Appendix D
Alternatives Development Process

This appendix describes the alternatives development process for the proposed Millennium Bulk Terminals—Longview (Applicant) project to construct and operate an export terminal in Cowlitz County, Washington, along the Columbia River. This process is also presented in the Applicant's document *Millennium Coal Export Terminal, Project Purpose and Need, and Site Alternatives* (2014). The Applicant's process resulted in the selection of two action alternatives to be evaluated in the draft environmental impact statement (Draft EIS), the On-Site Alternative and Off-Site Alternative, in addition to a No-Action Alternative.

The alternatives development process included a framework established by the Applicant for screening potential sites. The process also included a review of the Applicant's screening criteria and screening approach with a supplemental screening analysis by a third party on behalf of the U.S. Army Corps of Engineers (Corps).

The following sections present a background discussion on coal exports and what is needed for a new export terminal, a description of the alternative site screening performed by the Applicant, and a summary of the review and alternative site screening performed by a third party. Lastly, this appendix identifies the alternatives carried forward for evaluation in this EIS.

Background

The Applicant proposes to construct and operate an export terminal in Cowlitz County, Washington, along the Columbia River. The terminal would receive coal from sources in the Powder River Basin in Montana and Wyoming and the Uinta Basin in Utah and Colorado via rail shipment, then load and transport the coal by ocean-going vessels via the Columbia River and Pacific Ocean to overseas markets in Asia. It would be capable of receiving, stockpiling, blending, and loading coal by conveyor onto ships for export.

The Applicant leases a 540-acre site at the former Reynolds Metals aluminum plant in unincorporated Cowlitz County, Washington, near the Longview city limits. The proposed export terminal would be constructed on 190 acres of the leased area (project area). The project area is adjacent to the Columbia River. The Applicant currently operates and would continue to operate approximately 350 acres of the 540-acre leased area as a bulk product terminal. Industrial Way (State Route 432) provides vehicular access to the project area. The Reynolds Lead spur track (Reynolds Lead) and BNSF spur track (BNSF Spur), both owned by BNSF Railway, provide rail access to the project area from the BNSF mainline located to the east in Kelso, Washington. Ships access the project area via the Columbia River and berth at an existing dock (Dock 1) in the Columbia River.

Coal Export

Coal is a world-traded commodity varying in price based on demand, supply, and the energy content of the coal. Other factors affecting the cost of coal are the cost of mining the coal and the cost of transporting it.

The Coal Market

The Applicant has identified significant Asian market demand for low-sulfur coal from the western United States. According to the U.S. Energy Information Administration (EIA), "global coal demand has almost doubled since 1980, driven by increases in Asia, where demand is up over 400% from 1980 to 2010. In turn, Asian demand is dominated by China; demand in China increased almost five-fold between 1980 and 2010 and accounted for 73% of Asia's consumption and almost half of coal consumption globally in 2010" (U.S. Energy Information Administration 2011). In December 2013, the International Energy Agency (IEA) reported the actual growth rate of global coal demand had increased by 3.4% per year between 2007 and 2012 (International Energy Agency 2013). With Southeast Asia set to double its energy consumption over the next two decades, IEA has predicted coal will replace natural gas as the dominant fuel for electricity production.

Japan, South Korea, and Taiwan each lack substantial coal resources and depend almost exclusively on foreign imports. China, in contrast, is rich in coal, which accounts for 95% of the country's fossil fuel resources (Tu and Johnson-Reiser 2012). However, most of China's coal resources are located in the western and northern inland provinces. The major coal-consuming centers in China are along the eastern and southern coastline (Aden et al. 2009; Tu and Johnson-Reiser 2012). This means Chinese domestic coal must be moved long distances by rail, water, and/or roads. The transportation of coal in China is complicated and costly because of an insufficient and overused rail infrastructure, limitations of domestic seaports, and local and provincial taxes (Aden et al. 2009). As a result, the delivered price of domestically produced coal increases the farther it is hauled from the mine. At some distance from the mine, the cost of imported coal from Indonesia and Australia becomes competitive with or lower than the price of China's domestic coal. Consequently, China closed nearly half its domestic coal mines in 2009 and 2010, and has increased imports.

U.S. Exports

In the United States, coal is mainly found in three regions: Appalachia coal region; the Interior coal region, with Illinois as the largest producer; and the Western coal region, of which Wyoming is the largest producing state in the nation. More than half of the coal production in the United States is produced in the Western coal region, which includes the Powder River Basin (U.S. Energy Information Administration 2015).

Bituminous coal is the most common coal. There are two subtypes of bituminous coal: thermal (or steam) and metallurgical (or coking). Thermal or steam coal is used to create steam to power steam turbines for coal-fired electrical power generation. Metallurgical or coking coal is coal used for making iron and steel.

In recent years, almost all the U.S. coal exported to Asia went to the world's top four coal importers: China, Japan, India, and South Korea. Asia's share of total U.S. coal exports increased from 2% in 2007 to 25% in 2012. In 2012, most U.S. exports of steam coal to Asia were from ports on the West Coast and in the Gulf of Mexico. In the past few years, steam coal exports transported through the Pacific Northwest and exported through British Columbia, a key outlet for Powder River Basin coal, have been primarily destined for South Korea. Nearly all exports of metallurgical or coking coal to Asia in 2012 were from ports on the East Coast and in the Gulf of Mexico.

Exporting Powder River Basin Coal from Pacific Northwest Ports

Pacific Northwest ports are well positioned to provide western U.S. coal to trade partners in Japan, South Korea, China, and Taiwan at rates that are competitive in the international marketplace, and to provide a diversification of coal supply to those importing countries. Ports in the Pacific Northwest are within short rail hauls from the Powder River Basin in comparison to other U.S. ports.

The primary competitors for coal shipped from the Powder River Basin are Australia and Indonesia. Indonesia has abundant coal reserves and is geographically proximate to coal-importing countries in Asia. As a result, Indonesia is currently the world's largest exporter of coal by weight, having surpassed Australia in 2011 (U.S. Energy Information Administration 2014a).

Coal from the Powder River Basin has both similarities with and differences from Australian and Indonesian coal. These distinctions can be important factors for foreign consumers in selecting one coal over another. Australian exports primarily include bituminous coal from the states of Queensland and New South Wales (U.S. Energy Information Administration 2014b), but buyers in Korea and Japan prefer low-ash coal for power generation, a characteristic shared by Indonesian and Powder River Basin coal.

Transporting Coal to Terminals

The cost of moving coal from mine to market is an important factor behind the viability of the terminal. Methods of transporting coal from the mine depend on the distance to be traveled. Over short moves, coal is generally carried by conveyors or trucks, while trains are typically used for carrying coal over longer distances (World Coal Institute 2005; American Association of Railroads 2015). In considering the cost to move a ton of coal 1 mile, trains are more fuel efficient, clean, and cost effective than trucks, especially over long-distance hauls (ICF International 2009). Nearly all coal transported by rail is carried by unit trains, which are freight trains made up of rail cars carrying a single commodity, all with the same origin and same destination, without being split up or stored en route (American Association of Railroads 2015).

Unit trains are typically used for the transportation of bulk goods. Bulk goods include: solid substances such as gravel, iron ore, alumina, coal, and steel; bulk liquids in tank cars carrying crude oil, mineral oil, ethanol, propane, butane, and molten sulfur; grain such as wheat and corn; and other materials including solid waste, vehicles, or shipping containers. Unit trains operate around the clock, use dedicated equipment, generally follow direct shipping routes, and have lower costs per unit shipped than nonunit trains (American Association of Railroads 2015).

Rail transportation costs are substantial and exceed the cost of mining for Powder River Basin coal.[1] Two railroads, BNSF and Union Pacific, move most of the coal along primary freight rail mainlines throughout the western United States. Rates for moving freight by rail vary based on the cost of fuel, labor, and equipment (such as the number of locomotives necessary to ascend grades). Rates can also be higher on heavily used routes and increased based on the time sensitivity of the cargo, which can influence priority among trains.

[1] Powder River Basin coal is produced at a lower price per ton when compared to coal from other regions in the United States because of the large, efficient, modern surface coal mines with thick coal seams near the surface.

Trans-Pacific Shipping

There is a high level of competition between shipping companies for trans-Pacific shipments. As a result, shipping rates for the trans-Pacific shipping of coal are highly variable and based on market demands. The total shipping cost is based on a per-ton freight rate for the coal and a daily charter rate for the vessel (McAllister 2013). Charter rates for bulk carriers are currently lower than the high reached in 2008 and lower than rates charged for the period extending back to 1985. Reduced shipping rates in recent years also reflect the large supply of bulk carriers currently available in the world marketplace. Between 2004 and 2013, the global bulk carrier fleet more than doubled, resulting in a surplus of shipping capacity (Clarksons Research 2013). Rates for bulk carriers in Panamax-class vessels and larger are expected to remain depressed into the future, unless substantial numbers of ships are scrapped to increase pricing.

Because of the relationship between shipping cost and transit time, sailing distance can be used to compare the cost differences for shipping coal between different geographic regions along the U.S. West Coast and Asian markets. Furthermore, because international shipping is a world market, differences in shipping time can be used to compare shipping costs to Asian markets from the U.S. West Coast and competing coal supply regions.

Pacific Northwest ports are located advantageously in terms of transit time for access to ports in China, Japan, Korea, and eastern India, in comparison to other West Coast ports.

Requirements for a New Export Terminal

Currently, the existing West Coast terminals cannot serve the demand for coal overseas. The Applicant proposes to build an export terminal to serve this need. An export terminal would need to be sufficient in throughput to take advantage of economies of scale and allow for efficient transfer of coal from rail to ships. For such a terminal to be economically viable, the cost of transporting the coal must be competitive in the Asian energy markets with coal from other international supply regions. Because coal is traded at an international scale, new export facilities must be designed to operate at the highest levels of efficiency to minimize operating costs. In order to allow delivered coal to compete in distant markets, terminals must be located geographically in order to best serve rail and shipping routes.

Throughput Capacity

Existing Australian terminals operate with throughputs ranging from 10 to 120 million metric tons per year (MMTPY), with most existing Australian terminals having a throughput capacity greater than 44 MMTPY. There are two proposed terminals in Australia that, once built, will range from 80 to 120 MMTPY. The combined throughput of Carrington Coal Terminal and the nearby Kooragang Coal Terminal (jointly owned and geographically proximate) is currently 145 MMTPY and, with the proposed Terminal 4 Coal Terminal, will increase to 265 MMTPY.

Indonesian coal terminals are fundamentally different from Australian coal terminals because they do not typically transfer coal from rail to ocean-going vessels. Instead, Indonesian coal primarily moves from mines to shipping points through a combination of barging and trucking. Inland coal is barged down rivers to land-based terminals or is alternatively trans-loaded directly from barges to ocean-going vessels at floating trans-loading terminals (Ewart and Vaughn 2009). As of 2010,

Indonesia had 47 floating trans-loading facilities with a total capacity of 400 MMTPY and 11 land-based terminals with a total capacity of 150 MMTPY (Lucarelli 2011).

The Applicant has determined an economically viable coal export terminal must have a throughput capacity of 40 to 50 MMTPY of coal. The proposed throughput capacity is necessary to take advantage of economies of scale, efficiently transfer coal from rail to ships, and compete with other international supply regions, such as Australia and Indonesia. Because Australia and Indonesia are the world's largest coal exporters to the Pacific Basin, reviewing the throughput capacities for Australian and Indonesian coal export terminals was used by the Applicant to help determine a viable throughput capacity for the proposed export terminal

Vessel Size

Most seaborne coal delivered to Asian markets is transported in Capesize or Panamax-class vessels to take advantage of economies of scale relative to smaller vessels. Capesize vessels are larger than 100,000 deadweight[2] metric tons (DWT)—often in the 130,000 to 150,000 DWT capacity range—and require a channel with a depth of 55 feet below water surface (bws). Panamax-class vessels range from 60,000 to 100,000 DWT and require a channel with a depth of at least 42 feet bws.

To support a throughput capacity of 40 to 50 MMTPY and to take advantage of economies of scale, the Applicant has determined the proposed terminal must be capable of supporting vessels in the Panamax class (or larger).

Shiploading Capability

A single shiploader, sized to efficiently load Panamax-class vessels and paired with a single ship berth, could support a throughput of 20 MMTPY. The Applicant has determined a configuration of two shiploaders with two berths would be efficient for loading Panamax-class vessels, and that this configuration is necessary to support a throughput of 40 to 50 MMTPY.

Rail Accessibility and Distance

To be viable, an export terminal must also be accessible by rail on the land side for economical transportation of coal to the terminal. The terminal location has an effect on the transportation costs and the overall price per ton.

Applicant Site Screening

The Applicant developed a framework to screen potential sites for the export terminal. The framework consisted of two tiers, with each tier comprising criteria for potentially suitable export facility sites. First-tier screening criteria focus on the general location for a new export terminal. Second-tier screening criteria focus more on specific site characteristics of the new terminal. The two tiers of screening are described in the following sections.

[2] Deadweight tonnage is a measure of how much weight a ship is carrying or can carry safely. It is the sum of the weights (in metric tons) of cargo, fuel, fresh water, ballast water, provisions, passengers, and crew. The term is often used to specify a ship's maximum permissible deadweight when the ship is fully loaded.

First-Tier Screening

The following sections describe the first-tier screening criteria and summarize the outcome of the first-tier screening.

First-Tier Screening Criteria

The Applicant identified the following first-tier criteria to screen potentially suitable export terminal sites in terms of general location.

- **Criterion 1:** Ensure rail transportation costs from the Powder River Basin would be economically viable.
- **Criterion 2:** Ensure trans-Pacific shipping costs remain economically viable to Asia.
- **Criterion 3:** Accommodate Panamax-class vessels. This vessel size class is commonly used for overseas transport of coal and any economically viable export terminal needs to have the ability to load this vessel size class in order to attract coal buyers and sellers.
- **Criterion 4:** Have a landowner willing to lease or sell property for a coal terminal in 2010 when site selection occurred.

Each criterion is described below.

Criterion 1: Ensure Economically Viable Rail Transportation Cost

The Applicant determined moving coal by rail is the only cost-effective method to transport bulk products to market. The site should be geographically located to minimize rail transportation cost. This first site-suitability criterion was based on an evaluation of transportation costs for rail from the Powder River Basin and for shipping to Asian markets. Of the potential sites, those in the Pacific Northwest are closest to the Powder River Basin. The Applicant used rail distance as an indicator of rail transportation cost. Rail distances were estimated from the Powder River Basin to the Applicant's Longview, Washington site, and rail distances from the Powder River Basin to each of the other sites were compared based on the distance to Longview.

Criterion 2: Ensure Economically Viable Trans-Pacific Shipping Cost

In addition to rail transportation costs, the Applicant determined that trans-Pacific shipping costs are also an important factor in the cost of coal deliveries to Asian markets. The Applicant used Trans-Pacific shipping times as an indicator of cost. Trans-Pacific shipping time was estimated based on shipping distance between Longview, Washington, and Incheon, South Korea, and shipping time from each of the other sites to South Korea based on the shipping time to Longview.

Criterion 3: Accommodate Panamax-class Vessels

The Applicant determined that the site must accommodate Panamax-class vessels. This vessel class is commonly used for overseas transport of coal and an economically viable coal export terminal needs to have the ability to load this vessel size class. Ships in this class need deepwater access of at least 42 feet bws. This criterion considered the adequacy of a potential terminal site to accommodate Panamax-class vessels in terms of navigational access and moorage. A potential terminal site would not be able to accommodate Panamax-class vessels if the adjacent waterbody or navigation channel is too shallow. Several sites were located adjacent to public navigation channels

that were of inadequate depth to support Panamax-class vessels or would involve substantial dredging, beyond provision of berths, to connect to deepwater navigation routes. It would not be reasonable to expect the Applicant to assume responsibility for deepening and maintaining a public navigation channel; therefore, sites accessed through channels that do not accommodate Panamax-class vessels were considered unsuitable. For sites with a navigational access where the magnitude of dredging and/or channel maintenance was considered infeasible, the site was considered unsuitable.

Criterion 4: Work with an Owner Willing to Sell or Lease

Existing transfer facilities with an owner not willing to lease or sell for a coal terminal in 2010 were not considered as potential options. Because the Applicant does not have condemnation authority to acquire property from unwilling owners, prospective sites owned by unwilling sellers were considered to be unavailable to the Applicant.

Potential Coal Export Terminal Sites

This evaluation does not extend to potential sites located in Canada and Mexico because neither the federal Clean Water Act nor the National Environmental Policy Act apply to proposed actions or action alternatives that would occur in locations outside the territorial boundaries of the United States. Because the Applicant has identified coal markets in Asia, and the purpose and need for the proposed export terminal is focused on exporting coal mined in western states to Asian countries, alternative sites that exist in the Gulf of Mexico or the East Coast were also not considered due to obviously prohibitive rail and ocean vessel transportation costs. The West Coast of the United States is the logical geographic area that an applicant who is seeking to export Powder River Basin coal would focus on.

A total of 29 sites that were available on the West Coast for terminal development or use in 2010, between northwest Washington and southern California, were identified by the Applicant for initial screening. Each site was screened for suitability based on the defined criteria, with the criteria considered sequentially. The sites identified for California, Oregon, and Washington are presented in the following sections.

California

Four sites were identified in California.

- Mid-California #1, Levin Terminal, Richmond
- Mid-California #2, Port of Sacramento
- Mid-California #3, Port of Stockton
- Southern California #1, Long Beach

Rail transportation rates for Powder River Basin coal to California are nearly twice as high as to Washington or Oregon. As a point of comparison, the distance to transport Powder River Basin coal to Longview, Washington is approximately 1,307 miles, where the distance to transport Powder River Basin coal to Sacramento and Long Beach, California is approximately 1,650 miles and 1,781 miles, respectively (BNSF Railway Company, 2015). Because rail cost is an important factor behind the delivered cost of Powder River Basin coal, the region as a whole is not considered to be a viable option for an export terminal (Criterion 1). In addition, California ports are farther from Asian

markets than are potential sites in the Pacific Northwest (Criterion 2). For all three mid-California sites, the lack of deepwater access for Panamax-class vessels does not meet the suitability criteria (Criterion 3). Overall, the Applicant determined these and other potential sites in California are not viable for siting a new export terminal for Powder River Basin coal, and the sites were not carried forward to the second-tier analysis.

Washington and Oregon

Twenty-five sites were identified within Washington (19 sites) and Oregon (6 sites) as shown in Table D-1. Sites considered in Washington and Oregon are located at varying distances from the Powder River Basin but are all a similar distance from ports in Asia. Transportation costs related to moving coal by ship are similar among sites, but costs for rail varies somewhat. However, these differences were not sufficient to eliminate any of the sites based on transportation cost. Sites accessed through channels that do not accommodate Panamax- class vessels were considered unsuitable because it would not be reasonable to expect the Applicant to assume responsibility for deepening and maintaining a public navigation channel due to the logistical and regulatory hurdles deepening a navigation channel would present, in addition to the significant and likely prohibitive additional expense that it would entail. One site (Southwest Washington #10) was rejected because of the need to dredge a very large volume of material to permit navigation in a side channel of the Columbia River. For those ports in the region providing deepwater access to Panamax-class vessels, certain sites did not warrant further consideration because of the unwillingness of an owner to lease or sell a site for a coal terminal in 2010.

Results of First-Tier Screening

Results of the first-tier screening are presented in Table D-1. Out of the 29 sites originally identified as available for terminal development or use in 2010, ten sites met first-tier suitability criteria and were carried forward to the second-tier analysis. These ten sites are shown as shaded in Table D-1.

Second-Tier Screening

The following sections describe the second-tier screening criteria and summarize the outcome of the second-tier screening.

Second-Tier Screening Criteria

The Applicant identified the following criteria for the second-tier screening.

- **Criterion A:** Minimum site size of 175 acres to accommodate proposed throughput.
- **Criterion B:** Existing rail access or a location close enough to existing an rail line to make constructing an access line practicable.
- **Criterion C:** Site topography flat enough to allow on-site rail operation and connection to the main rail line.
- **Criterion D:** Site configuration accommodating intact unit trains.

Each criterion is described after Table D-1.

Table D-1. First-Tier Screening of Sites Identified by Applicant

Site	Criterion 1: Rail Distance from PRB[a]	Criterion 2: Trans-Pacific Shipping Time to Incheon, South Korea	Criterion 3: Deepwater Access for Panamax-class Vessels	Criterion 4: Owner Willing to Lease or Sell for Coal Terminal (2010)	Site Carried Forward?
WASHINGTON SITES					
Northwest Washington #1 Cherry Point Bellingham, WA	Greater (+10–19%)	Similar (+/- 2%)	Yes Strait of Georgia	No (unwilling owner)	No
Northwest Washington #2 Port of Anacortes Anacortes, WA	The Port has no railroad access	Similar (+/- 2%)	Yes Strait of Juan de Fuca	Yes	No
Northwest Washington #3 Shell & Tesoro Refinery Dock Anacortes, WA	Greater (+10–19%)	Similar (+/- 2%)	Yes Strait of Juan de Fuca	Yes	Yes
Mid-Washington #1 Dupont, WA	Slightly greater (+4–9%)	Similar (+/- 2%)	Yes Puget Sound	Yes	Yes
Mid-Washington #2 Port of Everett Everett, WA	Greater (+10–19%)	Similar (+/- 2%)	Yes Puget Sound	Yes	Yes
Mid-Washington #3 Port of Tacoma Tacoma, WA	Slightly greater (+4–9%)	Similar (+/- 2%)	Yes Puget Sound	No (unwilling owner)	No
Mid-Washington #4 Port of Seattle Seattle, WA	Greater (+10–19%)	Similar (+/- 2%)	Yes Puget Sound	No (unwilling owner)	No
Mid-Washington #5 Port of Olympia Olympia, WA	Slightly greater (+4–9%)	Similar (+/- 2%)	No 2 miles of federal channel at restricted depths (<28 feet bws)	Yes	No
Mid-Washington #6 Blair Waterway, Puyallup Tribe Tacoma, WA	Slightly greater (+4–9%)	Similar (+/- 2%)	Yes Puget Sound	No (unwilling owner)	No

Site	Criterion 1: Rail Distance from PRB[a]	Criterion 2: Trans-Pacific Shipping Time to Incheon, South Korea	Criterion 3: Deepwater Access for Panamax-class Vessels	Criterion 4: Owner Willing to Lease or Sell for Coal Terminal (2010)	Site Carried Forward?
Southwest Washington #1 Austin Point, Port of Woodland Woodland, WA	Similar (+/- 3%)	Similar (+/- 2%)	Yes Columbia River	Yes	Yes
Southwest Washington #2 Barlow Point Longview, WA	Similar (+/-3 %)	Similar (+/- 2%)	Yes Columbia River	Yes	Yes
Southwest Washington #3 Northwest Alloys Longview, WA	Similar (+/- 3%)	Similar (+/- 2%)	Yes Columbia River	Yes	Yes
Southwest Washington #4 Port of Grays Harbor Aberdeen, WA	Slightly greater (+4–9%)	Similar (+/- 2%)	No 10 miles of federal channel at restricted depths (<40 feet bws)	Yes	No
Southwest Washington #5 Port of Kalama Kalama, WA[b]	Similar (+/- 3%)	Similar (+/- 2%)	Yes Columbia River	No (unwilling owner)	No
Southwest Washington #6 Terminal 2, Port of Longview Longview, WA	Similar (+/- 3%)	Similar (+/- 2%)	Yes Columbia River	Yes	Yes
Southwest Washington #7 Columbia Gateway Facility, Port of Vancouver Vancouver, WA[b]	No rail access (As of 6/2014 ownership not resolved to allow rail extension from Terminal 5 to Columbia Gateway facility)	Similar (+/- 2%)	Yes Columbia River	Yes	No
Southwest Washington #8 Terminal 5, Port of Vancouver Vancouver, WA	Similar (+/- 3%)	Similar (+/- 2%)	Yes Columbia River	No (competing proposal)	No

Site	Criterion 1: Rail Distance from PRB[a]	Criterion 2: Trans-Pacific Shipping Time to Incheon, South Korea	Criterion 3: Deepwater Access for Panamax-class Vessels	Criterion 4: Owner Willing to Lease or Sell for Coal Terminal (2010)	Site Carried Forward?
Southwest Washington #9 Kinder Morgan Terminal, Port of Vancouver Vancouver, WA	Similar (+/- 3%)	Similar (+/- 2%)	Yes Columbia River	Yes	Yes
Southwest Washington #10 Wasser-Winters Kelso, WA	Similar (+/- 3%)	Similar (+/- 2%)	No Substantial dredging required[c]	Yes	No
OREGON SITES					
Northwest Oregon #1 Hunt Mill Point Bradwood Landing, OR	Similar (+/- 3%)	Similar (+/- 2%)	Yes Columbia River	Yes	Yes
Northwest Oregon #2 Port of Portland Portland, OR	Similar (+/- 3%)	Similar (+/- 2%)	Yes Willamette River	No (unwilling owner)	No
Northwest Oregon #3 Port of Westward, Port of St. Helens Columbia County, OR	Similar (+/- 3%)	Similar (+/- 2%)	Yes Columbia River	No (unwilling owner)	No
Northwest Oregon #4 Tongue Point, Port of Astoria Astoria, OR	Slightly greater (+4–9%)	Similar (+/- 2%)	Yes Columbia River	Yes	Yes
Northwest Oregon #5 Troutdale Sundial Sand & Gravel Site Troutdale, OR	Similar (+/- 3%)	Similar (+/- 2%)	No 12 miles of federal channel at restricted depths (<27 feet bws)	Yes	No
Western Oregon #1 Port of Coos Bay Coos Bay, OR	Greater (+10–19%)	Similar (+/- 2%)	No 6 miles of federal channel at restricted depths (<37 feet bws)	Yes	No

Site	Criterion 1: Rail Distance from PRB[a]	Criterion 2: Trans-Pacific Shipping Time to Incheon, South Korea	Criterion 3: Deepwater Access for Panamax-class Vessels	Criterion 4: Owner Willing to Lease or Sell for Coal Terminal (2010)	Site Carried Forward?
CALIFORNIA SITES					
Mid-California #1 Levin Terminal, Port of Richmond Richmond, CA	Substantially greater (+25-40%)	Greater (+5%)	No 2 miles of federal channel at restricted depths (38 feet bws)	Did not evaluate[d]	No
Mid-California #2 Port of Sacramento Sacramento, CA	Substantially greater (+25-40%)	Greater (+7%)	No 26 miles of federal channel at restricted depths (30 feet bws)	Did not evaluate[d]	No
Mid-California #3 Port of Stockton Stockton, CA	Substantially greater (+25-40%)	Greater (+6%)	No 75 miles of federal channel at restricted depths (35 feet bws)	Did not evaluate[d]	No
Southern California #1 Port of Long Beach Long Beach, CA	Substantially greater (+25-40%)	Greater (+11%)	Yes Pacific Ocean	Did not evaluate[d]	No

Notes:
Shading indicates that the site was carried forward to second- tier screening.

[a] Compared to Longview, WA; greater rail distance equates to greater cost to transport coal.

[b] The Corps' third-party review reevaluated this site (see Table D-7).

[c] The Applicant would need to develop and maintain an independent navigation channel and berthing basin within Carrolls Channel, a side channel of the Columbia River, which would be common with the mouth of the Cowlitz River. Initial dredging would need to remove an estimated 12 million cubic yards of material. The Cowlitz River receives substantial sediment inputs from upstream sources, notably the North Fork Toutle River, which drains the debris avalanche of Mount St. Helens. Extensive dredging would be required at least on an annual basis (and likely more often) to maintain passage through approximately 3,500 feet of the Cowlitz River to meet the Columbia River federal navigation channel.

[d] California locations were eliminated from consideration because of the greater distance and higher cost to transport Powder River Basin coal to the region (Criterion 1), the greater distance to Asian markets (Criterion 2), and the lack of deepwater access for Panamax-class vessels at all three Mid-California sites (Criterion 3). Owner willingness to lease or sell was not evaluated because the California sites were determined to be economically infeasible.

Source: Millennium Bulk Terminals—Longview 2014

PRB = Powder River Basin; bws = below water surface

Criterion A: Size of Site to Accommodate Throughput

The Applicant is proposing a large-scale export terminal to take advantage of economies of scale and efficiencies to keep operating cost low on a per-metric-ton basis. The Applicant determined that the desired throughput is in the range of 40 to 50 MMTPY to ensure the economic viability for a terminal exporting coal.

Throughput at a bulk terminal is often related to the capacity of a key piece of equipment: the shiploader. Therefore, the shiploader can exert an important influence on site design and the overall project footprint. A single shiploader, sized to efficiently load Panamax-class vessels and paired with a single ship berth, could support a throughput of 20 MMTPY. If an additional berth were available, ship-handling efficiencies could raise the throughput of a single shiploader to 25 MMTPY. The Applicant has determined a configuration of two shiploaders with two berths would be efficient for loading Panamax-class vessels, and this configuration would support a throughput of 40 MMTPY. The Applicant's proposal is based on a throughput of 44 MMTPY. This volume incorporates a 10% increase to account for additional throughput that can be achieved with common Industry Process Improvement techniques. History has demonstrated a workforce with experience with facility equipment can optimize export tonnage by employing operational and maintenance improvements.

The stockpile is vital to the facility because it provides the "buffer" volume of coal to ensure that, if delays occur in one part of the transportation chain (e.g., winter weather delaying trains in the Rocky Mountains), ship loading and deliveries can continue. Delays in loading ships not only reduce throughput capacity but yield costs to the shipper or terminal. Shipping contracts typically include a fee that will be added should delay occur at the terminal. This fee is termed "demurrage" in the industry and is substantial and related to the daily charter rate for the vessel.

The size of the stockpile is a direct ratio of the size of the desired throughput and the ability to efficiently move product through the site. To be efficient, operations must not delay either the loading of ships or the unloading of trains. The Applicant's competitors' existing and planned terminals provided illustrative references of sufficient stockpile capacity. The modern Kooragang and NCIG terminals in Australia have stockpile sizes of approximately 3.5% to 8.3% of the desired throughput. The older, lower-capacity Carrington terminal has a stockpile size of 3.0%. Based on the percentages of 3.5% to 8.3% associated with the more modern terminals, the needed stockpile size for a 44 MMTPY throughput facility would be 1,540,000 to 3,653,000 metric tons of coal. The Applicant is proposing four stockpiles totaling approximately 1,500,000 metric tons, which, at 3.4%, is at the low end of this size range.

The Applicant concluded for a site to be viable it must provide on-site opportunity for a full day of train traffic to minimize impacts on users of adjacent properties. Therefore, similar to the stockpile, the number and length of rail storage tracks and operating tracks are determined by the need to efficiently handle a specific throughput. Rail loops keeping unit trains intact throughout their travel in a coal terminal allow more efficient movement and handling of trains and are more efficient than rail configurations storing trains in segments. This means on-site rail loops influence both the acreage and configuration of a parcel supporting a specific throughput.

Based on the projected throughput of the facility, the Applicant determined the necessary size of the stockpile and the need for on-site rail means a site must be at least 175 acres to be viable.

3.1.1.2 Criterion B: Rail Access

Rail access for unit trains was determined by the Applicant to be a necessary component for a viable terminal. Only sites with existing rail rights-of-way (with or without tracks) were considered viable. For sites without adequate existing rails, the number of miles of new or rebuilt track was a consideration in the viability of the site as the need to build new rail corridors would increase the capital costs of the project and uncertainties with respect to the ability to acquire a new right-of-way. Ultimately, no sites were excluded solely because of the need for extension of new tracks or rebuild of existing tracks.

Criterion C: Topography Suitable for Rail

The elevation of a site relative to the rail mainline is an important criterion in determining the viability of a specific location. Railroad grades need to be much flatter than road grades to allow trains adequate traction to move unit trains; therefore, sites with large differences in elevation over short distances cannot be accessed by rail.

Criterion D: Site Configuration Accommodating Intact Unit Trains

The site configuration must allow for the opportunity to store intact unit trains. Keeping unit trains intact throughout their movement within an export terminal allows efficient operation and handling of the trains. The Applicant's goal is to be able to accommodate up to eight unit trains on site. This goal is tied to the proposed throughput and the Applicant's desire to accommodate a days' worth of trains on site to eliminate the need for trains to wait to access the site at locations on the spur line or main line track locations, which would in turn cause vehicular and other associated rail delays and backup.

The need to accommodate 8 unit trains on site is also tied to efficient shiploading. The types of vessels the proposed export terminal expects to call on its port are those that can ship large volumes of coal. If a site cannot accommodate up to 8 unit trains on a daily basis, vessels would have to remain at pier longer to wait for more coal to arrive by train, which would prevent the proposed export terminal from reaching its throughput threshold of approximately 40 to 50 MMTPY.

Similarly, if unit trains were required to be separated into a smaller number of cars, this would delay the transloading process. It would be less efficient for the Applicant to maneuver rail cars into shorter strings, which would require some rail cars to remain off site. This would require more time and labor on behalf of the Applicant to move the rail cars into place, and would likely increase vehicular or rail congestion requiring rail cars to be moved across area roadways, highways, or rail lines. A delay in the transloading process would require a larger stockpile area and larger site overall footprint for the proposed export terminal to meet the throughput threshold.

Results of Second-Tier Screening

The ten sites remaining after the first-tier screening were evaluated based on the second-tier criteria: a minimum site size of 175 acres, an appropriate site configuration to accommodate intact unit trains, rail access, and suitable topography. If either the site size or site configuration were inadequate, the site was rejected and no further evaluation occurred. Of the ten sites evaluated (Table D-2), two met the criteria and were recommended by the Applicant to be carried forward for analysis in the Draft EIS.

- Southwest Washington #2, Barlow Point, Longview (referred to as the Off-Site Alternative in the Draft EIS)
- Southwest Washington #3, Northwest Alloys (Chinook Ventures), Longview (the site currently leased by the Applicant and referred to as the On-Site Alternative in the Draft EIS)

These sites are shown as shaded in Table D-2.

Third-Party Review and Site Screening

The Corps requested its consultant to conduct a third-party review of the analysis prepared by the Applicant to identify alternative sites for the proposed export terminal. The third party's task included reviewing the Applicant's *Millennium Coal Export Terminal Project Purpose and Need, and Site Alternatives* document (Millennium Bulk Terminals—Longview 2014) and, using the Applicants screening criteria, determine if additional sites in the Pacific Northwest could be considered potential alternative sites for the proposed export terminal. Because the proposed site is near Longview, Washington, most analysis criteria were compared to the Applicant's Longview site.

Methods

The methods used by ICF to review the identification of alternative sites included the following steps.

1. Reviewing and understanding the screening criteria used by the Applicant to determine viability of Applicant-identified potential sites (Step 1).
2. Identifying additional potential alternative sites for the proposed export terminal not already identified by the Applicant (Step 2).

Applying the Applicant's screening criteria to both lists of potential sites to determine whether the Applicant's conclusion is still valid, i.e., that the two proposed sites present the only two viable alternative sites (Southwest Washington #2, Barlow Point, Longview, and Southwest Washington #3, Northwest Alloys/Chinook Ventures, Longview) (Step 3).

Table D-2. Second-Tier Screening of Sites Identified by Applicant

Site	Criterion A: Adequate Site Size[a] to Handle Throughput?	Criterion B: New or Rebuilt Rail[b] Needed to Access Site	Criterion C: Site Topography Suitable for On-Site Rail and Connection to Mainline?	Criterion D: Site Configuration Accommodates Intact Unit Trains?	Recommended for Further Consideration in Draft EIS?
Northwest Washington #3 Shell & Tesoro Refinery Dock Anacortes, WA	Yes	Approx. 1 mile of new rail required	Yes	No	No
Mid-Washington #1 Dupont Dupont, WA	Yes	Did not evaluate	Did not evaluate	No	No
Mid-Washington #2 Port of Everett Everett, WA	No Four areas of 9, 15, 13, and 13 acres each	Did not evaluate	Did not evaluate	Did not evaluate	No
Southwest Washington #1 Austin Point, Port of Woodland Woodland, WA	No Approx. 80 acres	Approx. 1.5 miles of new rail (additional right-of-way needed)	Did not evaluate	Did not evaluate	No
Southwest Washington #2 Barlow Point Longview, WA	Yes	Less than 2 miles	Yes	Yes	Yes
Southwest Washington #3 Northwest Alloys (Chinook Ventures) Longview, WA	Yes	None	Yes	Yes	Yes
Southwest Washington #6 Terminal 2, Port of Longview Longview, WA	No Approx. 120 acres	Did not evaluate	Did not evaluate	Did not evaluate	No
Southwest Washington #9 Kinder Morgan Terminal, Port of Vancouver Vancouver, WA	No Approx. 80 acres	Did not evaluate	Did not evaluate	Did not evaluate	No

Site	Criterion A: Adequate Site Size[a] to Handle Throughput?	Criterion B: New or Rebuilt Rail[b] Needed to Access Site	Criterion C: Site Topography Suitable for On-Site Rail and Connection to Mainline?	Criterion D: Site Configuration Accommodates Intact Unit Trains?	Recommended for Further Consideration in Draft EIS?
Northwest Oregon #1 Hunt Mill Point Bradwood Landing, OR	Yes	Did not evaluate	No	No	No
Northwest Oregon #4 Tongue Point, Port of Astoria Astoria, OR	No Approx. 40 acres	Did not evaluate	Did not evaluate	Did not evaluate	No

Notes:
Shading indicates that the site was recommended for further consideration in the Draft EIS.
[a] Minimum of 175 acres.
[b] Availability of rail access.
Source: Millennium Bulk Terminals—Longview 2014

Review of Screening Criteria

The Applicant presented a two-tiered screening process for assessing the viability of potential alternative sites. For the third-party review, the first step was to review the descriptions of the first- and second-tier screening criteria used by the Applicant to understand the underlying assumptions used during screening. When reviewing the screening criteria, ICF also referred to the sources of information identified in Table D-3.

Table D-3. Sources of Information Used to Review and Apply Screening Criteria

	Screening Criteria[a]	Source of Information
First-Tier Screening	Rail distance from the Powder River Basin relative to Longview, WA	http://www.bnsf.com/bnsf.was6/RailMiles/RMCentralController
	Trans-Pacific shipping time to Incheon, South Korea, relative to Longview, WA	http://www.sea-distances.org
	Deepwater access for Panamax-class vessels	Information available online for the website of each port
	Owner willing to lease or sell to a coal terminal in 2010	Information available online; contacted the port via phone, where necessary
Second-Tier Screening	Adequate site size to handle full throughput capacity (approximately 175 acres)	Information available online; contacted the port via phone, where necessary
	Miles of new or rebuilt rail needed to access site	Not researched in detail; however, reviewed information available online for the port and available parcel
	Site topography suitable for on-site rail and connection to mainline	Not researched in detail; however, reviewed Google Earth Maps, where necessary
	Site configuration accommodates intact unit train	Not researched in detail; however, reviewed information available online for the port and available parcel

Notes:
[a] Screening criteria were obtained from Table 10 in the *Millennium Coal Export Terminal Project Purpose and Need, and Site Alternatives* document (Millennium Bulk Terminals—Longview 2014).

Identification of Other Potential Alternative Sites

The second step of the third-party review was to generate a list of sites in Washington and Oregon that were not identified by the Applicant and could be considered potential sites for the proposed export terminal. A list was developed by searching online databases of industrial coastal properties in Washington and Oregon and identifying those terminals that are deepwater ports (or have the potential to become a deepwater port) and have existing rail access. The list of alternative sites was limited to only deepwater port terminals having rail access. Based on the Applicant's determination that only export terminals in the Pacific Northwest were cost effective to ship coal to Asia because of shorter rail distances from the source to the terminal and shorter vessel transportation distances, export terminals in California were not considered in the third-party review.

Application of Screening Criteria

The final step in the third-party review was to screen both the Applicant's list and the third party's list of potential sites using the two-tiered screening process identified by the Applicant. For the list of sites identified by the Applicant, ICF checked the screening process that resulted in eliminating a specific site from being considered for further evaluation. If ICF did not agree with the Applicant's determination a site should be eliminated from further evaluation, this determination is noted. For the list of sites generated by the third party, the third party evaluated each site by applying the two-tiered screening process. When reviewing the screening criteria, the third party referred to the sources of information identified in Table D-3.

Step 1: Review of Screening Criteria

To better understand the underlying assumptions used during screening, the third-party review applied the screening criteria to see if the same conclusions were reached as the Applicant. As mentioned in *Methods*, section, when reviewing the screening criteria, ICF referred to the sources of information identified in Table D-3.

First-Tier Screening Criteria

The following describes the results of the third-party review of each first-tier screening criterion.

Criterion 1: Minimize Rail Transportation Cost

Based on the Applicant's analysis, all ports along the Washington and Oregon coast were considered within a reasonable rail distance from the Powder River Basin[3] (i.e., the source of coal) relative to Longview, Washington. The Applicant concluded ports in California, however, would be too far from the Powder River Basin and transporting coal to these ports by rail would be cost prohibitive.

Using the BNSF 6003 Rail Miles Inquiry Tool (BNSF Railway 2015), the third party reviewed 12 representative locations for comparison purposes (four sites in each state), in addition to reviewing the proposed site in Longview, Washington, to confirm the rail distance between the Powder River Basin and ports in Washington and Oregon is substantially less than the rail distance between the Powder River Basin and ports in California.

As shown in Table D-4, the relative distance in rail miles from the Powder River Basin ranges from 97% to 119% for ports in Washington and Oregon compared to the distance from the Powder River Basin to Longview. Ports in California, however, increase the distance in rail miles from the Powder River Basin by approximately one-third compared to the rail distance from the Powder River Basin to Longview.

[3] In addition to coal produced by the Powder River Basin, Uinta Basin also produces high-quality coal that the Applicant anticipates exporting overseas; however, for the purposes of this assessment, rail distance was determined using the Powder River Basin, Wyoming, as the place of origin.

Table D-4. Rail Distance from Powder River Basin to West Coast Ports

Destination	Rail Miles[a]	Distance Relative to Distance from the Powder River Basin to Longview, WA (1,307 rail miles)
Ferndale, WA[b]	1,549	119%
Everett, WA[b]	1,475	113%
Tacoma, WA[b]	1,402	107%
Longview, WA	1,307	100%
Vancouver, WA	1,271	97%
Astoria, OR	N/A	N/A
St. Helens, OR	1,302	99%
Portland, OR	1,282	98%
Coos Bay, OR	N/A	N/A
Richmond, CA	1,767	135%
Sacramento, CA	1,650	126%
Stockton, CA	1,696	130%
Long Beach, CA	1,781	136%

Notes:

[a] Point of origin is Powder River, Wyoming.

[b] The rail distances for these ports were calculated by adding the rail distance between Powder River, Wyoming, and Longview, Washington, to the rail distance between Longview, Washington, and the West Coast port (i.e., Ferndale, Everett, and Tacoma, Washington). This approach was taken because the BNSF Railway source (2015) provides the rail distance for the shortest route between Powder River, Wyoming, and these ports, rather than providing the rail distance for the more likely route that would be taken from the Powder River Basin.

Source: BNSF Railway 2015

N/A = rail distance not available from BNSF Railway 2015.

Based on the results in Table D-4, the conclusion of the third-party review was the same as that of the Applicant: the rail distance from the Powder River Basin to ports in Washington and Oregon is approximately the same distance that must be traveled by rail from the Powder River Basin to Longview, Washington; and the rail distance from the Powder River Basin to ports in California is greater compared to the rail distance to ports in Washington and Oregon.

The third-party review did not conduct a cost analysis to confirm the Applicant's statement that the cost to transport coal to a port in California would be prohibitive; however, because the distance from the Powder River Basin to California ports is greater compared to the distance from the Powder River Basin to Washington and Oregon ports, the conclusion that it would be less expensive to transport coal to Washington and Oregon ports is reasonable. The higher cost to transport coal to any California terminal would be sufficiently expensive to render California sites economically infeasible and unable to provide a viable export terminal for Powder River Basin coal.

Conclusion of third-party review: A suitable site must be located in Washington or Oregon, to keep rail transportation costs low, which would enable the terminal to be economically feasible and able to provide a viable export terminal for Powder River Basin coal.

Criterion 2: Minimize Trans-Pacific Shipping Cost

Based on the Applicant's analysis, ports along the Washington and Oregon coast are considered to have relatively similar shipping times compared to Longview, whereas ports in California have relatively longer shipping times.

ICF used the sea-distances.org website (Sea-distances.org 2015) to identify the sea distance and shipping time for 12 west coast ports to Incheon, South Korea. This information is presented in Table D-5 for the same sites as those used in Table D-4 to determine the rail distance from the Powder River Basin to the potential sites.

Table D-5. Approximate Sea Distances and Shipping Times from West Coast Ports to Incheon, South Korea

Destination	Sea Distance to Incheon, South Korea (nautical miles)	Shipping Time to Incheon, South Korea[a] (days)
Ferndale, WA	4,996	17.3
Everett, WA	5,005	17.4
Tacoma, WA	5,031	17.5
Longview, WA[b]	5,062	17.6
Vancouver, WA	5,101	17.7
Astoria, OR	5,043	17.5
St. Helens, OR[c]	N/A	N/A
Portland, OR	5,101	17.7
Coos Bay, OR	5,114	17.8
Richmond, CA[d]	5,348	18.6
Sacramento, CA[d]	5,348	18.6
Stockton, CA[d]	5,348	18.6
Long Beach, CA	5,630	19.5

Notes:

[a] Based on vessel speed of 12 knots

[b] Transit distance and shipping times were calculated to Portland, OR (river mile 102) and corrected to Longview, WA (river mile 63)

[c] Information for St. Helens, OR, was not available at sea-distances.org; however, the transit distance and shipping times are estimated to be somewhere between those presented for Vancouver, WA, and Longview, WA.

[d] Transit distance and shipping times were calculated to Martinez, CA, and are similar for the ports of Richmond, Sacramento, and Stockton.

Source: Sea-distances.org 2015

N/A = not available from sea-distances.org 2015

Based on the information presented in Table D-5, the conclusion of the third-party review was the same as that of the Applicant: sea distance and shipping times from ports along the coast of Washington and Oregon to South Korea are very similar to that of Longview, Washington (17.3 to 17.8 days). In addition, sea distances and shipping times from California ports to South Korea are greater (18.6 to 19.5 days).

Although the third-party review did not conduct a cost analysis to confirm the Applicant's statement that additional shipping time to move the coal through a port in California would be cost prohibitive, according to the World Coal Institute (World Coal Institute 2005), transportation can account for 70% of the delivered cost of coal. Consequently, it is reasonable to conclude that the added

transportation costs associated with the longer sea distances and trans-Pacific shipping times to ship Powder River Basin coal from California ports would increase export costs and render California ports economically infeasible compared to shipping Powder River coal from Washington or Oregon ports.

Conclusion of third-party review: A suitable site must be located in Washington or Oregon to keep rail and trans-Pacific shipping costs low, which would enable the terminal to be economically feasible and able to provide a viable export terminal for Powder River Basin coal.

The coal export business is highly competitive. The cost of coal from the mine to the buyer comprises four primary components: 1) the cost of mining the coal, 2) the cost of shipping the coal via rail to an export terminal, 3) the cost of handling coal at the terminal (i.e., unloading, storing, and loading it onto ships), and 4) the cost of overseas shipping. As described above, the rail and ocean shipping distances play a role with longer distances likely to increase costs. A terminal located farther from the Powder River Basin, or farther from the end market in Asia, would require higher cumulative transportation costs. When comparing the price of coal at the mine, and the price of coal sold in Asia, a site outside of Washington or Oregon may be less competitive and, therefore, less economically viable than a Washington or Oregon location for an export terminal.

Criterion 3: Accommodate Panamax-class Vessels

Port locations and sites are constrained by the quality of maritime access they can provide. A primary component of this access is related to the depth of the waterway system.

According to the World Coal Institute (World Coal Institute 2005), typical shipping vessels range from Handymax (40,000 to 60,000 DWT) to Capesize vessels (80,000+ DWT). Panamax-class vessels typically hold 60,000 to 80,000 DWT; however, the medium-sized Panamax-class vessels are the most common ships used to transport coal internationally.

Panamax-class vessels are the mid-sized cargo ships that are capable of passing through the lock chambers of the original Panama Canal. Vessel limitations of the original Panama Canal are 1,050 feet (320.04 meters) in length, 110 feet (33.53 meters) in width, and 41.2 feet (12.56 meters) in depth. These limits have influenced ship building companies to build Panamax vessels strictly in accordance with the dimensions (width, length, and depth) of the Panama Canal lock chambers and the height of the Bridge of the Americas. A Panamax vessel should not exceed the dimensional limit of 965 feet (294,13 meters) in length, 106 feet (32,31 meters) in width, and 39.5 feet (12,04 meters) draft to easily and safely fit to the lock chambers and the height of the Bridge of Americas at Balboa. Panamax-class vessels have been in operation since the opening of the Panama Canal in 1914. (Maritime Connector 2016)

While a typical Panamax-class vessel could be accommodated by a 39-foot to 42-foot mean low water (MLW) channel, the draft of a Panamax vessel is dependent on the type (and stowage factor) of cargo loaded. With coal, the loadable quantity is generally constrained by the available draft rather than the available cargo space in the vessel. The Applicant intends for the proposed export terminal to receive primarily Panamax-class vessels and would maximize shiploading to take advantage of the 43-foot channel depth and the maximum available draft determined by the Columbia River Pilots.

Conclusion of third-party review: A suitable site must have a channel depth of at least 42 feet MLW.

Criterion 4: Owner Willing to Sell or Lease

The Applicant conducted research to determine the owners' willingness to sell or lease to a coal terminal. Existing transfer facilities with an owner unwilling to lease or sell to a coal terminal in 2010 were not considered as potential options. (As a privately owned company, the Applicant does not have condemnation authority like a public port or a railroad.)

The third-party review was unable to determine the owners' willingness to sell in 2010; however, research was conducted to determine if the ports and/or parcels in question were available to be sold or leased by identifying any apparent obstacles to selling. Following this research, the third-party review assumed that the owner was unwilling to sell or lease to a coal terminal when one or more of the following criteria was met.

- The port does not have property available to sell or lease.
- The port has a competing proposal of similar scope and scale, i.e., a site where the developer was already pursuing the same type of project (e.g., Terminal 5 at the Port of Vancouver, Washington; see Table D-7).

Conclusion of third-party review: A suitable site must be available to sell or lease and must not have a competing proposal of similar scope and scale on the same site.

Second-Tier Screening Criteria

The following describes the results of the third-party review of each second-tier screening criterion.

Criterion A: Size of Site to Accommodate Throughout

The Applicant determined that the desired throughput for an economically viable project is between 40 to 50 MMTPY. To achieve this capacity, the Applicant determined that a project site must be at least 175 acres to provide sufficient space for stockpiling and a full day of train traffic to minimize impacts on adjacent properties.

For the third-party review, a list of other proposed coal terminals in the Pacific Northwest was reviewed. The Applicant's facility is the second largest of five proposed facilities in Washington and Oregon; the capacity of the Applicant's facility is nearly double that of the next largest proposed facility. Table D-6 provides a summary of the five proposed coal export terminals with the location and proposed annual throughput capacity in million metric tons.

Table D-6. Size of Other Proposed Coal Export Terminals in the Pacific Northwest

Proposed Terminal	Terminal Location	Proposed Annual Throughput Capacity
Gateway Pacific Terminal	Whatcom County, WA	54 million metric tons
Millennium Bulk Terminals	Longview, WA	44 million metric tons
Port of St. Helens	Clatskanie, OR[a]	27.2 million metric tons
Port of Coos Bay	Coos Bay, OR[b]	10 million metric tons
Port of Morrow/ Port of St. Helens	Boardman and Clatskanie, OR	9 million metric tons

Notes:
[a] Export terminal proposal for Port of St. Helens dropped in May 2013 (Learn 2013a).
[b] Export terminal proposal for Port of Coos Bay dropped in April 2013 (Learn 2013b).
Source: Western Interstate Energy Board 2015

The Applicant's proposed site is significantly larger than other proposed facilities in the region (excluding the proposed Gateway Pacific Terminal) and suggests that 40 to 50 MMTPY may not necessarily be the minimum throughput capacity that would make the terminal economically viable. As requested by the Corps, the third party performed a coal market assessment to determine how much coal could be exported by the Applicant based on the current Asian market demand for western U.S. low-sulfur coal to warrant the development of a coal export terminal of this size. The assessment determined Asian demand is sufficient to support a terminal with the annual throughput capacity proposed by the Applicant (44 million metric tons), and the proposed throughput is sufficient to ensure an economically viable export terminal. Therefore, this analysis maintains the annual throughput capacity of 40 to 50 MMTPY as a threshold because it is consistent with the export terminal capacity proposed by the Applicant and was determined valid by the independent coal market assessment modeling results.

The Applicant has determined handling an annual throughput of 44 MMTPY would require eight unit trains daily. According to the Applicant, to accommodate an annual throughput of 44 MMTPY, the site would need sufficient space for one operating track and eight tracks for unit trains. The Applicant prepared three site plans as alternative layouts using what they considered to be the most efficient rail layout given the desired throughput of 44 MMTPY (see Appendix E, *Alternative Design Layouts*). The smallest of the three site plans to accommodate one operating track and eight tracks with an appropriate curve radii requires an acreage of approximately 175 acres, as determined by the Applicant's engineers.

The third-party review did not research the number of unit trains required daily to accommodate 44 MMTPY, nor did the third-party review research the number of tracks needed to accommodate eight unit trains daily. The third-party review assumed that this information was correct in determining a suitable site size to accommodate 44 MMTPY.

Conclusion of third-party review: An annual throughput capacity of 44 MMTPY would require 8 unit trains daily. To accommodate one operating track and 8 tracks for unit trains with an appropriate curve radii, a suitable site must be at least 175 acres.

Criterion B: Rail Access

The third-party review did not research the cost to rebuild existing or build new rail. The review assumed that the Applicant's criterion of avoiding or minimizing new rail construction or rebuilding of rail based on additional capital cost was valid.

Conclusion of third-party review: A suitable site must have rail access or be located close enough to existing rail lines to minimize the need to construct or rebuild new rail.

Criterion C: Topography Suitable for Rail

The third-party review did not research the suitability of site topography needed for rail. The review assumed that the Applicant's criterion—that site topography must be relatively flat to be suitable for on-site rail and rail connections to the mainline—was valid.

Conclusion of third-party review: A suitable site must have relatively flat topography to be suitable for on-site rail and connection to the mainline.

Criterion D: Site Configuration Accommodates Intact Unit Trains

The third-party review did not research the suitability of the Applicant's proposed site configuration to accommodate intact unit trains. The review assumed the Applicant's criterion was valid because keeping unit trains intact throughout their travel within an export terminal allows more efficient movement and handling of the trains. Maintaining efficient movement and handling of the trains would in turn provide for a more cost-effective and economically viable export terminal.

Conclusion of third-party review: A suitable site must allow a configuration that would accommodate intact unit trains.

Step 2: Identification of Other Alternative Sites

The Applicant identified and evaluated 29 alternative sites for the proposed export terminal (Table D-1).

Under Step 2, the third-party review identified additional ports in Washington and Oregon—not already identified by the Applicant—that could possibly be considered alternative sites for the proposed export terminal. The additional ports were determined by reviewing a search previously conducted by the third party that identified 36 deepwater ports in the Pacific Northwest. This list was shortened to include only those deepwater industrial ports with rail access.[4] As a result of this review, the list was shortened to eight sites as potential locations for the proposed export terminal in Washington and Oregon that were not already identified by the Applicant.

- Alcoa Intalco Works, Whatcom County, WA
- ConocoPhillips Ferndale Refinery, Whatcom County, WA

[4] The Applicant concluded rail access for unit trains is a necessary component for a viable terminal. The third-party review also considered rail access when screening potential sites for an export terminal. Only sites with existing rail right-of-ways (with or without tracks) were considered viable. For sites without adequate existing rails, the number of miles of new or rebuilt track was considered an important consideration in the viability of the site. A track extension was considered a potential reason for rejecting a site. Ultimately, no sites were excluded solely due to the need for an extension of new tracks or rebuild of existing tracks.

- Port of Port Angeles, Port Angeles, WA
- Port of Brownsville, Brownsville, WA
- Port of The Dalles, The Dalles, OR
- Port of Morrow, Morrow, OR
- Port of Umatilla, Umatilla, OR
- Port of Newport, Newport, OR

Step 3: Application of Screening Criteria

Under Step 3, the third-party review applied the first-tier and second-tier screening criteria to the sites identified as potential sites for the proposed export terminal. First-tier screening criteria were applied to sites identified by the Applicant and reviewed during the third-party review (Table D-7). First-tier screening criteria were also applied to the additional alternative sites identified during Step 2 of the third-party review (Table D-8). Second-tier screening criteria were then applied to those sites that were carried forward to second-tier screening (Table D-9), as identified in Table D-7 and Table D-8.

Results of the first-tier screening and second-tier screening are described in the following sections.

First-Tier Screening

Table D-7 shows the third-party review of first-tier screening performed by the Applicant. This analysis confirmed the elimination of 17 of the 29 sites by the Applicant based on first-tier criteria. However, for two sites the Applicant screened out, elimination could not be verified at the first-tier level, so these two additional sites were carried forward into the second-tier analysis by the third-party review, resulting in 12 sites evaluated at the second-tier level.

Table D-8 shows the eight additional sites identified by the third-party review and evaluated using the criteria established by the Applicant for first-tier screening. Based on this analysis, no new sites were carried forward in the third-party review to the second-tier screening. As mentioned previously, 12 sites were carried forward to the second-tier screening (Table D-7).

Table D-7. First-Tier Screening of Sites Identified by Applicant and Third-Party Review

Site	Identified by Applicant or Third-Party Review?	Applicant's Conclusion	Conclusion of Third-Party Review
WASHINGTON SITES			
Northwest Washington #1 Cherry Point Bellingham, WA	Applicant	Eliminated Criterion 1 (Minimize rail transportation rates): greater train distance Criterion 4 (Owner willing to sell or lease): owner unwilling to sell or lease	Elimination confirmed Site currently under review for full-service commodity export/ import facility, the Gateway Pacific Terminal[a]
Northwest Washington #2 Port of Anacortes Anacortes, WA	Applicant	Eliminated Criterion 1 (Minimize rail transportation rates): no rail access	Elimination confirmed Port is primarily used for the Washington State Ferries that provide service to the San Juan Islands and Vancouver Island, B.C.; there is no industrial rail service to the Port[b]
Northwest Washington #3 Shell & Tesoro Refinery Dock Anacortes, WA	Applicant	Carried forward	N/A
Mid-Washington #1 Dupont Dupont, WA	Applicant	Carried forward	N/A
Mid-Washington #2 Port of Everett Everett, WA	Applicant	Carried forward	N/A
Mid-Washington #3 Port of Tacoma Tacoma, WA	Applicant	Eliminated Criterion 4 (Owner willing to sell or lease): owner unwilling to sell or lease	Elimination confirmed Unwillingness to sell or lease not further investigated.
Mid-Washington #4 Port of Seattle Seattle, WA	Applicant	Eliminated Criterion 4 (Owner willing to sell or lease): owner unwilling to sell or lease	Elimination confirmed Unwillingness to sell or lease not further investigated.

Site	Identified by Applicant or Third-Party Review?	Applicant's Conclusion	Conclusion of Third-Party Review
Mid-Washington #5 Port of Olympia Olympia, WA	Applicant	Eliminated Criterion 3 (Accommodate Panamax-class vessels): 2 miles of federal channel at restricted depths (<28 feet bws)	Elimination confirmed Port has been dredged to 38 feet MLLW for Panamax vessels; however, the depth is not sufficient given the proposed throughput capacity and number of vessels that would be required for the proposed export terminal[c]
Mid-Washington #6 Blair Waterway, Puyallup Tribe Tacoma, WA	Applicant	Eliminated Criterion 4 (Owner willing to sell or lease): owner unwilling to sell or lease	Elimination confirmed Unwillingness to sell or lease not further investigated.
Southwest Washington #1 Austin Point, Port of Woodland Woodland, WA	Applicant	Carried forward	N/A
Southwest Washington #2 Barlow Point Longview, WA	Applicant	Carried forward	N/A
Southwest Washington #3 Northwest Alloys Longview, WA	Applicant	Carried forward	N/A
Southwest Washington #4 Port of Grays Harbor Aberdeen, WA	Applicant	Eliminated Criterion 3 (Accommodate Panamax-class vessels): 10 miles of federal channel at restricted depths (<40 feet bws)	Elimination confirmed Port has fully authorized to deepen the channel to 38 feet MLLW. This will accommodate Panamax-class vessels more easily. However, the depth is not sufficient given the proposed throughput capacity and number of vessels that would be required for the proposed export terminal.
Southwest Washington #5 Port of Kalama Kalama, WA	Applicant	Eliminated Criterion 4 (Owner willing to sell or lease): owner unwilling to sell or lease	Carried forward Not able to confirm unwillingness to sell or lease at Tier 1 level

Site	Identified by Applicant or Third-Party Review?	Applicant's Conclusion	Conclusion of Third-Party Review
Southwest Washington #6 Terminal 2, Port of Longview Longview, WA	Applicant	Carried forward	N/A
Southwest Washington #7 Columbia Gateway Facility, Port of Vancouver Vancouver, WA	Applicant	Eliminated Criterion 1 (Minimize rail transportation rates): no rail access	Carried forward The Port of Vancouver website indicates that they will be expanding rail access to the Columbia Gateway Facility[d]
Southwest Washington #8 Terminal 5, Port of Vancouver Vancouver, WA	Applicant	Eliminated Criterion 4 (Owner willing to sell or lease): owner unwilling to sell or lease	Elimination confirmed Another company has proposed building a Bulk Potash Handling Facility at Terminal 5; it is reasonable to conclude that the Port would be unwilling to sell to the Applicant
Southwest Washington #9 Kinder Morgan Terminal, Port of Vancouver Vancouver, WA	Applicant	Carried forward	N/A
Southwest Washington #10 Wasser-Winters Kelso, WA	Applicant	Eliminated Criterion 3 (Accommodate Panamax-class vessels): estimated 12 million cubic yards for initial dredging. Receives substantial sediment inputs from upstream sources requiring annual dredging.	Elimination confirmed As noted in Table D-1 (see note "c"), a substantial amount of dredging would be required to create and maintain a navigation channel
OREGON SITES			
Northwest Oregon #1 Hunt Mill Point Bradwood Landing, OR	Applicant	Carried forward	N/A
Northwest Oregon #2 Port of Portland Portland, OR	Applicant	Eliminated Criterion 4 (Owner willing to sell or lease): owner unwilling to sell or lease	Elimination confirmed Unwillingness to sell or lease not further investigated

Site	Identified by Applicant or Third-Party Review?	Applicant's Conclusion	Conclusion of Third-Party Review
Northwest Oregon #3 Port of Westward, Port of St. Helens Columbia County, OR	Applicant	Eliminated Criterion 4 (Owner willing to sell or lease): owner unwilling to sell or lease	Elimination confirmed In May 2013, the proposed export terminal that would have an annual capacity of 27.4 million metric tons was dropped by the applicant (Learn 2013a)
Northwest Oregon #4 Tongue Point, Port of Astoria Astoria, OR	Applicant	Carried forward	N/A
Northwest Oregon #5 Troutdale Sundial Sand & Gravel Site Troutdale, OR	Applicant	Eliminated Criterion 3 (Accommodate Panamax-class vessels): 12 miles of federal channel at restricted depths (<27 feet bws)	Elimination confirmed Third-party review unable to identify depth of channel. Assumed information provided by Applicant is correct
Western Oregon #1 Port of Coos Bay Coos Bay, OR	Applicant	Eliminated Criterion 3 (Accommodate Panamax-class vessels): 6 miles of federal channel at restricted depths (<37 feet bws)	Elimination confirmed Channel depth is 37 feet MLLW[e]
CALIFORNIA SITES			
Mid-California #1 Levin Terminal, Port of Richmond Richmond, CA	Applicant	Eliminated Criterion 1 (Minimize rail transportation rates): Nearly twice the cost to transport coal to CA as to Longview, WA. Criterion 2 (Minimize trans-Pacific shipping times): Greater distance to Incheon, South Korea Criterion 3 (Accommodate Panamax-class vessels): 2 miles of federal channel at restricted depths (38 feet bws)	Elimination confirmed Added transportation costs associated with greater rail and sea distances and longer shipping times would render location economically infeasible

Site	Identified by Applicant or Third-Party Review?	Applicant's Conclusion	Conclusion of Third-Party Review
Mid-California #2 Port of Sacramento Sacramento, CA	Applicant	Eliminated Criterion 1 (Minimize rail transportation rates): Nearly twice the transport coal to CA as to Longview, WA. Criterion 2 (Minimize trans-Pacific shipping times): Greater distance to Incheon, South Korea Criterion 3 (Accommodate Panamax-class vessels): 2 miles of federal channel at restricted depths (30 feet bws)	Elimination confirmed Added transportation costs associated with greater rail and sea distances and longer shipping times would render location economically infeasible
Mid-California #3 Port of Stockton Stockton, CA	Applicant	Eliminated Criterion 1 (Minimize rail transportation rates): Nearly twice the transport coal to CA as to Longview, WA. Criterion 2 (Minimize trans-Pacific shipping times): Greater distance to Incheon, South Korea Criterion 3 (Accommodate Panamax-class vessels): 2 miles of federal channel at restricted depths (35 feet bws)	Elimination confirmed Added transportation costs associated with greater rail and sea distances and longer shipping times would render location economically infeasible
Southern California #1 Port of Long Beach Long Beach, CA	Applicant	Eliminated Criterion 1 (Minimize rail transportation rates): Nearly twice the transport coal to CA as to Longview, WA. Criterion 2 (Minimize trans-Pacific shipping times): Greater distance to Incheon, South Korea	Elimination confirmed Added transportation costs associated with greater rail and sea distances and longer shipping times would render location economically infeasible

Notes:
[a] Gateway Pacific Terminal 2015
[b] Port of Anacortes 2015
[c] Port of Olympia 2013
[d] Port of Vancouver 2015
[e] Port of Coos Bay 2015
MLLW = mean lower low water; bws = below water surface; N/A = not applicable (third-party review did not address sites carried forward)

Table D-8. First Tier of Additional Sites Identified in Third-Party Review

Sites	Rail Distance from PRB[a]	Trans-Pacific Shipping Time to Incheon, South Korea	Deepwater Access for Panamax-Class Vessels?	Owner Unwilling to Lease or Sell for Coal Terminal?[b]	Carried Forward?
Alcoa Intalco Works Ferndale, WA	Similar (+/- 3%)	Similar (+/- 2%)	Yes	Unknown[c]	No
Conoco Phillips Ferndale, WA	Similar (+/- 3%)	Similar (+/- 2%)	Yes	Unknown[c]	No
Port of Port Angeles Port Angeles, WA	No rail access	Similar (+/- 2%)	Yes	Unknown	No
Port of Brownsville Brownsville, WA	No rail access	Similar (+/- 2%)	Yes	Unknown	No
Port of The Dalles The Dalles, OR	Similar (+/-3 %)	Similar (+/- 2%)	No[d]	Unknown	No
Port of Morrow Boardman, OR	Similar (+/- 3%)	Similar (+/- 2%)	No[d]	No (competing proposal)[e]	No
Port of Umatilla Umatilla, OR	Similar (+/- 3%)	Similar (+/- 2%)	No[d]	Unknown	No
Port of Newport Newport, OR	Similar (+/- 3%)	Similar (+/- 2%)	No[f]	Unknown	No

Notes:

[a] Compared to Longview

[b] Owners were not contacted for the additional sites as these sites did not meet one or more of the other first-tier screening criteria, or the site is currently being used for an industrial purpose and likely does not have capacity for additional industrial development.

[c] Because this is a refinery, it is not likely that the site would be available for additional industrial development suitable for an export terminal requiring train transport, stockpiling, and transfer to Panamax size vessels.

[d] The site is upstream of Bonneville Dam. Although the depth of the channel at this terminal could potentially be deep enough to accommodate Panamax-class vessels, in order for the vessels to reach the terminal it must first pass through the navigation lock at Bonneville Dam. The navigation lock at Bonneville Dam is 86 feet wide by 675 long (The U.S. Army Corps of Engineers), whereas Panamax-class vessels are approximately 106 feet wide by 965 feet long (Maritime Connector 2016) and, therefore, too large to fit through the navigation lock at Bonneville Dam. To transport coal from the terminal out to sea, the terminal would need to first load coal from rail onto covered barges. Similar to the Morrow Pacific Project, the coal would then be shipped down the Columbia River to Port of St. Helens' Port Westward Industrial Park, where enclosed transloaders would transfer the coal onto covered oceangoing Panamax ships (Ambre Energy 2015). This process would not meet the purpose and need identified for the proposed export terminal.

[e] Ambre Energy has proposed a similar project at the Port of Morrow. Based on the existence of a competing proposal, it is reasonable to conclude that the Port of Morrow would be unwilling to sell to the Applicant (Oregon Department of Environmental Quality 2015).

[f] The entrance bar to the Port of Newport is only dredged to 40 feet bws; Panamax vessels require deepwater access of at least 42 feet bws (Port of Newport 2015).

Second-Tier Screening

Table D-9 shows the third-party review of second-tier screening by the Applicant, as well as the second-tier screening of the two sites eliminated by the Applicant but carried forward by the third-party review. No new additional sites identified during the third-party review were carried forward to the second-tier screening.

This analysis confirmed the Applicant's ten sites evaluated using the second-tier criteria, two sites met the criteria and were carried forward for further consideration in this Draft EIS. The two sites the Applicant had rejected, but were carried forward into the second-tier screening based on the third-party review, were not carried forward because they did not meet the second-tier screening criteria (either because the site was too small or because there was no existing rail service near the site).

Table D-9. Second-Tier Screening of Sites Identified by Applicant and Third-Party Review

Site	Adequate Site Size to Handle Throughput (approx.. 175 acres)?	Site Configuration Accommodates Intact Unit Trains?	Miles of New or Rebuilt Rail Needed to Access Site	Site Topography Suitable for On-site Rail and Connection to Mainline?	Recommended for Further Consideration in Draft EIS?
Sites identified and carried forward by Applicant					
Northwest Washington #3 Shell & Tesoro Refinery Dock Anacortes, WA	Yes	No	Approx. 1 mile of new rail required	Yes	Applicant: No Third-party review: No Site configuration would not accommodate intact trains
Mid-Washington #1 Dupont Dupont, WA	Yes	No	Did not evaluate	Did not evaluate	Applicant: No Third-party review: No Topography is not suitable
Mid-Washington #2 Port of Everett Everett, WA	No Four areas of 9, 15, 13, and 13 acres each	Did not evaluate	Did not evaluate	Did not evaluate	Applicant: No Third-party review: No Site is too small
Southwest Washington #1 Austin Point, Port of Woodland Woodland, WA	No Approx. 80 acres	Did not evaluate	Approx. 1.5 miles of new rail (additional right-of-way needed)	Did not evaluate	Applicant: No Third-party review: No Site is too small
Southwest Washington #2 Barlow Point Longview, WA	Yes	Yes	Less than 2 miles	Yes	Applicant: Yes Third-party review: Yes
Southwest Washington #3 Northwest Alloys Longview, WA	Yes	Yes	None	Yes	Applicant: Yes Third-party review: Yes
Southwest Washington #6 Terminal 2, Port of Longview Longview, WA	No Approx. 120 acres	Did not evaluate	Did not evaluate	Did not evaluate	Applicant: No Third-party review: No Site is too small

Site	Adequate Site Size to Handle Throughput (approx.. 175 acres)?	Site Configuration Accommodates Intact Unit Trains?	Miles of New or Rebuilt Rail Needed to Access Site	Site Topography Suitable for On-site Rail and Connection to Mainline?	Recommended for Further Consideration in Draft EIS?
Southwest Washington #9 Kinder Morgan Terminal, Port of Vancouver Vancouver, WA	No Approx. 80 acres	Did not evaluate	Did not evaluate	Did not evaluate	Applicant: No Third-party review: No Site is too small
Northwest Oregon #1 Hunt Mill Point Bradwood Landing, OR	Yes	No	Did not evaluate	No	Applicant: No Third-party review: No Public opposition
Northwest Oregon #4 Tongue Point, Port of Astoria Astoria, OR	No Approx. 40 acres	Did not evaluate	Did not evaluate	Did not evaluate	Applicant: No Third-party review: No Site is too small
Sites identified by Applicant and carried forward by third-party review					
Southwest Washington #5 Port of Kalama Kalama, WA	No Approx. 75 acres	Did not evaluate	Did not evaluate	Did not evaluate	Applicant: Did not evaluate Third-party review: No; Site is too small
Southwest Washington #7 Columbia Gateway Facility, Port of Vancouver Vancouver, WA	Yes Approx. 541 acres	Did not evaluate, but with 541 acres it is likely to have sufficient space	No rail access[a]	Yes	Applicant: Did not evaluate Third-party review: No; Although Port indicates that the site will be served by rail at some point, currently the site has no rail
Sites identified by third-party review					
No sites were carried forward to second-tier screening.					

Notes:

[a] As of June 2014, ownership was not resolved to allow for a rail extension from Terminal 5 to the Columbia Gateway facility. A parcel within the potential rail corridor to this site was owned by a third party opposed to terminal development.

Alternatives to Be Carried Forward for Evaluation in Draft EIS

Based on the Applicant's screening of alternatives and the Corps' third-party review, the following alternatives will be carried forward and evaluated along with a No-Action Alternative.

- Southwest Washington #2, Barlow Point, Longview (referred to as the Off-Site Alternative in the Draft EIS)
- Southwest Washington #3, Northwest Alloys, Longview (the site currently leased by the Applicant and referred to as the On-Site Alternative in the Draft EIS)

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