	16.4	97.6
Poverty rate (%)	10.6	13.5	27.3	16.1	20.9	37.7

Source: U.S. Census Bureau 2014a and 2014b

7.1.3.2 Regional Income, Poverty, and Unemployment

In 2012, Washington ranked eighth in median household income among the 50 states. Its median household income exceeded that of all non-eastern-seaboard states, except Alaska (U.S. Census Bureau 2013). Although Washington is relatively affluent, its unemployment and poverty rates increased substantially between 2000 and 2012 (Table 7-1).

In 2012, Grays Harbor County ranked 34th in median household income among the state's 39 counties (Washington State Office of Financial Management 2014). Unemployment and poverty have recently become more prevalent in the county: approximately one in five county residents lived in poverty, and one in six members of the work force was unemployed in 2012 (Table 7-1). Grays Harbor County's per-capita income is substantially less than the statewide average, and it increased more slowly than in Washington between 2000 and 2012 (Table 7-2).

Table 7-2. Per-Capita Income in Washington State and Grays Harbor County (2003–2012)

Year	Washington State	Grays Harbor County
2003	34,620	24,663
2004	36,715	25,315
2005	37,651	26,150
2006	40,139	27,132
2007	42,845	28,566
2008	44,162	29,903
2009	42,112	29,391
2010	42,521	29,645
2011	44,420	30,963
2012	46,045	31,848
Percent change 2003–2012	33.3	29.1

Source: U.S. Bureau of Economic Analysis 2014
Values are not inflation-adjusted.

7.1.3.3 Regional Employment and Wages

Between 2002 and 2012, the state industries that increased fastest in statewide employment level were educational services; health care and social assistance; and professional, scientific, and technical services (Table 7-3). The industries that declined the fastest in employment in the state were mining, construction, and finance and insurance.

In Grays Harbor County, the industries that increased fastest in employment between 2002 and 2012 were management, administrative and waste management, and real estate and rental and leasing services (Table 7-3). The industries in which employment declined most rapidly were construction, military, and other services. More industries had declining employment than increasing employment.

Countywide average wages are lower than the statewide average, and they increased more slowly between 2004 and 2012 compared to statewide (Table 7-4).

Table 7-3. Employment[a] by Place of Work in Washington State and Grays Harbor County by Industry (2002 and 2012)

	Washington State			Grays Harbor County		
Sector	2002	2012	Percent Change[b]	2002	2012	Percent Change[b]
Farming	44,116	52,776	19.6	590	766	29.8
Forestry, fishing, and related activities	24,924	27,696	11.2	(D)	(D)	--
Mining	3,063	2,158	(29.6)	(D)	(D)	--
Utilities	4,524	4,913	8.6	16	(D)	--
Construction	160,441	143,496	(10.6)	1,705	1,339	(21.5)
Manufacturing	286,033	280,554	(1.9)	3,574	3,079	(13.9)
Wholesale trade	116,491	124,363	6.7	852	765	(10.2)
Retail Trade	309,158	322,363	4.3	3,969	3,425	(13.7)
Transportation and warehousing	85,295	89,301	4.7	902	(D)	--
Information	93,555	105,535	12.8	222	275	23.9
Finance and insurance	101,513	94,517	(9.3)	922	1,055	14.4
Real estate and rental and leasing services	48,565	45,918	(5.4)	841	1,128	34.1
Professional, scientific, and technical services	140,060	173,116	23.6	1,005	1,007	0.2
Management	30,286	36,318	19.9	36	92	155.5
Administrative and waste management	123,101	143,031	16.2	628	925	47.3
Educational services	41,954	52,981	26.3	112	117	4.5
Health care and social assistance	271,964	340,181	25.1	2,390	2,831	18.4
Arts, entertainment, and recreation	41,986	46,452	10.6	483	424	(12.2)
Accommodation and food services	206,171	232,890	12.9	2,432	2,317	(4.7)
Other services	145,889	146,708	0.6	2,118	1,815	(14.3)
Federal civilian	69,300	73,258	5.7	215	212	(1.4)

Sector	Washington State			Grays Harbor County		
	2002	2012	Percent Change[b]	2002	2012	Percent Change[b]
Military	75,587	81,956	8.4	288	240	(16.7)
State government	141,344	149,352	5.7	1,243	1,256	1.0
Local government	300,536	319,886	6.4	4,844	4,720	(2.6)
Total	**2,865,856**	**3,089,759**	**7.8**	**31,203**	**29,872**	**(4.3)**

Notes:
Source: U.S. Bureau of Economic Analysis 2014.
(D) Not shown to avoid disclosure of confidential information
[a] Includes full- and part-time employees and proprietors.
[b] Negative changes shown in parentheses.

Table 7-4. Average Weekly Wages for Washington and Grays Harbor County (2004 and 2012) ($)

Year	Washington State	Grays Harbor County
2004	757	574
2012	999	686
Percent Change 2004–2012	32.0	19.5

Source: U.S. Bureau of Labor Statistics 2015.
Values are not inflation adjusted.

7.1.4 What are the potential impacts on economic conditions?

This section describes impacts on economic conditions that could occur in the study area. Potential impacts of the no-action alternative are described first, followed by potential impacts of the proposed action.

7.1.4.1 No-Action Alternative

Under the no-action alternative, the applicant would continue to operate its existing facility as described in Section 2.1.3.2, *Existing Operations*. Although the proposed action would not occur, it is assumed that growth in the region would continue under the no-action alternative. This growth could lead to development of another industrial use at the project site, which could result in in impacts similar to those described for construction and routine operation of the proposed action. However, for the purposes of this analysis, it is assumed that no future development would occur at the project site.

7.1.4.2 Proposed Action

This section describes the impacts that could occur in the study area as a result of the construction and routine operation of the proposed action. First, this section describes impacts from construction of the proposed action. It then describes impacts of routine operation of the proposed action.

Construction

As described in Chapter 2, *Proposed Action and Alternatives*, construction of the proposed action would likely be completed in two phases. It is anticipated that Phase 1 could begin in 2016 and would last 10 to 12 months. The start date for Phase 2 is unknown but is anticipated to last approximately 10 months. Construction of Phase 1 is anticipated to cost $38.3 million and Phase 2 is estimated to cost an additional $20.4 million for a total construction cost of $58.7 million.

Construction of the proposed action would temporarily stimulate the economy through purchases of materials, supplies, equipment, and services; payroll to construction workers; and related indirect and induced effects. Direct purchases of goods and services used to construct the proposed facility would require the vendors providing these products to increase spending on the inputs they need to operate. For example, construction companies engaged in building industrial infrastructure would probably need to buy additional heavy equipment. Such purchases by directly affected businesses represent the *indirect effects* of the proposed action. *Induced effects* result when workers and proprietors who receive additional income from work generated by the proposed action spend that additional income on consumer goods and services within the region.

As indicated by the IMPLAN analysis (Appendix O, *Economic Impact Analysis*), approximately $10.9 million of Phase 1 total construction costs ($38.3 million) would go to labor spending (e.g., construction worker salaries and benefits) associated with the creation of approximately 82 direct construction jobs and a total of 293 jobs in the state (Table 7-5). Of the total Phase 1 construction costs, the remaining $27.4 million would go to nonlabor spending (e.g., equipment and materials purchases). Businesses classified by IMPLAN as "the construction of other new nonresidential structures industry" would receive most of the construction spending.

Of the $10.9 million to go to labor spending, approximately $10.4 million (95%) is estimated to be spent in Washington (Table 7-5). Of the $27.4 million to go to nonlabor spending, it is estimated approximately $13.2 million (48%) would be spent on construction commodities such as materials, supplies, equipment, and services in Washington. The remaining $14.2 million (52%) would be spent out of state. The relatively low share of in-state nonlabor spending reflects the need to import specialized equipment manufactured outside Washington. The estimated direct, indirect, and induced employment, income (including benefits), and output effects associated with Phase 1 construction spending that would occur in Washington State are shown in Table 7-5. Income and output levels are expressed in 2013 dollars per year.

Table 7-5. Estimated Economic Impacts from Phase 1 Construction—Proposed Action (2013 dollars)

Impact	Employment (jobs)	Labor Income and Benefits	Economic Output
Direct	82	$10,398,000	$23,570,000
Indirect	111	$6,619,000	$17,157,000
Induced	100	$4,695,000	$13,407,000
Total	293	$21,712,000	$54,134,000
Multiplier[a]	3.57	2.09	2.30

Source: Appendix O, *Economic Impact Analysis*

[a] The employment multiplier (ratio of the total effect to the direct effect) for the construction is much larger than the labor income multiplier because, although the average nonresidential construction job results in 3.57 jobs in supporting industries, the average wage in those industries is substantially lower than in the nonresidential construction industry.

In addition to these economic impacts, construction of the proposed action would result in various tax revenues accruing to state and local governments. As shown in Table 7-6, the first phase of construction was estimated to generate approximately $2.66 million in property, sales, and business and occupation tax revenues.

Table 7-6. Estimated Tax Revenues from Phase 1 Construction—Proposed Action (2013 dollars)

Property Tax	Sales Tax	Business and Occupation Tax	Total
$143,600	$2,453,700	$58,400	$2,655,700

Source: Appendix O, *Economic Impact Analysis*

As mentioned above, construction of Phase 2 is estimated to cost an additional $20.4 million. The economic impacts associated with Phase 2 construction would be similar to but slightly less than those described for Phase 1.

Operations

The annual economic output of the proposed action in Grays Harbor County was estimated at $19.9 million (Table 7-7). This includes onsite operation of the proposed action and rail and vessel operations to and from the project site. This amount does not include the value of the commodities (e.g., crude oil) that would be shipped through the Port of Grays Harbor (Port), which, for this analysis, comprise pass-through costs with no economic impacts. The annual economic output includes annual operating costs of Westway Terminal Company LLC (applicant), PS&P, and vessel operators related to the proposed action, business taxes, and net business income.

At full buildout, the proposed action would generate an estimated 36 direct jobs in Grays Harbor County associated with onsite operations (by the applicant), rail transport (by PS&P), and vessel transport (by vessel operators). The proposed action would generate an estimated 73 jobs throughout the county's economy. These jobs would account for $3.6 million in annual direct labor income and benefits and $5.1 million in total labor income and benefits throughout the county's economy (Table 7-7).

The annual operating costs of the proposed facility (by the applicant), and rail transport (by PS&P) and vessel transport (by vessel operators) related to the proposed action was estimated at $6.6 million. One-third of this spending ($2.2 million) would be attributed to the applicant, and two-thirds ($4.4 million) would be attributed to the rail and vessel transport operators. Of the total spending, $3.6 million (54.8%; Table 7-7) would be paid as income or benefits to employees and proprietors with the remainder going to non-labor expenditures.

The difference between the annual economic output and annual operating costs would consist primarily of business taxes and net business income. A substantial share of the applicant's net business income would probably be allocated to retire debt incurred during the construction phase. Essentially, all business taxes and net business income related to onsite operations and income earned by rail and vessel operators would leave Grays Harbor County and would not result in regional employment or income. The regional economic effects of operation of the proposed action are shown in Table 7-7, with income and output levels expressed in 2013 dollars per year.

Table 7-7. Estimated Economic Impacts in Grays Harbor County of Operations at Full Buildout—Proposed Action (2013 dollars)

	Employment (jobs)	Labor Income and Benefits	Economic Output
Direct	36	$3,620,000	$19,942,000
Indirect	20	$856,000	$2,961,000
Induced	17	$574,000	$1,951,000
Total	73	$5,051,000	$24,854,000
Multiplier[a]	2.58	1.40	1.25

Source: Appendix O, *Economic Impact Analysis*

[a] The multipliers for operation of the proposed action are smaller than those for construction primarily because the study area for operation is much smaller (Grays Harbor County) and the industries that would be most affected by operation are, on average, less labor-intensive and have lower wages.

In addition to these economic impacts, operation of the proposed action was estimated to generate $1.27 million in increased annual property, sales, and business and occupation tax revenues at full buildout (Table 7-8).

Table 7-8. Estimated Annual Tax Revenues Generated by Operations at Full Buildout—Proposed Action (2013 dollars)

Property Tax	Sales Tax	Business and Occupation Tax	Total
$1,083,500	$68,000	$116,300	$1,267,800

Source: Appendix O, *Economic Impact Analysis*

7.2 Social Policy

The social policy analysis considers elements of community and social structure that could be affected by the proposed action, including community cohesion, community welfare, population growth, and minority and low-income communities.

- **Community cohesion** is the ability of people to communicate and interact with each other in ways that lead to a sense of community, as reflected in a neighborhood's ability to function and be recognized as a singular unit (Washington State Department of Transportation 2014). In general, community cohesion is affected by elements that tend to divide communities, such as railroads, highways, and industrial facilities not accessible to the public.
- **Community welfare** refers to the physical health and mental well-being of individuals in a community.
- **Population growth** refers to the increase in the number of people that reside in a country, state, county, or city.
- **Minority and low-income communities** refer to those localized communities that have a higher percentage of residents in this category than the county in which they reside.

This section describes the existing conditions related to community cohesion, community welfare, population, and minority and low-income populations. It then describes impacts on these conditions that could result under the no-action alternative or as a result of the construction and operation of

the proposed action. This section also considers if impacts resulting from the proposed action could disproportionately affect minority and low-income communities.

7.2.1 What is the study area for social policy?

The study area for social policy consists of the communities surrounding the project site that could be affected by construction and operation of the proposed action. The study area also includes the communities that could be affected during rail transport along the PS&P rail line and vessel transport through Grays Harbor.

7.2.2 How were impacts on social policy evaluated?

This section describes the sources of information and methods used to evaluate impacts.

7.2.2.1 Information Sources

The analysis used information from the following sources.

- Public scoping comments
- Relevant land use plans and mapping
- U.S. Census data
- Interviews with local land use planners

7.2.2.2 Impact Analysis

Impacts of the proposed action on social policy elements were evaluated qualitatively using information from the sources described above and the analysis of impacts on the natural and built environment in Chapter 3, *Affected Environment, Impacts, and Mitigation*.

- **Community cohesion.** The evaluation of impacts on community cohesion considered how the proposed action would divide a neighborhood, isolate part of a neighborhood, or separate residents from public services by changing accessibility.
- **Community welfare.** The evaluation of impacts on community welfare considered how impacts of the proposed action described in Chapter 3 could affect human health and welfare (e.g., physical health, mental well-being, property values) in the study area.
- **Population growth.** Impacts on population growth were evaluated based on projected employment from construction and operation of the proposed action described in Section 7.1, *Economics*.
- **Minority and low-income communities.** The analysis of impacts on minority and low-income communities involved compiling minority and low-income data for the U.S. census block groups in the study area and evaluating whether the impacts would affect minority and/or low-income communities. This means considering if impacts would occur or occur in greater magnitude in areas where these populations were concentrated.

  For the purposes of this analysis, a population was considered a minority or low-income population if the percentage of minority or low-income individuals in any given census block

group was greater[5] than the percentage of that population at the county level,[6] which provides for a conservative analysis. For this analysis, *minority* populations include all racial groups other than white (defined as not Hispanic or Latino), and *low-income* populations include those living below poverty.

7.2.3 What are the existing conditions related to social policy in the study area?

This section describes the existing conditions related to community cohesion, community welfare, population growth, and minority and low-income in the study area that could be affected by construction and operation of the proposed action.

7.2.3.1 Community Cohesion

This section describes existing dividing elements, such as railroads, highways, and industrial facilities not accessible to the public, near the project site, along the PS&P rail line, and along the shoreline of Grays Harbor.

Project Site

The project site is located within the city limits of Hoquiam and Aberdeen along the industrial waterfront at the Port. Land on and directly surrounding the project site is designated and zoned for industrial use (Chapter 3, Section 3.8, *Land and Shoreline Use*). The industrial area extends several miles north and south of the project site along the shoreline. The PS&P rail line borders this industrial area to the north and east, dividing the industrial area from high-density residential, recreational, and other uses to the north and northeast. The rail line and industrial area are dividing elements near the project site in that they separate these residential areas from the Grays Harbor shoreline. However, physical and visual access to Grays Harbor is provided via the 28th Street Boat Ramp and Viewing Tower located north of the project site.

US Route 101 (US 101) is north of the project connecting Hoquiam to the west and Aberdeen to the east. Local road access to the project site is provided via Port Industrial Road at the intersection with West 1st Street.

PS&P Rail Line

The PS&P rail line links the densely populated cities of Hoquiam and Aberdeen (to the west) and Centralia (to the south and east), largely following the Chehalis River; in between, development is much less dense. Land uses mostly consist of agricultural fields and forested open space interspersed with smaller cities and communities, including (west to east) Junction City, Central Park, Alder Grove, City of Montesano, Brady, Satsop, City of Elma, Malone-Porter, City of Oakville, the Chehalis Reservation, Rochester, Grand Mound, and Fords Prairie (Chapter 2, *Proposed Action and Alternatives*, Figure 2-1).

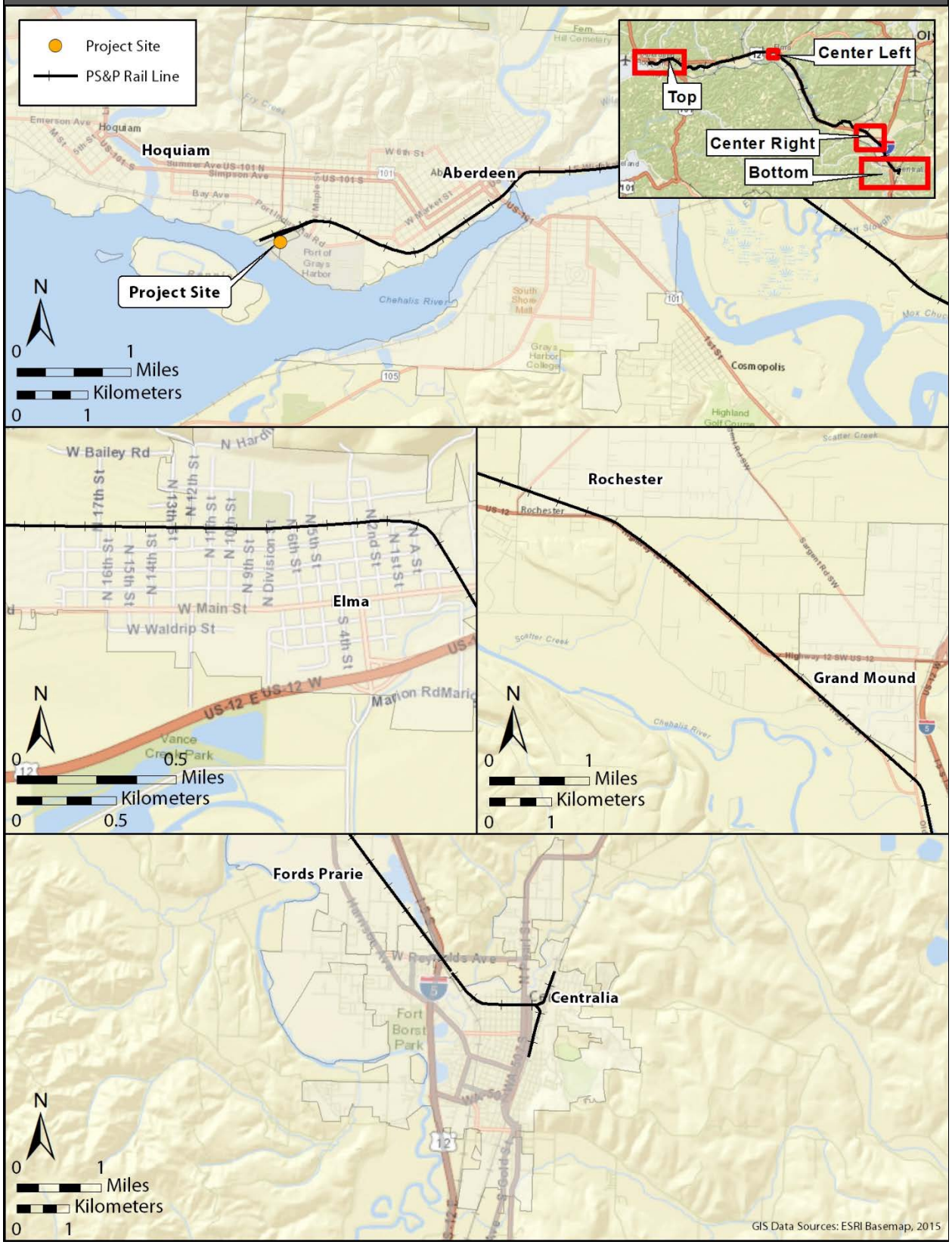
[5] For comparison, the U.S. Environmental Protection Agency considers impacts on minority populations to be disproportionate if the minority population exceeds 50% of the study area population or if the minority population percentage of the study area is meaningfully greater than the minority population percentage in the general population or the reference area the study area (Council on Environmental Quality 1997).
[6] The study area spans three counties; the census block groups were evaluated against the county in which they are located.

The PS&P rail line travels along the outskirts of most communities; however, it intersects Centralia, Fords Prairie, Ground Mound, Rochester, Elma, and Aberdeen, where it divides portions of these communities. When a train is traveling through this corridor, access from one side of the town to the other can be temporarily blocked. With the exception of impacts in Aberdeen, the delay typically lasts the duration of the train passing (approximately 3 minutes with some periods of longer delay in Centralia due to slower speed restrictions).

Elsewhere along the rail line are additional locations where access is completely blocked by a passing train, meaning there are no alternative routes. These access limitations are summarized below (Figure 7-1).

- In Centralia, from north to south, the PS&P rail line cuts through an industrial district, crosses the Skookumchuck River, and traverses a variety of mid- to high-density residential and commercial uses. Interstate 5 also runs north-south along the western side of the city.
- In Fords Prairie, the PS&P rail line runs through the northern part of the city, bisecting a large commercial complex from some scattered residential development. During the passing of the train, access into the warehouse area to the north is temporarily blocked.
- In the Rochester and Grand Mound area, the PS&P rail line bisects scattered residential areas with most development occurring to the north of the rail line. Some isolated areas, including primarily agricultural development and rural residential uses, are temporarily blocked from access when trains pass.
- From Rochester to Elma, access is temporarily limited in some scattered areas. These areas mostly consist of agricultural development and rural residential land uses.
- In Elma, the PS&P rail line runs through the length of the community and separates the northern portions, primarily residential development, from the more concentrated residential and commercial development to the south. When a train is passing, access to the Lloyd Murray Park is temporarily blocked.
- From Elma into Aberdeen, a passing train temporarily blocks access to some smaller groupings of residential land uses.
- In Aberdeen, the PS&P rail line mostly splits industrial uses to the south and most other uses (mainly commercial and residential) to the north. East of the Wishkah River; however, the rail line divides residential and commercial uses on the north from a popular commercial area (Olympic Gateway Plaza) on the south. When a train is passing, access into the Olympic Gateway Plaza is blocked (Chapter 3, Section 3.16, *Vehicle Traffic and Safety*).

Figure 7-1. Communities Intersected by the PS&P Rail Line



Grays Harbor

Lands surrounding Grays Harbor are relatively sparsely populated outside of the cities and communities. Communities along the harbor include Cosmopolis, Westport, Cohassett Beach, and Ocean Shores. General land uses surrounding the harbor include residential, industrial, commercial, transportation/communications/utilities, recreation, resource production (i.e., agriculture, fishing, and mining activities and designated forest land), and undeveloped land (Chapter 3, *Affected Environment, Impacts, and Mitigation*, Figure 3.8-1). Generally, development is more concentrated on the eastern and western sides of the harbor and most undeveloped land is located along the northern and southern sides.

Grays Harbor encompasses many recreational areas, including several state and local parks and designated wildlife areas. Fishing, shellfishing, bird and wildlife viewing, hiking, and boating are popular recreational activities throughout the harbor. Most of Grays Harbor's recreational areas are on the western half of the harbor in and near the northern and southern peninsulas.

Besides the industrial area along the eastern end of the harbor in which the project site is located and along where the rail line runs, there are no major dividing elements along the Grays Harbor shoreline. Although present, US 101 and State Route 109 (SR 109) are not dividing elements because they are accessible from local roadways.

As described in Chapter 3, Section 3.17, *Vessel Traffic*, Grays Harbor experiences many forms of vessel activity, including large commercial vessels that transit the harbor via the Grays Harbor Navigation Channel destined for Port terminals and other private wharves further east along the Chehalis River. Commercial fishing vessels also tend to congregate along the navigation channel east of the Hoquiam River, and recreational fishing and pleasure boats move throughout the harbor, mostly in the summer. The navigation channel could be considered a dividing element among commercial fishers and recreationalists using the harbor, because the latter vessels must make way for the large commercial vessels whose transit through the harbor is restricted to the navigation channel. As noted in Chapter 3, Section 3.10, *Recreation*, Section 3.12, *Tribal Resources*, and 3.17, *Vessel Traffic*, existing deep-draft vessel traffic currently does cause some disruption to recreation boaters and fishers and tribal and commercial (treaty and nontreaty tribal) fishing.

7.2.3.2 Community Welfare

Community welfare analysis identifies the factors that influence the existing sense of welfare in the study area, such as living in a healthy and safe environment and relatively easy access to public amenities and services.

Project Site

As noted in Chapter 3, *Affected Environment, Impacts, and Mitigation*, in general, project site does not have significant documented concerns with air quality or water quality. Easy access to the harbor and the Chehalis River provides recreational and commercial opportunities. There are also recreational facilities and public facilities in Hoquiam and Aberdeen, such as ballparks, boat launches, restaurants, and other businesses. However, closest to the project site, there are areas that experience some exposure to increased noise and environmental health and safety risks associated with the existing industrial facilities. These land uses are described in Chapter 3, Section 3.8, *Land and Shoreline Use*.

PS&P Rail Line

The PS&P rail line links the densely populated cities of Hoquiam and Aberdeen (to the west) and Centralia (to the south and east), largely following the Chehalis River. In between, land uses generally consist of agricultural fields and forested open space interspersed with smaller cities and communities. In general, environmental conditions along the PS&P are good. There are no known concerns with air quality or water quality. There are numerous recreational facilities and public facilities in the cities along the rail line. However, residents are exposed to noise and environmental health and safety risks associated with existing rail operations, primarily related to train horn noise and some risks of incidents. Existing noise conditions are discussed in Chapter 3, Section 3.7, *Noise and Vibration*, and existing safety risks are addressed in Chapter 4, *Environmental Health and Safety*. Additionally, there are areas where rail operations result in increased vehicle delay and limited vehicle access, primarily in East Aberdeen and around the project site. These limitations are discussed in Section 7.2.3.1, *Community Cohesion*, and in Chapter 3, Section 3.16, *Vehicle Traffic and Safety.*

Grays Harbor

As described in Section 7.2.3.1, *Community Cohesion*, lands surrounding the harbor are relatively sparsely populated outside of the cities and communities. In general, environmental conditions around the harbor are good. There are no known concerns with air quality or water quality. There are numerous recreational facilities and public facilities in the surrounding cities. Views of Grays Harbor are relatively intact and are available from land- and water-based vantages. Numerous recreational and wildlife areas are located around the bay with views of the water. Additionally, water-based views are available from recreational, commercial, and industrial vessels. Views in the region vary based on viewers' location in the landscape. Many views are of high visual quality, featuring the harbor and rivers, tidal areas, forested hillsides, and relatively low levels of development. However, other views are somewhat degraded and include industrial operations and infrastructure juxtaposed against the forested hillsides and waterfront.

The shoreline of Grays Harbor provides opportunities for hiking, biking, picnicking, wildlife viewing, bird watching, and hunting at the numerous state and city parks and designated wildlife areas that surround the harbor. Miles of public shoreline with multiple public access options provide opportunities for beachcombing and shellfishing; public boat launches provide access for recreational fishing and boating. Wave riding and surfing are other popular activities near the south jetty.

However, there is increased exposure to some risks associated with existing vessel operations. This includes the low potential for incidents, as discussed further in Chapter 4, *Environmental Health and Safety*, and some low level of disturbance to recreational boaters, commercial fishers, and tribal fishers in the study area, as discussed in greater detail in Chapter 3, Section 3.10, *Recreation*, Section 3.12, *Tribal Resources*, and Section 3.17, *Vessel Traffic*.

7.2.3.3 Population Growth

This section describes recent population growth in the study area. As noted in Section 7.1.3.1, *Regional Population*, Washington State's population increased between 2000 and 2012 by 17% and Grays Harbor County's population increased by 6.7% (Table 7-9). Over the same period, population increased in most of the cities and communities in the study area. The exceptions are Hoquiam

(-2.9%), Westport (-5.0%), Junction City (-77.5%), Elma (-0.6%), and Fords Prairie (-0.1%) (Table 7-9).

Table 7-9. Population Growth[a] in Washington, Grays Harbor County, and Surrounding Communities (2000 and 2012)

Population	2000	2012	Percentage Change
Hoquiam	8,987	8,726	-2.9
Aberdeen	16,461	16,896	2.6
Westport	2,137	2,030	-5.0
Ocean Shores	3,836	5,584	45.6
Cosmopolis	1,595	1,600	0.3
Junction City	80	18[a]	-77.5
Central Park	2,558	2,685[a]	5.0
Montesano	3,312	3,976	20.0
Brady	645	676[a]	4.8
Satsop	619	675[a]	9.0
Elma	3,049	3,030	-0.6
Malone-Porter	473	1,825[a]	285.8
Oakville	233	663	184.5
Rochester	1,829	2,388[a]	30.6
Grand Mound	1,948	2,981[a]	53.0
Fords Prairie	1,961	1,959	-0.1
Centralia	14,742	16,611	-13
Study area communities total	51,723	57,725	11.0
Grays Harbor County	67,194	71,692	6.7
Washington	5,894,121	6,897,012	17.0

Source: U.S. Census Bureau 2013 unless otherwise noted.
[a] U.S. Census Bureau 2010.

7.2.3.4 Minority and Low-Income Populations

This section identifies minority and low-income populations in the study area based on the census block group data (U.S. Census Bureau 2014c). Of the 57 census block groups in the study area, 31 have minority populations that exceed their respective county levels (minority populations account for 19.1% of the Grays Harbor population, 14.4% of the Lewis County population, and 21.9% of the Thurston County population), ranging from 15.5 to 56.8% of the total population. Table 7-10 presents the average percentage of populations for each element of the study area, project site, PS&P rail line, and Grays Harbor, compared to area counties. Appendix P, *Census Block Group Data*, presents minority and poverty data for each block group in the study area.

In addition, 25 of the 57 census block groups in the study area have low-income populations that exceed their respective county levels (low-income populations account for 19.0 % of the Grays Harbor population, 15.4% of the Lewis County population, and 11.7% of the Thurston County population), ranging from 17.0 to 57.6%. This information is also summarized in Table 7-10 with more information for all census block groups presented in Appendix P, *Census Block Group Data*.

Overall, 39 of the 57 census block groups in the study area are considered minority and/or low-income populations for the purposes of this analysis (Figure 7-2). Relative to the project site, PS&P rail line, and Grays Harbor shoreline, these populations occur as follows.[7]

- Nearest the project site, all three of the census block groups are minority and/or low income.
- Along the PS&P rail line, 31 of the 43 (or 72%) census block groups are minority and/or low income. These populations occur along almost the entire length of the line with the exception of a small portion of Rochester (in Thurston County) and the area between Satsop and Montesano.
- Along the shoreline of Grays Harbor, 15 of the 22 (or 68%) census block groups are minority and/or low income, primarily concentrated around Ocean Shores, Hoquiam, Aberdeen, Cosmopolis, and along the southern shore of the harbor.

[7] Some census block groups are considered with respect to more than one of the study area features (i.e., project site, PS&P rail line, and Grays Harbor shoreline).

Table 7-10. 2013 Minority Populations and Poverty Status

Census Block Groups or Area	Average Percentage of Population that is a Minority Population	Comparison to Grays Harbor County Average Minority Population	Comparison to Lewis County Average Minority Population	Comparison to Thurston County Average Minority Population	Comparison to Washington State Average Minority Population	Average Percentage of Population Below Poverty Level[a]	Comparison to Grays Harbor County Average Low-Income Population	Comparison to Lewis County Average Minority Population	Comparison to Thurston County Average Low-Income Population	Comparison to Washington State Average Low-Income
Study area	20.0	0.9% higher	5.6% higher	1.9% lower	2.7% lower	17.8	1.2% lower	2.4% higher	6.1% higher	1.4% lower
Project site	26.9	7.8% higher	12.5% higher	5.0% higher	4.2% higher	31.6	12.6% higher	16.2% higher	19.9% higher	12.4% higher
PS&P rail line	21.1	2.0% higher	6.7% higher	0.8% lower	1.6% lower	18.1	0.9% lower	2.7% higher	6.4% higher	1.1% lower
Grays Harbor shoreline	21.6	2.5% higher	7.2% higher	0.3% lower	1.1% lower	21.1	2.1% higher	5.7% higher	9.4% higher	1.9% higher
Grays Harbor County	19.1	--	4.7% higher	2.8% lower	3.6% lower	19.0	--	3.6% higher	7.3% higher	0.2% lower
Lewis County[b]	14.4	4.7% lower	--	7.5% lower	8.3% lower	15.4	3.6% lower	--	3.7% higher	3.8% lower
Thurston County	21.9	2.8% higher	7.5% higher	--	0.8% lower	11.7	7.3% lower	3.7% lower	--	7.5% lower
Washington State	22.7	3.6% higher	8.3% higher	0.8% higher	--	19.2	0.2% higher	3.8% higher	7.5% higher	--

Table includes average percentage of populations for each element of the study area, project site, PS&P rail line, and Grays Harbor, compared to area counties.

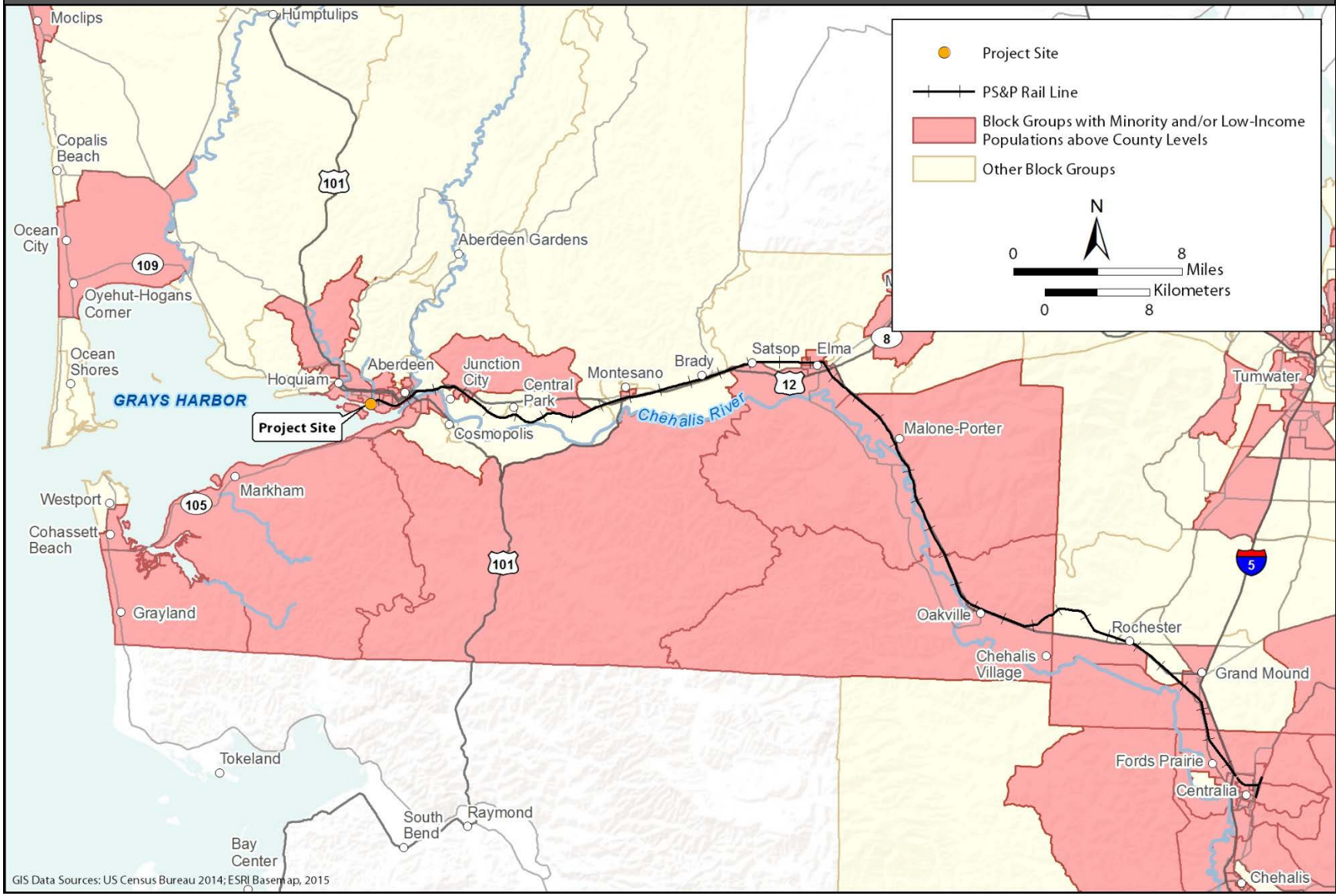
[a] Percentage of individuals with incomes below poverty level, as established by the U.S. Census Bureau.

[b] Lewis County numbers are provided for comparison with census block groups in and near Centralia.

[c] Thurston County numbers are provided for comparison with census block groups in and near Rochester and Grand Mound.

Source: U.S. Census Bureau 2014c

Figure 7-2. Minority and Low-Income Populations in the Study Area



7.2.4 What are the potential impacts on social policy?

This section describes impacts on social policy that could occur in the study area. Potential impacts of the no-action alternative are described first, followed by potential impacts of the proposed action.

7.2.4.1 No-Action Alternative

Under the no-action alternative, the applicant would continue to operate its existing facility as described in Section 2.1.3.2, *Existing Operations*. Although the proposed action would not occur, it is assumed that growth in the region would continue under the no-action alternative. This growth could lead to development of another industrial use at the project site, which could result in impacts similar to those described construction and operation of the proposed action. However, for the purposes of this analysis, it is assumed that no future development would occur at the project site. Rail and vessel traffic projection for 2017 and 2037 described in Section 3.15, *Rail Traffic*, and Section 3.17, *Vessel Traffic*, respectively, are considered in the potential impacts below.

7.2.4.2 Proposed Action

This section describes the impacts that could occur in the study area as a result of construction and operation of the proposed action. First, this section describes impacts from construction of the proposed action. It then describes impacts of operation at the project site and of rail and vessel transport to and from the project site.

Construction

Community Cohesion

The project site is located in an existing industrial area and construction of the proposed action would not bisect, disrupt, or isolate any established communities or change the existing community character, nor would it require relocating any residences or businesses. As described in Chapter 3, Section 3.16, *Vehicle Traffic and Safety*, transport of materials and workers to and from the project site during construction is not expected to result in a substantial increase in traffic that could adversely affect the level of service of area roadways. Moreover, increased traffic related to construction of the proposed action would occur over a relatively short period (approximately 10 to 12 months for each phase).

Community Welfare

Construction of the proposed action would affect community welfare if it were to substantially degrade air quality, increase noise, reduce access to parks and recreational uses, or reduce property values.

As described in Chapter 3, Section 3.2, *Air*, construction of the proposed action would result in emissions of criteria pollutants; however, these emissions are not expected to cause a significant contamination of the air and are unlikely to affect sensitive receptors surrounding the project site. Construction of the proposed action could result in emissions of toxic air pollutants, primarily associated with diesel particulate matter, a known human carcinogen. The construction-related emissions would be short-term and intermittent, with total diesel particulate matter emissions of less than 0.17 ton per year, which would be less than 0.2% of total 2011 diesel particulate matter

emissions for Grays Harbor County (9.5 tons per year) (Washington State Department of Ecology 2014). Off-site exposure would likely be well below any level of concern based on the level considered acceptable for permitting new stationary sources of toxic air pollutants in Washington State.

As discussed in Chapter 3, Section 3.7, *Noise and Vibration*, construction of the proposed action would result in a temporary increase in daytime[8] noise and vibration from construction equipment operations. While construction noise would likely be audible in nearby residential areas and recreational uses, the levels would relatively low level and are not expected to adversely affect the surrounding these areas.

As described in Chapter 3, Section 3.10, *Recreation*, construction activities, including the transport of workers and materials to the project site, would not disrupt access to nearby recreation uses, including the 28th Street Boat Ramp and Viewing Tower.

Construction can also affect community welfare by temporarily lowering property values during construction. Specifically, potential buyers may find a property less attractive if views are altered by the visible and audible presence of construction equipment and activity. However, as noted in Chapter 3, Section 3.9, *Aesthetics, Light, and Glare*, views of the project site by residents are relatively limited and consist of elements that are already industrial in nature (e.g., large storage tanks, rail-loading equipment).

Population Growth

Construction of the proposed action could affect population growth, housing, or relocation if construction workers were to move from outside of the area. Because the period of construction is relatively short (10 to 12 months for each phase), it is expected that construction workers would commute from nearby communities. Therefore, construction of the proposed action would not result in the permanent relocation of workers from outside the study area, displacement of local residents, or the requirement for additional housing.

Minority and Low-Income Populations

As shown in Table 7-10, minority and low-income populations in the census block groups near the project site are much higher (7.8 and 12.6%, respectively) than Grays Harbor County levels. Because construction-related impacts described above would be relatively low and would only last during the construction period, construction of the proposed action is not anticipated to significantly and adversely affect these populations.

Operations

Community Cohesion

Operation of the proposed action would affect community cohesion if activities were to bisect, disrupt, or isolate any established communities or change the existing community character, such as by requiring the relocation of residences or businesses.

[8] No nighttime construction is proposed.

Onsite

Onsite operation of the proposed action would not require acquisition of new properties that would require relocating any residences or businesses, nor would it change the existing community character. The project site is located in an existing industrial area and the proposed facility is consistent with the existing facility at the project site.

Onsite operation of the proposed action would affect community cohesion if it were to block or obstruct access to important community resources. Although onsite activities would occur within the boundaries of the existing industrialized site, loading of tank vessels at the Terminal 1 dock could disrupt fishing activities adjacent to the dock.

As described in Chapter 3, Section 3.12, *Tribal Resources*, and Section 3.17, *Vessel Traffic*, onsite operations would reduce access to fishing areas immediately adjacent to the dock as result of increased frequency of vessels docked at the Terminal 1 berth.

As described in Chapter 3, Section 3.16, *Vehicle Traffic and Safety*, onsite operation of the proposed action would result in additional employee vehicle trips to and from the project site. However, this increase would be minimal and would not noticeably affect surrounding roadways. Operations related to bringing rail cars onto the project site are addressed below under *Rail*.

Although there would be increased development and activity under the proposed action, the project site and surrounding area are already developed for industrial uses. In general, the increased activity occurring at the project site would be similar to the no-action alternative.

Rail

As described in Chapter 3, Section 3.15, *Rail Traffic*, operation of the proposed action at maximum throughput would add approximately 1.25 trips[9] per day on average (458 per year maximum) along the PS&P rail line to approximately three train trips per day (1,100 per year) under the no-action alternative. Although the PS&P rail line is an existing facility, the increased traffic associated with the proposed action would affect community cohesion if it were to block or obstruct access to important community resources.

As discussed for existing conditions, the rail line is one of the primary dividing elements in the study area, especially in Centralia, Fords Prairie, Ground Mound, Rochester, Elma, Aberdeen, and Fords Prairie. Existing rail traffic already causes vehicle delay and temporary access limitations in these communities.

Increased unit train traffic related to the proposed action would result in increased occupancy of PS&P rail line grade crossings (Chapter 3, Section 3.15, *Rail Traffic*). As noted in Chapter 3, Section 3.16, *Vehicle Traffic and Safety*, these areas would result in increases in vehicle delay along the rail line. However, for the majority of the line (between Centralia and Aberdeen), although there would be an increase in the total number of minutes each grade crossing would be blocked for an average 24-hour period, the actual traffic impacts (level of service) would not notably worsen. This is primarily because existing (and future) vehicle traffic is projected to remain relatively low along the PS&P rail line. In other words, for an average driver, the chances of encountering and having to wait for a passing train would not notably change compared to the no-action alternative. However, as noted in Section 3.16, there are locations in Aberdeen and Hoquiam where vehicle delay and

[9] A trip represents one-way travel; in other words, an inbound trip and an outbound trip are counted as two trips.

access would notably worsen. As described in Section 3.15, *Rail Traffic*, this has to do with switching activity (i.e., delivering and removing trains from the project sites). Vehicles at grade crossings in Aberdeen would experience the most substantial increase in average vehicle delay with the addition of the proposed action trains (Chapter 3, Section 3.16, *Vehicle Traffic and Safety*, Table 3.16-5). These grade crossings are located in two general areas.

- **Port of Grays Harbor area:** Average and peak-hour vehicle delay would worsen at several crossings in the Port area due to switching operations at the Poynor Yard to break down unit trains and the delivery of the rail cars across Industrial Road to the project site, as described in Section 3.16.While no crossings would drop below LOS D under average conditions, Washington Street would degrade below LOS D under peak-hour conditions
- **Olympic Gateway Plaza area:** Average vehicle delay would worsen in the Olympic Gateway Plaza area with the proposed action. Delays at grade crossings blocked by activities at the Poynor Yard under existing conditions would lengthen with the addition of proposed action trains (Section 3.16). The level of service would degrade below LOS D at the East Heron Street and Newell Street crossings (the western-most crossings in the plaza area).

As further noted in Section 3.16, emergency vehicle delay would also increase with the proposed action and crossing providing access to the above areas in Aberdeen would be blocked during switching operations. The communication and response procedures for providing emergency access to the Olympic Gateway Plaza area if a train is blocking all crossings, described in Section 3.16, would also apply under the proposed action. The alternative route described in Section 3.16 for accessing the Port area would also apply under the proposed action; and the proposed mitigation measure would ensure that the fire departments are able to use this alternative route to access blocked areas.

Vessel

Operation of the proposed action at maximum throughput would add 238 tank vessel trips per year (0.7 trip per day on average) along the navigation channel to projected large commercial vessel trips under the no-action alternative—between 338 and 436 large commercial vessel trips per year in 2017 and 2037, respectively, or approximately one trip per day on average (Section 3.17, *Vessel Traffic*).

Although the navigation channel is an existing transportation route, the increased traffic associated with the proposed action would affect community cohesion, if it were to block or obstruct access to important community resources. Because vessel operations are far from the shore, impacts on community cohesion related to increased vessel traffic would be limited to in-water uses. As described in Chapter 3, Section 3.10, *Recreation*, recreational fishing and pleasure boating occurs throughout the harbor and these vessels would be required to move out of the way of the tank vessels transiting the harbor via the navigation channel. Recreational fishing and pleasure boating occurs throughout the harbor and the small vessel could easily navigate away from tank vessels in transit. As described in Chapter 3, Section 3.12, *Tribal Resources*, and Section 3.17, *Vessel Traffic*, increased vessel traffic would disrupt commercial fishing and tribal fishing that occurs along the navigation channel. Transiting vessels related to the proposed action would limit the timing, duration, and physical area that could be fished. Proposed mitigation providing advance notice of incoming vessels related to the proposed action could help reduce potential conflicts, but the proposed action would still likely result in some community cohesion impacts related to these users.

Community Welfare

Operation of the proposed action would affect community welfare if it were to substantially degrade air quality, increase noise, reduce access to parks and recreational uses, reduce property values, or affect environmental health and safety.

Onsite

As described in Chapter 3, Section 3.2, *Air*, onsite operation of the proposed action would result in emissions of criteria air pollutants from stationary sources (e.g., emissions from storage tank cleaning, combustion of vapors from vessel loading) and from mobile sources (e.g., emissions from rail locomotives and vessel engines that would occur onsite), with the most potentially problematic air pollutant being nitrogen oxides (NO_X). Onsite operation of the proposed action would also result in emissions of toxic air pollutants, which would all be under regulated standards. Onsite operations of the proposed action are not expected to result in increased air emissions that would adversely affect the surrounding community.

As discussed in Chapter 3, Section 3.7, *Noise and Vibration*, noise and vibration levels related to onsite operations are anticipated to be similar to levels generated by other industrial sources and would not result in substantial increases that would be noticeable to surrounding recreational and residential uses. The impacts of air and noise emissions related to the movement of rail cars onto and off the project site are described under *Rail*.

As described in Chapter 3, Section 3.10, *Recreation*, onsite operations would occur entirely within the boundaries of the project site and would not block access to offsite recreational facilities. Increased tank vessel calls under the proposed action would increase the number of days that a vessel would occupy the Terminal 1 berth. Impacts on recreational fishing and pleasure boats would be low because boaters could access other boating and fishing areas throughout the harbor. Potential impacts on community welfare related to commercial and tribal fishers are discussed under *Vessel.*

Onsite operations could also affect local communities as the result of the increased onsite risks compared to the no-action alternative. The increased likelihood of an onsite incident and the potential consequences (e.g., release of crude oil) are described in Chapter 4, Section 4.4, *Environmental Health Risks—Terminal (Onsite)*.

As discussed in Chapter 4, there are regulatory requirements for prevention of, preparedness for, and response to incidents involving the release of crude oil, and mitigation measures are recommended to reduce potential impacts. However, no mitigation measures would completely eliminate the possibility of a spill, fire, or explosion, nor would they completely eliminate the adverse consequences of a spill, fire, or explosion. Depending on the location of the incident, amount spilled, type of crude oil, and environmental conditions, such as the time of year, water flows, and weather conditions, the potential adverse environmental impacts could be significant.

The potential impacts, including those affecting human health, are described in Section 4.7, *Impacts on Resources*. Potential social and economic costs related to the proposed action, including potential impacts on property values, are discussed in Section 7.3.3, *What are the costs of the proposed action?*

Rail

As described in Chapter 3, Section 3.2, *Air*, onsite operations related to the proposed action are not anticipated to result in any exceedance of applicable air quality standards that could affect human health. Although there would be some increases in diesel particulate matter emissions related to the proposed action, primarily in the areas where switching activities would occur (around the project site and in Poynor Yard), the extent of the risk is considered less than significant. See Section 3.2, *Air*, for more information about the analysis of air toxics along the PS&P rail line.

As described in Chapter 3, Section 3.7, *Noise and Vibration*, increased frequency of rail traffic and the associated routine operational activities would increase average daily noise levels primarily related to horns sounding at crossings for safety. This increased noise could result in impacts considered severe on sensitive receptors under FRA/FTA criteria. These impacts would occur near eight grade crossings, representing approximately 33 total receptors with up to approximately eight receptors affected at any one grade crossing.

Section 3.7 proposes a mitigation measure to have the applicant fund and support a process for the affected communities to establish quiet zones under the FRA regulations. Where implemented, quiet zones would eliminate horn soundings from all trains and eliminate potential severe impacts on receptors. Where not implemented, train horns would continue to sound for safety at the grade crossings identified in Section 3.7, and the potential for exposure to severe impacts the crossings would remain.

As described in Section 3.10, *Recreation*, access to one study area park—Morrison Riverfront Park—would be blocked more often and for longer periods due to switching operations related to proposed action trains.

Increased rail traffic related to the proposed action could also affect local communities as the result of the increased rail risk compared to the no-action alternative. The increased in likelihood of an incident (e.g., derailment) and the potential consequences (e.g., release of crude oil) are discussed in Chapter 4, Section 4.5, *Environmental Health Risks—Rail Transport*. As discussed in Chapter 4, there are regulatory requirements for prevention of, preparedness for, and response to incidents involving the release of crude oil, and mitigation measures are proposed to reduce potential impacts. However, no mitigation measures would completely eliminate the possibility of a spill, fire, or explosion, nor would they completely eliminate the adverse consequences of a spill, fire, or explosion. Depending on the location of an incident, amount spilled, type of crude oil, and environmental conditions, such as the time of year, water flows, and weather conditions, the potential adverse environmental impacts could be significant.

Section 4.7, *Impacts on Resources*, describes the types of impacts that could occur, including impacts on human health and the natural and built environment. Any of these impacts, should they occur, could affect community welfare. Moreover, the perceived risk of potential impacts could shape perception of the communities in the study area as unsafe, unhealthy, or undesirable. The potential social and economic costs related to the proposed action, including potential impacts on property values, are discussed in Section 7.3.3, *What are the costs of the proposed action?*

Vessel

As described in Chapter 3, Section 3.2, *Air*, emissions from vessel traffic related to the proposed action would not adversely affect public health because the emissions from transiting vessels do not affect the shoreline.

As described in Chapter 3, Section 3.7, *Noise and Vibration,* increased noise from vessel traffic related the proposed action is anticipated to be within levels similar to existing conditions and would not result in substantial increases that would be noticeable to surrounding recreational and residential uses.

As described in Chapter 3, Section 3.10, *Recreation*, Section 3.12, *Tribal Resources*, and Section 3.17, *Vessel Traffic*, increased tank vessel traffic along the navigation channel under the proposed action would result in some conflict with commercial fishing, tribal fishing and recreational vessels accessing the harbor via the 28th Street Boat Ramp and Viewing Tower. As noted in Section 3.10, recreational impacts are anticipated to be minimal; however, increased vessel activity related to the proposed action could affect community welfare related to commercial and tribal fishing, as described in Sections 3.12 and 3.17. Implementation of the proposed mitigation measures identified in these sections could reduce these impacts.

Increased vessel traffic related to the proposed action could also affect local communities as the result of increased vessel risk compared to the no-action alternative. The increased likelihood of a vessel incident (e.g., vessel collision) and potential consequences (e.g., release of crude oil) are described in Chapter 4, Section 4.6, *Environmental Health Risks—Vessel Transport*.

As discussed in Chapter 4, there are regulatory requirements for prevention of, preparedness for, and response to incidents involving the release of crude oil, and mitigation measures are proposed to reduce potential impacts. However, no mitigation measures would completely eliminate the possibility of a spill, fire, or explosion, nor would they completely eliminate the adverse consequences of a spill, fire, or explosion. Depending on the location of an incident, amount spilled, type of crude oil, and environmental conditions, such as the time of year, water flows, and weather conditions, the potential adverse environmental impacts could be significant. Section 4.7, *Impacts on Resources*, describes the types of impacts that could occur, including impacts on human health and the natural and built environment. Any of these impacts, should they occur, could affect community welfare. Moreover, the perceived risk of potential impacts could shape the perception that the communities in the study area as unsafe, unhealthy, or undesirable. The potential social and economic costs related to the proposed action, including potential impacts on property values, are discussed below in Section 7.3.3, *What are the costs of the proposed action?*

Population Growth

Operation of the proposed action would have a limited potential to affect population demographics primarily associated with the creation of an estimated 36 direct jobs in Grays Harbor County. Although some of these jobs could be filled by new residents moving into the area, it is more likely they would be filled by current residents or by workers living outside the area (as would likely be the case with rail and vessel operators). Some additional indirect and induced jobs would also be created (estimated 73 additional jobs) throughout the county; however, the population is unlikely to increase noticeably to meet this need. Therefore, impacts of operation of the proposed action related to population growth—permanent relocation of workers from outside the study area, displacement of local residents, and the requirement for additional housing—would be low.

Minority and Low-Income Populations

Onsite

As shown in Table 7-10, minority and low-income populations in the census block groups near the project site are higher (7.8 and 12.6%, respectively) than Grays Harbor County levels. However, as noted above, potential impacts from routine onsite operations are not anticipated to result in significant environmental impacts and would, therefore, not be expected to significantly adversely affect minority and low-income populations around the project site.

As discussed in Chapter 4, there is a potential for increased risk of oil spills, fires, or explosions that could result in environmental impacts affecting these populations. As discussed in Chapter 4, there are regulatory requirements for prevention of, preparedness for, and response to incidents involving the release of crude oil, and mitigation measures are recommended to reduce potential impacts. However, no mitigation measures would completely eliminate the possibility of a spill, fire, or explosion, nor would they completely eliminate the adverse consequences of a spill, fire, or explosion. Depending on the location of the incident, amount spilled, type of crude oil, and environmental conditions, such as the time of year, water flows, and weather conditions, minority and low-income populations near the project site could be disproportionately affected. This would also include the potential for impacts related to decreased property values from the perception of increased risks as discussed in Section 7.3.4.2*, Potential Costs Related to Environmental Health and Safety Concerns*.

Although it is not possible to determine the specific outcome of any one event, any event that might adversely affect fisheries or natural resources within the harbor would cause impacts on tribal resources; namely, the Quinault Indian Nation's Usual & Accustomed Fishing Rights and the Chehalis Tribe recreational shellfish area. For additional details about impacts on tribal resources, see Section 3.12, *Tribal Resources.*

Rail

As discussed in Section 7.2.3.4, *Minority and Low-Income Populations,* 31 of the 43 census block groups along the PS&P rail line are considered minority and/or low-income populations for the purposes of this analysis. These populations occur primarily along the entire rail corridor with the exception of a small area near Rochester and between Satsop and Montesano.

As discussed in Chapter 3, Section 3.2, *Air*, increased rail traffic related to the proposed action would result in increases in air emissions. However, as discussed in that section, emissions are not anticipated to be high enough to materially affect the air quality in the air basin or Grays Harbor County. Additionally, the potential for increased rail traffic to result in localized exposure to potentially hazardous air pollutants would be low and would therefore, not result in disproportionate impacts.

As discussed in Chapter 3, Section 3.7, *Noise and Vibration,* there would be increases in noise along the rail line, primarily related to increase horn noise at grade crossings. These impacts are distributed relatively evenly along the line but would affect a greater number of individuals where the residential development occurs closest to the line. As shown in Figure 7-1, the census block groups are large and extend relatively far from the rail line. The impacts of increased horn noise are anticipated to affect only the first or second row of buildings from the rail line. While it is not possible to determine the status of individual residents, it is possible that minority and low-income

populations closest to the rail line could be disproportionately affected by increases in noise depending on the proximity of noise-sensitive receptors (residents) to the line.

As discussed in Chapter 3, Section 3.16, *Vehicle Traffic and Safety*, and noted above, increased rail traffic related to the proposed action could result in significant increases in delay at certain intersections, primarily around the project site and in East Aberdeen. These impacts could disproportionately affect minority and low-income populations in communities immediately surrounding the affected areas.

As discussed in Chapter 4, there is a potential for increased risk of oil spills, fires, or explosions that could result in environmental impacts that would affect these populations. As discussed in Chapter 4, there are regulatory requirements for prevention of, preparedness for, and response to incidents involving the release of crude oil, and mitigation measures are recommended to reduce potential impacts. However, no mitigation measures would completely eliminate the possibility of a spill, fire, or explosion, nor would they completely eliminate the adverse consequences of a spill, fire, or explosion. Depending on the location of the incident, amount spilled, type of crude oil, and environmental conditions, such as the time of year, water flows, and weather conditions, there is the potential for minority and low-income populations to be disproportionately affected. This would also include the potential for impacts related to decreased property values from the perception of increased risks as discussed in Section 7.3.4.2, *Potential Costs Related to Environmental Health and Safety Concerns*.

Vessel

As discussed in Section 7.2.3.4, *Minority and Low-Income Populations,* 15 of the 22 census block groups along the Grays Harbor shoreline are considered minority and/or low-income populations for the purposes of this analysis. These populations occur primarily in Ocean Shores, Hoquiam, Aberdeen, Cosmopolis, and along the entire southern shore of the harbor.

In general, the proportions of minority and low-income populations in the study area communities are higher than at the state and county level, with the most meaningful differences occurring closer to the project site and around the harbor. While any impacts could disproportionately affect minority and low-income populations, as stated previously, vessel-related impacts are anticipated to be relatively low with two exceptions: the potential for conflicts with tribal access to usual and accustomed fishing areas and the potential for environmental health and safety impacts. Impacts on tribal resources are discussed in Chapter 3, Section 3.12, *Tribal Resources*.

As discussed in Chapter 4, there is a potential for increased risk of oil spills, fires, or explosions that could result in environmental impacts that would affect these populations. As discussed in Chapter 4, there are regulatory requirements for prevention of, preparedness for, and response to incidents involving the release of crude oil, and mitigation measures are recommended to reduce potential impacts. However, no mitigation measures would completely eliminate the possibility of a spill, fire, or explosion, nor would they completely eliminate the adverse consequences of a spill, fire, or explosion. Depending on the location of the incident, amount spilled, type of crude oil, and environmental conditions, such as the time of year, water flows, and weather conditions, there is the potential for minority and low-income populations to be disproportionately affected. This would also include the potential for impacts related to decreased property values from the perception of increased risks as discussed in Section 7.3.4.2, *Potential Costs Related to Environmental Health and Safety Concerns*.

7.2.5 What mitigation measures would reduce impacts on social policy?

This section describes the applicant mitigation that would reduce impacts on social policy from construction and operation of the proposed action.

Mitigation measures to reduce impacts related to noise are presented in Chapter 3, Sections 3.7, *Noise and Vibration*.

Mitigation measures to reduce impacts on vehicle traffic and safety are presented in Chapter 3, Section 3.16, *Vehicle Traffic and Safety*.

Mitigation measures to reduce potential impacts related to increased risk of incidents and related consequences are presented in Chapter 4, *Environmental Health and Safety*.

7.2.5.1 Applicant Mitigation

The applicant will implement the following mitigation.

- The applicant will appoint a community liaison to consult with affected communities, businesses, and agencies; develop cooperative solutions to address local concerns; be available for public meetings; and conduct periodic public outreach. The applicant will provide the name, telephone number, and email address of the community liaison to mayors and other local officials in each community through which the PS&P rail line passes.
- The applicant will appoint a tribal liaison to assist in addressing issues of concerns to federally recognized tribes; develop cooperative solutions to tribal concerns; be available for tribal meetings; and conduct periodic outreach. The applicant will provide the name, telephone number, and email address of the tribal liaison to officials of each tribe that wish to be notified.
- The applicant will submit quarterly reports to the City of Hoquiam on the progress of, implementation of, and compliance with all mitigation measures. The reporting period for these reports will begin the first quarter after permit issuance and continue quarterly through the first year of project operations after which the applicant will submit a report annually through the first 5 years of operation.

7.3 Cost-Benefit Analysis

This section describes the cost-benefit analysis required by the City of Hoquiam (HMC 11.10.160). Because the cost-benefit analysis informs the City's decision regarding issuance of the land use permits, the scope of the analysis focuses on potential costs and benefits to the residents of Hoquiam. This section describes costs and benefits related to employment, income, and fiscal revenues as a result of the construction and routine operation[10] of the proposed action. This section also provides information about the range of costs that can result from an incident involving the release of crude oil.

[10] Chapter 4, *Environmental Health and Safety*, addresses the potential impacts from increased risk of incidents (e.g., storage tank failure, train derailments, vessel collisions) and related consequences (e.g., release of crude oil).

7.3.1 What is the study area for the cost-benefit analysis?

The study area for the cost-benefit analysis considers the costs and benefits that would affect the residents of Hoquiam and the city at large. In addition to resources in Hoquiam, this study area includes resources in Aberdeen but only to the extent that job creation in Aberdeen would affect residents of Hoquiam.

7.3.2 How was the cost-benefit analysis conducted?

This section describes the sources of information and methods used to conduct the cost-benefit analysis.

7.3.2.1 Information

Information used in this analysis came from the sources described in Chapter 3, *Affected Environment, Impacts, and Mitigation,* Chapter 4, *Environmental Health and Safety*, and Chapter 5*, Extended Rail and Vessel Transport*, and through conversations with staff at the City of Hoquiam.

7.3.2.2 Impact Analysis

Cost-benefit analysis is a commonly used tool for evaluating proposed policies and actions. Cost-benefit analysis is conducted by estimating the net benefits of a proposed action or the benefits of a proposed action minus the costs of the action. In a cost-benefit analysis, a proposed action is usually evaluated over a period long enough for the main costs and benefits of the action to be realized. Costs and benefits that accrue in future years are then expressed in present value terms through the application of a discount rate. When conducting a cost-benefit analysis, the goal is to express as many impacts in monetary terms as possible. It is often not possible, however, to ascribe a monetary value to all relevant impacts because some impacts are difficult to quantify, and other impacts, even if they can be quantified, are difficult to express in monetary terms. When impacts in a cost-benefit analysis cannot be expressed in monetary terms for either of these reasons, they are discussed and evaluated on a qualitative basis.

This cost-benefit analysis is based on the analysis of impacts from the proposed action on the resources discussed in Chapter 3, *Affected Environment, Impacts, and Mitigation*. Impacts of the proposed action related to increased safety risks (e.g., storage tank failure, train derailments, vessel collisions) analyzed in Chapter 4, *Environmental Health and Safety,* are also considered. However, because there are many factors that contribute to the specific circumstances of an environmental outcome (e.g., crude oil release) related to an incident, it is difficult to predict the specific outcomes that may occur. Therefore, the cost-benefit analysis considers costs that may accrue to the City of Hoquiam related to preparing for the potential consequences rather than identifying the specific costs that may be incurred related to cleanup activities and the related degradation. Costs and benefits from socioeconomic impacts analyzed in previous sections of this chapter are also considered. Short-term impacts during construction and long-term impacts during routine operations are both considered.

Impacts leading to an increase in revenues to the City of Hoquiam are assumed to benefit the residents of Hoquiam because increased revenues would lead to increased local public services, reduced future growth in local taxes paid by current residents, or both. Impacts that correspond to an increase in the demand for local public services are assumed to be a cost to the residents of

Hoquiam because they would result in a need for future increases in local tax collections or would compete with existing local demand. Costs and benefits to the residents of Hoquiam would also result to the extent that the proposed action would affect employment and income, leisure, and nonmarket values, such as those associated with environmental resources (e.g., water quality, clean air).

Impacts are discussed quantitatively, to the extent that quantitative indicators are provided in the analyses in Chapter 3, *Affected Environment, Impacts, and Mitigation*. When quantitative impact estimates are available, the monetary impacts on the residents of Hoquiam are discussed, to the extent possible. All monetized impacts are presented in 2013 dollars. Because it is not possible to monetize all impacts, it is not possible to reach one estimate of net present value of the proposed action for the residents of Hoquiam. No attempt to generate a future stream of costs and benefits is made, and no discount to the monetized value of future impacts is applied. Rather, the costs and benefits are described to summarize information to be used in assessing the financial outcomes of implementing the proposed action. The monetized impacts are presented separately for a single phase of the construction period (for this analysis, assumed to occur in 12 months) and for a representative 1-year period during operations.

As discussed in Chapter 3, *Affected Environment, Impacts, and Mitigation,* although construction and routine operations could affect the resources addressed in that chapter, in general, these impacts would be low either before or after implementation of the recommended mitigation. Because the proposed action would have low impacts on most resources, there would be no measurable benefits or costs to the residents of Hoquiam from those impacts and they are not discussed further in this analysis.

The notable exceptions include potential impacts related to noise, tribal resources, vehicle traffic and safety, and environmental health and safety. With respect to noise, as discussed in Section 3.7, *Noise and Vibration*, substantial increases in noise levels would occur nearby the PS&P rail line. Because the portion of the PS&P rail line that would be used related to the proposed action is located entirely in Aberdeen (and at least 450 feet from residents of Hoquiam) or east of Aberdeen, there would be no significant impacts on residents of Hoquiam.

Additionally, although there would also be impacts on tribal resources, namely, the Quinault Indian Nation's Usual & Accustomed fishing areas, it is not clear how those impacts might directly translate to broader economic losses relative to the residents of Hoquiam or to the city at large. However, as noted in Section 3.12, *Tribal Resources*, there is the potential for economic implications to members of the Quinault Indian Nation, depending on the extent of the disruption as a result of the proposed action.

As discussed in Chapter 3, Section 3.16, *Vehicle Traffic and Safety*, in Chapter 4, *Environmental Health and Safety*, and in Section 7.1, *Economics*, there is the potential for significant impacts that could affect the City of Hoquiam related to these resources and they are therefore, addressed further in the cost-benefit analysis. Although there could also be substantial increases in noise (Section 3.7, *Noise and Vibration*) and disturbance to tribal fishing (Section 3.12, *Tribal Resources*), impacts on these resources would not likely affect Hoquiam residents and are not considered further in this analysis. The following sections focus on assessing the costs and benefits related to the potential impacts of the proposed action. As noted in Section 7.1, *Economics*, benefits are related to increased employment and income and fiscal revenues that could accrue to the City of Hoquiam as the result of the proposed action. The discussion of costs focuses on those that would affect the City of Hoquiam

as the result of increased vehicle traffic and safety concerns, environmental health and safety concerns, and impacts on property values related to the real and perceived impacts that would occur within or affect the City of Hoquiam.

7.3.3 What are the benefits of the proposed action?

This section describes the beneficial impacts of the proposed action that could occur in the study area.

7.3.3.1 Employment and Income

As discussed in Section 7.1.4.2, *Proposed Action*, construction and operation of the proposed action would result in increased employment and income associated with direct spending related to labor salaries and benefits and material purchases. Additionally, these activities would result in indirect and induced employment and income impacts. As discussed below, it is possible to estimate the proportion of employment and income likely to benefit the City of Hoquiam.

Construction

As presented in Appendix O, *Economic Impact Analysis,* the construction of Phase 1 of the proposed action would support 82 direct jobs and an additional 211 indirect and induced jobs in Washington. Each job would consist of a full-time or part-time position during a 1-year period. The 82 direct jobs provide construction services at the project site. The remaining 211 indirect jobs could occur anywhere in Washington. Construction of Phase 2 would add 46 direct jobs for site construction and 144 indirect and induced jobs in Washington State.

U.S. Census Bureau estimates of commuting patterns indicate that approximately 23% of workers employed in Hoquiam reside in the city and 27% of workers employed in Aberdeen reside in Hoquiam (U.S. Census Bureau 2011). If the workers employed at the construction site show similar patterns of residence as to those of the general population, and if each 1-year job is filled by one worker,[11] between 19 and 22 direct construction workers (between 23 and 27% of total) would likely reside in Hoquiam during Phase 1. An additional 11 to 12 construction workers (between 23% and 27% of total) would reside in Hoquiam in Phase 2. A share of the indirect and induced employment could also occur in Hoquiam although it is not possible to determine the specific numbers of jobs that would be filled by Hoquiam residents.

ECONorthwest (2014) estimated that each onsite construction job would pay approximately $125,000 a year in total compensation (wages and benefits). If 30 to 34 of the 128 onsite construction jobs are filled by construction workers that reside in Hoquiam (as assumed above), construction would generate an estimated $3.8 million to $4.3 million in labor income for construction workers residing in Hoquiam during both Phase 1 and Phase 2 of construction.

Additional labor income would be generated in Hoquiam, associated with indirect and induced jobs. ECONorthwest estimates 355 indirect and induced jobs would be generated during construction

[11] ECONorthwest (2014) estimates the number of jobs associated with the proposed action. These jobs are defined as 1-year part-time or full-time employment. Because two workers employed for 6 months each would correspond to one job, and one worker employed for 2 years would correspond to two jobs, jobs and employed persons are not the same. For analytical purposes, this section assumes each job corresponds to one worker employed over a 1-year period.

(both Phases 1 and 2) in Washington State. It is not possible to infer from the ECONorthwest study and from readily available data how many of these jobs would be likely to occur in Hoquiam. These jobs would average $53,500 in annual labor income per job (ECONorthwest 2014).

Operations

During operations, ECONorthwest (2014) estimated that 11 direct jobs would be supported at the terminal if only Phase 1 infrastructure were operational, and an additional four direct jobs would be supported at the terminal if both Phase 1 and Phase 2 infrastructure were operational. An additional 10 indirect and induced jobs (six in Phase 1 and four in Phase 2) would be generated in Grays Harbor County, associated with the creation of the direct jobs at the project site. As noted in Section 7.1, *Economics*, additional direct, indirect, and induced employment in Grays Harbor County would be associated with vessel and rail transportation; however, it is anticipated that most of these jobs would occur outside the local communities. Although some rail and vessel jobs may be filled by residents of Hoquiam or Aberdeen, for the purposes of providing a conservative estimate, job creation associated with increased rail and vessel operations is not included.

Assuming all direct jobs in Grays Harbor County would be located in Hoquiam and Aberdeen (excluding vessel and rail transportation direct jobs), it is possible to estimate the number of operations jobs filled by workers who reside in Hoquiam. Assuming each job is filled by one worker, and using the same U.S. Census Bureau commuting pattern estimates used to analyze construction jobs, between 23 and 27% of direct operations workers would reside in Hoquiam. This would correspond to three to four workers (from a total of 15). A share of the indirect and induced employment could also occur in Hoquiam.

ECONorthwest (2014) estimated that each direct onsite job would pay approximately $65,000 a year in total compensation (wages and benefits). Under this assumption, total labor income in Hoquiam, supported by operational jobs directly linked to the proposed action, would correspond to between $195,000 (3 multiplied by $65,000) and $260,000 (4 multiplied by $65,000), assuming a full build-out (after Phase 1 and Phase 2 construction).

Additional labor income would be generated in Hoquiam, associated with indirect and induced jobs. ECONorthwest (2014) estimates 37 indirect and induced jobs would be generated during operations (at full build-out) in Grays Harbor County. It is not possible to infer from the ECONorthwest study and from readily available data how many of these jobs would be likely to occur in Hoquiam. These jobs would average $38,600 in annual labor income per job (ECONorthwest 2014).

Operations jobs would be permanent. Because permanent jobs generate income year after year, they are more likely to induce additional economic activity attracting businesses and local investment than temporary construction jobs.

7.3.3.2 Fiscal Revenues to the City of Hoquiam

As discussed in Section 7.1.4.2, *Proposed Action*, in addition to generating increased employment and income, construction and routine operations of the proposed action would also result in increased fiscal revenues. It is possible to estimate the proportion of revenues that would likely accrue to the City of Hoquiam. Increased revenues would be generated by the property tax, sales tax, business and occupation tax, utility taxes, and building permits.

Property Tax and Leasehold Excise Tax

The Port is a public port and a taxing district. The use of public land and publicly owned property pays a leasehold tax to the Port in lieu of real estate property taxes. A portion of the leasehold tax is transferred to the city where the property is located. The tax rate for the city's portion of the leasehold tax is up to 4% of the rent paid for the property, with the remaining of the 12.84 % tax rate going to the county and state (Washington State Department of Revenue 2010). There is currently no information on changes in property rents paid by the applicant to the Port due to the proposed action. To the extent that property rents increase, the City of Hoquiam portion of the leasehold excise tax would increase as well.

Owners of private improvements at the Port pay regular property taxes to the city where their property is located, including taxing districts within the city such as school districts (Washington State Department of Revenue 2010). The property tax levy rate for the City of Hoquiam in 2014 was approximately $10.98 per $1,000 of assessed value, including the Hoquiam school district and an emergency medical service levy (Washington State Department of Revenue 2014a).

ECONorthwest (2014) estimated property taxes to be paid by the applicant and REG (formerly Imperium Terminal Services) based on information provided directly by both. Jointly, the two projects would pay $223,222 in property taxes during construction and $1,869,393 during each year of operations, assuming a full build-out (Phase 1 and Phase 2). ECONorthwest does not report the portion attributable to the applicant's proposed action and the portion attributable to the REG proposed action. However, it is reasonable to assume that the assessed value of each proposed action is proportional to construction costs. In this case, approximately 48.1% of the total assessed value of these two proposed actions corresponds to the applicant's proposed project.[12] The tax rate paid by the applicant and REG would not necessarily be the same, because the applicant's facility would be partially located in Aberdeen, while the REG facility would be mostly located in Hoquiam.[13] Assuming 50% of the applicant's assessed property value is taxed by the City of Aberdeen and 50% by the City of Hoquiam (based on the location of the project site relative to the city borders), property tax collections by the City of Hoquiam can be estimated to be approximately $55,783 during construction and approximately $467,161 during each year of operation.

Sales and Use Tax

As of January 2015, the Hoquiam local sales/use tax rate is 6.5% (Washington State Department of Revenue 2014b). In other words, for each dollar spent in Hoquiam, the city collects 6.5% in local sales/use tax. During construction of the proposed action, construction service providers would pay City of Hoquiam sales taxes to the extent that they are established within the city boundaries. This would also be the case of subcontracted companies, providers of inputs, and establishments where workers spend their income. Similarly, sales by establishments located in Hoquiam during operations would also pay City of Hoquiam sales taxes. There is no information on the extent to which service and input providers, during construction or operations, would be located in Hoquiam, or the extent to which earnings associated with construction and operations of the proposed action would be spent in Hoquiam. Therefore, it is not possible to estimate sales and use taxes collected by the City of Hoquiam from construction and operation of the proposed action.

[12] ECONorthwest (2014) estimated total construction costs for the proposed action to be $61.3 million at full build-out and for the REG (formerly Imperium Terminal Services) Expansion Project to be $66.1 million.
[13] In 2014, the property tax levied by the City of Aberdeen was $9.25 per $1,000 compared to $10.98 per $1,000 for the City of Hoquiam (Washington State Department of Revenue 2014a).

Business and Occupation Tax

Washington State does not have an income tax. The business and occupation tax is assessed on gross receipts of businesses in specific occupations. The City of Hoquiam imposes a local business and occupation tax, in addition to that imposed by the State of Washington. As of January 2014, Hoquiam's business and occupation tax rate was 0.2% of gross receipts for all major categories of business (manufacturing, retail, wholesale and services) (Association of Washington Cities 2014). During construction of the proposed action, construction service providers would pay City of Hoquiam business and occupation taxes to the extent that they are established within the city boundaries. This would also be the case of subcontracted companies, providers of inputs, and establishments where workers spend their income. Similarly, gross receipts by establishments located in Hoquiam during operations would also pay City of Hoquiam business and occupation taxes. As in the case of sales and use tax collections, there is not enough information to estimate the business and occupation tax collections by the City of Hoquiam that would be associated with the proposed action. This would require estimating the extent to which construction and operations service and input providers would be located in Hoquiam, as well as the location of establishments where proposed action- related earnings would be spent.

Utility and Other Taxes, Licenses, and Permits

The City of Hoquiam taxes gross operating revenues derived from business in the city of various types of utilities, including gas, electricity, cable TV, telephone, garbage collection and water, sewer and stormwater collection. Tax rates range between 6 and 8% (HMC 4.88). During both construction and operations of the proposed action, increased business revenues, and labor income in Hoquiam associated with employment at the terminal and with train and vessel operations, and input and service providers to construction and operations, would result in increased utility revenues and, consequently, increases utility tax collections for the City of Hoquiam. Because the increase in demand for utilities associated with the proposed action was determined to be minor (Chapter 3.13, *Public Services and Utilities*), the increase in utility tax collections to the City of Hoquiam would be expected to be minor as well.

Other minor City of Hoquiam revenues derived from the proposed action would include revenues from licenses and permits, particularly building permits.

7.3.4 What are the costs of the proposed action?

Potential costs relevant to the City of Hoquiam would be the result of potentially significant impacts that would directly affect residents or the city at large. This section discusses the costs that could occur as the result of increased vehicle traffic and safety concerns, and of real and perceived risks associated with onsite operations and rail and vessel transport due to environmental health and safety impacts. This includes a discussion of the broader social and economic costs that could occur and the potential for the perception of increased risk to affect property values in Hoquiam.

7.3.4.1 Potential Costs Related to Increased Vehicle Traffic and Safety

As discussed in Chapter 3, Section 3.15, *Rail Traffic*, and 3.16, *Vehicle Traffic and Safety*, operation of the proposed action would result in increased rail traffic along the PS&P rail line that would increase vehicle delays at certain grade crossings and surrounding intersections during operations. Additionally, increased train traffic would result in increased risks of accidents at grade crossings

along the entire PS&P rail line. The average number of train trips along the PS&P rail line is expected to increase from approximately three train trips per day by an additional 1.25 trips per day.

Although none of the directly affected intersections is located in Hoquiam, Hoquiam residents commuting to Aberdeen and other areas east of the project site would have increased potential to be delayed at a grade crossing by a train or to be affected by increased congestion at surrounding intersections as motorists attempt to bypass blocked grade crossings. As a result, depending on the timing of such an event and on commuting routes, residents may see their commuting times increase.

It is not possible to estimate how much commuting time would increase for these residents because it is not possible to know what specific roads would be taken or what share Hoquiam residents would represent of the vehicles on roads affected by delays during commuting times. Increases in commuting times would have a cost to the residents of Hoquiam. This cost would correspond to the estimated opportunity cost of their time; i.e., the value of the time they would spend in other activities (work or leisure) were they not delayed in traffic. The U.S. Department of Transportation developed a measure of this value that it uses in regulatory analysis (Belenky 2011). The opportunity cost of one hour in surface traffic for all-purpose traffic (business and personal) is estimated to be between $9.66 and $16.18 per person for local traffic and between $16.51 and $24.76 per person for intercity traffic, in 2013 dollars.[14]

As discussed in Chapter 3, Section 3.16, *Vehicle Traffic and Safety*, increased rail and vehicle traffic would contribute to an increase in the expected number of vehicle accidents at grade crossings. Although none of these grade crossings is located in Hoquiam, residents commuting to Aberdeen and other nearby areas could face increased risk of accidents if commuting routes include affected grade crossings. It is not possible to estimate this increase in risk because there is not enough information on commuting routes for residents of Hoquiam. Accidents have an economic cost that includes the cost of damage to property, lost productivity associated with injury and death, the cost of medical and emergency services, travel delays, added fuel consumption, and pollution impacts caused by congestion, among others.

A recent study from the National Highway Traffic Safety Administration (2014) estimated the total economic costs of traffic accidents (not including the value of lives lost or the loss of quality of life due to nonfatal injuries) to be from $3,037 per person to $1.5 million per person in 2013 dollars, depending on the severity of injuries or on fatalities.[15] Individuals involved in these crashes pay for approximately 25% of these costs, the remaining being paid by insurance companies, public revenues, and other third parties such as motorists delayed in traffic and health care providers.

7.3.4.2 Potential Costs Related to Environmental Health and Safety Concerns

As discussed in Chapter 4, *Environmental Health and Safety*, operation of the proposed action could increase safety risks (e.g., storage tank failures, train derailments, and vessel collisions) that could result in harm to both humans and the surrounding environment, depending on the specific circumstances of such an event and the related consequences (e.g., oil spill, fire, or explosion).

[14] Values reported in 2009 dollars were adjusted for inflation using the U.S. Bureau of Labor Statistics Consumer Price Index (2014).
[15] Values reported in 2010 dollars were adjusted for inflation using the U.S. Bureau of Labor Statistics Consumer Price Index (2014).

In terms of potential costs to the City of Hoquiam, the proposed action could increase safety risks due to train derailments and other kinds of rail incidents. These events pose a variety of risks to environmental health and safety, including potential injuries and fatalities for railroad staff and other individuals, loss and damage of property (both property belonging to the railroad and adjacent properties), environmental damage resulting from spills from train cars, loss of freight, and cleanup and wreck removal costs.

The possibility of train derailments is of particular concern considering the derailments that have occurred along the PS&P rail line between 2014 and 2016, which are described in greater detail in Chapter 4, Section 4.5, *Environmental Health Risks—Rail Transport*. Although these incidents resulted in minimal costs besides the damage to the rail cars and loss of freight, they raised concern about the potential for damages if similar derailments occurred for rail shipments of crude oil. The potential costs related to an incident would depend on a variety of factors, including the severity of the incident (i.e., number of affected rail cars) and the proximity of the incident to people, property, and sensitive environments.

As discussed in Chapter 4, *Environmental Health and Safety*, regulatory standards are or will soon be in place that will require the implementation and maintenance of emergency preparedness and response protocols intended to reduce the risks related to the proposed action. Depending on the specific circumstances, the consequences of an incident could be significant. Therefore, mitigation is identified in Chapter 4 to minimize these risks.

Costs related to emergency preparedness, response, and recovery are described below.

Costs of Emergency Preparedness

Costs related to emergency preparedness include emergency response equipment, staff, and training. Although cleanup of environmental impacts of hazardous material release or oil spills is typically not the responsibility of local jurisdictions, the local fire, police, and medical services are typically first responders and have the responsibility of protecting the public from harm. As described in Chapter 4, Section 4.4, *Environmental Health Risks—Terminal (Onsite)*, the existing equipment and capabilities of the fire departments near the project site and along the rail line. As described in that section, current capabilities are not adequate to respond to potential risks under existing or proposed action conditions. The Hoquiam and Aberdeen Fire Departments have expressed a need for training at the project site and along the PS&P rail line to review and practice hazardous material release emergency responses.

The Hoquiam Fire Department is funded by the City of Hoquiam general funds and by fees for ambulance services. The main source of revenues for the City of Hoquiam general funds are property, sales and use, business and occupation, and utility taxes (City of Hoquiam 2012). Increased demands for training and equipment would require increases in local tax collections unless funded by other sources, such as a specific agreement with the applicant or through funding by public grants. There is currently not enough information on the extent of training or equipment needed to quantify these costs.

To address concerns about these costs, Chapter 4 includes, in addition to other measures, mitigation related to providing equipment and training to the Hoquiam and Aberdeen Fire Departments to response to potential risks at the project site. The equipment and training also would improve the departments' capabilities to respond to an incident along the rail line.

Costs Related to Response to and Recovery from a Crude Oil Spill, Fire, or Explosion

This section provides information on the economic and social costs of rail and vessel incidents involving crude oil. The information is presented in terms of the range of impacts that could be expected because the costs of a potential incident would vary based on the material spilled, volume, weather, location, proximity to sensitive resources, and other factors. It does not specifically identify the responsible party. For more information about the liability and responsibility for responding to and cleaning up an oil spill, refer to Chapter 4, *Environmental Health and Safety*.

The types of costs that would be incurred because of a crude oil spill, fire, or explosion can be divided into the following three categories (Fejes et al. 2011).

- Direct costs are the damages that result directly from the incident and response such as the value of oil lost, damage to property, and cost of cleanup.
- Market costs are the indirect economic costs of the incident such as financial losses to local businesses and increased healthcare costs.
- Nonmarket costs are social values that cannot be priced in a market but that affect the health and well-being of a community such as reduction in recreation opportunities and loss of ecosystem services (e.g., food production, provisioning of clean water).

Considering all types of costs, economic as well as social, provides a more holistic picture of the cost of oil spills. The direct, market, and nonmarket costs of oil spills, fires, and explosions are discussed below, followed by descriptions of recent oil spills, fires, and explosions and their monetary costs.

Direct Costs

Direct costs of an oil spill, fire, or explosion would include the loss of the market value of the oil spilled, physical damage to rail cars or vessels and rail infrastructure or marine facilities, damage to other property, reimbursement for the state's expenses to respond, assess and investigate an incident, penalties for violations of federal or state laws, and response and cleanup activities. Oil spill cleanup operations are generally one of the highest costs associated with an oil spill (Montewka et al. 2013). Costs can range widely depending on the complex interaction of location, volume, oil type, and other factors and are extremely challenging to forecast.[16] Location is considered the most important determinant of cleanup costs (Etkin 1999). Spills that occur in sensitive habitats or popular tourist destinations would cost more to clean up than spills in other areas, as would spills that result in oil spreading to connecting tributaries or adjacent watersheds (Great Lakes Commission 2015). A spill in open water away from shore could be much less costly to abate than a spill close to shore and near sensitive habitat or a populated area (Frittelli 2014).

[16] Various studies have attempted to estimate oil spill cleanup costs. Montewka et al. (2013) provides a review of recent publications. Deterministic models of oil spill costs, such as the model advanced by Etkin (1999), are intended to yield single solutions based on factors such as broad geographic region (e.g., United States), shoreline oiling, oil type, cleanup strategy, and volume spilled. As Etkin (1999) readily admits, however, the circumstances surrounding a spill are complex and advancing a single per-unit cleanup cost (e.g., cost per barrel spilled) can be meaningless in the face of numerous complicating factors and specific location. Montewka et al (2013) developed a probabilistic model using a case study in the Gulf of Finland, which considered more site-specific factors such as evaporation, wave height, effects of booms, and response times. The model was not compared to an actual event so it is difficult to determine the efficacy of the model, although it is reasonable to assume that, because location is the most important factor in determining oil spill costs, a geographically tailored estimate would provide more precise results.

Large oil spills from vessels or marine facilities that occur near shore are the most costly to clean up. The 1989 Exxon Valdez oil spill cost $2.1 billion to clean up while cleanup operations for the 2010 Deepwater Horizon oil spill are estimated at $14 billion (Exxon Valdez Oil Spill Trust Council 2016; Ramseur 2015). Spills from train derailments are typically much less expensive to clean up as they occur most often over land and cleanup procedures are less resource intensive, usually involve less spilled oil, and, unless the oil spill reaches water, are limited in geographic scope. However, costs for explosions or fires related to train derailments can vary depending on the scale of the incident and the resources affected. The 2013 Lac-Mégantic train explosion in Quebec, Canada, which destroyed several buildings in the town center of Lac-Mégantic, provides an example of the magnitude and cost of cleanup efforts that can be required following a fire or explosion. Cleanup costs from the incident are estimated at $200 million (Beaudin 2014).

The type of oil can also affect the time and resources necessary to clean up an oil spill. Heavier crude oils with high viscosity and persistence are generally more expensive to remove from water than lighter oils. Bakken crude oil is characterized as a light crude oil and is easier to remove from the environment than heavier oils, although the volatility and flammability of Bakken oil could pose a concern for responders and complicate cleanup efforts (Lee et al. 2015). Certain types of heavy crude oil may sink to the bottom of a body of water, making extraction more difficult. As noted in Chapter 4, Section 4.3, *Risk Considerations*, diluted bitumen, derived from Canadian oil sands and diluted with lighter oils, can behave differently than other heavy oils because of the added diluents. A 2010 spill from a pipeline owned by Enbridge Inc. released 850,000 gallons of diluted bitumen into Talmadge Creek, a tributary of the Kalamazoo River in Michigan, and is the only known spill of diluted bitumen in an aquatic environment (Frittelli et al. 2014). Three years after the oil spill occurred, cleanup was still ongoing because the diluted bitumen had sunk to the river bottom and had not appreciably degraded. EPA ordered the pipeline owner to dredge the river to remove the oiled sediment. In 2013, the cost of the cleanup was estimated at approximately $1.2 billion, which, according to a 2014 Congressional Research Service report on rail transportation of crude oil, "is substantially higher than the average cost of cleaning up a similar amount of conventional oil" (Frittelli et al. 2014). Section 4.3.1.2, *Crude Oil*, provides a detailed description of the characteristics of crude oil that would be transported under the proposed action and their implications for cleanup.

Damage to natural resources, such as loss of plant life and organisms, could be considered a nonmarket value because the value to society is often based on the recreational or ecosystem services they provide. However, under Washington State law (RCW 90.56.370), anyone responsible for spilling oil into state waters is liable for damages resulting from injuries to public resources. As discussed in Chapter 4, Sections 4.4.6, 4.5.6, and 4.6.6, the process for determining damages for an oil spill is called a natural resource damage assessment and is established under Washington State rules (WAC 173-183). The rule establishes a process to calculate damages based on the habitat and organisms affected by the spill, the type of oil spilled, and the volume of oil spilled. The overall objective of this process is to restore natural resources to a pre-spill condition. The Washington State Department of Ecology is responsible for implementing the rule to collect compensation based on a dollar per gallon charge. For spills less than 1,000 gallons the range is $1 to $100 per gallon range. For spills of 1,000 gallons or more the range is $3 to $300 per gallon spilled (Washington State Department of Ecology 2016a). Between 1991 and 2016, the compensation claims ranged from $5.2 million to $25 million based on the natural resources affected (Washington State Department of Ecology 2016b). At the federal level, an oil spill can trigger a natural resource damage assessment under the Oil Pollution Act of 1990. Ecology would represent the State of Washington during a

federal assessment, which is typically conducted by the U.S. Fish and Wildlife Service or the National Oceanic and Atmospheric Administration.

Penalties are issued for violations of federal and state law. The amount depends on the nature of the violation, prior behavior and actions taken to correct the problem. In Washington, penalties can be assessed under multiple rules, including oil spill prevention (RCW 90.56), vessel oil spill prevention and response (RCW 88.46), state toxics control (RCW 70.10D) and coastal protection (RCW 90.48).

Fines, legal fees, and court-imposed settlements can impose additional direct costs because of an oil spill. Civil fines and penalties can be imposed under federal and state regulatory frameworks, which are described in detail in Chapter 4, Section 4.2*, Applicable Regulations*. These costs and associated legal settlements can be substantial. Although the mechanisms of spill were different from what could occur under the proposed action, the following provide examples of civil fines related to spills. BP plc, the owner of the Macondo oil well that blew out in the Gulf of Mexico in the 2010 Deepwater Horizon oil spill, was required to pay $15 billion to federal, state, and local governments and private parties for economic claims and reimbursements for response costs and another $6 billion in civil and criminal settlements (Ramseur 2015). Legal proceedings involving the smaller 2010 Enbridge pipeline spill are still ongoing; current estimates of civil fines and penalties total $63 million (Enbridge 2016).

Market Costs

For the purposes of this discussion, market costs are considered the indirect costs from an oil spill, such as financial losses to local businesses forced to close in the aftermath of an oil spill incident, closure of commercial fisheries, and human health costs. As with direct costs, market costs are highly variable depending on numerous variables such as the severity of the incident and proximity to populated areas and economic activity. An oil spill or explosion resulting from a train derailment in the middle of an urban setting could result in major indirect costs (e.g., loss of business and healthcare costs); an isolated spill from a vessel in open water that does not reach shore may have limited market costs. The primary market costs that could affect the City of Hoquiam and surrounding region are disruptions to local industries, such as tourism and commercial fishing, as well as impacts on human health, such as increased health care costs from exposure to toxic fumes.

Business Costs

Businesses could experience a financial cost if an oil spill, fire, or explosion caused physical damage to assets or restricted customer or worker access. An oil spill or explosion in a populated area could have substantial impacts on businesses depending on the scale of the incident. The Lac-Mégantic disaster in Quebec province, Canada on July 6, 2013, involved the derailment of a train carrying crude oil which derailed near downtown and destroyed nearly 40 buildings (Goodman and Rowan 2013). In addition to the direct physical losses, damages could also result from the loss of revenue and productivity if businesses are forced to close during evacuations and cleanup activities. Conversely, some businesses, especially those in the hospitality industry such as hotels and restaurants, could experience an increase in revenue associated with the oil spill and event response activities. The increase in business spending associated with an oil spill typically drops off quickly after event response activities are completed, while the effects on other industries, such as tourism, can linger (Tourism Economics 2011), as described below.

Leisure Spending

Impacts on tourism and visitor spending could result from oil spills that physically affect areas popular with visitors and recreationists and that negatively affect people's perception of the region and reduce leisure visitation. The costs to the City of Hoquiam and the region could include the loss of revenue associated with visitor spending if fewer visitors patronize hotels, restaurants, and other leisure businesses, such as commercial sport fishing. The greatest potential for impacts would occur in the event of a large spill along a waterway or popular natural area (Section 4.7.1.5, *Recreation*). The impacts on visitor spending would be most significant in the immediate aftermath of the spill and, depending on the scale of the impacts, could be depressed for months or years. Following the Exxon Valdez oil spill in 1989, recreation and tourism dramatically declined in Prince William Sound and the surrounding area and took years to recover (Exxon Valdez Oil Spill Trust Council 2016). In the year following the spill, visitor spending decreased 35% in Southwest Alaska for a net loss of $19 million (McDowell Group 1990).

In 1999, the freighter New Carissa ran aground off the coast of Oregon during a winter storm and released an estimated 70,000 to 140,000 gallons of fuel into the marine environment, affecting several beaches and federal and state recreation sites. As part of the Natural Resource Damage Assessment process, federal, state, and tribal agencies estimated 27,974 to 29,204 public recreation trips were lost or diminished in the affected areas, valued between $395,756 and $413,056 (U.S. Fish and Wildlife Service 2012). These losses accounted only for recreational trips associated with federal- and state-managed land and resources and did not account for losses to private industry.

Perception about a region or industry can affect visitor behavior long after an oil spill and response activities have been completed. A study prepared by Oxford Economics measured the duration of time visitor spending was reduced below pre-spill levels for six large oil spills (Exxon Valdez, Ixtoc, Amoco Cadiz, Erika, Prestige) (Oxford Economics n.d.). On average, it took 12 to 28 months for spending to rebound to normal levels from these large spills. An oil spill or fire resulting from a train derailment would typically only directly affect a narrow geographic area and therefore have limited impacts on recreational resources and resulting visitor spending to the region. However, if a spill were to occur near and enter a waterway, such as the Columbia River or Chehalis River, effects could be more widespread.

A 2011 study commissioned by the Louisiana Office of Tourism following the Deepwater Horizon oil spill in April 2010 found that perceptions of the impacts on the leisure and seafood industry were often more impactful than the spill itself (Tourism Economics 2011). A quarter of people surveyed thought that certain recreational areas and business catering to leisure visitors (e.g., boat tours) were closed because of the spill when they were in fact open. The influence of people's perceptions was most pronounced associated with seafood—over half of people surveyed thought that oysters harvested in Louisiana were unsafe when food safety tests demonstrated otherwise (Tourism Economics 2011).

Tribal and Other Commercial Fishing

Economic costs to the commercial fishing industry in Grays Harbor or the Chehalis River could occur in the event an oil spill limits access to fishing areas or affects the number of fish available for harvest. As described in Section 4.7.1.6, *Commercial Fishing*, and 4.7.1.8, *Tribal Resources*, the impact of reduced fish harvest could last several years from residual amounts of oil persisting in the environment. Fishing could also be affected by restrictions or closure of fisheries to protect a species

as well as temporary closures during an event response. Seafood safety measures, such as fishery closures or public warnings about consumption, could be put in place to protect the public from consumption of contaminated shellfish and fish. As discussed above, after the direct impacts on fisheries have subsided, perception of seafood safety can have long-lasting impacts on people's willingness to consume local seafood and could further affect the commercial fishing industry. Depending on the scale of the spill, the economic costs to the commercial fishing industry could be significant.

Although total monetary costs to fishing from the 1999 New Carissa oil spill and 2004 Dalco Passage oil spill were not quantified, these spills provide examples of the types of costs to tribal and commercial fishing in the Pacific Northwest that could result following an oil spill on the coast. The grounding of the New Carissa off the coast of Oregon released between 70,000 and 140,000 gallons of fuel, which resulted in low levels of direct mortality to harvestable fish and shellfish, reducing by a small amount the total catch available to commercial fishers (M/V New Carissa Natural Resource Trustees 2006). Studies performed as part of the Natural Resource Damage Assessment process (M/V New Carissa Natural Resource Trustees 2006) estimated that chronic impacts on fish larvae from long-term exposure could have occurred up to 5 kilometers north and south of the oil spill site, potentially reducing future harvests. The Oregon Department of Agriculture closed commercial shellfish harvesting in several locations near the site of the spill for approximately 3 weeks because of concern for potential contamination and risks to consumers. Marine fish have a higher capacity to metabolize and excrete hydrocarbons than most types of shellfish and no closure of commercial marine fish harvesting was issued.

The Dalco Passage oil spill, which resulted in the release of an estimated 7,000 gallons of crude oil in Puget Sound, resulted in similar types of impacts on commercial fishing as the New Carissa oil spill. The Natural Resource Damage Assessment process (Dalco Pass Oil Spill Natural Resource Trustees 2009) found that while no acute injuries to marine organisms, including fish and shellfish, were observed following the oil spill, elevated levels of petroleum in the water near the spill presented a risk to developing fish embryos, potentially affecting future commercial fish and shellfish harvests. Tissue samples from shellfish collected at oiled beaches, although below levels known to cause lethal or sublethal effects, were sufficiently high to cause concern over human consumption and the Washington Department of Health issued a harvest advisory for oyster and clams for 148 days. There were no studies performed for either the New Carissa or Dalco Passage oil spills evaluating long-term impacts associated with the public's perception of seafood safety.

Human Health

An oil spill, fire, or explosion could affect human health through bodily injury or mortality from an explosion or fire, increased exposure to hazardous pollutants, and psychological stress following an incident. Depending on the scale of the incident, the personal costs of these impacts could be severe and have long-lasting physical and emotional impacts on affected individuals and their families. While the personal and emotional effects following an incident cannot be monetized, human health impacts could pose market costs on society associated with increases in healthcare costs of individuals affected by an incident and loss of productivity from sick or injured workers.

The impacts on human health from an oil spill are described in Section 4.7.1.9, *Human Health,* and the impacts from a fire and explosion are described in Section 4.7.2.2, *Human Health.* Although the risk of acute exposure health effects to the public and response workers in the event of a release is relatively low, as described in these sections, should exposure occur, serious health consequences

are possible. Depending on the severity of the impacts, medical intervention could be required resulting in increased healthcare costs. If the symptoms are severe enough, there could be a loss of economic productivity if affected individuals are unable to work.

In addition to the physical effects of an oil spill, fire, or explosion, psychological stresses can result from the trauma of an extreme event or the potential loss of financial earning capacity, such as due to damages to commercial fisheries. Studies of communities affected by the 1989 Exxon Valdez oil spill found that many people experienced psychological and social effects associated with the spill, in large part because of damage to fisheries that were extremely important to the local economy (Gay et al. 2010). There is also evidence that many native Alaskans who depended on the sea for subsistence experienced psychological symptoms because they could not practice many cultural traditions (Gay et al. 2010). An extreme event, such as a fire or explosion, can also trigger psychological distress that can result in heightened anxiety and difficulty coping with the emotional effects of the traumatic event. Residents affected by the Lac-Mégantic train explosion in Quebec province, Canada in 2013 have reported anxiety problems that were twice as frequent in Lac-Mégantic as they were in the rest of the geographical region (Canadian Press 2016). During the year that followed the explosion, the local health authority indicated 423 people were treated for psychological stress associated with the incident (Blatchford 2014). Similar to the physical impacts described above, psychological stresses from an oil spill, fire, or explosion can result in increased healthcare costs for mental health treatment and reduce economic productivity if workers are unable to perform to their full potential.

Nonmarket Costs

Nonmarket costs include losses of public goods that are not valued in the market. These losses occur when non-priced services, such as ecosystem services, clean air, clean water, and aesthetic quality, are affected. As described in Section 4.7, *Impacts on Resources*, crude oil spills can endanger air and water, human health, animal and plant life, recreational and aesthetic values, and other resources. The loss or damage of these resources can impose a high cost on society.

The impacts on air, water, and other natural resources can be looked at in terms of their costs on ecosystem services, a term used to describe the value natural resources provide to humans. Ecosystem services are an example of non-market values that provide a benefit to society which cannot be priced in a market. Ecosystem services are commonly thought of in four categories: supporting (e.g., nutrient cycle, soil formation), provisioning (e.g., food, fresh water), regulating (e.g., climate regulation, water purification), and cultural (e.g., aesthetic, recreation) (Millennium Ecosystem Assessment 2005). An example of how ecosystem services could be affected by an oil spill is the loss of marine life that would affect food provisioning, as seafood would not be available for human consumption, and cultural, as fisheries would be depleted and not available for recreational or tribal fishing.

Section 4.7, *Impacts on Resources,* describes impacts on environmental and human resources from an oil spill, fire, or explosion that could affect ecosystem services. The costs to ecosystem services from these impacts would be greatest if an oil spill reached water and affected marine life, coastal ecosystems, and beaches or other popular recreational areas. The area in and around the City of Hoquiam and Grays Harbor provides numerous ecosystem services including commercial, recreational, and tribal fishing, bird watching and scenic beauty. It provides basic supporting services such as habitat for marine and terrestrial animals and production of oxygen and regulating services such as carbon sequestration. The loss or degradation of these ecosystem services from an

oil spill, while not valued in a market, would impose nonmarket and social costs to the City of Hoquiam and the region.

Recent Oil Spills, Fires, and Explosions

Table 7-11 presents costs related to recent incidents involving oil spills, fires, and explosions provide. This information represents the range of potential economic and social costs of an incident. Spills resulting from pipeline ruptures are included to illustrate the effects of oil spills on freshwater aquatic habitats.

Table 7-11 Range of Potential Economic and Social Costs of Rail, Vessel, or Pipeline Incidents

Location	Description	Volume Spilled	Injuries and Evacuations	Estimated Damages
Rail Transport				
Mt. Carbon, West Virginia	On February 16, 2015, a CSX crude oil unit train derailed 27 loaded tank cars in Mount Carbon, West Virginia. Crude oil from the punctured tank cars discharged into the Kanawha River and contaminated soils in the area. Much of the released oil was consumed in the post-accident fire.	378,000 gallons of crude oil	One nearby resident received minor injuries, 300 people evacuated	$2.5 million
Aliceville, Alabama	On November 8, 2014, a Genesee and Wyoming crude oil unit train derailed 25 cars near Aliceville, Alabama. The spilled oil discharged into nearby marsh and some of it caught fire.	455,520 gallons of crude oil	No injuries or evacuations reported	$5 million
LaSalle, Colorado	On May 9, 2014, a Union Pacific train derailed 17 cars near LaSalle, Colorado spilling an estimated 7, 932 gallons of crude oil.	7,932 gallons of crude oil	No injuries or evacuations reported.	$0.3 million
Lynchburg, Virginia	On April 30, 2014, a CSX Transportation crude oil unit train derailed near the James River in Lynchburg, Virginia. Three of the derailed cars were partially submerged in the James River, one of which was breached and released approximately 30,000 gallons of crude oil into the river, some of which caught fire.	29,868 gallons of crude oil	No injuries, 350 people and 20 businesses evacuated	$1.2 million
North Vandergrift, Pennsylvania	On February 13, 2014, a Norfolk Southern train derailed 21 cars near North Vandergrift, Pennsylvania, spilling an estimated 9,800 gallons of crude oil.	9,800 gallons of crude oil	No injuries, 16 people evacuated	$4.5 million
Casselton, North Dakota	On December 30, 2013, a BNSF crude oil unit train derailed near Casselton, North Dakota resulting in the breach of 18 tank cars carrying crude oil which caught fire.	400,000 gallons of crude oil	No injuries, 1,400 people evacuated	$6.1 million
Lac-Mégantic, Quebec, Canada	On July 6, 2013, a crude oil unit train derailed in Lac-Mégantic, Quebec because of an improperly set brake. A large fire and series of explosions followed, resulting in the destruction of much of the town center as well as the deaths of 47 people.	1.6 million gallons of crude oil	Forty-seven deaths, 2,000 people evacuated	$460 million
Vessel Transport				
Port Arthur, Texas	In January 2010, an oil tanker collided with a barge near Port Arthur, Texas. Up to 460,000 gallons of crude oil spilled into the Sabine-Neches Waterway.	460,000 gallons of crude oil	No injuries, 12 people evacuated	Unknown

Location	Description	Volume Spilled	Injuries and Evacuations	Estimated Damages
Philadelphia, Pennsylvania	On November 26, 2004, the hull of a 750-foot tanker carrying crude oil was punctured on the Delaware River. The resulting spill affected 280 miles of shoreline and resulted in a three-day shutdown of the Port of Philadelphia.	265,000 gallons of crude oil	No injuries or evacuations reported	$150 million
Dalco Passage, Washington	On October 13, 2004, an oil spill occurred in Puget Sound during a ballasting operation on board a tank vessel.	7,000 gallons of crude oil	No injuries or evacuations reported	$2.3 million
Coos Bay, Oregon	On February 4, 1999, the 640-foot freighter New Carissa ran aground on the Oregon coast during a major winter storm, releasing between 70,000 and 140,000 gallons of fuel.	70,000-140,000 gallons of fuel	No injuries or evacuations reported	$85 million
Prince William Sound, Alaska	On March 24, 1989, the Exxon Valdez struck a reef and released between 11 million and 38 million gallons of crude oil.	11-38 million gallons of crude oil	No injuries or evacuations reported.	Over $2 billion
Pipeline				
Yellowstone River, Montana	In July 2011, a pipeline ruptured on the Yellowstone River in Montana. Approximately 63,000 gallons of crude oil spilled because of the rupture, affecting 70 miles of the river.	63,000 gallons of crude oil	No injuries reported, evacuation of nearby residences	$135 million
Talmadge Creek, Michigan	In July 2010, a pipeline rupture near Talmadge Creek in Michigan spilled an estimated 843,000 gallons of diluted bitumen. High rains pushed the oil over dams into the Kalamazoo River, where it flowed 35 miles downstream. The spill was contained before any oil reached Lake Michigan.	843,000 gallons of diluted bitumen	No injuries reported, evacuation of nearby residences	$1.2 billion

Source: National Transportation Safety Board 2014a, 2014b, 2015, 2016; Transportation Safety Board of Canada 2014; Seba 2010; Graham 2006; Cornwall 2006; Ferrell 2006; Exxon Valdez Oil Spill Trust Council 2016; Jorgensen 2015; Frittelli et al. 2014

7.3.4.3 Potential Impacts on Property Values

Impacts on property values from the proposed action could result during construction and, to a larger extent, during operation of the proposed action. Impacts from these activities could affect property values by making surrounding properties less desirable as the result of impairing natural amenities such as air and water quality, increasing ambient noise levels and traffic congestion, and increasing risks that could adversely affect surrounding land uses (e.g., increased chance of incidents that could lead to hazardous materials releases and environmental damage).

Hedonic pricing is a method that uses data on real estate transactions to estimate the impact of various attributes on the values of nearby properties. It is commonly used to estimate the impacts of environmental amenities and other landscape features on property values. This method uses data on property values to estimate the value of an environmental amenity in terms of its effect on the values of nearby properties. More specifically, the hedonic pricing method uses statistical techniques to infer the value of a property attribute by comparing values of properties that have a given attribute and those that do not. Attributes evaluated in hedonic pricing studies can have either positive or negative impacts on property values.

Hedonic pricing is based on the assumption that individuals view goods such as houses as a bundle of attributes. In the case of houses, these attributes may include structural characteristics (e.g., size, number of bedrooms), neighborhood characteristics (e.g., crime rate, school quality, recreation opportunities), and environmental attributes (e.g., trees, proximity to open space, air quality, proximity to undesirable land uses). Individuals choose houses based on a combination of these attributes. Differences in the market price of houses can be used to derive an implicit value of each attribute. The implicit value of an attribute reflects what individuals, on average, are willing to pay for that attribute. The result of the hedonic pricing method is a function that relates the value of a property to a set of housing attributes, including the specific attribute being valued.

Although previous hedonic pricing studies suggest that there could be impacts on property values from construction and onsite operations of the proposed action, the impacts on property values that could be directly attributed to the proposed action are negligible. Because the project site is located in an already industrialized area, any negative impacts on nearby properties from construction or onsite operations would already have been realized and would not be a result of the proposed action.

Therefore, the potential for the proposed action to affect property values would occur primarily as the result of the perception of increased risk of impacts that could occur during transport. To evaluate the potential for these impacts, a literature review was conducted of other studies that have estimated the impacts of rail lines on property values. The studies, and their estimated impact of freight rail lines on property values, are summarized in Table 7-11.

Table 7-12. Summary of Studies Estimating the Impacts of Freight Rail Lines on Nearby Property Values

Authors and Publication Year	Study Title	Description of Rail Line Impact	Estimated Impact per Property	Distance Factor
Futch, M. (2011)	*Examining the Spatial Distribution of Externalities: Freight Rail Traffic and Home Values in Los Angeles*	Large increase in rail traffic along the Alameda Corridor, leading from the Ports of Los Angeles and Long Beach, California	Average per-property decrease in value of $3,500	Impact dissipates with distance, and is strongest for properties within 0.33 mile, less significant for properties within 0.66 mile of the rail line. Impact is not significant for properties greater than 0.66 miles from the rail line.
Simons, R.A. and A. El Jaouhari (2004)	*The Effect of Freight Railroad Tracks and Train Activity on Residential Property Values*	Increase in freight rail traffic on existing rail lines in Cuyahoga County, Ohio	Average decrease in value between $3,800 and $5,800. Impact increases with each additional train trip	Impact estimated for properties within 750 feet of the rail line.
The Eastman Company (2012)	*Increased Coal Train Traffic and Real Estate Values*	Large increases (between 9 and 18 daily trips) resulting from proposed Gateway Pacific Terminal at Cherry Point Washington	Decreases in property values between 5 and 20% for increases of 18 train trips per day. Decreases in property values between 3 and 5% for increases of 9 trips per day	Study focused on properties within 600 feet of the rail line, but suggests that impacts also would be experienced by properties further out from this zone.

From this review, it can be seen that proximity to freight rail lines can affect property values, and this impact increases with increasing rail traffic. These studies also show that the impact of rail lines on property values dissipates with distance. The most severe impacts are for properties within roughly 1,000 feet of the rail line and become negligible at distances of roughly 0.66 mile from the rail line.

To evaluate the potential for impacts on property values in Hoquiam, geographic information system (GIS) data were analyzed to determine the number of properties close to the rail line. As shown in Table 7-12, this analysis resulted in a count of the number of properties within given distance bands of 0 to 0.33 mile (1,760 feet), 0.33 to 0.66 mile (3,520 feet), and 0.66 mile to 1 mile (5,280 feet). As shown in Table 7-13, only a small number of properties within the boundaries of Hoquiam are located close to the rail lines and could possibly experience property value impacts from the proposed action.

Table 7-13. Properties in Hoquiam Potentially Affected by Rail Traffic—Proposed Action

Distance from Rail Line	Number of Residential Properties
0 to 0.33 mile (1,760 feet)	7
0.33 mile to 0.66 mile (3,520 feet)	25
0.66 mile to 1 mile (5,280 feet)	33

Although other studies have shown an impact on the values of nearby properties from increases in freight rail traffic, it is not possible to use these studies as a basis for quantifying the impact of the proposed action on potentially affected properties in Hoquiam. The studies by The Eastman Company (2012) and Simons and El Jaouhari (2004), for example, only estimate impacts for properties less than 1,000 feet from the rail line, and no residential properties in Hoquiam are that close to the rail line. Futch (2011) estimated impacts on property values that were significant up to 0.66 mile from the rail line, meaning that 32 (7 plus 25) residential properties within the city boundary could experience property value impacts. It is difficult, however, to use the results of the Futch study to determine an impact for affected properties in Hoquiam, as the property value impacts estimated in the Futch study were for a very large increase in rail traffic. In contrast, the increase in rail traffic from the proposed action would be much smaller. The property value impacts from increased rail traffic due to the proposed action would thus likely be much smaller than the impacts estimated by these studies, which involved much larger increases in rail traffic.

7.3.5 What are the likely costs and benefits of the proposed action?

In summary, implementation of the proposed action would result in some economic and financial benefits to Hoquiam as well as some costs. Table 7-14 summarizes the main benefits and costs that are likely to occur as the result of the proposed action. When enough information was available, monetary estimates are provided in 2013 dollars.

If additional projects, such as the REG (formerly Imperium Terminal Services) Expansion Project or Grays Harbor Rail Terminal Project are implemented, the potential for more significant impacts on rail congestion, vehicle congestion, and the related safety concerns would also increase. The potential cumulative impacts related to these topics are discussed in Chapter 6, *Cumulative Impacts*.

Table 7-14. Main Benefits and Cost to the City of Hoquiam—Proposed Action (2013 Dollars)

Benefits	Quantification
Employment and Income	
Direct labor income (including benefits) during construction	Estimate: $3.8 million to $4.3 million
Annual direct labor income (including benefits) during each year of operations	Estimate: $195,000 to $260,000 per year
Additional labor income (including benefits) associated with indirect and induced jobs in during construction and operations	Not estimated
Fiscal Revenues	
Property tax collections during construction	Estimate: $55,783
Property tax collections during each year of operations	Estimate: $467,161 per year
Additional tax collections during construction and operations from local sales and use tax, business and occupation tax and utility taxes	Not estimated
Costs	
Vehicle Traffic and Safety	
Increased traffic delays	Previous studies estimate: $9.66 and $16.18 per person delayed in traffic, per hour, for local traffic $16.51 and $24.76 per person delayed in traffic, per hour, for intercity traffic
Increased exposure to traffic accidents risks	Previous studies estimate: $3,037 per person to $1.5 million per person involved in a traffic accident, depending on severity of incident
Environmental Health and Safety	
Cost of training for the City of Hoquiam Fire Department on flammable liquid fires risks and to review and practice material release emergency response	Not estimated
Property Values	
Potential decrease in property values	Previous studies estimate: $3,500 to $5,800 on average 3 to 5% for increases of 9 trips per day 5 to 20% for increases of 18 trips per day