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Cherry Point coal trains: environmental impact assessment

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Cherry Point Coal Trains



Environmental Impact Assessment

Huxley College of the Environment

Western Washington University

Winter 2012

ESCI 436

Photo Courtesy of: **Paul K. Anderson**

Environmental Impact Assessment

Huxley College of the Environment

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Signature _____ Signature _____
Sarah Brownell Kirsten Miller

Signature _____ Signature _____
Stephen O'Guin Matthew Reider

Signature _____
Sarah Ward

Dear Concerned Citizen,

This Environmental Impact Assessment (EIA) was performed and presented as a class project under the supervision of Dr. Leo Bodensteiner. Our group analyzed the proposed plan to develop Gateway Pacific Terminal, the largest coal port export facility in North America at Cherry Point in Whatcom County. Specifically, we focused on the effects of the transportation of coal through Whatcom County to the proposed west coast terminal site at Cherry Point.

The Gateway Pacfic Terminal, a project of Pacific International Terminals, would be owned by SSA Marine. Coal mined from the Powder River Basin by Peabody Energy would be hauled by trains along Burlington Northern Santa Fe (BNSF) rail lines. The coal train corridor extends from mines in Montana and Wyoming through Sandpoint, Idaho to Spokane, down through the Columbia River Gorge, then up along the Puget Sound coast, passing through the cities of Longview, Tacoma, Seattle, Edmonds, Everett, Mt. Vernon, Bellingham, Ferndale.

Moving 48 million tons of coal per year would mean an additional eighteen mile-and-a-half long coal trains through Bellingham's waterfront every day. The following Environmental Impact Assessment provides a discussion which includes the impacts of the current proposal, a proposed alternative, and a no-action alternative for the increase in coal train activity.

The Environmental Impact Assessment summarizes the impacts of the project on the both the built and nature environment.

We thank you for your interest in the topic of increased coal trains in Whatcom County.

Sincerely,

The Cherry Point Coal Train Environmental Impact Assessment Team

Cherry Point Coal Trains

Environmental Impact Assessment

Bellingham, WA

Prepared for:

Environmental Science 436

Professor Leo Bodensteiner

Western Washington University

Huxley College of the Environment

Prepared by:

Sarah Brownell

Kirsten Miller

Stephen O'Guin

Matthew Reider

Sarah Ward

**This presentation represents a class project that was carried out by students of Western Washington University, Huxley College of the Environment. It has not been undertaken at the request of persons representing local governments or private individuals, nor does it necessarily represent the opinion or position of individuals from the government or the private sector. **

FACT SHEET

Title

Cherry Point Coal Trains Environmental Impact Assessment

Description

This Environmental Impact Assessment (EIA) is based on the State Environmental Policy Act (SEPA) requirements for any action that has a significant, adverse impact on the environment. These requirements are set forth in Chapter 197-11 of the Washington Administrative Code (WAC).

The proposed action is to move up to 24 to 50 million metric tons of coal annually requiring at least nine additional mile-and-a-half long trains carrying coal and nine empty trains returning through Whatcom County every day on BNSF's Burlington–Ferndale rail line. Under this proposal, at least eighteen additional coal trains will pass through Whatcom County each day. This is in addition to current rail usage where an average of six trains pass between Everett to Brownsville, BC each day, according to Whatcom County Transportation Plan of 2007 (Coal Train Facts, 2011). Around thirty or more trains would pass through Whatcom County each day.

The proposed project also includes developmental changes to the Burlington Northern Santa Fe (BNSF) Railway Custer Spur line and two industrial service rail loops (Appendix- Figure A), both of which would be connected to the BNSF Railway's Custer Spur (Agencies, 2012).

Our alternative to the proposed action evaluates the use of an alternate train route through the Highway 9 corridor through the Southfork Valley to Lynden. The alternative would allow the coal trains to bypass major urban areas, such as Bellingham and Ferndale. However, in order to reach the final destination at the proposed Gateway Pacific Terminal at Cherry Point, linking the main Southfork line via Lynden would require construction of about ten new miles of rail line.

Under the no action plan, the Cherry Point Coal Terminal proposal would not be approved and there would be no change in the current rail usage in Whatcom County.

Location of Site

This Environmental Impact Assessment focuses on the adverse environmental effects of the coal trains traveling through Whatcom County and the construction associated with the additional tracks required by the project.

Proposer

Huxley College of the Environment Environmental Impact Assessment Winter 2012-ESCI 436

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Stephen O'Guin: Earth, Environmental Health, Noise, and Light

Matt Reider: Animals and Plants, Transportation

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Acknowledgements:

We would like to thank the following people for the contributions and guidance:

Dr. Leo Bodensteiner, Ph.D., Professor, Western Washington University

Lindsay Taylor, North Sound Baykeeper Project Coordinator, RESources

Jean Melious, Professor, Western Washington University

Issue Date

March 7th, 2012

Public Hearing

6:00 PM; Wednesday, March 7, 2012.

RESources Conference Room

2309 Meridian Street

Bellingham, WA 98225

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Glossary

Adjacent: lying near, close, or contiguous; adjoining; neighboring.

AMEC: an engineering consultancy and project management services firm conducting archaeological surveys at the project proposal site.

Arrhythmias: any disturbance in the rhythm of the heartbeat.

At-Grade Crossing: a junction at which two or more transport axes cross at the same level, also known as an At-Grade Intersection.

Autotroph: an organism capable of making nutritive organic molecules from inorganic sources via photosynthesis

Bioaccumulation: refers to the accumulation of substances, such as pesticides, or other organic chemicals in an organism.

Biomagnification: is the increase in concentration of a substance that occurs in a food chain as a consequence of persistence of the substance throughout the food chain.

Bifurcate: to divide or split into two branches.

Cardiopulmonary: of, pertaining to, or affecting the heart and lungs.

Cardiovascular: of, pertaining to, or affecting the heart and blood vessels.

Circadian rhythms: present in humans and most other animals, is generated by an internal clock that is synchronized to light-dark cycles and other cues in an organism's environment.

Coal Worker's Pneumoconiosis: Black Lung Disease; lung disease caused by inhaling coal dust.

Coniferous: any of various mostly needle-leaved or scale-leaved, chiefly evergreen, cone-bearing gymnospermous trees or shrubs such as pines, spruces, and firs.

Coronary: of or pertaining to the human heart, with respect to health.

Corrugation: the act of forming a wrinkle; fold; furrow; ridge.

Cortisol: one of several steroid hormones produced by the adrenal cortex and resembling cortisone in its action.

dBA: a unit used to express the intensity of a sound wave, equal to 20 times the common logarithm of the ratio of the pressure produced by the sound wave to a reference pressure, usually 0.0002 microbar.

Deciduous: certain trees and shrubs that shed their leaves annually.

Dredging: the removal of bed material using machinery other than hand-held tools (WAC 220-110-020).

Dust suppression topper agent: a chemical spray applied to the top of the coal train cars to keep sediment dust from blowing out into the surrounding environment.

Eminent domain: a circumstance when a landowner's property is taken by the government for the purposes of a public project.

Emissions: the production and discharge of something, especially gas or radiation.

Epinephrine: one of several steroid hormones produced by the adrenal cortex.

Erosion: the process of eroding or being eroded by wind, water, or other natural agents.

Flood desynchronization: when flooding is delayed by temporary water storage in wetlands.

Flood plain: is synonymous with one hundred-year flood plain and means that land area susceptible to inundation with a one percent chance of being equaled or exceeded in any given year. The limit of this area shall be based upon flood ordinance regulation maps or a reasonable method which meets the objectives of the act (WAC 173-22-030).

Frost heave: results from ice forming beneath the surface of soil during freezing conditions in the atmosphere. The ice grows in the direction of heat loss (vertically toward the surface), starting at the freezing front or boundary in the soil.

Gas exchange: is a process in biology where gases contained in an organism and atmosphere transfer or exchange.

Glaciomarine: of, or relating to, processes or deposits that involve the action of glaciers and the sea, or the action of glaciers in the sea.

Geofoam: is expanded polystyrene (EPS) or extruded polystyrene (XPS) manufactured into large lightweight blocks.

Grade Separation: is the method of aligning a junction of two or more surface transport axes at different heights so that they do not intersect or disrupt traffic flow.

Groundwater discharge area: the zone in which groundwater leaves the ground either as a spring or into a water body.

Herbaceous: is a plant that has leaves and stems that die down at the end of the growing season to the soil level. They have no persistent woody stem above ground. Herbaceous plants may be annuals, biennials or perennials.

Historic-period structures-in-ruin: an archaeological categorization of sites consisting of ruins of built structures.

Idling: to pass time without working or while avoiding work.

Impermeability: a descriptive term for earth materials which have a texture or structure that does not permit fluids to perceptibly move into or through its pores or interstices (WAC 173-160-111).

Infiltration: is the process by which water on the ground surface enters the soil.

Ischemic: local deficiency of blood supply produced by vasoconstriction or local obstacles to the arterial flow.

Loam: is soil composed of sand, silt, and clay in relatively even concentration (about 40%-40%-20% concentration respectively). Loams are gritty, moist, and retain water easily.

Maritime: is primarily an adjective that describes objects or activities related to the sea**.**

Methyl-mercury: organic form of mercury and the form of mercury that is most easily bioaccumulated in organisms; a neurotoxin.

Mortality: the relative frequency of deaths in a specific population; death rate

Movable-point frogs: a mechanical installation enabling railway trains to be guided from one track to another, such as at a railway junction or where a spur or siding branches off.

Neurotoxins: are an extensive class of exogenous chemical neurological insults which can adversely affect function in both developing and mature nervous tissue.

Organic compound: is any member of a large class of gaseous, liquid, or solid chemical compounds whose molecules contain carbon.

Pacific Flyway: is the major north-south route of travel for migratory birds in America, extending from Alaska to Patagonia.

Particulate matter: are tiny subdivisions of solid matter suspended in a gas or liquid.

Pedestrian survey: an archaeological technique, also called surface survey or reconnaissance survey, involves walking the surface of an archaeological site or large region in stratified patterns, and either marking the location of identified artifacts, or collecting a sample for further investigation. The field method is an established practice for providing data on settlements in large regions, and is usually considered one part of an investigation strategy.

Piscivorous: habitually feeding on fish; fish-eating.

Rail embankment: a road, railway line or canal is normally raised onto an embankment made of earth to avoid a change in level required by the terrain, the alternatives being either to have an unacceptable change in level or detour to follow a contour.

REM sleep: a recurrent period of sleep, typically totaling about two hours a night, during which most dreaming occurs as the eyes move under closed lids and the skeletal muscles are deeply relaxed.

Riparian: is the interface between land and a river or stream.

Safety Gate: gates located on either side of at-grade railroad crossing to prevent traffic, humans, bicycles or any other form of transportation from crossing the railroad as trains pass by.

Site 45WH523: the title assigned to non-significant archaeological site located at the project site.

Site 45WH1: the title assigned to significant archaeological site located at the project site.

Shell midden: an archaeological feature consisting mainly of mollusk shells. Shell middens contain debris and waste products relating to human activity and are directly associated with villages, as a designated village dump site. Middens provide a useful resource for archaeologists wishing to study the diet and habits of past societies.

Subgrade: is the native material underneath a constructed road, pavement or railway (US: railroad) track. It is also called formation level. The term can also refer to imported material that has been used to build an embankment.

Surface water: All lakes, rivers, ponds, wetlands, streams, inland waters, salt waters and all other surface water and surface water courses within the jurisdiction of the state of Washington (WAC 173-350-100).

Telecommunications: is the transmission of information over significant distances to communicate.

Terrestrial biological resources:

Topography: is a field of planetary science comprising the study of surface shape and features of the Earth and other observable astronomical objects including planets, moons, and asteroids. It is also the description of such surface shapes and features.

Treaty of Point Elliott (1855): Signed on January 22, 1855 at Point Elliott (near Mukilteo, Washington) created a Government-to-Government relationship between the United States and the Native Tribes of Washington including: the Dwamish, Suquamish, Sk-kahl-mish, Sam-ahmish, Smalh-kamish, Skope-ahmish, St-kah-mish, Snoqualmoo, Skai-wha-mish, N'Quentl-ma-mish, Sk-tah-le-jum, Stoluck-wha-mish, Sno-ho-mish, Skagit, Kik-i-allus, Swin-a-mish, Squin-ah-mish, Sah-ku-mehu, Noo-wha-ha, Nook-wa-chah-mish, Mee-see-qua-guilch, and Cho-bah-ah-bish. The United States Senate ratified the Point Elliott Treaty in 1859. The Point Elliott Treaty guaranteed hunting and fishing rights and reservations to all Tribes represented by the Native signers. In return for the reservation and other benefits promised in the treaty by the United States government, the Duwamish Tribe exchanged over 54,000 acres of their homeland. Today those 54,000 acres include the cities of Seattle, Renton, Tukwila, Bellevue, and Mercer Island, and much of King County.

Vasoconstriction: constriction of the blood vessels, as by the action of a nerve.

Vegetation: is a general term for the plant life of a region; it refers to the ground cover provided by plants. It is a general term, without specific reference to particular taxa, life forms, structure, spatial extent, or any other specific botanical or geographic characteristics.

Wellhead protection area (WHPA): the portion of a well's, wellfield's or spring's zone of contribution defined using WHPA criteria established by the department (WAC 246-290-010).

Wetlands (Palustrine and forested shrub wetlands): those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (WAC 173-22-030).

Washington Natural Heritage Program: The WNHP manages site-specific and species/ecosystem-specific information on priority species and ecosystems; those that are rare or have very limited distribution.

Acronyms and Abbreviations

AREMA: The American Railway Engineering and Maintenance-of-Way Association

BLD: Black Lung Disease

BNSF: Burlington Northern Santa-Fe

CWP: Coal Worker's Pneumoconiosis

DAHP: Washington State Department of Archaeology and Historic Preservation

dBA: Decibels

EIA: Environmental Impact Assessment

EPA: Environmental Protection Agency

EMS: emergency medical services

ER: emergency room

FRA: Federal Railroad Administration

FRAOS: Federal Railroad Administration Office of Safety

FTA: Federal Transportation Administration

GPT: Gateway Pacific Terminal

NAAQS: National Ambient Air Quality Standards

NCRS: Natural Resources Conservation Service

NRDC: Natural Resources Defense Council

NRHP: National Register for Historic Places

NWAA: Northwest Archaeological Associates

NWCAA: Northwest Clean Air Agency

PM: Particulate Matter

PUD: Public Utility District

RACT: Reasonable Available Control Technology

REM: Rapid Eye Movement

UGA: Urban Growth Area

USDA: United States Department of Agriculture

WAC: Washington Administrative Code

WORC: Western Organization of Resource Councils

1. Executive Summary

1.1 Purpose

The purpose of this environmental impact assessment (EIA) is to determine the potential environmental effects of increasing the amount of coal trains passing through Whatcom County if the Gateway Pacific Terminal site were to be approved at the Cherry Point, Whatcom County location (Figure 1.2a).

This document addresses the environmental impacts train traffic associated with of the Gateway Pacific Terminal's proposed construction project at Cherry Point in Whatcom County, which would increase the amount of coal train traffic passing through Whatcom County by about 18 additional trains each day. The environmental impact assessment includes detailed sections on the existing conditions of the natural and built environments with the impacts each action will have on the respective categories. Mitigation measures are defined for any impact determined to be significant. The no action alternative impacts refer to no construction or related aspects of the proposed project.

Currently there are only six trains on average that travel through Whatcom County each day on the Burlington Northern Santa Fe (BNSF) rail line. The proposed action would require coal trains traveling from Powder River Basin, Wyoming, to the west coast and terminating at Cherry Point.

The most significant adverse effects could be caused during transport of the coal in Whatcom County. The main environmental concerns associated with implementation of the Gateway Pacific site include the impacts from the dispersal of coal dust blowing off of the uncovered coal rail cars. The three options targeted by the document are the proposed action, the alternative action, and no action. The alternative action includes rerouting of the train transport to the east of Whatcom County where there is an existing BNSF rail line. The primary difference between the two options is the difference in the population density affected. The impacts from the transport of coal has similar effects to the natural environment in the proposed action and the alternative action. The emphasis of the alternative action is to minimize the impacts on the built environment.

1.2 Site Description

Cherry Point Location & Vicinity Map

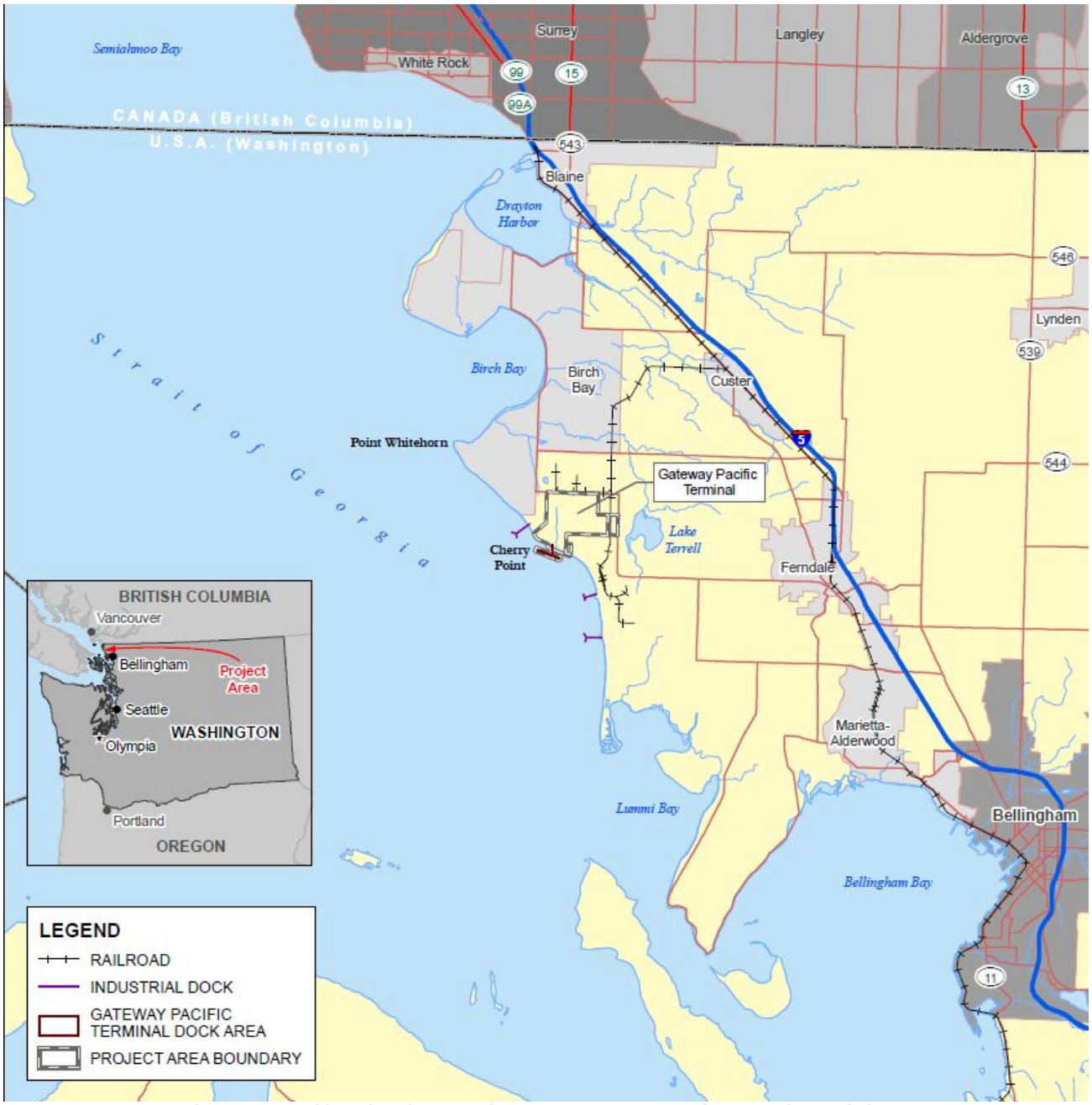


Figure 1.2a. View depicting rail line leading to Cherry Point, surrounding roads, and the site to develop the Gateway Pacific Terminal

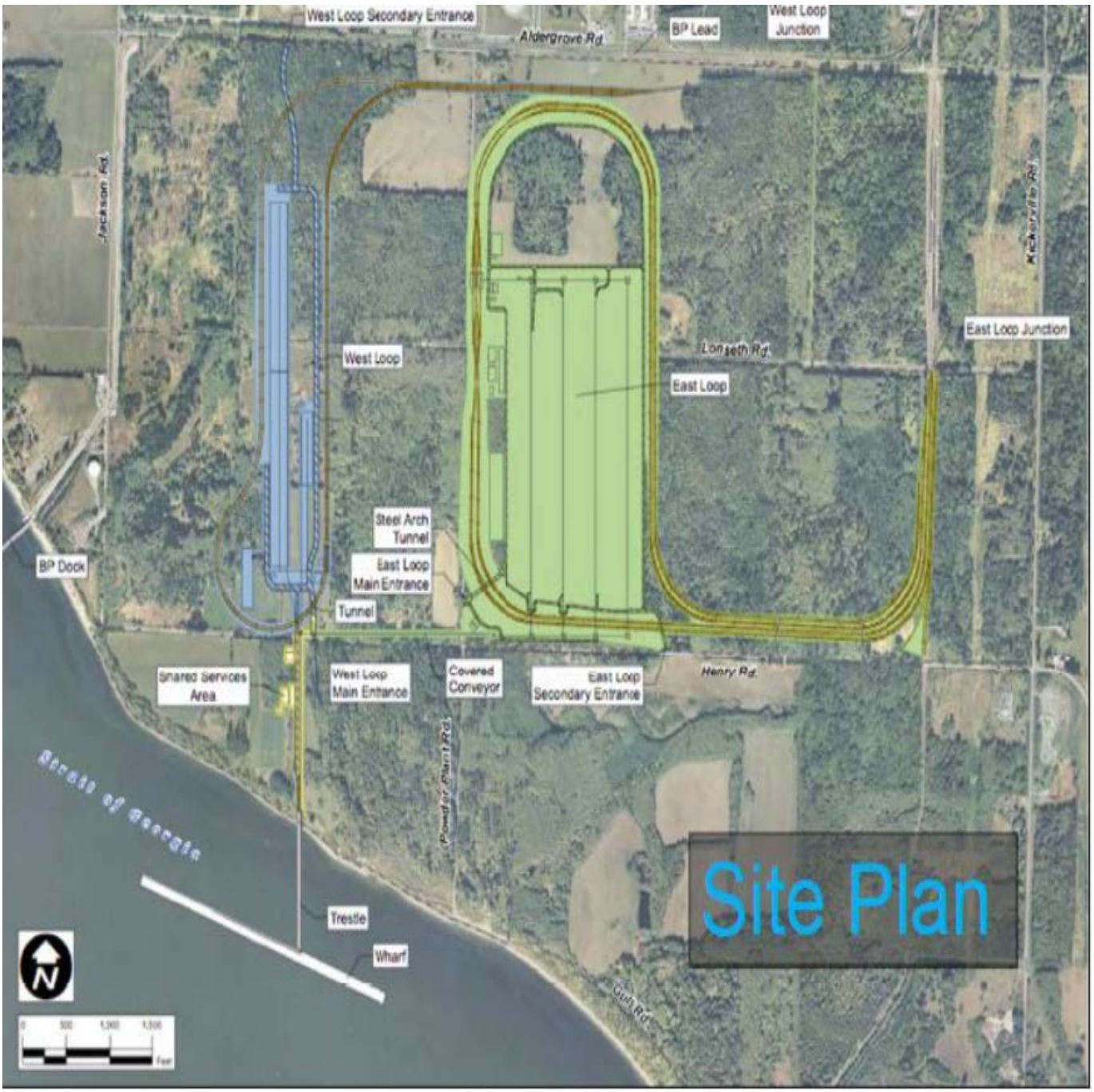


Figure 1.2b. Aerial view depicting East and West loops at Cherry Point

EARTH

The proposed action will impact soils mainly at the projected terminal site due to grading and fill to ready the site for the construction of the East Loop and West Loop required to receive trains carrying commodities.

AIR

The proposed action will have significant negative impacts on air quality and climate change due to a vast increase in diesel emissions and fugitive coal dust. Air quality will be degraded due to the release of soot and hazardous chemicals into the Whatcom County air supply potentially adversely affecting human and environmental health.

LAND AND SHORELINE USE

The proposed project will have no significant effects on the land and shoreline use of the site area or adjacent properties. The rail line is currently in use for the transportation of commerce to existing major ports in Whatcom County and in Canada.

ENERGY AND NATURAL RESOURCES

The proposed action will have a direct effect on stocks of natural resources. The proposed action would result in an increase in idling engines as well as safety gate and light activity along the rail lines. This, in turn, will result in an increased demand for diesel fuel, electricity and water.

WATER

The proposed action will impact water quality due to the increase in amount of coal trains passing over waterways in Whatcom County. The transportation corridor directly parallels Bellingham Bay for more than thirty miles. The rail line crosses streams, rivers, and critical wetlands areas. The increase in amount of coal trains will increase the amount of coal dust transported, which may affect water quality and disrupt ecosystems.

PLANTS AND ANIMALS

This section describes the upland biological resources in the proposal area and provides an assessment of potential environmental effects of the coal train on upland vegetation, wildlife, and habitat. While the focus of this section is terrestrial biological resources, some of the species discussed utilize wetland, marine, and/or riparian habitats at times, and references to these habitats are included here.

ENVIRONMENTAL HEALTH

The proposed action will result in significant adverse impacts to the surrounding communities through particulate emissions (diesel fumes and fugitive coal dust), noise pollution, chemical storage and increased wait times for emergency response services (EMS).

UTILITIES

The proposed action will result in the Public Utility District No.1 (PUD) of Whatcom County and other utilities being faced with the responsibility of handling an increased demand for electricity use along the rail lines. However, the capital in place for PUD and other affected utilities deem them more than capable of handling the increased demand.

LIGHT

The proposed action would result in negative impacts to the communities adjacent to the main line Burlington Northern Santa Fe track within Whatcom County and the Custer Spur, to both humans and animals.

PUBLIC SERVICES

Public services such as police protection, fire protection, health care services and emergency vehicles will be directly impacted by the proposed project. Demand for public services will increase significantly as a result of intensified rail traffic and road traffic delays. These delays will put great stress on the emergency responders as prolonged, more frequent rail crossings imply delayed emergency medical service response times, as well as increased risk of accidents, traumatic injury and death.

TRANSPORTATION

The proposed action will increase the railroad usage by 18 more coal trains each day. This action has severe impacts to the transportation systems present throughout Whatcom County, such as increased wait times for public transportation, medical controversies with EMS services and bifurcation of downtown. The impacts that the alternative route effects will have similar characteristics as the proposed action.

HISTORIC AND CULTURAL PRESERVATION

The proposed action may interfere with historic and cultural preservation, as Cherry Point is an important site for natives of Whatcom County. The construction of the rail line at the Cherry Point site will prevent natives from accessing their cultural grounds, inhibiting cultural practices and preservation and overall negatively impacting tribal people. The public also values the proposal site for recreational uses. The shoreline is open to the public and is used by the public for many water related activities including kayaking, boating and fishing. The construction of rail lines, increased rail traffic, noise pollution, diesel odor emissions and air pollution associated with the proposed project will deter recreational activities in the area.

AESTHETICS

The proposed action will adversely affect the aesthetic values of Bellingham. The coal trains will pollute the natural aesthetics and reduce the quality of life by imposing fugitive coal dust, smog, train whistles, screeching wheels, negative health impacts and traffic congestion on the community. The proposal will digress from and discredit the proactive environmental efforts and values of the Whatcom County community.

HOUSING

The proposed action will not include the construction or removal of any housing units to Whatcom County. However, it is likely that the increased rail traffic will decrease property values of homes in the areas surrounding the rail corridor. Constant rail traffic brings with it increased noise, vibrations, environmental toxins, delays and fears of accidents; all of which negatively impact real estate values by degrading the attractiveness of certain residential locations.

1.3 Description of Proposed Action and Alternatives

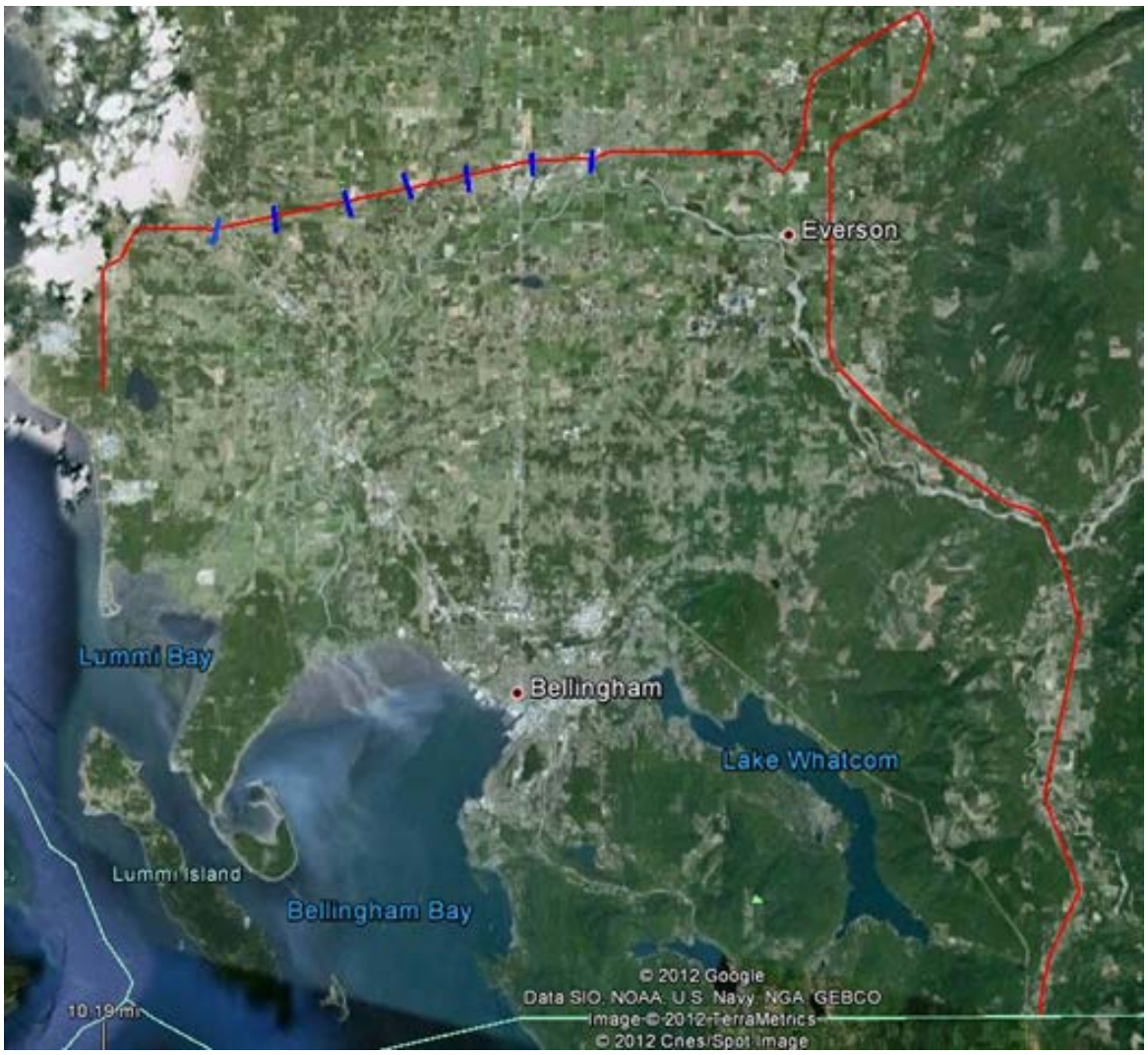
Proposed Action

There are currently plans to develop the largest coal export facility in North America at Cherry Point, in northwest Washington state. If the proposal is successful, the rail corridor extending from the mines in Montana and Wyoming through Idaho and Spokane, the Columbia River Gorge and along Puget Sound would be effect as many as 18 daily trains (9 full, 9 empty) would be required to shuttle coal from mines in Montana and Wyoming through Sandpoint, Idaho to Spokane, down through the Columbia River Gorge, then up along the Puget Sound coast, passing through Longview, Tacoma, Seattle, Edmonds, Everett, Mt. Vernon, Bellingham, Ferndale.

The proposed action is to move up to 24 to 50 million metric tons of coal annually requiring at least nine additional mile-and-a-half long trains carrying coal and nine empty trains returning through Whatcom County every day on BNSF's Burlington–Ferndale rail line. Under this proposal, at least eighteen additional coal trains will pass through Whatcom County each day. This is in addition to current rail usage where an average of six trains pass from Everett to Brownsville, BC each day, according to Whatcom County Transportation Plan of 2007 (Coal Train Facts, 2011). Around thirty or more trains would pass through Whatcom County each day. The increase in coal trains would include impacts on the to local economies, public health, and rail corridor communities as a long as built and natural environmental impacts as discussed in the EIA.

Proposed Alternative Action

In order to avoid at least eighteen coal trains from traveling through highly populated areas each day, the alternative action will divert the route of coal trains to the eastern perimeter of Whatcom County. Another section of Burlington Northern Santa Fe travels north for approximately 39.8 miles beginning at the most southwestern point of the Skagit-Whatcom County border north to Lynden, WA approximately 12.7 miles east of the proposed route. The addition of another 9.6 miles of new track and a crossing at Interstate 5 and Nooksack river would be required to reach the Custer Spur before reaching it's final destination at the Gateway Pacific Terminal site.



No Action

Under the no action alternative, the proposed Gateway Pacific Coal Terminal at Cherry Point would not be constructed and the site would remain in its currently undeveloped state for the foreseeable future. There would be no change in the current transport of coal train traffic in Whatcom County. Other industrial development would be likely to occur on the site and adjacent properties over time, consistent with the existing industrial zoning.

1.4 Permits and Approvals

The permitting process for the Gateway Pacific Terminal will be complex and will involve multiple levels of federal, state and local review. Decision-makers for this project include the Whatcom County Council for shoreline and development permits and the Public Lands Commissioner at the Department of Natural Resources for an aquatic lease (state-owned tide lands). The Department of Ecology, the Department of Fish and Wildlife and the U.S. Army Corps of Engineers must also grant approvals in order for the project to go through. These governmental bodies will consider the Environmental Impact Statement when making their decisions. The Lummi and Nooksack Nations, following their own processes, will render pivotal decisions regarding usual and accustomed fishing grounds.

Primary decision makers for permits regarding train development will be:

- the Whatcom County Council for shoreline and development permits
- the Department of Ecology for water quality and storm water approvals
- the U.S. Army Corps of Engineers for construction on wetlands
- U.S. Congress: BNSF rail improvements
- Lummi Nation and Nooksack Indian Tribes: permission related to impact on fishing grounds

1.5 Decision Matrix

+ = Positive Impact - = Negative Impact 0 = No Impact

Natural Environment	Proposed Action	Alternative Action	No-Action
Earth			
Geology	-	-	0
Soils	-	-	0
Topography	-	-	0
Erosion	-	-	0
Unique Physical Features	0	-	0
Air			
Air Quality	-	-	0
Odor	-	-	0
Climate	-	-	0
Water			
Surface Water	-	-	0
Flooding	0	0	0
Ground Water	-	-	0
Runoff/Absorption	-	-	0
Public Water Supplies	-	-	0
Plants & Animals			
Habitat/Diversity	-	-	0
Unique Species	-	-	0
Migration Routes	-	-	0

Energy & Natural Resources			
Amount/Efficiency	-	-	0
Source/Availability	0	0	0
Renewable Resources	-	-	0
Scenic Resources	-	-	0
Built Environment			
Environmental Health			
Noise	-	-	0
Risk of explosion	-	-	0
Public Health	-	-	0
Land & Shoreline Use			
Existing Land Use	0	-	0
Housing	-	-	0
Light & Glare	-	-	0
Aesthetics	-	-	0
Recreation	-	-	0
Historical & Cultural Preservation	-	-	0
Agricultural Crops	0	-	0
Transportation			
Transportation Systems	-	-	0
Vehicular Traffic	-	-	0
Waterborne, rail & air traffic	-	-	0
Traffic Hazards	-	-	0
Public Services & Utilities			

Fire/Police	-	-	0
Schools	-	0	0
Parks & Recreation	-	-	0
Maintenance	-	-	0
Communications	-	-	0

1.6 Recommendation

Based on our findings on the impacts to the natural and built environments from the increase of transport in coal in the following EIA, we would recommend the No Action alternative. In this alternative, the proposed Gateway Pacific Coal Terminal at Cherry Point would not be constructed and the site would remain in its currently undeveloped state. Without the construction at the site, there would be no change in the current transport of coal train traffic in Whatcom County. This is the best option for Whatcom County because there would be no increase in coal transport and therefore no additional adverse impacts in Whatcom County.

2. Elements of the Natural Environment

2.1 Earth

Existing Conditions

This section describes the existing physical landscape including topography, soils, and other factors that exist in Whatcom County.

Topography: Beginning at the southwestern most point on the Whatcom- Skagit County border, the Burlington Northern Santa Fe Rail system travels North for approximately 30.5 miles before culminating at the Gateway Pacific Terminal site location about 2 miles west of Lake Terrell and 9.5 miles south of the Canada- USA international border (Appendix Figure 2.1a). The rail system travels along a mostly flat to gently sloping route with a percent slope range of 0 to 8% (Soil Survey). The tracks run over a variety of soils.

Soils: This section outlines both the soils classifications and descriptions for the project site based on both Natural Resources Conservation Service (NRCS) maps and data from the USDA Soil Conservation Service Soil Survey of Whatcom County Area, Washington. Soils only include the top 40 inches of depth from the surface.

The coal trains of this proposal would cross through eight different Whatcom soils: 1) Mt. Vernon-Puyallup, a very deep moderately well drained level soil; 2) Kickerville-Barneston-Everett, a very deep well and excessively well drained level to steep soil; 3) Lynden-Hale-Tromp, a very deep well and poorly drained level to sloping soil; 4) Pangborn-Fishtrap-Shalcar, a very deep, very poorly drained soil with artificial drainage; 5) Whatcom-Labounty, a very deep, moderately well drained level to very steep soil; 6) Birchbay- Whitehorn, a very deep, moderately well drained level to gently sloping soil; 7) Skipopa-Bellingham, a very deep, poorly drained sloping soil; and 8) Squalicum-Chuckanut-Nati, a deep, moderately drained level to steep soil. Most of the areas with these soil types have existing train tracks above them that the coal trains would use to get to the Gateway Pacific Terminal.

Proposed Action

This section describes the physical landscape including topography, soils, and other factors influencing both the existing railway and the additions from the Gateway Pacific Terminal.

The proposed Gateway Pacific terminal site rests atop the Birchbay-Whitehorn soil. This soil area is located on the wave-reworked glaciomarine drift plains of western Whatcom County with a slope range of 0-8%, according to the Soil Survey of Whatcom County, WA. The NRCS has determined and mapped seven soil subtypes at the project site (Appendix Figure 2.1b): These soil subtypes include Birchbay silt loam, Clipper silt loam, Edmonds-Woodlyn loams, Hale silt loam, Kickerville silt loam, Neptune very gravelly sandy loam, Tromp loam, Whatcom silt loam, and Whitehorn silt loam.

Impacts on Topography and Soils

Topography: Much of the proposed area within the East Loop and West Loop will be "graded to create a level surface for rail embankments. Grading would alter the existing topographic elevations to create large level areas for commodity handling. Filling and compaction would be needed to create level rail embankments" (PIT, Inc., 2011). Although the East Loop and West Loop location is mainly flat, the existing topography would be altered to new contours in many locations at the proposed site. Currently, the exact lightweight fill is unknown but can include a wide variety of materials such as geofoam, lightweight aggregate, wood chips, shredded rubber tires, and other materials.

Additionally, based on the American Railway Engineering and Maintenance-of-Way Association (AREMA) standards, the glaciomarine drift, composed of clay and silty to sandy clay, is considered a "poor" to "bad" subgrade for railway embankment. As such, geotechnical risks including "medium- to high-severity frost heave, fair to poor drainage, and slight to high severity pumping action along the rail alignments" require adequate subgrade preparation.

Soils: Filling and grading of the site to create level ground capable of supporting the East Loop and West Loop is an indicator of unstable soils. The land will change from wetlands and fields to dual rail loops resting on unstable compacted soils. In addition, locomotive trains vibrate the ground at a velocity level between 80 and 90 VdBs (Figure 2.1c). Adding up to 8 additional trains a day would create more frequent vibration along the track and at the terminal site, on graded and filled land, adding to the potential for settling (WADOE). Additionally, erosion will likely increase encouraged due to grading and filling for the construction of the East Loop and West Loop by water, wind, and ice.

Mitigation

Subgrade improvements using compacted stone columns or aggregate piers beneath the planned fill embankments can be used to minimize settlement even though they have relatively high costs and are mostly used when supporting critical structures (PIT, Inc., 2011).Additionally, techniques will be implemented ranging from completing all major earthwork in Stage 1 (the first of 3 stages) so that earth and soil will only be overturned one time for the remainder of the project.

Alternative Action

This section describes the physical landscape including topography, soils, and other factors influencing the alternative route.

Topography: The rail system for the alternative action travels along a mostly flat to gently sloping route with a percent slope range of 0 to 8% (Soil Survey). The tracks run through a variety of soil types.

Soils: This section outlines both the soils classifications and descriptions for the alternate project site based on both Natural Resources Conservation Service (NRCS) maps and data from the USDA Soil Conservation Service Soil Survey of Whatcom County Area, Washington.

Soils Overview: The coal trains from the alternative action would cross through 9 different Whatcom soils: 1) Mt. Vernon- Puyallup, a very deep moderately well drained level soil; 2) Briscot-Oridia: a very deep, poorly drained level soil on floodplains; 3) Kickerville-Barneston-Everett, a very deep well and excessively well drained level to steep soil; 4) Lynden-Hale-Tromp, a very deep well and poorly drained level to sloping soil; 5) Pangborn-Fishtrap-Shalcar, a very deep, very poorly drained soil with artificial

drainage; 6) Whatcom-Labounty, a very deep, moderately well drained level to very steep soil; 7) Birchbay- Whitehorn, a very deep, moderately well drained level to gently sloping soil; 8) Skipopa-Bellingham, a very deep, poorly drained sloping soil; and 9) Squalicum-Chuckanut-Nati, a deep, moderately drained level to steep soil. Most of these soil types are under existing train track that the coal trains would use to get to the Gateway Pacific Terminal.

The proposed Gateway Pacific terminal site, however, rests atop the Birchbay-Whitehorn soil. This soil area is located on the wave-reworked glaciomarine drift plains of western Whatcom County with a slope range of 0-8%, according to the Soil Survey Whatcom County, WA. The NRCS has determined and mapped seven soil subtypes at the project site (Figure 2.1a): Birchbay silt loam, Clipper silt loam, Edmonds-Woodlyn loams, Hale silt loam, Kickerville silt loam, Neptune very gravelly sandy loam, Tromp loam, Whatcom silt loam, and Whitehorn silt loam. Soils only include the top 40 inches of depth.

Impacts on Topography and Soils

The alternate route is subject to the same impacts as the proposed Gateway Pacific Terminal route as specified above.

In addition to the proposed route, the alternative route would require at least 9.6 miles of track to span from Lynden, WA to the Burlington Northern Santa Fe Custer Spur. Grading and fill of earth and gravel would be required to support the tracks as well as the creation of crossings where none were initially present.

Another impact on the topography of the alternative route would be the grading, removal, and fill of earth to create either an overpass or a tunnel in order for the track addition between Lynden and the Custer Spur to cross Interstate 5.

Mitigation

Subgrade improvements using compacted stone columns or aggregate piers beneath the planned fill embankments can be used to minimize settlement even though they have relatively high costs and are mostly used when supporting critical structures (PIT, Inc., 2011).Additionally, techniques will be implemented ranging from completing all major earthwork in Stage 1 (the first of 3 stages) so that earth and soil will only be overturned one time for the remainder of the project.

No Action

Impacts

Under the no action alternative, no major impacts to the geology, topography, and soil will be present.

Mitigation

Erosion will occur at natural rates, requiring no mitigation.

2.2 Air

Existing Conditions

Air quality is generally assessed in terms of whether concentrations of air pollutants are higher or lower than ambient air quality standards established to protect human health and welfare. Three agencies have jurisdiction over ambient air quality in the project area: the US Environmental Protection Agency (EPA), Washington Department of Ecology, and the Northwest Clean Air Agency (NWCAA). These agencies have established regulations that govern both the concentrations of regulated pollutants in the outdoor air and contaminant emissions from some air emission sources. To track air quality conditions, the Department of Ecology and NWCAA maintain a network of monitoring stations throughout Whatcom County. These stations are typically located in or near urban areas or close to specific large air pollution sources, there is one monitoring station in Bellingham on Yew Street. Based on "official" monitoring data collected over a period of years, the state (Ecology) and federal (EPA) agencies designate regions as being "attainment" or "nonattainment" areas for designated "criteria pollutants" under the federal Clean Air Act. Attainment status is a measure of whether air quality in an area "attains" or, complies with the National Ambient Air Quality Standard (NAAQS) established for criteria air pollutants. Criteria air pollutants include ozone, particulate matter (PM), carbon monoxide (CO), nitrogen oxides, sulfur dioxide, and lead. The project area is located in a region designated as attainment for all monitored air pollutants.

The existing average air quality in Whatcom County is categorized as good under the National Ambient Air Quality Standards due to its low population and stringent emission control requirements placed on the County's industrial facilities (U.S. EPA, 2011). Bellingham's average air quality score is twenty out of two hundred, where zero is considered excellent and five hundred is life threateningly poor (NWCAA, 2005). One of the variables that influences air quality is climate. Although weather itself does not cause high pollutant levels, stagnant weather conditions can lead to air pollutants not dispersing. The county's coastline has a mild maritime climate and wind is typical, but rarely exceeds twenty miles per hour for extended periods of time. Despite its small population, Whatcom County has a large number of major industrial facilities which are primary contributors to air pollutant emissions (Air Quality, 2009). Existing sources of air pollution in the project area include several industrial sources (refineries, aluminum works, and bulk fuel storage facilities), local traffic sources, and residential wood burning associated with low-density residential development.

Proposed Action

Impacts

The proposed action includes the construction of an additional 30,000 lineal feet of track to create a rail loop system off of the existing Custer Spur. Construction would include extensive grading and excavation of the project area, grading of new roads, and earthwork for construction of rail line embankments. Construction of the rail tracks will result in temporary, localized increases in dust particulates released into the atmosphere as plants are removed from the soil and the filling of 150 acres of wetlands on the site ensues. Dust from construction activities, such as excavation, grading, sloping, and filling, would contribute to ambient concentrations of suspended particulate matter. Construction contractors would be required to comply with NWCAA regulations requiring that

Reasonable Available Control Technology (RACT) precautions be taken to minimize dust emissions (PIT, 2011). Construction would require the use of heavy trucks, excavators, graders, cranes, pile drivers, and pavers along with a range of smaller equipment, such as generators, pumps, and compressors. Heavy, diesel fueled machinery will be required for transporting the building materials and construction of the additional tracks resulting in carbon dioxide emissions, these may contribute to temporary decreased air quality in the immediate surrounding area and to overall long term climate change.

Once the building phase of the proposed project is completed, there will be an increase in rail traffic of at least an additional eighteen trains each day, nine northbound filled with coal and nine southbound returning empty. Diesel exhaust is produced when an engine burns diesel fuel. This increase in rail traffic will increase diesel emissions and result in reduced air quality in the Whatcom County region. Each train is between 125 and 150 cars long, and each loaded car weights an average of 143 tons. Due to the extreme weight and length, each train requires four to five locomotives for effective transport, thereby at least quadrupling the impacts of diesel emissions compared to those of a single locomotive train typically traveling through Whatcom County (Coal Train Facts, 2012).

Diesel emissions consist of a complex mixture of thousands of gases and fine particles (commonly known as soot) that contain more than forty toxic air contaminants (U.S. DOL, OSHA). These toxic substances include carbon dioxide, carbon monoxide, nitrogen dioxide, nitric oxide, sulfur dioxide, particulate matter (2.5 micrometers in diameter and smaller) and many additional less significant components (U.S. EPA, 2011). These diesel emissions would reduce air quality, adding not only harmful chemicals but also a smoggy haze and unpleasant odor to Whatcom County's air supply. According to one National Resources Defense Council study, in the United States railroad engines hauling coal release more than 600,000 tons of nitrogen oxide and 50,000 tons of particulate matter into the air annually, primarily due to diesel exhaust (Lashof, 2007). The scale of this coal transportation proposal will contribute significantly to nitrogen oxide and particulate matter concentrations by way of locomotive diesel exhaust emissions.

The addition of coal trains will also negatively affect air quality in Whatcom County through the release of fugitive coal dust. While the amount of coal dust released from each individual car depends on a number of factors, including the weather, distance traveled and preventative measures (the application of dust suppression topper agents) taken by the rail company, Burlington Northern Santa Fe estimates that between 500 and 2000 pounds of coal dust can escape from a single loaded rail car in a single one way trip (de Place, 2011). Due to the dependence on numerous factors including varying weather patterns in each of the different regions passed en route and speed variation, it is easy to discern that quantities of fugitive coal dust lost are inconsistent throughout any single trip. According to a rail emissions study done by Calvin and Williams in 1996, measurements of coal dust emissions along a 500-mile long rail corridor were maximized at 0.6 tons or 1200 pounds per car, while the average coal dust releases were between 0.2 tons and 0.4 tons per car or 400-800 pounds (Calvin, 1996). Other reports have indicated that these numbers are severely conservative and estimate that 3% of the coal can be lost by way of fugitive dust and nuggets assuming the average weight of each car is approximately 100 tons (de Place, 2011). According to the route map applied on Google Maps, the approximate distance traveled between the Cherry Point proposal site and the Powder River Basin in Wyoming and Montana is 1200 miles. It is hard to quantify these numbers into accurate estimations of the diesel and fugitive coal dust released over the proposed rail route because the data from the above studies are approximations.

Mitigation Measures

No measures are proposed for mitigating impacts on air quality due to fugitive coal dust and diesel emissions in transit. Reasonable Available Control Technology (RACT) to minimize off-site dust emissions must be employed, as stated in NWCAA regulation 550, "Preventing Particulate Matter from Becoming Airborne" (550.3). According to Pacific International Terminal Project Information Document, mitigation measures will be taken to reduce fugitive coal dust emissions while unloading the trains at the Cherry Point site. Rail car unloading at the project proposal site would occur inside a covered unloading station. Inside the unloading station, air would be drawn into a dust control system to remove particulate matter. The ventilation system inside of the unloading station will maintain negative air pressure to prevent particulate matter emissions from escaping from the open ends of the shed (PIT, 2011).

Alternative Action

Impacts

The proposed alternative action would still see negative air quality impacts similar to the proposed action. Construction of an additional nine to ten miles of rail lines would be required for this alternative to work. The construction of new rail lines would release dust particles into the air. Diesel particles from heavy vehicles and machinery required for construction will also be released to a larger degree than the proposed action. However, air pollution impacts on people will be less because the population near the alternative route is less dense. A less dense population would be impacted by the odor and smog released by diesel fuel emissions. Fugitive coal dust would more directly impact agricultural lands, threatening the health of humans, livestock and crops inhabiting the area.

Mitigation Measures

No mitigation measures have been proposed for the impacts that the alternative action would have on air quality.

No Action

Impacts

If no action ensues, air quality in Whatcom County will remain at the same satisfactory level under the National Ambient Air Quality Standards as presently (U.S. EPA, 2011).

Mitigation Measures

No mitigation measures for air quality enhancement will be necessary with the no action alternative.

2.3 Land and Shoreline Use

Existing Conditions

The existing tracks span through many different zoning areas according to the Whatcom County Title 20 Zoning and Comprehensive Plan Designations map (Appendix Figure 2.3a)**.** The tracks start in the south of Whatcom County in Public Recreation zone and continue north through rural, urban growth area

(UGA), rural community, through the cities of Bellingham, Ferndale, and Custer and end up in a major/port industrial UGA.

Proposed Action

Impacts

The proposed project will not have significant effects on the land and shoreline use of the site area or adjacent properties. The railroad tracks are already in place and are used for Amtrak and commerce to major ports in Whatcom County and in Canada. There will be an increase in the amount of trains on the tracks. However, this will not change the land or shoreline use.

The addition of the rail line spur near the Gateway Pacific Terminal will change the physical character of the site. Currently, according to the Whatcom County Comprehensive Plan, the Cherry Point UGA site contains approximately 7,000 acres of industrial land. This land has long been planned and designated by Whatcom County for industrial development. The existing industrial developments that occupy the land cover about 4,100 acres of the total Cherry Point industrial lands.

Adding the railroad spur at the proposed site is in accordance with current zoning regulations, and Whatcom County's Comprehensive Plan and Shoreline Management Program. At this time there are no significant impacts from the transportation of coal on land use in Whatcom County. However, in the future if additional rail infrastructure is needed or environmental degradation occurs in relation to the transportation of coal, this may change.

Mitigation Measures

No mitigation measures are proposed for impacts to land use, as no adverse impacts would occur.

This is contingent on following Whatcom County's Comprehensive Plan, current zoning regulations and the Shoreline Management Program's guidelines.

Alternative Action

Impacts

The alternative action will have a greater impact on land use. The alternative action will require more than nine miles of tracks to be installed through land that has existing designated land use. The railroad would need to acquire 100 to 150 acres of land along the new route, construct a railroad bridge over the Nooksack River, cross the Interstate 5 corridor, and compensate for the loss of farmlands and wetlands (Stark, 2011).

Mitigation Measures

The land use measures of the alternative action would be similar to those of the proposed action.

No Action

Impacts

The no action proposal have no effect on land and shoreline use.

Mitigation Measures

No mitigation measures are proposed for impacts to land use, as no adverse impacts would occur.

2.4 Energy and Natural Resources

Existing Conditions

In some places along the rail corridor the trains are on single tracks. Although passenger rails are sometimes forced off of the tracks to make way for other train traffic, the wait time and therefore idling engine time does not currently pose a significant energy and natural resource threat.

Proposed Action

Impacts

The proposed action would require about 9.6 miles of new railroad tracks to be built to connect the end of the currently existing rail lines in Lynden to the Custur spur. This construction would require equipment powered by electricity, oil, natural gas and propane. In addition, passenger rails that will be forced off of the tracks to make way for the increased coal train traffic will be left idling for extended periods of time. This will produce a significant amount of diesel usage and emissions for the project (Coat Train Facts, 2011).

Increased electricity use will come primarily from increased usage of lighting along the railroad tracks and of the safety gates that will experience much more activity with increased train traffic. Some electricity will be used in lighting the construction area of the new tracks, but only for a short period of time.

Mitigation Measures

Improving operating and maintenance practices can impact fuel efficiency and decrease environmental impacts of the project. Acquiring new locomotives and retiring older units can increase fuel efficiency and reduce environmental impacts and operating costs of the proposed action. Over the last decade, BNSF has acquired more than 2,700 new locomotives, and the newest locomotives are about 15% more fuel efficient than the engines they replaced. However, it is not confirmed that BNSF will be replacing the locomotives used to transport coal from the Powder River Basin to the Gateway Pacific Terminal Cherry Point site (BNSF, 2012) .

Lubricating rails to help reduce the friction between the wheels and the rails can help reduce the cost of maintenance.

Burlington Northern Santa Fe could initiate GenSet switch locomotive technologies to the trains being used to transport the coal to the Cherry Point Terminal. GenSet locomotive is an ultra low-emissions, EPA-certified diesel switch locomotive. The locomotive has three low-horsepower engines that only operate when needed instead of one large engine operating at all times, saving fuel and reducing air emissions (BNSF, 2012).

Locomotive engineers could always be advised to shut down idling locomotives, isolate or shutdown unneeded locomotives in trains, and adjust acceleration and braking to conserve fuel.

There is no existing mitigation proposed for decreasing electricity usage of safety barriers. The barriers are required for the safety of the Whatcom County citizens.

Alternative Action

Impacts

The environmental impacts associated with the alternative action are similar to those associated with the proposed action, but include increased adverse environmental impacts. Linking the main line to the South Fork line via Lynden would require construction of 15 new miles of rail line. In addition to the cost of building the line, the railroad would need to acquire 100 to 150 acres of land along the new route, construct a railroad bridge over the Nooksack River, and find ways to compensate for the loss of farmlands and wetlands (Stark, 2011).

Although this route would experience less rail traffic, and therefore less idling time for passenger trains forced off of the tracks, the new construction and overall energy and natural resource consumption would be greater than that of the proposed action.

Mitigation Measures

Mitigation measures for the alternative action would be the same as for the proposed action: increasing fuel efficiency by improving operation and maintenance practices, and no decrease in electricity usage of safety gates.

No Action

Impacts

The no action alternative will cause no additional impacts on energy and natural resources from coal trains.

Significant Unavoidable Adverse Impacts

The impacts of the proposed and alternative action are unavoidable, even with the help of mitigation measures. Large amounts of electricity, diesel and other energy resources would be necessary as a result of both of the actions. Transportation and construction costs of the alternative action would be great, whereas idling time of the trains and safety gate electricity usage of the proposed action would also be very great.

2.5 Water

Existing Conditions

The rail line runs near and through a broad range of ground and surface aquatic environments. The Puget Sound, including Bellingham Bay, and other water resources have previously been polluted by many different sources, especially industrial and human activities.

The train tracks run along Bellingham Bay from the south of Whatcom County to Marietta, passing over many small streams and large river systems. The railroad tracks cross Chuckanut Creek, Padden Creek, Whatcom Creek, Squalicum Creek, and the Nooksack River. The Nooksack River frequently floods, according to the Whatcom County Critical Areas Ordinance Flood Map (Appendix Figure 2.5a).

According to Whatcom County's current Comprehensive Plan, the railroad tracks cross many different zoning regulations including rural forest, incorporated city limits, urban growth areas, rural areas, rural communities, public recreation, and a major/port industrial UGA.

Wetlands and upland zoned areas are located on the Gateway Pacific site where the proposed additional rail line would be built. The Whatcom County Critical Areas Map-Wetlands (Appendix Figure 2.5b) shows that the site where the rail spur will be built supports a combination of palustrine forested and shrub wetlands.

The site of the proposed Gateway Pacific Terminal is directly adjacent to the Cherry Point Aquatic Reserve. Cherry Point Pacific Herring, which are part of a larger population that stretches along 4,500 miles of coastline, spawn next to the proposed site for marine facilities (Department of Natural Resources, 2010).

Proposed Action

Impacts

Coal dust blowing off the rail cars in transport and while unloading at the Gateway Pacific Terminal will contaminate areas such as Puget Sound, streams, rivers, and wetlands, with heavy metals and other toxins. Heavy metals include elements such as arsenic, mercury, lead, cadmium, selenium, nickel, vanadium and copper (Clean Air Task Force, 2001). The fine particulate nature of coal dust allows the coal to accumulate and concentrate in our waterways resulting from the transportation of coal. The cycle of accumulation and concentration causes stream and river sediments to be less conducive to aquatic life, decreasing biodiversity and health of the waterways (Roberts, 2010).

The railroad tracks in the proposed terminal site will be built within 200 feet of the Cherry Point Aquatic Reserve. Although building the site and the impacts of shipping will have the greatest impacts, dust from the increase of coal trains can be transported through coal dust and runoff into the Aquatic Reserve. This area is subjected to high winds which can affect the amount of coal dust transferred; however, it is unknown to what extent coal dust in the water might affect the marine plants and

animals. Coal dust could reduce plant growth rates near the transportation corridors by physically impeding leaf gas exchange or by bioaccumulation of toxic materials in leaf tissue (EPA, 1985).

Mercury, a heavy metal found in coal dust, can be converted to a highly toxic, organic compound called methylmercury when it becomes in contact with water. In the water, plants and small organisms like plankton take up mercury through passive surface absorption or through food intake. For "autotrophic" organisms (which do not eat other organisms), organisms take up mercury through passive absorption (Environment Canada, 2010). Mercury biomagnifies through the food chain as predators eat other organisms and absorb the contaminants that their food sources contained. Over time, an individual who consumes plants or prey contaminated with methylmercury will acquire levels greater than in either its habitat or its food. As a result, top predators, such as humans, will acquire high levels of mercury.

The construction of the rail line located on the Gateway Pacific site has the potential to affect fragile ecosystems in the wetlands and upland zoned areas. The Whatcom County Critical Areas Wetlands Map (Appendix Figure 2.5b) shows that the site where the rail spur will be built supports a combination of palustrine forested and shrub wetlands. According to the Whatcom County Critical Areas Ordinance, wetland zones span along the entire track from the south of Whatcom County all the way to the end of the proposed terminal. The terminal project proposes to change the physical characteristics of the site in a significant manner including impacting 162 acres of wetlands and altering more than two miles of existing waterways (RESources, 2011). Wetlands are areas of great natural productivity providing natural flood control, flood desynchronization, and flow stabilization of rivers and streams. The unrestricted use and development of wetlands will destroy many of these beneficial qualities which directly affect human health and safety during flood events. The alteration and destruction of wetlands through draining, dredging, filling and other means has an adverse cumulative impact on their ability to reduce flood damages (WAC 173-158-080). However, the spur of track in the proposed plan will be built on the terminal site, which is zoned as a significant port industrial urban growth area.

According to Whatcom County Critical Areas Ordnance Critical Aquifers Recharge Areas map (Appendix Figure 2.5c), the train tracks are located directly over low to highly susceptible critical aquifer recharge areas and wellhead protection zones. Although disruption and contamination of recharge or discharge areas already exists from the built rail line, the increase of coal dust from coal trains may increase toxins in the water. Coal dust settling in sediments may result in soil impermeability and changes in soil infiltration (Clean Air Task Force, 2001). Soil impermeability along with heavy metals from the coal dust may affect groundwater recharge areas. However, the area disturbed would be concentrated around the rail line which is small compared to the total area of the recharge areas. Also, addition of coal dust may alter the rate of groundwater discharge and could increase flooding potential (Clean Air Task Force, 2001).

Mitigation Measures

The application of a dust suppression topper agent to the coal shipment at the time of loading has been used in order to mitigate against coal dust. The topper agent is a chemical spray applied to the top of the coal train cars to keep sediment dust from blowing out into the air.

The cargo loading system practices will be designed to minimize coal dust during transfer on site (PIT, 2011). This will mitigate against coal dust during the transfer of coal from the trains on the actual site. This mitigation measure will not have an effect on the transportation of coal through Whatcom County.

Mitigation measures for impacts of coal dust have not been addressed by the Gateway Pacific at this time.

The rail car doors should be sealed once the coal is transferred to the site for the return trip, mitigating the effects o blowing coal dust on the trains' return trip (PIT, 2011).

Gateway Pacific will map all of the wetlands on the property and will replace any wetlands that are disturbed in the construction or operation of the terminal and railway on the site (PIT, 2011). According to WAC 222-24-015, Gateway Pacific should avoid impacts by selecting the least environmentally damaging landing location to build the rail line, minimize impacts by reducing the subgrade width and fill acreage, restore affected areas by removing temporary fills or road sections upon the completion of the project, reduce or eliminate impacts over time by preserving or maintaining areas and replace affected areas by creating new wetlands or enhancing existing wetlands.

Alternative Action

Impacts

The impacts of the alternative action will have a greater effect on drainage basins including stream and river systems and ground water because of the necessary installation of additional tracks from the South Fork line to Lynden. Beginning at the southwestern most point on the Whatcom- Skagit County border approximately 12.7 miles east of the proposed route, another section of Burlington Northern Santa Fe travels north for approximately 39.8 miles to Lynden, WA where it will take another nine to ten miles of new track and a crossing at Interstate 5 to reach the Custer Spur before culminating at the Gateway Pacific Terminal site location. The new proposed railway would cross lakes, rivers, and wetland areas that are not zoned for rail lines at this time. Pollution could affect other groundwater recharge and discharge areas, wetlands, rivers, and streams.

The rail road tracks will cross more land zoned for agricultural usage in the alternate action proposal. This may allow heavy metals from the coal dust to affect the water for irrigation of agricultural crops. Murcury found in coal dust may bioaccumulate in our food sources, which supply much of Whatcom County.

Mitigation Measures

The new railway from Lynden to Custer Spur would be placed in an area that has the greatest distance from agricultural crops and stream systems. The other measures would be similar to those listed in the proposed action plan.

No Action

Impacts

The no action alternative will cause no additional impacts on water from coal trains.

Significant Unavoidable Impacts

Although the mitigation measures will help to prevent a large amount of the coal dust contamination, there will some coal dust movement during transportation. Coal cars are typically uncovered and each car loses between 500 and 2000 pounds of coal dust en route (Coal Train Facts, 2011). Heavy metals,

such as arsenic, cadmium, barium, chromium, selenium, lead and mercury from coal ash will leach into water supplies and potentially contaminate agricultural crops (Coal Train Facts, 2011). It is currently unknown to what extent these heavy metals might leach out from the coal and coal dust from the train cars into surface and ground waters, including the marine environment.

2.6 Plants and Animals

Existing Conditions

This section describes the upland biological resources in the proposal area and provides an assessment of potential environmental effects of the Coal Train on upland vegetation, wildlife, and habitat. While the focus of this section is terrestrial biological resources, some of the species discussed utilize wetland, marine, and/or riparian habitats at times, and references to these habitats are included here.

Upland Vegetation: Whatcom County is situated within a region known as the Western Hemlock (*Tsuga heterophylla*) vegetation community zone (Department of Natural Resources, 2010). This is the largest vegetation zone in the Pacific Northwest. The proposed train route travels within the predominantly coniferous forests characterized by the dominant tree species Douglas-fir (*Pseudotsuga menziessii*) and western hemlock. Grasses, herbaceous plants, shrubs and trees, both deciduous and coniferous, are also present along the proposed coal train route. Deciduous trees include Willow (*Salix sp.*), Red Alder (*Alnus rubra*), Vine Maple (*Acer circinatum*), and Big Leaf Maple (*Acer macarophyllum*). Evergreen trees include Grand Fir (*Abies grandis*), Sitka Spruce (*Picea sitchensis*), Engelmann Spruce (*Picea engelmanni*), and Western Red Cedar (*Thuja plicata*). The Washington Natural Heritage Program (WNHP) lists 25 species that are in Whatcom County and identified as sensitive to becoming endangered or threatened in the state (Washington Dept. of Natural Resources, 2012). For a complete list of high quality or rare plant species that reside within Whatcom County(Appendix Figure 2.6a).

The train route will travel through agricultural farmland in Whatcom County. Marietta, Ferndale, Custer, and Pleasant Valley are primarily agricultural towns with mowed pastures and plots of land growing seasonal crops. Vegetation in hayfields that are seeded and hayed annually consists of grasses and forbs, including red fescue (Festuca rubra), bentgrass (Agrostis spp.), sweet vernalgrass (Anthoxanthum odoratum), common velvetgrass (Holcus lanatus), and English plantain (Plantago lanceolata). In less frequently managed pasture areas, dominant grass species include red fescue, meadow foxtail (Alopecurus pratensis), Canadian thistle (Cirsium arvense), bentgrass, quackgrass (Agropyron repens), and orchard grass (Dactylis glomerata). Mowing occurs annually along power-line and pipeline easements and promotes thick stands of reed canarygrass (Phalaris arundinacea) (Whatcom County, 2011).

Wildlife: The corridor the coal train route follows consists of a diverse range of animal species. The train corridor goes through or near the following three wildlife areas within Whatcom County: British Petroleum, Intalco, and Nooksack (Whatcom Wildlife Area, 2012).

The Whatcom wildlife areas contain a wide range of wildlife that is dependent on both wetland and riparian habitats. These areas support important habitat for wintering waterfowl and reside within the

Pacific Flyway. Barn swallow, brown-headed cowbird, common yellowthroat, harlequin duck, olive-sided flycatcher, orange-crowned warbler, Pacific-slope flycatcher, red-breasted merganser, rufous hummingbird, savannah sparrow, Swainson's thrush, and warbling vireo were observed in a variety of habitats in the project area during the breeding season, and were presumed to be breeding in the project area (PIT, 2011). Western tanagers and Swainson's thrush were limited to riparian areas; warbling vireo were limited to forested areas; common yellowthroat were limited to shrub areas; and barn swallows and brown-headed cowbirds were limited to the hayfield adjacent to the shoreline(PIT, 2011). The Pacific Flyway encompasses all of Western Washington and is the only known migration route for the bird species listed. See **Figure 2.6b in the Appendix for a map of the Pacific Flyway**.

Terrestrial mammals likely to occur within the coal train route include those species typical of urban open-space. Raccoon, eastern gray squirrel, black-tailed deer, and coyote were all identified during various field investigations .There are three federally listed wildlife species known to occur within Whatcom County: the northern spotted owl (Strix occidentalis caurina), marbled murrelet (Brachyramphus marmoratus), Canada lynx (Lynx Canadensis), all of which are listed as threatened. These species are expected to occur away from the proposed coal train route in more remote wilderness areas.

Wetlands and Riparian Areas: The proposed coal train route would travel through or near various wetland and riparian habitats. These habitats include Tennant Lake, Chuckanut Bay, Whatcom Creek, Brennan Pond, Nooksack River, and Lake Terrell. Whatcom wildlife area wetlands provide excellent habitats for migrating ducks, geese, swans, and shorebirds, in addition to excellent hunting grounds for bald eagles, peregrine falcons and other birds of prey. The Lake Terrell area contains bog habitat with some unique plant species. These riparian habitats contain vegetation that provides thermal cover, stream channel features such as pools, and maintains the stability of stream banks (Washington Department of Fish and Wildlife, 2012).

Fish: Three fish species occur in Whatcom County that are protected under the Endangered Species Act: Chinook Salmon (*Oncorhynchus tshawytscha*), Bull Trout (*Salvelinus confluentus*), and Steelhead (*Onchorhynchus* myskiss)(*City of Bellingham*, 2012.). Candidate species that also inhabit Whatcom County waterways include the Coho Salmon and Pacific Herring (stocks occur at Cherry Point). Cherry Point Pacific Herring are a keystone species, providing food for a number of other species.

"Salmon have significant cultural, economic, and recreational value. For these reasons state and local governments are required to give special attention to anadromous fish (that is, fish such as salmon that migrate between fresh and salt water). Because the health of the salmon population is related to the watershed health, salmon are considered an indicator species. Because many other aquatic and terrestrial species use and rely on salmon, it is also considered a keystone species (City of Bellingham, 2012)."

Proposed Action

The potential increase of eighteen more coal trains per day present concerns for the health of the plants and animals in the project area.

Impacts

Coal dust accumulation has significant effects on vegetation. Studies on carbon dioxide intake and chlorophyll flouresence parameters show adverse affects on vegetative species (G Naidoo, D Chirkoot,

2004). Coal dust reduces the photosynthetic processes required for vegetative growth. These impacts will affect plant species along the proposed railroad corridor as well as crop species that travel through the agricultural land of Whatcom county. The reduction of photosynthetic processes inhibits growth and present severe impacts to plant life along the rail corridor.

Studies show that high mortality rates of animals are found where important wildlife habitats and migration routes intersect with railroads (L"sekrug 1982; Child 1983; Child & Stuart 1987; Child et al. 1991; Andersen et al. 1991; Jaren et al. 1991; Modafferi 1991; Modafferi & Becker 1997). Hoofed animals and carnivores travel along train tracks during winter months because of the plowed rail beds providing substitute rail corridors . "A more indirect barrier effect occurs when animals are unwilling to cross or avoid the railroad, even if wildlife passages are present. This avoidance is often related to disturbance factors (e.g. noise, light, and pollution) caused by railroad traffic, and other human activities (e.g. construction, maintenance, and management of the right-of-ways) (Wildlands CPR, 2011).

Chinook salmon are listed as a threatened species and Coho salmon are listed as a candidate species in Puget Sound. The Cherry Point stocks of Pacific Herring use the area from southern Hale Passage all the way north to Drayton Harbor. The coal train route's proximity to these fish habitats merits concerns over the effects of proposed action to these species. Coal dust particles can reduce life expectancy of fish, pollute waterways and cause harm to fish through lacerations to their gills (Cordone, and Kelley, 2011). Coal sediment settles to the stream beds, destroy spawning beds, suffocating fish eggs and bottom dwelling organisms, and block sunlight resulting in reduced growth of beneficial aquatic grasses (Environment News Service, 2012). These addressed impacts will have negative consequences to aquatic life near the shoreline along whatcom county, as well as in the Nooksack River and Whatcom Creek.

Furthermore, the proposed action presents risk to aquatic ecosystems through exposure to hard metals. Coal dust that is dispersed from the train cars will enter riparian habitats. Mercury is a dangerous neurotoxin found in coal dust (Luttrel, 2011). This neurotoxin is a persistent substance that can bioaccumulate in living organisms. In aquatic environments , mercury can be converted to a highly toxic organic compound called methylmercury. This organic compound can be absorbed into the human body through the consumption of fish, which as a species can tolerate high levels of mercury in their bodies (Environment Canada, 2010). "Piscivorous (fish eating) predators such as loons, merganser ducks, osprey, eagles, herons, and kingfishers, generally have very high concentrations of mercury" (Environment Canada, 2010). Studies of loons with high levels of mercury have shown signs of decreased reproductive health which in turn reduces the birth rate and thus increases the death rate of these birds (Environment Canada, 2010).

Mercury biomagnifies through the food chain as predators eat other organisms and absorb the contaminants that their food sources contained. Over time, an individual who consumes plants or prey contaminated with methylmercury will acquire levels greater than in either its habitat or its food. As a result, top predators, such as humans, will acquire high levels of mercury (Environment Canada, 2010).

Mitigation

The proposed train route will use the currently placed railroad tracks. To minimize mammalian deaths, animal bridges must be constructed where high volume animal traffic occurs. In order to reduce coal dust dispersal in riparian and wetland areas, train cars should be covered with either a physical barrier or spray-on topper agent. Scheduled maintenance of the tracks should include coal particle

accumulation removal, and rinsing of vegetation along rail corridor to minimize the impacts of vegetative deterioration.

Alternative Action

Impacts

The alternative action will have a greater impact on wetland and riparian areas. The impacts of the alternative action will have a greater effect on drainage basins including stream and river systems and ground water because of the necessary installation of additional tracks from the South Fork line to Lynden. The railroad would need to acquire 100 to 150 acres of land along the new route, construct a railroad bridge over the Nooksack River, cross the Interstate 5 corridor, and compensate for the loss of farmlands and wetlands (Stark, 2011). Plant and animal species along the alternative proposal (Highway 9) will suffer from the same impacts as the current proposed action.

Mitigation Measures

Mitigation measures to the alternative action would require the same detail as described for the proposed action. This includes construction of animal bridges, use of topper spray, and regular maintenance of the railroad.

No Action

Impacts

The no action proposal will cause no affect on plants and animals of the existing environment.

Mitigation Measures

The no action alternative will not require any mitigation measures.

2.7 Environmental Health

This section outlines the main health hazards resulting from coal train traffic of both the proposed and alternative action posed by diesel particulate matter, coal dust, noise exposure, chemical storage and increased wait time at crossings. All environmental health effects are the result of train locomotion which occurs in both the proposed action as well as the alternative action. Route specific data has not been provided due to complexity and time constraints imposed on this EIA. The information that follows applies to both the proposed action and the alternative action as general environmental health hazards created by coal train traffic.

Existing Conditions

Currently, the communities near both the proposed action route and the alternative action route experience some level of adverse impacts from train traffic in the form of diesel emissions, coal dust

particulates, noise pollution, increased wait time for emergency medical services (EMS), and increased accident potential because some number of trains currently pass along established tracks within those communities.

P*roposed Action and Alternative Action Impacts*

Diesel Particulates: The release of diesel particulates has a similar effect of cigarette smoke when inhaled into the human body (Whatcom Docs). Among the many ways to measure the impacts of air pollution, some include measurements of lung function (pulmonary function studies), measurements of lung inflammation, increased rate and severity of asthma attacks, increased ER visits and hospital admissions, and even increased death rates.

Diesel particulate emissions caused by the increase in size and number of coal trains from the Gateway Pacific Terminal can directly be linked to the following pulmonary health hazards: impaired pulmonary development in adolescents (Gauderman, W. et al., 2004), increased frequency and severity of asthma attacks in children (Slaughter, J. C. et al., 2003), increased ER visits (Norris, et al., 1999), increased hospital admissions for children with asthma (Lin, et al., 2002), and an increased risk for hospital admissions for pneumonia, acute bronchitis, and asthma (Ostro, B., et al., 2009), and increased risk of all-cause and cardiopulmonary mortality associated with long term exposure to PM2.5 (Ostro, B., et al.).

Additionally, diesel particulate matter contributes to cardiovascular health hazards: high risk of cardiovascular- related events and mortality including heart attacks, heart failure, arrhythmias, and strokes in the elderly, patients with pre-existing coronary artery disease, diabetes and obese patients, and women (Pope, C.A. 3rd, et al., 2006), reduced life expectancy by a few months to years (Brook, R.D., 2008), and increased absolute risk for cardiovascular disease over pulmonary (Simkhovich, B.Z., et al., 2006).

Diesel Particulate Mitigation: Currently, no complete plan of mitigation exists for diesel emission impacts of both the proposed action and alternative action. Mitigation can include reducing the time engines are idle to reduce diesel particulate emission.

Coal Dust: During the mining, transport, and delivery of raw coal, some portion of that coal will fracture and become air born. This air born particulate matter is associated with a variety of adverse health impacts such as: increase risk of contracting Coal Worker's Pneumoconiosis (CWP), also known as Black Lung Disease (BLD) (Hathaway, et al., 1991), potential for accelerated damage when combined with other pollutants such as diesel particulate matter (Karagianes, 1981), and increased exposure to heavy metals such as Lead, Mercury, Chromium, and Uranium from fugitive coal dust (Sharma and Singh, 1991).

Coal Dust Mitigation: Currently, mitigation for the release of fugitive coal dust is being researched for the proposed action. The same mitigation techniques for the proposed action can apply to the alternative action. Mitigation techniques for fugitive coal dust at the terminal site include unloading coal trains in a covered with ventilation. There is no plan to mitigate coal dust along the proposed route although mitigation during transit may include covering coal cars during transit (even after delivery) and spraying a coal dust dampener atop each car load to reduce dust dispersal during transit.

Noise Pollution: The proposed project has a wide variety of sources for sound output. Noise pollution can come from any of the following: train horns, whistles & bells, vehicle electric motors and auxiliary equipment, diesel engine noise, wheel/rail noise including noise from rolling, impacts at track connections, & wheel squealing, grade crossing bells, maintenance, and PA systems that may be present at the Gateway Pacific Terminal. According to David A. Towers, P.E. at Harris Miller Miller & Hanson Inc., a diesel locomotive's sound level is a little less than 90 dBA at fifty feet which is almost equivalent to a jack hammer's maximum sound level (Appendix Figure 2.7a). The locomotive horn has a maximum sound level range between 96dBA and 110 dBA at fifty feet.

The resulting noise both ambient, from the addition of nine 1.5 mile long trains traveling on the tracks, and source specific noise, from both the train horns and bells at crossings, can influence cardiovascular disease, cognitive impairment in children, sleep disturbance, and mental health:

Both short and long-term adverse health impacts have been identified such as increased blood pressure, heart rate, vasoconstriction, elevated stress hormones like epinephrine and cortisol, arrhythmias, ischemic heart disease, and stokes (Selander, et al., 2009),

Children in environments with increased noise exposure show lower academic achievement in reading, learning, problem solving, concentration, social development, emotional development, and motivation (Evans, G.W., 2003).

Noise has auditory effects, including delays in falling asleep, frequent night time awakenings, alteration in sleep stages with a noticeable reduction in REM sleep, and a decreased depth of sleep, and non-auditory effects, including increased blood pressure, heart rate, vasoconstriction, changes in respiration, and arrhythmias even after the subject has "gotten used" to the noise (Whatcom Docs).

Increased noise is known to intensify mental health disorders including depression, mental instability, neurosis, hysteria, and psychosis (Whatcom Docs).

The Federal Transportation Administration designates a two-tier noise criteria impact level: severe and moderate. A severe impact would cause "a significant percentage of the population"to be "highly annoyed" requiring noise mitigation, while a moderate impact constitutes a noticeable change in the cumulative noise level, but it may not be strong enough to cause an adverse community reaction (Towers, hmmh.com).

Since much of the population of Whatcom County is dispersed along the proposed route, the impact to Bellingham and other towns along the way to the terminal site is severe. Adding 8 to 9 round-trip trains means multiplying sounds created by the horns and whistles at each crossing, the bumps in the track joints, the tight curves causing squealing, and the roar of the diesel engines by 16 to 19 times as well since impacts occurring in one direction are likely to occur on the way back. Consequently,this impact is severe because if the trains run at night, they will add a significant amount of noise to the communities adjacent to the tracks throughout the whole of Whatcom County, potentially disrupting sleep. Should the trains run in the day time, individuals at work, school, church, or any other building near the tracks would also be disturbed.

The impact of noise at the terminal site is considered a moderate impact. The proposal outlines mitigation of sound by installing continuously welded track at the terminal site which is a good noise

reducer, yet a significant proportion of Whatcom County residents do not live near the terminal site at Cherry Point, but rather along the route where existing track already sits. There is no plan to improve upon the track from the southern border of Whatcom County all the way north to the Custer Spur.

Noise Mitigation: A variety of techniques are being researched in order to mitigate the impacts the additional diesel powered coal trains would emit throughout Whatcom County.

Mitigation of noise caused by the trains themselves includes but is not limited to dampened or resilient wheels to prevent rolling noise and wheel squeal, vehicle skirts, under car sound absorbers, spin slide control and wheel truing to prevent flat spots from forming on the wheels causing bumping, continuous welding, rail grinding to eliminate corrugation, sharp turn lubrication, and movable-point frogs to reduce rail gaps at crossovers (Towers).

Mitigation for noise created along the path includes but is not limited to sound barriers near sound sensitive areas (Appendix Figure 2.7b), sound barriers at crossings, absorptive sound walls, buffer zones based on either vegetation cover or distance from source, or the creation of a quiet zone by the community and the Federal Railroad Administration (BNSF FAQ).

Chemical Storage: The storage of undisclosed chemicals will be necessary during construction and operation. These chemicals may include, but are not limited to, oils, lubricants, solvents, cleaners, degreasers, fuels, adhesives, thinners, and waste water. Storing these chemicals increases the risk that they may potentially enter the surrounding environment causing a variety of adverse health, water and air impacts depending on the type and quantity of the chemical spilled.

Chemical Storage Mitigation: Mitigating the potential for chemicals entering the surrounding environment may include storing chemicals in appropriate and safe containers, keeping them in a secure area, and monitoring and limiting how these chemical can be accessed among other techniques.

Increased EMS Wait Time: With the addition of eight to nine coal trains, increased transactions will occur at the intersection of railway and roadway. Given today's modern medicine, a delay of 5 – 10 minutes is a matter of life and death. Among the greatest risk areas for the delay of emergency medical service (EMS) are the Birch Bay-Lynden Road and Slater Road, which EMS frequently travel, according to the Whatcom Docs Position Statement. While there are alternate routes and detours EMS can take to respond to an accident, these routes are usually out of the way and still cause response delays, increasing the risk- intensified damage and mortality.

EMS Wait Time Mitigation: Mitigation for increased EMS wait time focuses only at the GPT site. The terminal will hire private security so as to not remove police forces from neighboring patrols. No other mitigation efforts are currently planned.

Accident Potential: According to the Federal Railroad Administration Office of Safety, in 2010 there were 739 deaths, 8,167 injuries and 11,417 incidents at railroad crossings across the nation. In the US, a train/vehicle collision occurs every 90 minutes. It takes a 150 car freight train moving at 50 mph about 8,000ft to stop completely. Train/vehicle crashes also has the potential of derailing the train, increasing the risk to the community and environment if hazardous materials are in transit (Spaite, E., et al., 1988). Additionally, with increased train traffic, the potential for runaway trains increases.

Accident Potential Mitigation: Mitigation for accident potential include the sounding of bells and whistles when trains approach crossings as well as railway gates lowering to warn traffic and pedestrians of oncoming train traffic.

Alternative Action

Since the alternate route still uses the same type of diesel trains, all of the aforementioned health hazards both at the terminal site and along the tracks still apply. The fundamental differences occur regarding particulate emissions and noise distribution within communities.

Particulate Impacts: The biggest difference between the proposed route and the alternative is that the alternative route is approximately 54.5 miles long while the proposed route is only approximately 30.5 miles long (Google Earth). This means that particulate matter will be spread over a much greater distance, meaning there will be more particulate emissions from the diesel engine as well as fugitive coal dust emissions. The greater the air pollution, in volume, the higher the chances and faster the rates of adverse health impacts generated from the emissions will be. The alternate route may, however, spread the coal train emissions over mainly agricultural land rather than commercial and residential.

Noise Pollution Impacts: Due to a greater track distance of the alternative route, more potential for noise pollution exists regarding noises created by trains in transit. This is somewhat offset by a reduction in the population density of the neighboring communities adjacent to the alternative route. Essentially, there is more noise potentially created, but fewer people to be disturbed. However, in order to be a significant noise impact, a significant percentage of the population must be highly annoyed by the noise. It is difficult to tell whether or not the alternative route would have a significant impact on the majority of the population surrounding the coal train route.

Mitigation Measures

For both particulate emissions (diesel and coal dust), noise pollution, and all other human health impacts, mitigation along the alternative action route is essentially equivalent to the mitigation used for the proposed action.

No Action

Impacts

Under the no action alternative, no additional trains would be added to the BSNF railway causing no increase in any adverse environmental health impacts.

Mitigation Measures

No additional mitigation steps will be required under the no action alternative.

3. Elements of the Built Environment

3.1 UTILITIES

Existing Conditions

Utilities, as defined here and for purposes of the plan, include all lines and facilities used to distribute, collect, transmit, or control electric power, natural gas, petroleum products, information (telecommunications), water, and sewage. Utilities associated with rail ways and train traffic refer to electricity and water usage. Electricity is allocated by aspects such as safety gate usage and light and glare activity along the rail line. Since these are associated with safety hazards and human health, they are not of immediate concern to the proposed project.

Proposed Action

Impacts

The increased usage of rail ways would result in increased usage of lights and safety gate usage and therefore more electricity. The main source of electrical power would be provided by the Whatcom County Public Utility District No.1 (PUD).

Mitigation Measures

The current infrastructure of the rail lines appear to be more than capable of handling the increased demands of the proposed action. Optional mitigation could be to use the most water, light and electrical efficient equipment available, however public safety takes precedence over such measures.

Alternative Action

Impacts

The impacts of utility usage on the alternative action would be similar to the proposed action. Although new safety gate crossings and new lighting infrastructure would need to be included in the 15 mile construction of new rail line, electricity usage along both routes would be increased on only minor scales.

Mitigation Measures

The same mitigation measures apply to the alternative action as does the proposed action.

Significant Unavoidable Adverse Impacts

The unavoidable impacts of both the proposed and alternative actions are that the rail lines will use relatively large amounts of electricity via increased safety gate and light usage.

3.2 Light

Existing Conditions

Currently, trains frequent corridors outlined for both the proposed action and the alternative action at some volume. As such, light emissions are realized at both locations both in the form of lights mounted to the trains as well as required lights at many crossings.

Proposed and Alternative Action

Both the proposed terminal route and the alternative route send trains through somewhat residential areas. The addition of nine new trains means the addition of eighteen new headlights (round trip), a variety of runner lights, and light from the terminal facility. Lights associated with trains both mounted and at crossings are meant as a safety device to ensure that an oncoming train is noticeable. The biggest threats posed by the lights affect animals and humans.

Light Impacts

Animal Impacts: Artificial light pollution can "disorient wildlife, affect natural circadian rhythms, and disrupt bird migration" (Biozine, 2009). It is likely that on either the proposed route or the alternative, one of the nine additional coal trains will cause disruption with either the mounted lights, running lights, flashing crossing lights, or lights required for terminal operations.

Human Impacts: Burlington Northern Santa Fe states that "trains operate 24 hours a day, seven days a week, making it hard to predict when one will be traveling" through a given area (BNSF FAQ). The Human Ecological and Socioeconomic Project identifies potential impacts "of light on health, stress-levels, productivity, and well-being" (H.E.S.E. Project). Since trains can run at any time of day, day or night, the impact from the lights will vary given the amount of daylight and the time of year. Major impacts to human health will occur during darker periods in the day when the impacts of train lights become more noticeable. Potential impacts from light on humans include sleep disturbance, temporary vision impairment, changes in circadian rhythm, and general annoyance.

Mitigation Measures

Possible mitigation for the most light sensitive areas in the project site include the construction of berms or buffers to reduce stray light pollution and the height at which the headlight is mounted to the front of the locomotive.

3.3 Public Services

Existing Conditions

Public services including fire protection, police protection and emergency medical response already serve three industrial facilities already existing at the Cherry Point site: British Petroleum refinery, ConocoPhillips refinery and Alcoa-Intalco aluminum smelter. Currently, police services are provided to Cherry Point by the Whatcom County Sheriff. The Sheriff's office also maintains a Division of Emergency Management that handles various aspects of emergency/disaster mitigation, planning, response and recovery for the community. The nearest emergency medical services is St. Joseph's Hospital in Bellingham, Washington, approximately seventeen miles from the proposed project site. The Sheriff's Department and St. Joseph's Hospital are equipped to provide services to a large geographic area with a mix of residential, commercial, and industrial uses**.**

Cherry Point is located within Fire District No. 7 in the city of Ferndale, Washington. Five of the district's stations respond to calls from Cherry Point, these five stations are located near the following intersections: Brown and Kickerville Roads, Grandview and Koene Roads, Northwest and Smith Roads, Grandview and Enterprise Roads, and Washington Avenue and 3rd Street in Ferndale. Fire District No. 7 has approximately twenty full-time responders and forty volunteer firefighters. Fire District No. 7 serves 75 square miles with a population of approximately 22,000 people. Fire District No. 7 does not typically provide first response services to the existing industries in the area (British Petroleum, ConocoPhillips and Alcoa-Intalco) as these industries maintain their own fire teams on site. The district currently provides backup and support services to these three major industrial sites. The first stations to respond to emergency calls at Cherry Point are the volunteer firefighter stations (PIT, 2011).

Proposed Action

Impacts

Public services such as police protection, fire protection, health care services and emergency vehicles will be directly impacted by the proposed project. Effects from the proposed project include an increase in demand on fire, police, and emergency medical services. While the project proponents plan to have full time security personnel as trained first responders for site security, fire and emergency response, they anticipate that Whatcom County Sheriff's Department would be required to provide backup in severe emergencies of larger scale (PIT, 2011). The public services required by the coal train terminal would be similar to those of the three existing industries at Cherry Point. Although the project proponent plans to have private first responders and security, nothing in the plans anticipates the increased demand and negative impacts that train traffic will have on public services.

During the construction of the railroad extension, there is the potential for an increased demand for police and fire protection as well ambulances in case of construction accidents. The project site would not rely solely on Fire District No. 7 to provide emergency fire services. However, it is likely that the District would not have the necessary resources to provide backup services during the construction and initial commencement of operations (PIT, 2011). Permanent increases in public services demanded will result from long term jobs at the project site will be minor. The most significant impact is an increase in

demand for public services comes from the increase in rail traffic and road traffic as a result of waiting for the trains to pass through major road crossings.

Currently rail traffic through Bellingham is approximately six trains per day, each delaying traffic for five minutes while passing through major crossings. Currently, public services in transit in the city of Bellingham are delayed on average by six freight trains each day operating on the Burlington Northern Santa Fe Railroad. These six freight trains delay drivers approximately five minutes at each crossing and a total of thirty minutes each day. The proposed addition of eighteen trains per day could cause delays of eight to ten minutes for each coal train, and cause overall daily vehicular delays to be approximately 170 to 210 minutes (Natural Resources Defense Council, 2007). These delays will put great stress on the emergency responders, as longer, more frequent rail crossings will mean delayed emergency medical service response times, as well as increased risk of accidents, traumatic injury and death due to train related collisions (Western Organization of Resource Councils, 2011).

Mitigation Measures

The project proponent plans to employ private security and emergency responders to mitigate impacts of the proposed project on public services, but this is limited only to the project destination site and will still require back up from local public services.

Alternative Action

Impacts
The negative impacts on public services of the proposed alternative action will be practically identical to the proposed action. The only exception being the potential for a more significant increase in public services demanded during the construction of the railroad extension at the project site as well as where the additional 9.6 miles of tracks will be installed between Lynden, Washington and the Custer Spur at the project proposal site.

Mitigation Measures

The mitigation measures intended to reduce impacts of the alternative action on public services will be similar to those planned for by the proponent in the proposed action.

No Action

Impacts

The no action alternative will not cause any change in the need for public services.

Mitigation Measures

Since the no action alternative will not cause a change in demand for public services, mitigation measures are not necessary.

3.4 Transportation

Existing Conditions

From the southern border of Whatcom County to the Cherry point site, there are approximately 30.5 miles of track on mostly flat ground, passing through coastal, residential, agricultural, and industrial land. According to the Federal Railroad Administration, there are approximately six trains per day, each delaying traffic for five minutes while passing through major crossings.

Transportation Systems: The following transportation systems have been investigated in regards to the impacts of increased coal transport by train through Whatcom County:

> **Pedestrians:** No significant impacts have been determined regarding pedestrian traffic and increased coal train occurrences.
> **Cyclists:** No significant impacts have been determined regarding bicycle users and increased coal train occurrences.
> **Public Transportation:** The Whatcom Transit Authority provides public transportation services via bus routes, handicap vans and ride share programs throughout Whatcom County. At-grade crossings present significant impacts to public transportation. On average public transportation is delayed 5 minutes per train, six times a day for total of 30 minutes.
> **Passenger Train:** Amtrak service connects Bellingham, Seattle and Vancouver, BC. Two northbound trains leave Seattle daily that follow the same tracks through Whatcom County to Fairhaven Station. Two southbound trains leave Fairhaven Station for Seattle and follow the same tracks through Whatcom County.
> **Water Transportation:** No significant impacts have been determined regarding movement of people or goods via water transportation. This includes, ferries, personal water craft, and larger vessel ships.
> **Vehicular Traffic:** There are 81 at-grade crossing in Whatcom County where vehicle traffic intersects the railroad (http://safetydata.fra.dot.gov/officeofsafety/publicsite/crossing/XingLocResults.aspx?state=53&countycity=073&railroad=&radionm=County&street=&xingtype=3&xingstatus=1&xingpos=1).

Proposed Action

Impacts
The increase of eighteen trains per day would have significant impacts to Whatcom county. The majority of impacts would be felt in the city limits. City speed restrictions limit freight trains to 50 miles per hour, however, typical freight trains travel at 35 mph through city limits (Koltonowski, 2011). Due to speed restriction approach warning, train travel through city limits means the at-grade barriers are down for approximately 8 to 10 minutes for the larger (each over one mile long) freight trains, this equates to

approximately 170 to 210 minutes of daily vehicular delays (NRDC, 2007). increased wait times will virtually bifurcate the cities thus reducing the level of service that city roads require.

An additional 18 trains per day would increase the daily rail traffic to approximately 30 trains per day. The delays from train crossings as mentioned in the public services sector would have significant impacts to emergency response vehicles, personal vehicle delays, increased risk of accidents as well as injury or death due to train related traffic collisions (WORC, 2011). An increase in frequency of at-grade gate crossings would increase the potential occurrence of at-grade vehicular accidents. "Within the last 5 years there have been approximately 25 accidents at the MT Vernon crossings including a death when a passenger vehicle hit a signal pole. Approximately half were rear ends as gates closed with also several gate collisions. In addition there were four train-road vehicle accidents recorded at the Mt Vernon crossing in the last five-year reporting period" (Koltonowski, 2011).

Mitigation

The mitigation measures that Whatcom county cities would need to take in order to reduce the significant impacts that 18 additional trains would produce, includes the construction of costly at grade separation. There are no outlined plans for these costly grade separation measures currently. The planning and construction of above grade crossings or separation measures are multi-million dollar projects and there is no current funding (Knoltonowski, 2011). "Railroads are federally exempt from paying more than 10% of mitigation costs, and are not required to pay any" (Cornell, 2011). This leaves taxpayers in Whatcom County with the financial burden of improving the railroad street crossing infrastructure.

Alternative Action

The alternative action would divert the route of the 18 additional coal trains along the eastern perimeter of Whatcom County. Currently there is another section of BNSF railroad that travels North for approximately 39.8 miles beginning at the most southwestern point of the Skagit-Whatcom County border north to Lynden. This route lies approximately 12.7 miles east of the proposed route. An additional 9.6 miles of new railroad and crossing would be needed for the Interstate 5 crossing and a bridge over the Nooksack river in order to reach the Custer Spur, where the coal train reaches its final destination at the Gateway Pacific Terminal site.

Impacts

Vehicular traffic and emergency response vehicles on the Eastern perimeter of Whatcom County would share the same consequences as the proposed route. Furthermore, there would be increased impacts to vehicle traffic during the construction of the additional 9.6 miles of new railroad.

Mitigation Measures

The mitigation measures for the alternative action will be identical to the scenarios of grade separation construction discussed in the proposed action, mitigation section.

No action

Under the no action alternative, the proposed Gateway Pacific Terminal at Cherry Point would not be constructed and the site would remain in its currently undeveloped state. Furthermore, the no action alternative would see no additional transport of coal thus eliminating the proposed 18 additional trains per day as outlined in the proposed action.

Impacts

The no action alternative would have zero impacts to the current site nor would this proposal affect the current transportation systems of the built environment.

Mitigation Measures

No mitigation measures are necessary using the no action alternative.

3.5 Historic and Cultural Preservation

Existing Conditions

The rail road extension construction associated with the proposed action will disturb a historically and culturally sensitive site.

Whatcom County Native Tribes: Cherry Point has traditionally been home to the Lummi, Nooksack, Sammish and Swinomish tribes. Currently British Petroleum and Conoco Phillips oil refineries as well as the Intalco-Alcoa aluminum smelter exist around the site at Cherry Point and impact the cultural preservation of the site. The tribal populations specifically located within Whatcom County warrant further consideration given their proximity to the project area and specific cultural and economic relevance of the Cherry Point area to each tribe. Comment letters from the tribes presented in the 1997 Gateway Pacific Terminal Final Environmental Impact Statement (Whatcom County Planning, 1997) state that the project area is located within the historic site of the Lummi Nation, and that several registered and unregistered areas of cultural significance exist within the project area. In addition, the Treaty of Point Elliott of 1855 provides the Lummi with primary and Nooksack with secondary fishing rights for the waters surrounding Cherry Point for economic and spiritual/cultural uses. The proposal site is the only remaining undeveloped land between British Petroleum refinery and the Intalco-Alcoa smelter (Preliminary Mitigation Plan, 2011). While the project area excludes tribally owned lands, the Lummi Reservation is located a few miles south of the site and the Nooksack Tribe is located seventeen miles east of Bellingham in Deming, Washington.

Archaeological Sensitivity: Because the project area lies within lands once occupied by the descendants of several federally recognized Indian Tribes presently represented by the Lummi Nation and Nooksack Tribe, the site is considered to have a high level of archaeological sensitivity (PIT, 2011).

Two phases of cultural resource investigations have been conducted within the Gateway Pacific Terminal proposal site. Northwest Archaeological Associates (NWAA) reported results from an intensive archaeological survey of approximately 340 acres conducted in the western and southwestern portions of the Gateway Pacific Terminal property in the 1990s. Northwest Archaeological Associates identified the existence of two previously discovered sites, site 45WH523 and site 45WH1 as well as five historic-

period structures-in-ruin. Northwest Archaeological Associates concluded that the five historic-period sites were not eligible for listing in the National Register for Historic Places (NRHP) because they lacked architectural integrity. It was recommended that additional testing at site 45WH523 be made to gather further evidence to warrant a listing. Site 45WH1has been the subject to numerous archaeological investigations (Blodgett 1976; Grabert and Hall 1978; Markham 1993; Donald 1995; Desilets 1995; Dugas 1996; VanBuskirk 2000; Rorabaugh 2009), and has been determined eligible for listing in the NRHP (PIT, 2011).

The most recent phase of cultural resource surveys of the Gateway Pacific Terminal project area were conducted by an environmental consulting firm called AMEC between 2008 and 2010. AMEC's efforts consisted of a background literature and records review, an intensive pedestrian survey and subsurface exploration of the site not previously investigated by other studies. Eleven newly discovered archaeological sites were discovered during the pedestrian survey but deemed not eligible for listing in the NRHP.

Multiple archaeological investigations including the one most recently conducted by AMEC in 20120 have verified the existence and cultural significance of site 45WH1. Records show that site 45WH1 is a shell midden located approximately 885 feet from the east end of the site. Archaeological site 45WH1 has been listed in the NRHP for archaeological and cultural significance. Most recently, the project proponent has been accused of damaging site 45WH1 due to geotechnical work on or near the site (Whatcom County Planning, 2011).

Recreation: Recreational use of Cherry Point by the public exists near the proposal site. The shoreline is open to the public and is used by the public for many water related activities including kayaking, boating and fishing. The shoreline located west of the proposal site is the only stretch of shoreline between the British Petroleum refinery and the Intalco-Alcoa aluminum smelting operation open for public use. The Lake Terrell State Refuge is located just east of the proposal site, which is a popular fish, grouse, duck and geese hunting location in the fall.

Proposed Action

Impacts

Whatcom County Native Tribes: The Lummi Nation inhabited Cherry Point historically and still uses the site specifically for fishing herring and salmon for subsistence and recreational purposes. Currently the three industrial plants existing at Cherry Point are impeding the Lummi tribe's access to the historic fishing and gathering site which they possess legal rights to. The proposal site, between the British Petroleum refinery and the Intalco-Alcoa smelter, is the only remaining portion of Cherry Point that the tribes consider their rightful and invaluable cultural property (Preliminary Mitigation Plan, 2011). If the proposed action ensues, the construction and increased train traffic will infringe significantly on tribal use of the site. The development of the Cherry Point site and construction of the rail line will reduce natives' access to their cultural grounds, inhibiting cultural practices and their preservation and overall negatively impacting the tribal people.

Archaeological Sensitivity: Site 45WH1 is an archaeological site that has significance both as an archaeological resource, and as a potential Traditional Cultural Property. Impacts to this site may result

from the construction of the additional rail lines at the project site. The project proponent has already been accused of filling and grading the site without legal permitting and tribal permission or advising.

Recreation: The construction, increased rail traffic, noise pollution, diesel odor emissions and air pollution associated with the proposed project will impact recreational activities in the immediate areas surrounding the site. Members of the community may be reluctant to expose themselves to the pollution associated with coal trains that threaten human and environmental health.

The proposed action would reduce recreational use of the proposal site and also other recreational areas in Whatcom County. The shoreline will be closed to the public and the option for the community and the Lummi tribe to fish and harvest fish will be eliminated. Increased rail traffic and the dispersal of coal dust may also impinge upon the recreational use of the Lake Terrell Game Reserve (Cherry Point Aquatic Reserve Management Plan, 2011). The increase coal train traffic and the resulting in the adverse effects to air, soil, water and aesthetics, safety hazards and traffic delays will diminish the desire and ability of residents to recreate, impeding upon the cultural values of the people of Whatcom County.

Mitigation Measures

The site should be surveyed or observed archaeological sites should be thoroughly investigated according to state law, and tribal peoples should be consulted before any action is taken. To mitigate adverse effects to Site 45WH1, an archaeologist should be present during the construction of project elements located within 200 feet of the boundary of Site 45WH1. The presence of an archaeologist would allow proper documentation of any cultural materials or features (e.g., shell midden, fire-cracked rock, or burned sediment) that may be uncovered inadvertently during the construction process. Prior to construction, an Inadvertent Discovery Plan should be prepared outlining the procedures that should be followed if archaeological materials are found during construction. If archaeological resources are discovered during the construction process and a monitor is not present, all work at that location should cease, and the Inadvertent Discovery Plan should be followed. If cultural resources (e.g., artifacts such as stone tools, bottles, ceramics, bone, or shell) are discovered during the excavation work, all work in the vicinity should stop. The contractor should work with a professional archaeologist and the Washington State Department of Archaeology and Historic Preservation (DAHP) to evaluate the significance of the find (PIT, 2011)(State, 2011).

Alternative Action
Impacts

The alternative action proposal will impose impacts identical to native tribes, archaeologically sensitive sites and recreational opportunities as those inflicted by the proposed action.

Mitigation Measures

The alternative action requires mitigation measures similar to those required by the proposed action.

No Action

Impacts

The no action proposal is not expected to impose any negative impacts on historical and cultural preservation.

Mitigation Measures

The no action alternative does not require mitigation as it does not assume any negative impacts on historical and cultural preservation.

3.6 Aesthetics

Existing Conditions

In 1996, the Draft Environmental Impact Assessment of the previous Cherry Point terminal discussed aesthetics. This document mentions that views from the San Juan Islands and Lummi Island will be impaired by the appearance of the upland development at the project site. Whatcom County is a region noted for spectacular physical beauty, an emphasis on quality of life, and a dedication to clean, healthy living and environmental stewardship. Bellingham is considered a prime tourist destination and a highly desirable place to live because of the natural environment and outdoor activities that it offers (Coal Train Facts, 2012).

Proposed Action

Impacts

The proposed project would alter the visual character of the site and the farmland and urbanized areas along the proposed route (Whatcom County Planning, 1997). The aesthetic value and image of Bellingham will be tarnished if this proposal is approved. The coal trains will cause pollution and reduce the quality of life by imposing fugitive coal dust, smog, train whistles, screeching wheels, negative health impacts and traffic congestion on the community. The proposed project is a direct contrast and undermines to local aspirations to build a community of thriving tourism, healthy agriculture and clean energy (Coal Train Facts, 2011).

Mitigation Measures

The proposed action offers no known measures to mitigate aesthetic damages directly. Buffers implemented to reduce sound and light impacts as well as preventative measures taken on site to capture coal dust while unloading cars may indirectly reduce aesthetic damage.

Alternative Action

Impacts

The alternative action will impress similar aesthetic impacts on the alternative route. Instead of the urbanized city of Bellingham, the agricultural landscapes of small rural towns including Lynden, Sumas and Ferndale will be littered with the pollution and annoyance of the coal trains.

Mitigation Measures

Although no suggested mitigation measures are known, they are likely to resemble the minimal measures assumed for the proposed alternative.

No Action

Impacts

The no action alternative will maintain the present aesthetic values of proposal site and the affected surrounding areas.

Mitigation Measures

The no action alternative does not require mitigation measures as it is expected that no negative impacts will be the result.

3.7 Housing

Existing Conditions

The proposed project site is vacant land and is zoned for heavy impact industry. There is currently no housing within a one-mile radius of the rail loop site at Cherry Point.

Proposed Action

Impacts

The proposal does not include the construction or removal of any housing units in Whatcom County. However, it is likely that the increased rail traffic will decrease property values of single and multi-family homes in the urbanized areas surrounding the rail corridor. Significantly increased rail traffic through urbanized areas is accompanied by increased noise, vibrations, environmental toxins, traffic delays and fears of train related auto and human accidents, all of which negatively impact real estate values by degrading the attractiveness of certain residential locations (Paben, 2011).

The reduction in property and home values will result in a direct monetary loss to property and home owners. A study conducted by Simons and Jaouhari (2004) examined the impact of freight trains on the prices of residential properties adjacent to rail lines. The study analyzed small apartments that had an

average value of approximately $76,000 and detected a 5% to 7% reduction in the value of residential properties within up to 230 meters from the train tracks. The same study found that property values along rail lines can decrease on average between $72.00 and $264.00 per daily train trip added, depending on the size of the house and distance from the train tracks. The project application stated that there could be an increase in eighteen daily train trips through urbanized areas in Whatcom County, where housing developments lie adjacent to the tracks (Stark, 2011). This increase in rail traffic could result in a net value loss of between $1,296.00 and $4,752.00 for each home and property owner depending on the size of the home and proximity to the tracks.

The reduction of property value might also interfere with the success of future redevelopment projects close to the tracks. For example, the City of Bellingham is planning a waterfront redevelopment project near the rail line that plans to include 2,270,000 square feet of new residential housing units to accommodate infill growth near the downtown area (Port of Bellingham). An increase in rail traffic causing decreases in property values will likely hinder the success of this and many redevelopment projects.

In Whatcom County, the Burlington Northern Santa Fe rail line runs along the coast line, splitting the waterfront side of cities from the inland side of cities. Significant increases in coal train traffic would cut homes and businesses on either side of the tracks off from one another. Bellingham's waterfront may suffer from this isolation as investors looking to develop new waterfront residential, retail and commercial projects could be discouraged because the effects of train traffic will reduce economic feasibility of these projects.

Mitigation Measures

The preliminary plans for the proposed action does not address mitigation of property values or housing directly. Some minimal mitigation of property value damages would occur indirectly as a result of barriers constructed to lessen noise pollution and light glare. The barriers would serve not only to reduce the impacts of noise and light which affect property values, but would also serve to mitigate view impairment so that homeowners will not have their valuable views obstructed by trains.

Alternative Action

Impacts

Along this route, residential homes, businesses, livestock, and other agricultural products are within feet of the railroad tracks and the associated noise, vibration, and pollution. The rail corridor through the alternative route passes through a more agricultural setting requires the construction of several overpasses to adequately support vehicle transportation along Highway 9 near the train tracks. Agricultural properties are often bisected by rail lines and would be negatively impacted by this alternative. In addition to decreased property values, eminent domain (landowner's property is taken by the government for a public project) may threaten some residents close to potential railway development areas (Protect Whatcom!, 2011).

Mitigation Measures

The alternative action would require mitigation similar to the proposed action. It is recommended that the project proponents make diligent efforts to prevent eminent domain and the bisection of private properties by coordinating the technicalities of building the additional rail between Lynden and the Custer Spur with property owners and associated government agencies.

No Action
Impacts

The no action alternative will result in no net impact to housing, present property values will not be affected.

Mitigation Measures

Mitigation measures are not necessary as the alternative action does not affect housing.

4. Appendix

Figure 1.2a.
Site plan: Gateway Pacific Terminal, Cherry Point



Source: Whatcom County Planning and Development Services Webpage for the Gateway Pacific Terminal, Operations Overview, prepared by Pacific International Terminals.

Figure 1.2b. Aerial view depicting East and West loops at Cherry Point



Source: Whatcom County Planning and Development Services Webpage for the Gateway Pacific Terminal, Operations Overview, prepared by Pacific International Terminals.

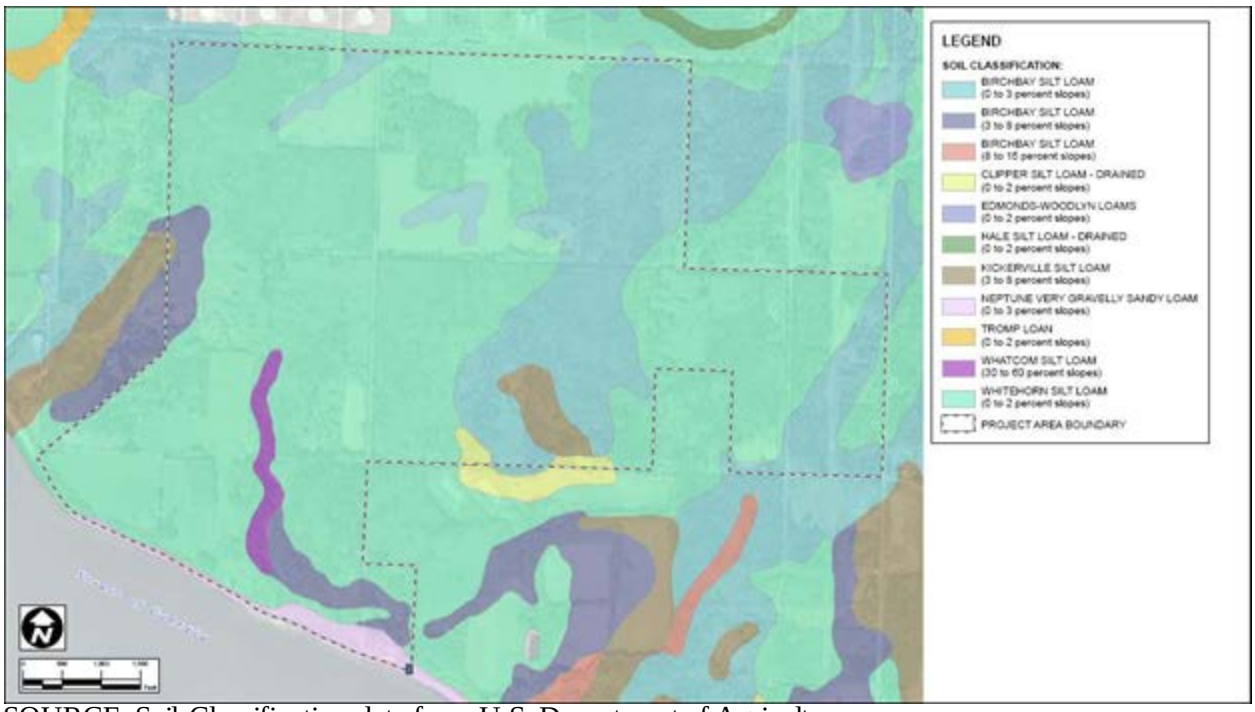
http://www.co.whatcom.wa.us/mwg-internal/de5fs23hu73ds/progress?id=HzqxlQWfyM

Figure 2.1a - Gateway Pacific Topographical Map



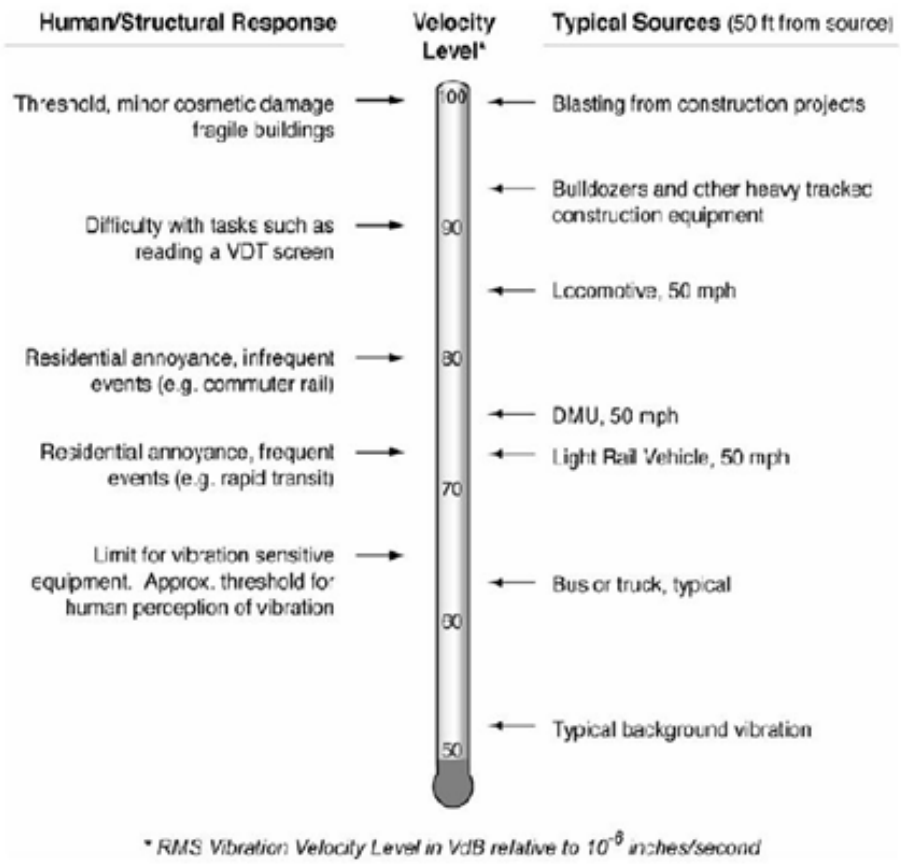
SOURCE: United States Geological Survey

Figure 2.1b - Gateway Pacific Terminal Site Soil Classifications



SOURCE: Soil Classification data from U.S. Department of Agriculture: http://SoilDataMart.nrcs.usda.gov

Figure 2.1c - Typical Levels of Ground-Borne Vibration



SOURCE: Towers, David A., "Rail Transit Noise and Vibration", Harris Miller Miller & Hanson, Inc.

Figure 2.3a-Whatcom County Zoning Map

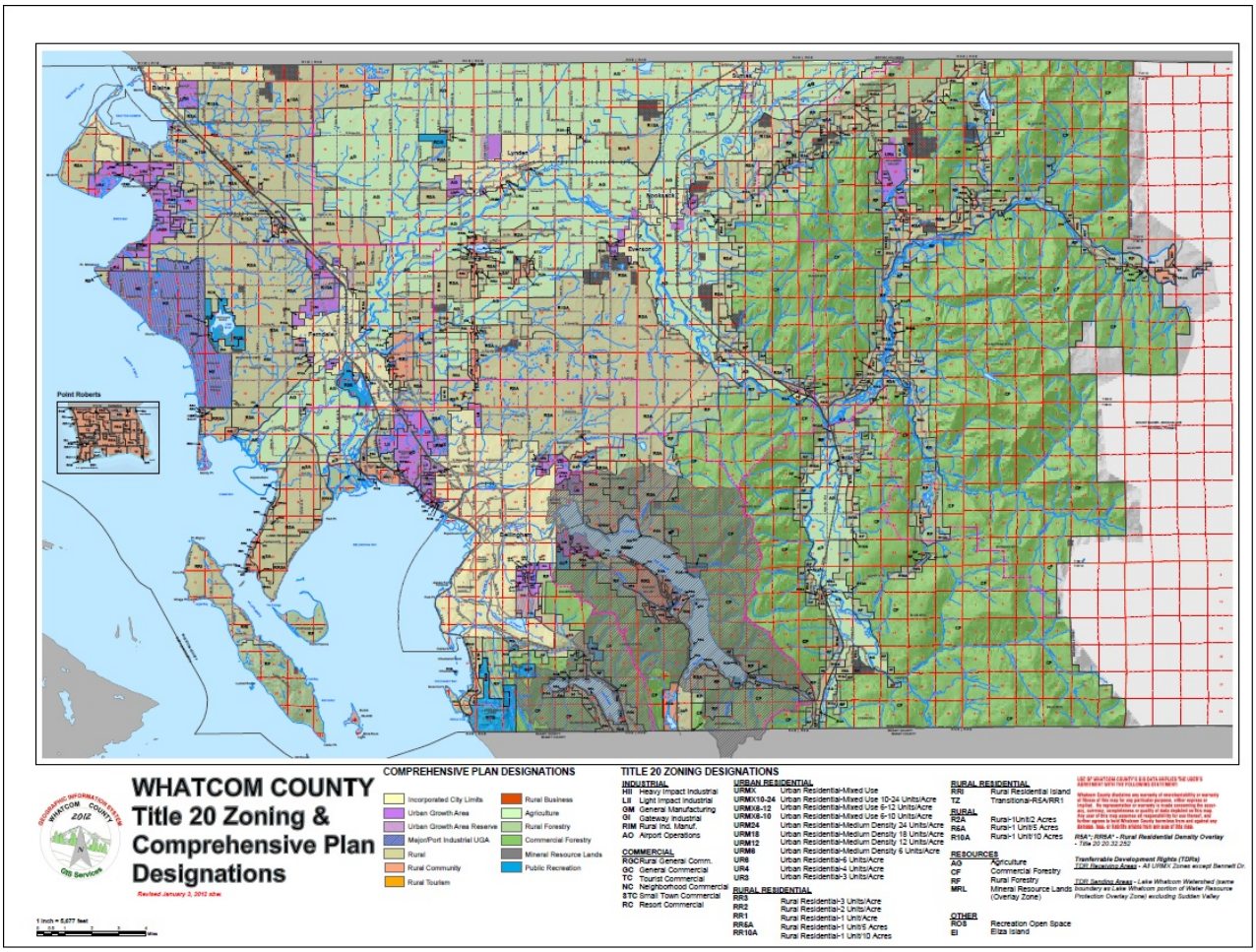
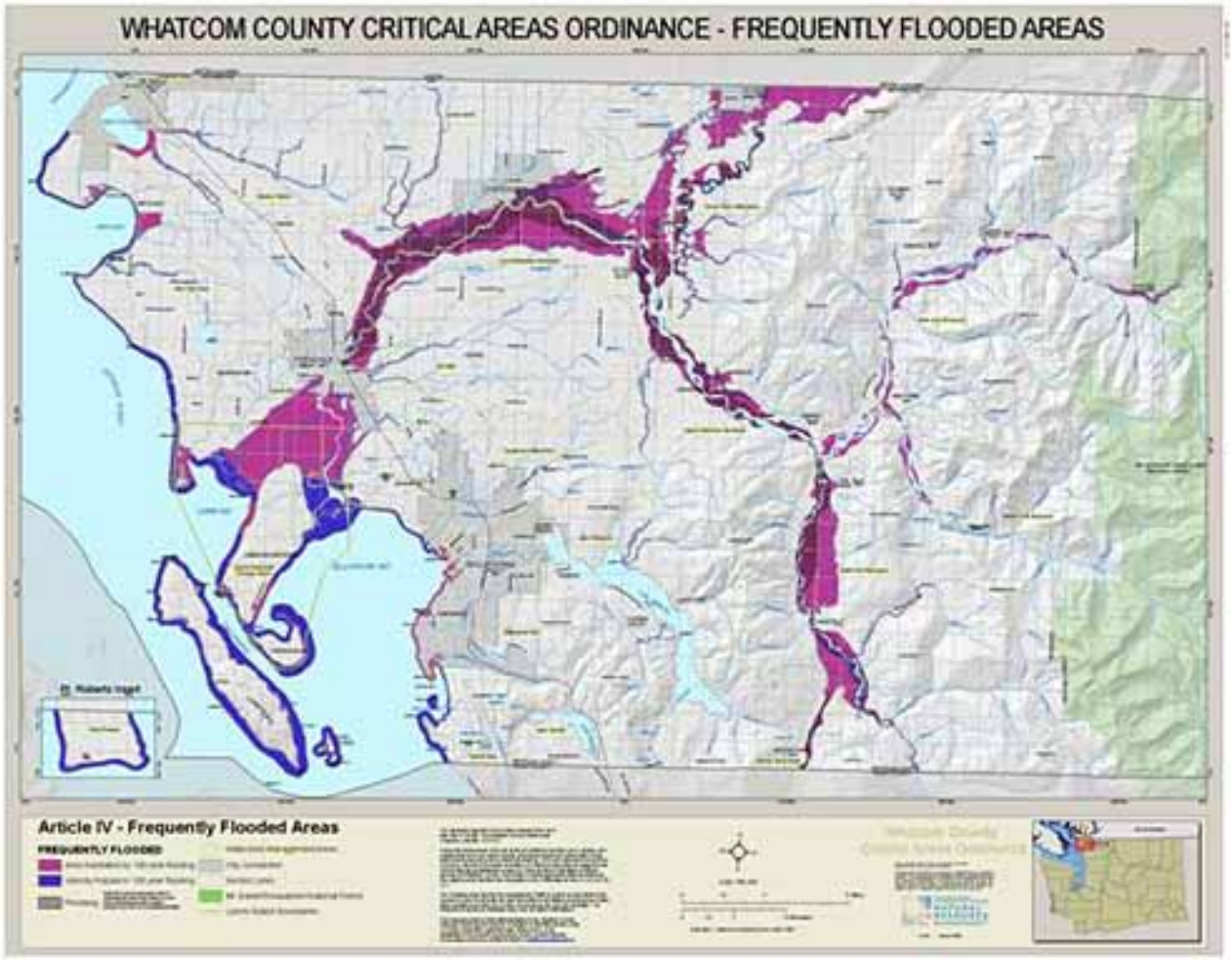
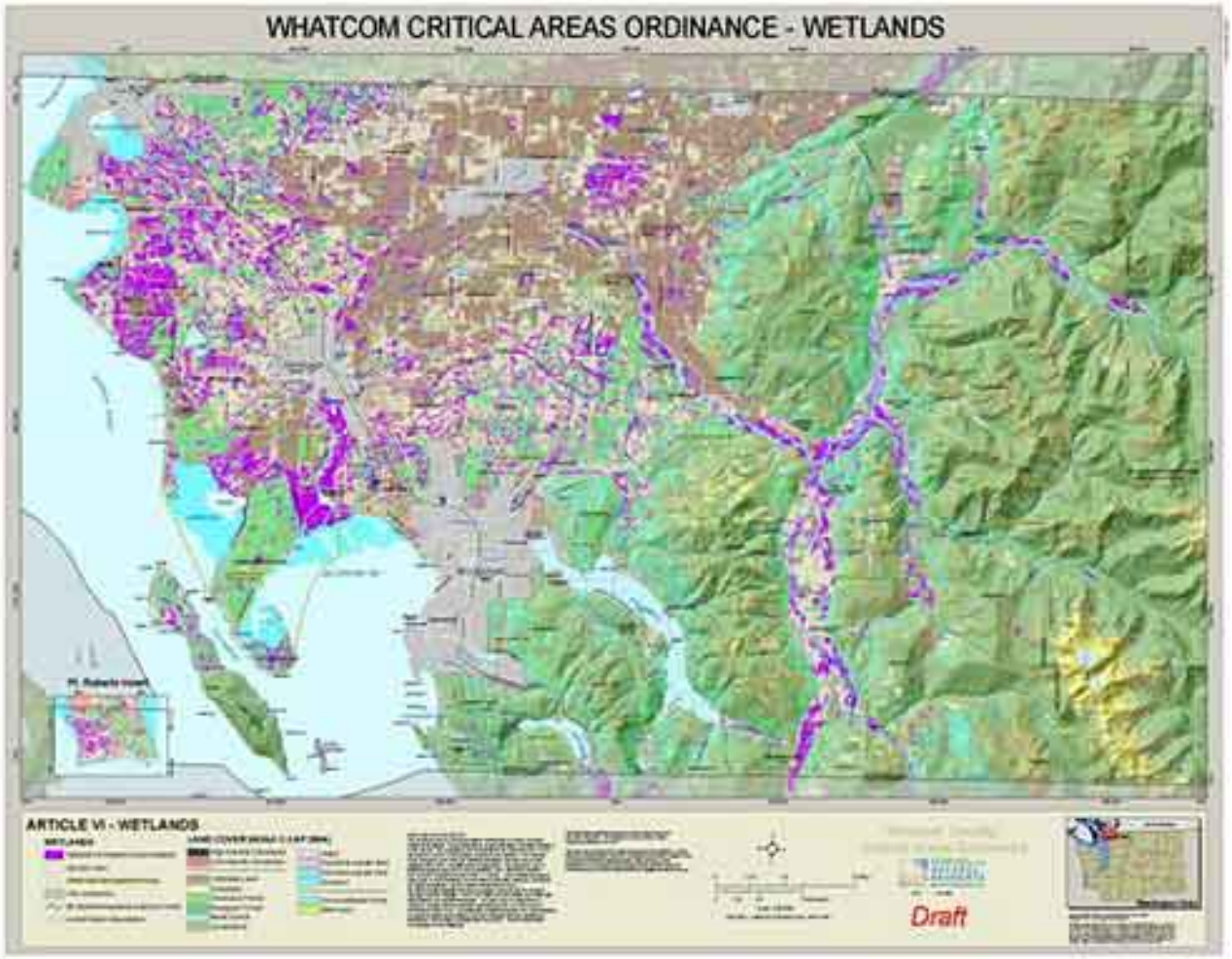


Figure 2.5a-Frequently Flooded Areas



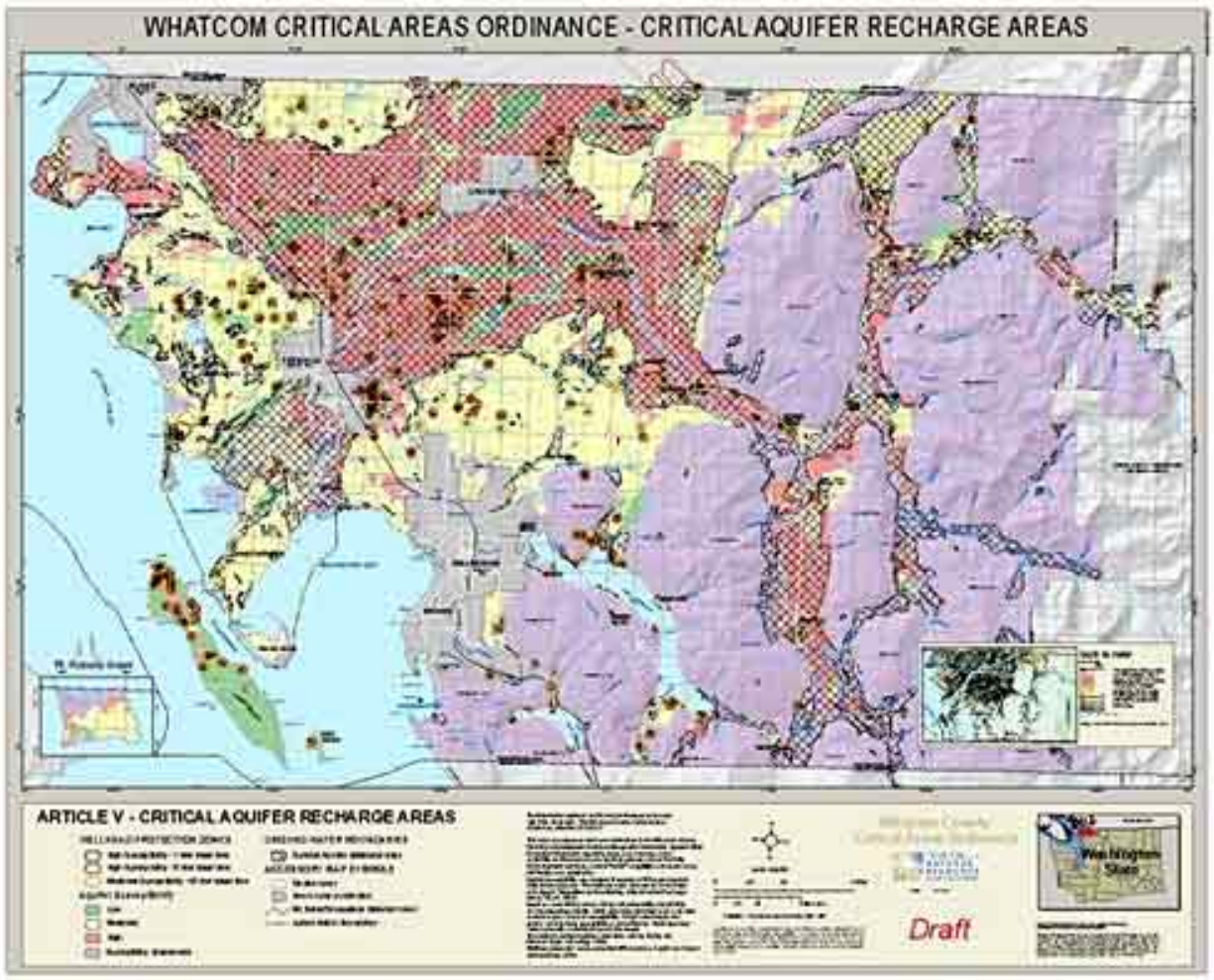
This map depicts the approximate location of Frequently Flooded Areas in Whatcom County. Frequently flooded areas are areas are located along major rivers, streams, and coastal areas where the depth, velocity, intensity and frequency of flood water during major events presents a risk to human life and property (Whatcom County, 2005).

Figure 2.5b
Wetlands



The wetlands shown comprise federal, state and local agencies most inclusive inventory of wetlands. Wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Swamps, fresh and saltwater marshes, bogs, and some meadows are examples of wetlands (Whatcom County, 2005).

Figure 2.5c-Critical Aquifer Recharge Areas



Critical aquifer recharge areas and well head protection zones. Critical aquifer recharge areas have prevailing geologic conditions associated with infiltration rates that create a high potential for contamination of ground water or contribute significantly to the replenishment of ground water (Whatcom County, 2005).

Figure 2.6a

Washington Natural Heritage Information System
Known High-Quality or Rare Plant Communities and Wetland Ecosystems of Washington
November 2010
Whatcom County

Scientific Name	Common Name	
Abies amabilis - Tsuga heterophylla Cover Type	Pacific Silver Fir - Western Hemlock Forest	
Abies amabilis - Tsuga mertensiana Cover Type	Pacific Silver Fir - Mountain Hemlock Forest	H
Abies amabilis / Oplopanax horridus Forest	Pacific Silver Fir / Devil's-club	
Abies amabilis / Tiarella trifoliata Forest	Pacific Silver Fir / Foamflower	
Abies amabilis / Vaccinium membranaceum Forest	Pacific Silver Fir / Big Huckleberry	
Abies amabilis / Vaccinium ovalifolium / Tiarella trifoliata Forest	Pacific Silver Fir / Oval-leaf Blueberry / Foamflower	
Abies amabilis / Vaccinium ovalifolium Forest	Pacific Silver Fir / Oval-leaf Blueberry	
Abies amabilis Cover Type	Pacific Silver Fir Forest	H
Abies lasiocarpa Cover Type	Subalpine Fir Forest	H
Acer circinatum Cover Type	Vine Maple Shrubland	H
Acer macrophyllum - Alnus rubra / Polystichum munitum - Tellima grandiflora Forest	Bigleaf Maple - Red Alder / Swordfern - Fringecup Community	
Acer macrophyllum / Rubus spectabilis Forest	Bigleaf Maple / Salmonberry	H
Alnus rubra / Rubus spectabilis Forest	Red Alder / Salmonberry	H
Alnus rubra Cover Type	Red Alder Forest	H
Alnus viridis ssp. sinuata Shrubland [Placeholder]	Sitka Alder	H
Arctostaphylos uva-ursi Dwarf-shrubland	Kinikinnick	
Betula papyrifera var. commutata - Alnus	Paper Birch - Red Alder / Swordfern	

rubra / Polystichum munitum Forest [Provisional]		
Calamagrostis canadensis Western Herbaceous Vegetation	Bluejoint Reedgrass	
Caltha leptosepala Herbaceous Vegetation	Two-flowered Marsh Marigold	
Carex (aquatilis var. dives, nigricans) - Caltha leptosepala ssp. howellii Herbaceous Vegetation	Sedge Spp. - Two-flowered Marsh Marigold	
Carex aquatilis var. dives Herbaceous Vegetation	Sitka Sedge	
Carex Cover Type	Sedge Spp. Grassland	H
Carex exsiccata Herbaceous Vegetation [Provisional]	Western Inflated Sedge	
Carex interior - Hypericum anagalloides Herbaceous Vegetation	Inland Sedge - Bog St. John's Wort	
Carex nigricans Herbaceous Vegetation	Black Alpine Sedge	
Carex pellita Herbaceous Vegetation	Woolly Sedge	
Cassiope mertensiana - Phyllodoce empetriformis Dwarf-shrubland	White Mountain-heather - Pink Mountain-heather	
Cassiope mertensiana / Luetkea pectinata Dwarf-shrubland	White Mountain-heather / Partridgefoot	H
Eleocharis palustris Herbaceous Vegetation	Creeping Spikerush	
Empetrum nigrum Dwarf-shrubland	Black Crowberry	
Eriophorum chamissonis / Sphagnum spp. Herbaceous Vegetation	Russet Cottongrass / Sphagnum Spp.	
Festuca rubra - (Camassia leichtlinii, Grindelia stricta var. stricta) Herbaceous Vegetation	Red Fescue - Great Camas - Oregon Gumweed	
Larix lyallii Woodland [Provisional]	Subalpine Larch Community	H
Ledum groenlandicum - Kalmia microphylla / Sphagnum spp. Shrubland	Bog Labrador-tea - Bog-laurel / Sphagnum Spp.	
Lemna minor Herbaceous Vegetation	Small Duckweed	
Low Elevation Freshwater Wetland PTN	Low Elevation Freshwater Wetland PTN	
Lysichiton americanus Herbaceous	Skunkcabbage	

Vegetation [Provisional]		
Mid-Elevation Freshwater Wetland WC	Mid-elevation Freshwater Wetland WC	
Mid-Elevation Riparian Wetland WC	Mid-elevation Riparian Wetland WC	
Mid-elevation Sphagnum Bog WC	Mid-elevation Sphagnum Bog WC	
North Pacific Herbaceous Bald and Bluff	North Pacific Herbaceous Bald and Bluff	
Nuphar lutea ssp. polysepala Herbaceous Vegetation	Yellow Pond-lily	
Phyllodoce empetriformis / Vaccinium deliciosum Dwarf-shrubland	Pink Mountain-heather / Blueleaf Huckleberry	H
Phyllodoce glanduliflora Cover Type	Yellow Mountain-heather Shrubland	
Picea sitchensis - Tsuga heterophylla Cover Type	Sitka Spruce - Western Hemlock Forest	
Pinus contorta - Pseudotsuga menziesii Cover Type	Lodgepole Pine - Douglas-fir Forest	
Pinus contorta / Arctostaphylos uva-ursi Forest	Lodgepole Pine / Kinikinnick	H
Populus balsamifera ssp. trichocarpa - Alnus rubra / Rubus spectabilis Forest	Black Cottonwood - Red Alder / Salmonberry	H
Pseudotsuga menziesii - Arbutus menziesii / Vicia americana Forest	Douglas-fir - Pacific Madrone / American Purple Vetch	
Pseudotsuga menziesii - Pinus contorta Cover Type	Douglas-fir - Lodgepole Pine Forest	
Pseudotsuga menziesii - Tsuga heterophylla / Gaultheria shallon Forest	Douglas-fir - Western Hemlock / Salal	
Pseudotsuga menziesii - Tsuga heterophylla / Mahonia nervosa Forest	Douglas-fir - Western Hemlock / Dwarf Oregongrape	
Pseudotsuga menziesii - Tsuga heterophylla / Polystichum munitum Forest	Douglas-fir - Western Hemlock / Swordfern	
Pseudotsuga menziesii - Tsuga heterophylla Cover Type	Douglas-fir - Western Hemlock Forest	
Pseudotsuga menziesii / Acer circinatum Forest	Douglas-fir / Vine Maple	H
Pseudotsuga menziesii / Gaultheria shallon - Holodiscus discolor Forest	Douglas-fir / Salal - Oceanspray	

Pseudotsuga menziesii / Gaultheria shallon Forest	Douglas-fir / Salal	
Pseudotsuga menziesii / Holodiscus discolor / Carex geyeri Forest	Douglas-fir / Oceanspray	
Pseudotsuga menziesii / Rosa gymnocarpa - Holodiscus discolor Forest	Douglas-fir / Baldhip Rose - Oceanspray	
Pseudotsuga menziesii / Symphoricarpos albus - Holodiscus discolor Forest	Douglas-fir / Common Snowberry - Oceanspray	
Pseudotsuga menziesii Cover Type	Douglas-fir Forest	
Quercus garryana / Carex inops - Camassia quamash Woodland	Oregon White Oak / Long-stolon Sedge - Common Camas	
Rubus parviflorus / Chamerion angustifolium - Heracleum maximum Shrubland	Thimbleberry / Fireweed	
Salix (hookeriana, sitchensis) - Spiraea douglasii Shrubland	Hooker's, Sitka Willow - Douglas' Spirea	H
Salix cascadensis / Festuca brachyphylla Dwarf-shrubland	Cascade Willow / Sheep Fescue	
Salix nivalis / Festuca brachyphylla Dwarf-shrubland	Snow Willow / Sheep Fescue	
Saxifraga tolmiei - Luzula piperi Herbaceous Vegetation	Tolmie's Saxifrage - Piper's Woodrush	
Spiraea douglasii Shrubland	Douglas' Spirea	
Thuja plicata - (Tsuga heterophylla) / Oplopanax horridus Forest	Western Redcedar - (Western Hemlock) / Devil's-club	H
Thuja plicata - Tsuga heterophylla / Acer circinatum Community Type	Western Redcedar - Western Hemlock / Vine Maple Community	H
Thuja plicata - Tsuga heterophylla / Lysichiton americanus Forest	Western Redcedar - Western Hemlock / Skunkcabbage	
Thuja plicata - Tsuga heterophylla Cover Type	Western Redcedar - Western Hemlock Forest	
Thuja plicata / Acer circinatum Forest	Western Redcedar / Vine Maple	H
Tsuga heterophylla - (Thuja plicata) / Oplopanax horridus / Polystichum munitum Forest	Western Hemlock - (Western Redcedar) / Devil's-club / Swordfern	
Tsuga heterophylla / Clintonia uniflora Forest	Western Hemlock / Queen's Cup	

Tsuga heterophylla / Polystichum munitum Forest	Western Hemlock / Swordfern	
Tsuga heterophylla / Tiarella trifoliata - Gymnocarpium dryopteris Forest	Western Hemlock / Foamflower - Western Oakfern	
Tsuga heterophylla / Vaccinium ovalifolium Forest	Western Hemlock / Oval-leaf Blueberry	
Tsuga heterophylla Cover Type	Western Hemlock Forest	H
Tsuga mertensiana - Abies amabilis / Phyllodoce empetriformis - Vaccinium deliciosum Woodland	Mountain Hemlock - Pacific Silver Fir / Pink Mountain-heather - Blueleaf Huckleberry	
Tsuga mertensiana - Abies amabilis / Rhododendron albiflorum Forest	Mountain Hemlock - Pacific Silver Fir / Cascade Azalea	
Tsuga mertensiana - Abies lasiocarpa Cover Type	Mountain Hemlock - Subalpine Fir Community	H
Tsuga mertensiana Cover Type	Mountain Hemlock Forest	H
Vaccinium deliciosum Parkland Dwarf-shrubland	Blueleaf Huckleberry Parkland	
Vaccinium membranaceum - Vaccinium deliciosum Dwarf-shrubland	Big Huckleberry - Blueleaf Huckleberry	H
Valeriana sitchensis - Veratrum viride Herbaceous Vegetation	Sitka Valerian - Green False Hellebore	
Valeriana sitchensis Cover Type	Sitka Valerian Herbland	H

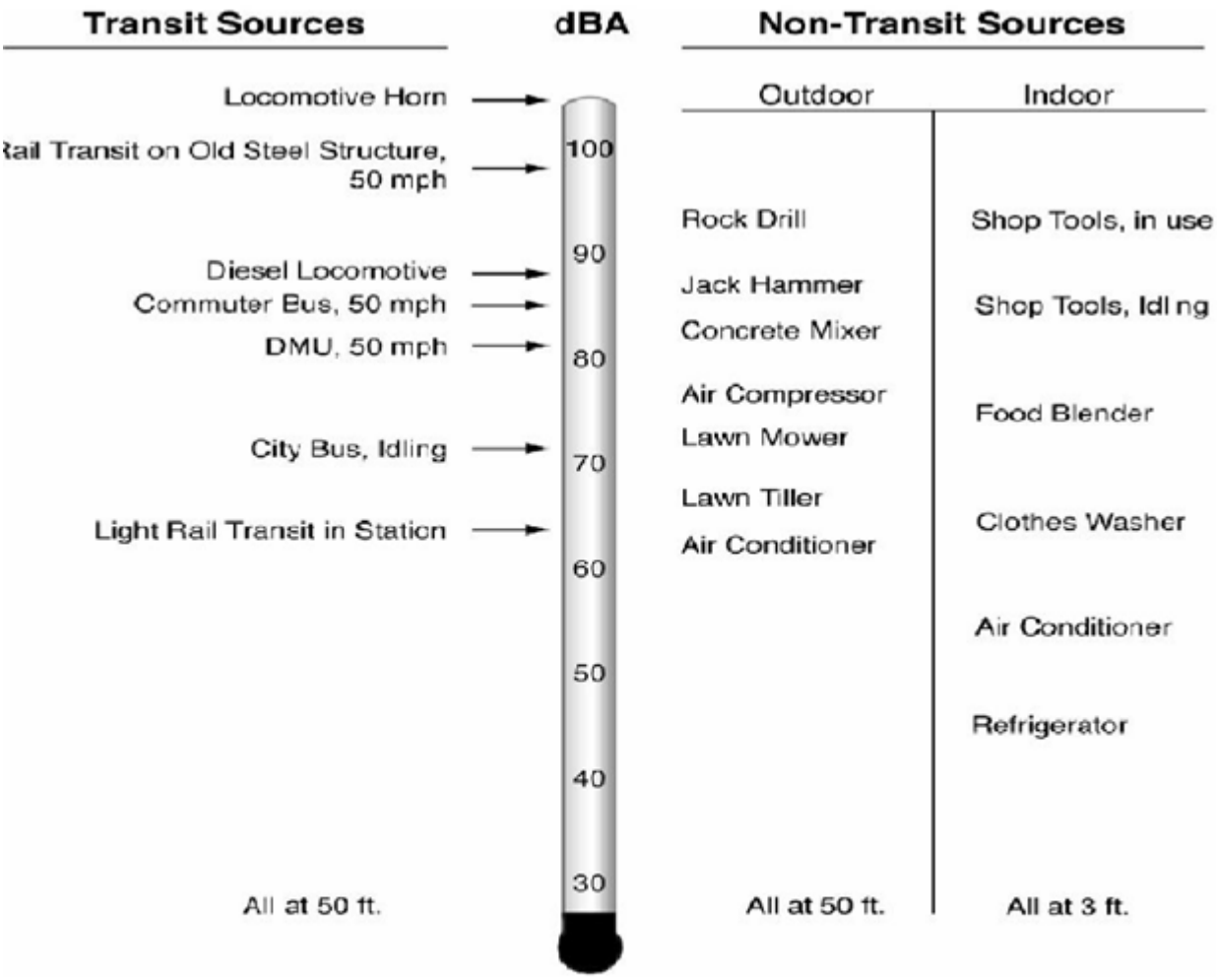
From Washington State Department of Natural Resources
http://www1.dnr.wa.gov/nhp/refdesk/lists/communitiesxco/whatcom.html

Figure 2.6b



From California's Department of Fish and Game
http://www.dfg.ca.gov/wildlife/avianflu/images/Pacific_map.jpg

Figure 2.7a - Typical A-Weighted Maximum Sound Levels



SOURCE: www.hmmh.com, David A. Towers, P.E.

Figure 2.7b - Sound walls near residential area from a reduction of 6-10dBA



SOURCE: www.hmmh.com, David A. Towers, P.E.

5. References

Andersen, R., Wiseth, B., Pedersen, P.H., Jaren, V. “Moosetrain Collisions: Effects of Environmental Condition”, 1991. Alces 27: 79-84.

Biozine.com. “The Impact of Artificial Lights on Wildlife”, April 14, 2009. Web. Feb. 2012. <http://biologybiozine.com/articles/feature/artificial_lights_impede_anima.php>.

Brook, R.D. “Cardiovascular Effects of Air Pollution”**,** 2008**.** *Clinical Science (London)*.115:175–187.

Burlington Northern Santa Fe. “Frequently Asked Questions: Train Horns”, 2010. Web. 14 Feb 2012. <http://www.bnsf.com/communities/faqs/train-horns/>.

Calvin, Edward M., Williams, Jerome E. “ A Rail Emission Study: Fugitive Coal Dust Assessment and Mitigation”, 1996. Web. 16 Feb. 2012. <http://www.powerpastcoal.org/wp-content/uploads/2011/08/A-RAIL-EMISSION-STUDY-FUGITIVE-COAL-DUST-ASSESSMENT-AND-MITIGATION.pdf>.

Child, K.N. 1983. “Railways and moose in the central interior of BC: A recurrent management problem.” Alces 19: 118-135.

Child, K.N., Stuart, K.M. “Vehicle and train collision fatalities of moose: some management and socio-economic considerations”, 1987. Swedish Wildlife Research, Supp. 1: 699-703.

Child, K.N., Barry, S.P., Aitken, D.A. “Moose mortality on highways and railways in British Columbia”, 1991. Alces 27: 41-49.

Clean Air Task Force. “Cradle to Grave: Environmental Impacts of Coal”, June 2001. Clean Air Task Force. Web. 5 Mar 2012. <http://www.catf.us/resources/publications/files/Cradle_to_Grave.pdf>.

Coal Train Facts. “Key Facts: Coal Dust & Trains”, 2012. Web. 15 Feb. 2012. <http://www.coaltrainfacts.org/key-facts#trains>.

Cordone, A. J., Kelley, D.W. "The influence of inorganic sediment on the aquatic life of streams", 1961. Web. 6 Mar 2012. <http://www.russianriverwatershed.net/docManager/1000000612/cordone1961.pdf>.

Department of Natural Resources. "Cherry Point Aquatic Reserve." Science and Environment . WA State Department of Natural Resources , 2010. Web. 5 Mar 2012. <http://www.dnr.wa.gov/ResearchScience/Topics/AquaticHabitats/Pages/aqr_rsve_cherry_point.aspx>.

Department of Natural Resources. “Cherry Point Aquatic Reserve Management Plan”, Nov. 2010. Web. 19 Jan. 2012. <http://www.dnr.wa.gov/Publications/aqr_cp_mgmt_plan_2010.pdf>.

De Place, Eric. “At Least The Website is Clean: What Railroads Don’t Want You to Know About Coal Dust”, Sightline Daily. Sightline Institute, 10 Aug. 2011. Web. 17 Feb. 2012. <http://daily.sightline.org/2011/08/10/at-least-the-website-is-clean/>.

Environment Canada. "Mercury in the Environment." . Environment Canada , 03 25 2010. Web. 5 Mar 2012. <http://www.ec.gc.ca/mercure-mercury/default.asp?lang=en&n=d721ac1f-1>.

Environment News Service, . "US mountain-top removal prompts legal action." *MAC: Mines and Communities*. ENS, Reuters, Charleston Gazette , 03-14-2011 . Web. 6 Mar 2012. <http://www.minesandcommunities.org/article.php?a=10773&highlight=miner>.

EPA. "Chapter 5: Environmental Consequences." Yosemite. Environmental Protection Agency , 1985. Web. 5 Mar 2012. <http://yosemite.epa.gov/r10/water.nsf/NPDES>

Evans GW. “Ambient Noise and Cognitive Process Among Primary Schoolchildren”, 2003. *Environment and Behavior*, 35(6) 725-735.

Gauderman, W. et al. “The Effect of Air Pollution on Lung Development From 10 to 18 years of Age”, 2004. *New Engl J Med* 351(11):1057-1067.

G Naidoo, D Chirkoot, “The effects of coal dust on photosynthetic performance of the mangrove, Avicennia marina in Richards Bay, South Africa, Environmental Pollution”, Volume 127, Issue 3, February 2004, Pages 359-366, ISSN 0269-7491, 10.1016/j.envpol.2003.08.018. <http://www.sciencedirect.com/science/article/pii/S0269749103003178>.

Hathaway GJ, Proctor NH, Hughes JP. “Proctor and Hughes’ Chemical Hazards of the Workplace”, 1991. 3rd Edition. New York, NY: Van Nostrand Reinhold

Jaren, V., R. Andersen, M. Ulleberg, P.H. Pedersen and B. Wiseth. 1991. “Moose-train collisions: the effects of vegetation removal with a cost-benefit analysis.” Alces 27: 93-99.

Karagianes MT, Palmer RF, Busch RH “The Effects of Inhaled Diesel Emissions and Coal Dust in Rats”, 1981. *American Industrial Hygiene Journal.* Volume 42(5):382 – 391.

Koltonowski, Edward. "Mount Vernon Traffic Study." *Coal Train Facts*. GTC, 01 Sept 2011. Web. 3 Mar 2012. <http://www.coaltrainfacts.org/docs/traffic-study-Mt-Vernon.pdf>.

Lashof, Daniel A., Delano, Duncan et al. “Coal in a Changing Climate”, Natural Resources Defense Council. NRDC Issue Paper, Feb. 2007. Web. 16 Feb 2012. <http://www.nrdc.org/globalwarming/coal/coalclimate.pdf>.

L"sekrug, R.G. ”Vogelverluste durch die Eisenbahn im Raum G"ttingen”, 1982. Angew. Ornithologie 5: 263-274.

Lin, S. et al.

"Childhood Asthma Hospitalization and Residential Exposure to State Route Traffic", 2002. *Environ Res*
Sect A 88:73-81.)

Luttrel, Mark. "Coal Dust on the Loose." *Resurrection Bay Conservation Alliance*. RBCA, 2010. Web. 6 Mar 2012. <http://rbca-alaska.org/page8/page13/page13.html>.

Mader, H.J., Schell, C., Kornacker, P. "Linear barriers to arthropod movements in the landscape. Biological Conservation", 1990. 54: 209-222.

Modafferi, R.D. "Train moose-kill in Alaska: characteristics and relationship with snowpack depth and moose distribution in lower Susitna Valley", 1991. Alces 27: 193-207.

Modafferi, R.D., Becker, E.F. "Survival of radio collared adult moose in lower Susitna River Valley, Southcentral Alaska", 1997. Journal of Wildlife Management 61:540-549.

Natural Resources Defense Council. "NRDC Issue Paper: Coal in a Changing Climate", Feb. 2007. Web. 17 Feb. 2012. <http://www.nrdc.org/globalwarming/coal/coalclimate.pdf>.

Norris, G. et al. "An Association Between Fine Particles and Asthma Emergency Department Visits for Children in Seattle", 1999. *Environmental Health Perspectives* 107:489-493.

Northwest Clean Air Agency. "Current Air Quality", Northwest Clean Air Agency, 2005. Web. 11 Feb. 2012. <http://www.nwcleanair.org/airQuality/current.asp>.

Northwest Clean Air Agency. "Emission Inventories." NWCAA. Northwest Clean Air Agency, 2005. Web. 11 Feb. 2012. <http://www.nwcleanair.org/airQuality/inventories.htm>.

Ostro, B. et al. "The Effects of Fine Particle Components on Respiratory Hospital Admissions in Children", 2009. *Environmental Health Perspectives* 117(3):475-480.

Ostro. B. et al. "Long-term Exposure to Constituents of Fine Particulate Air Pollution and Mortality: Results from the California Teachers Study". *Environmental Health Perspectives* 118(3):363-369.

Paben, Jared. "Whatcom Real Estate Professionals Against Coal Trains", The Bellingham Herald, 2011. Web. 16 Feb. 2012. <http://media.bellinghamherald.com/static/images/downloads/JaredPaben/Whatcom%20Real%20Estate%20Professionals%20Against%20Coal%20Trains.pdf)>.

Pacific International Terminals, Inc. "Gateway Pacific Terminal - Land Disturbance Permit (LDP2011-00054) Addressing SEPA Comments", Letter to Whatcom County Planning & Development Services, 28 Sept. 2011. Web. 19 Feb. 2012.

<http://www.co.whatcom.wa.us/pds/plan/current/gpt-ssa/pdf/20110928-letter-pit-re-wcresponse-to-mdns-comments.pdf>.

Pacific International Terminals, Inc. "Gateway Pacific Terminal Project Information Document", Chapter 5: Environmental Resources and Project Effects, 28 Feb. 2011. Web. 18 Feb. 2012. <https://secureaccess.wa.gov/ofm/iprmt24/site/alias__1357/22894/review_documents.aspx>.

Pacific International Terminals, Inc. "Project Information Document: Gateway Pacific Terminal, Whatcom County, Washington", 28 Feb. 2011. Web. 18 Feb. 2012. <http://www.co.whatcom.wa.us/pds/plan/current/gpt-ssa/pdf/2011-02-28-project-info-doc.pdf>.

Pope CA 3rd, Muhlestein JB, May HT, Renlund DG, Anderson JL, Horne BD. "Ischemic Heart Disease Events Triggered by Short-term Exposure to Fine Particulate Air Pollution", 2006. *Circulation*.114:2443–2448.

Protect Whatcom!. "Coal Costs US Property", ProtectWhatcom.org, 2011. Web. 17 Feb. 2012. <http://protectwhatcom.org/coal-costs-us-property/>.

RESources. "Gateway Pacific Terminal: The Impacts", *RESources for Sustainable Communities*. Web. 4 Mar 2012. <http://www.re-sources.org/home/Gateway-Pacific-Terminal/the-impacts>.

. "Review Environmental Impact Statement." *City of Bellingham*. COB, n.d. Web. 9 Mar 2012.

Roberts, Pauline . "Coal is Toxic ." *Greens Mining* . 17 June 2010. N.p., n.d. Web. 4 Mar 2012. <http://nonewcoal.greens.org.au/coal/toxicity/dust/effects-on-health/coal-is-toxic>.

Selander J, Milsson ME, Bluhm G, Rosenlund M, Lindqvist, M Nise G, Pershagen G. "Long-term Exposure to Road Traffic Noise and Myocardial Infarction", 2009**.** *Epidemiology* 20(2): 272-279.

Sharma PK, Singh G. "Distribution of Suspended Particulate Matter with Trace Element Composition and Apportionment with Possible Sources in Raniganj Coalfield India", 1991. *Environmental Monitoring and Assessment* 22:237 - 244.

Simons, R.A., Jaouhari., A.E. "The Effect of Freight Railroad Tracks & Train Activity on Residential Property Values." The Appraisal Journal, June, 2004.

Slaughter, J. C. et al. "Effects of Ambient Air Pollution on Symptom Severity and Medication Use in Children with Asthma", 2003. *Ann Allergy Asthmas & Immunol* 91:346-353.

Spaite, D., Criss, E., Valenzuela, T., Meislin, H.W., Ogden, R. **"**Railroad Accidents: A Metropolitan Experience of Death and Injury",1988. *Annals of Emergency Medicine* 6: 620-625.

Stark , John. "BNSF Says Bellingham is Only Practical Route to Cherry Point Cargo Terminal", 18 May 2011. Bellingham Herald. Web. 4 Mar. 2012.

<http://www.bellinghamherald.com/2011/05/13/2012172/bnsf-says-bellingham-is-only-practical.html>

State of Washington Department of Archaeology & Historic Preservation. “Archaeological Site Damage at 45WH1”, 5 Oct. 2011. Web. 19 Feb. 2012. <http://www.whatcomcounty.us/pds/plan/current/gpt-ssa/pdf/20111005-archaeological-site-damage.pdf>.

Towers, David A., “Rail Transit Noise and Vibration”, Harris Miller Miller & Hanson, Inc.

University, Cornell. "U.S. Code." *130 - Railway-Highway crossings*. n. page. Web. 9 Mar. 2012. <http://www.coaltrainfacts.org/docs/Cornell-Univ-Law-School.pdf>.

U.S. Department of Labor. “Partial List of Chemicals Associated with Diesel Exhaust”, Occupational Safety and Health Administration. Web. 15 Feb. 2012. <http://www.osha.gov/SLTC/dieselexhaust/chemical.html>.

U.S. Environmental Protection Agency. “National Ambient Air Quality Standards (NAAQS)”, Air and Radiation. 8 Nov. 2011. Web. 14 Feb. 2012. <http://www.epa.gov/air/criteria.html>.

U.S. Environmental Protection Agency. “Particulate Matter”, Air and Radiation. 6 July 2011. Web. 14 Feb. 2012. <http://www.epa.gov/pm/>.

USDA Soil Conservation Service. “Soil Survey of Whatcom County Area, Washington”, 1983.

Washington State Department of Ecology. “SEPA Guide for Project Applicants”, State Environmental Policy Act. <http://www.ecy.wa.gov/programs/sea/sepa/apguide/apguide1.htm>.

Washington Dept. of Natural Resources, . " Washington Natural Heritage Information System Known High-Quality or Rare Plant Communities and Wetland Ecosystems of Washington." . N.p., 2010. Web. 1 Mar 2012. <http://www1.dnr.wa.gov/nhp/refdesk/lists/communitiesxco/whatcom.html>.

"Whatcom Wildlife Area." *Washington Department of Fish and Wildlife*. N.p., 2012. Web. 8 Mar 2012. <http://wdfw.wa.gov/lands/wildlife_areas/whatcom/>.

"The Impacts of Railroads on Wildlife." *Wildlands CPR*. N.p., 10/Nov/2001. Web. 8 Mar 2012. <http://www.wildlandscpr.org/road-riporter/impacts-railroads-wildlife>.

Western Organization of Resource Councils. “Exporting Powder River Basin Coal: Risks and Costs”, WORC, Sept. 2011. Web. 16 Feb. 2012. <http://www.powerpastcoal.org/wp-content/uploads/2011/11/WORC-Exporting-PRB-Coal-Risks-and-CostsFINALFINAL9-111.pdf>.

Whatcom County. "Title 16, Chapter 16.16; the Whatcom County Critical Areas Ordinance." . Whatcom County , 09 30 2005. Web. 5 Mar 2012

Whatcom County Planning and Development Services. "Air Quality in Whatcom County." *Whatcom County 10-year Urban Growth Area Review Environmental Impact Statement*. May 2009. Web. 12 Feb. 2012. <http://www.co.whatcom.wa.us/pds/2031/pdf/Ch4-2_Air.pdf>.

Whatcom County Planning and Development Services. "Gateway Pacific Terminal Final Environmental Impact Statement", Feb. 1997. Web. 20 Feb. 2012. <http://www.co.whatcom.wa.us/pds/plan/current/gpt-ssa/pdf/1997-final-eis.pdf>.

Whatcom County Planning and Development Services. "Whatcom County Request for Proposals 12-08." The U.S. Army Corps of Engineers, Washington State Department of Ecology, Whatcom County Planning and Development Services. 4 Jan. 2012. Web. 6 Mar 2012. <http://www.coaltrainfacts.org/docs/RFPGPTEIS1-4-12.pdf>.

Whatcom Docs. "Whatcom Docs Position Statement and Appendices". *Coal Train Facts*. <www.coaltrainfacts.org/whatcom-docs-position-statement-and-appendices>.