TECHNICAL MEMORANDUM

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ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

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FROM: Shannon Khounnala and Chip Halbert, P.E.

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RE: AIR QUALITY TECHNICAL REPORT
NEW WHATCOM REDEVELOPMENT PROJECT
PORT OF BELLINGHAM
BELLINGHAM, WASHINGTON

INTRODUCTION

This technical report analyzes the potential impacts of the proposed New Whatcom Redevelopment Project action(s) and alternatives on air quality in the project area. This report has been prepared to address the emissions to air of any substance that could result in a nuisance to the surrounding community or endangers the comfort, health, or safety of any person within the project area in light of the federal, state, and local regulatory framework for air quality.

AFFECTED ENVIRONMENT

Existing Site Conditions

The following section provides information about the existing air quality regulatory framework and local climate.

Regulatory Framework

The federal Clean Air Act was enacted in 1970 and amended in 1977 and 1990 [42 U.S.C. 7506(c)] for the purposes of protecting and enhancing the quality of the nation's air resources to benefit public health, welfare, and productivity. In 1971, in order to achieve the purposes of Section 109 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) developed primary and secondary national ambient air quality standards (NAAQS). NAAQS represent the maximum levels of ambient air quality concentrations considered safe, with an adequate margin of safety, to protect the public health and welfare for six criteria air pollutants: ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, and particulate matter. The EPA has distinguished between two classes of particulate matter based on particle size: PM_{10} is

particulate matter with an aerodynamic diameter less than or equal to 10 micrometers; $PM_{2.5}$ is particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers. The primary NAAQS must "protect the public health with an adequate margin of safety" and the secondary standards must "protect the public welfare from known or anticipated adverse effects (aesthetics, crops, architecture, etc.)" (Clean Air Act 1990: Section 109). The primary standards were established in consideration of long-term exposure for the most sensitive groups in the general population (i.e., children, senior citizens, and people with breathing difficulties). Under the Clean Air Act, the EPA delegates authority to manage air quality issues to the states. In Washington State, the EPA and the Washington State Department of Ecology (Ecology) further delegate authority to local air quality agencies. The Northwest Clean Air Agency (NWCAA) has been delegated authority to regulate air quality in three counties, including Whatcom County where the project is located. The current NWCAA, State of Washington, and federal ambient air quality standards for criteria pollutants are presented in Table 1. Table 2 presents a brief summary of the principal sources of each criteria pollutant. Also shown in Table 2 are the potential health effects associated with exposure to elevated concentrations of the criteria pollutants.

The Clean Air Act also directs the EPA to regulate a list of 187 hazardous air pollutants (HAPs). EPA typically focuses its regulation of HAPs on "major" sources with emissions of at least 10 tons per year of any single HAP or 25 tons per year for any combination of HAPs.

Ecology has also adopted similar air quality standards for criteria pollutants and regulates what it calls toxic air pollutants (TAPs). Ecology's list of regulated TAPs overlaps much of the EPA's list of HAPs. In addition to ambient air quality standards for criteria pollutants, Ecology has also established ambient air quality standards for radionuclides and fluorides. The state's air quality standards and TAP regulations are listed in WAC 173-460 through 481 and, at a minimum, must be equivalent to the federal standards, although they can be more stringent. Based on air quality monitoring information collected or reviewed by the NWCAA, Ecology and the EPA designate regions as being in "attainment" or "non-attainment" for ambient concentrations of air pollutants. If a region is in compliance with the health-based NAAQS, then it is determined to be in "attainment." Whatcom County is in attainment for all air pollutants regulated by the NAAQS and the state air quality standards.

Within the greater Puget Sound region, emission control programs have created a substantial improvement in regional air quality following implementation of the Clean Air Act. Air quality standards are occasionally exceeded in the more urban counties of Snohomish, King,

and Pierce; however, exceedances in Whatcom County have not been recorded or reported in more than 16 years (Franzmann, A., 2007, personal communication).

Conformity Analysis Requirement

Provisions in the 1990 amendments to the federal Clean Air Act, the federal TEA-21 Transportation Equity Act for the 21st Century, and the Washington Clean Air Act require that regional transportation plans, and individual projects within these plans in non-attainment or maintenance areas, demonstrate conformity with Clean Air Act requirements for non-exempt transportation projects. However, because this project is located in Whatcom County, which is in attainment with all ambient air quality standards, conformity analysis is not required.

Climate

Air quality is a function of both the rate and location of pollutant emissions and how meteorological conditions and topographic features influence the dispersion of these pollutants. Atmospheric conditions, such as wind speed and direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersion of air pollutants and consequently affect air quality.

The proposed project is in the Puget Sound lowlands, a north-south topographical depression bordered on the east by the Cascade Mountains and the west by the Olympic Mountains and Vancouver Island. The project site is located in an area known as the Mountain View upland. The climate at the site is influenced by marine air that flows east from the Pacific Ocean and through the Straits of Georgia and Juan de Fuca. Occasionally cold, dry continental air flows from the east-northeast through the Fraser River canyon.

According to data from the Western Regional Climatic Center, the maximum high temperature recorded at the Bellingham Loomis weather observing station from 1949-2005 was 94°F (1960) and the record low temperature was –29°F (1998). Over the 56 years of monitoring, January and December had the lowest temperature average of 38°F and 39°F, respectively, while July and August had the highest average of 62°F. According to the University of Washington Atmospheric Science Department's K12 weather website, afternoon humidity readings for the Bellingham area are typically in the 60 percent range during summer months and in the mid- to upper 80 percent range during winter months. Higher relative humidity can be expected with the passage of migratory storm systems from the west. Lower

humidity can be expected with high pressure systems over eastern British Columbia and eastern Washington.

Predominant winds at the project site are from the south to south-southwest and from the east-northeast. On an annual basis, winds from the south and south-southwest occur with a frequency of about 24 percent. Winds from the east or east-northeast occur about 21 percent of the time, and winds from the west to northwest occur about 20 percent of the time.

Existing Site Vicinity Conditions

The following section provides information about the existing air pollutants and sources, and sensitive receptors.

Existing Air Quality

The NWCAA operates monitoring sites for a variety of air pollutants within Whatcom County to assure that long-term air quality complies with the NAAQS criteria. Pollutants monitored by or reported to the NWCAA include sulfur dioxide (SO_2), PM_{10}, $PM_{2.5}$ and ozone. Data are reported as micrograms per cubic meter ($\mu g/m^3$) and/or as an air quality index (AQI) where levels are characterized as good, moderate, unhealthy for sensitive groups, or unhealthy.

Ozone

Ozone is a highly reactive form of oxygen created by sunlight-activated chemical transformations of nitrogen oxides and volatile organic compounds (VOCs) (hydrocarbons) in the atmosphere. Ozone problems tend to be regional in nature because the atmospheric chemical reactions that produce ozone occur over a period of time, and because during the delay between emission and ozone formation, ozone precursors can be transported far from their sources. Transportation sources like automobiles and trucks are some of the sources that produce ozone precursors.

Ozone is monitored at one location in Whatcom County. The maximum reported 1-hour average concentration in 2002 was 0.07 parts per million (ppm), which is less than the NAAQS of 0.12 ppm. The maximum reported 8-hour average concentration in 2002 was 0.06 ppm, which is less than the NAAQS of 0.08 ppm.

Lead

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been motor vehicles (such as cars and trucks) and industrial sources. Due to the removal of lead from gasoline, metals processing is the major source of lead emissions to the atmosphere today. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers. Urban areas with high levels of traffic, trash incinerators, or other industry, as well as areas near lead smelters, battery plants, or industrial facilities that burn fuel, may still have high lead levels in air. As a result of the EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector have dramatically declined (95 percent between 1980 and 1999), and levels of lead in the air have decreased by 94 percent between 1980 and 1999.

Due to the low occurrence of any industrial facilities that may contribute lead to the air environment, this pollutant is not monitored within the Whatcom County area.

Carbon Monoxide (CO)

Carbon monoxide (CO) is the product of incomplete combustion. It is generated by transportation sources and other fuel-burning activities like residential space heating, especially heating with solid fuels like coal or wood. CO is usually the pollutant of greatest concern related to roadway transportation sources because it is the pollutant emitted in the greatest quantity for which short-term health standards exist. CO typically has a localized impact as concentrations diminish within a short distance of roads. The highest ambient concentrations of CO usually occur near congested roadways and intersections during wintertime periods of air stagnation.

Due to the nearshore location, lack of substantial congestion within Whatcom County, and a history of minimal CO concentrations within the county, CO is not monitored at any air quality stations within the area on an ongoing basis.

Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter air pollution is generated by industrial activities and operations, fuel combustion sources such as residential wood burning, motor vehicle engines and tires, and other sources. Federal, state, and local regulations set limits for particle concentrations in the air based on the size of the particles and the related potential threat to health. When first regulated, particle pollution was based on "total suspended particulate," which included all size

fractions. As sampling technology has improved and the importance of particle size and chemical composition have become more clear, ambient standards have been revised to focus on the size fractions thought to be most dangerous to people. At present, there are standards for PM_{10}, or particles less than or equal to about 10 micrometers (microns) in diameter as well as for $PM_{2.5}$, or particulate matter less than or equal to 2.5 microns in diameter. The latter size fraction is now thought to represent the most dangerous size fraction of airborne particulate matter because such small particles (e.g., a typical human hair is about 100 microns in diameter) can be breathed deeply into the lungs. In addition, such particles are often associated with toxic substances that are deleterious in their own right that can adsorb to the particles and be carried into the respiratory system.

AQI data based on ambient $PM_{2.5}$ concentrations for 2006 have been collected from Bellingham's downtown Yew Street monitoring station. This station collects $PM_{2.5}$ data continuously, which is summarized and reported by the NWCAA. For 2006, the maximum 24-hour $PM_{2.5}$ concentration was 22 $\mu g/m^3$. For 2005, the maximum 24-hour $PM_{2.5}$ concentration was 21 $\mu g/m^3$. For 2005 and 2006, the maximum 1-month $PM_{2.5}$ average was 11 $\mu g/m^3$. Based on the data collected, $PM_{2.5}$ concentrations have been translated into AQI classifications for each calendar day. Based on the AQI in 2006, 354 days were considered to have good air quality, 7 days were considered to have moderate air quality, and there were no unhealthy for sensitive group days or unhealthy days (4 days in 2006 are unaccounted for due to missed sampling).

At the Bellingham Yew Street monitoring station, PM_{10} is also collected continuously. For 2005, the maximum 24-hour PM_{10} concentration was 26 $\mu g/m^3$. This 24-hour concentration falls below the national, state, and local primary standard of 150 $\mu g/m^3$.

Nitrogen Oxides (NO_x)

Nitrogen oxides (NO_x) is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Many of the nitrogen oxides are colorless and odorless. However, one common pollutant, nitrogen dioxide (NO_2) along with particles in the air can often be seen as a reddish-brown layer over many urban areas.

NO_x form when fuel is burned at high temperatures, as in a combustion process. The primary manmade sources of NO_x are motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels. NO_x are one of the main ingredients involved in the formation of ground-level ozone, which can trigger serious respiratory problems.

NO_x react to form nitrate particles, acid aerosols, as well as NO_2, which also causes respiratory problems. These gases also contribute to the formation of acid rain, nutrient overload that deteriorates water quality, atmospheric particles that impair visibility most noticeably in national parks, reacts to form toxic chemicals, and contributes to global climate change.

NO_x and the pollutants formed from NO_x can be transported over long distances**,** following the pattern of prevailing winds in the U.S. This means that problems associated with NO_x are not confined to areas where NO_x are emitted. Therefore, controlling NO_x is often most effective if done from a regional perspective, rather than focusing on sources in one local area.

The national and state standards for NO_2, are being met in the Whatcom County and throughout Washington, and the latest pollutant trends suggest that these standards would not be exceeded in the foreseeable future. There are no monitoring stations collecting NO_x data within the area.

Sulfur Dioxide (SO_2)

Sulfur dioxide (SO_2) belongs to the family of sulfur oxide (SO_x) gases. These gases dissolve easily in water. Sulfur is prevalent in raw materials, including crude oil, coal, and ore, that contain common metals like aluminum, copper, zinc, lead, and iron. SO_x gases are formed when fuel containing sulfur, such as coal and oil, is burned, when gasoline is extracted from oil, or when metals are extracted from ore. SO_2 dissolves in water vapor to form acid, and interacts with other gases and particles in the air to form sulfates and other products that can be harmful to people and their environment.

More than 65 percent of SO_2 released to the air in the U.S., or more than 13 million tons per year, comes from electric utilities, especially those that burn coal (EPA 2007a). Other sources of SO_2 are industrial facilities that derive their products from raw materials like metallic ore, coal, and crude oil, or that burn coal or oil to produce process heat. Examples are petroleum refineries, cement manufacturing, and metal processing facilities. Also, locomotives, large ships, and some non-road diesel equipment currently burn high sulfur fuel and release SO_2 emissions to the air in large quantities.

Concentrations of SO_2 are monitored by NWCAA at a site west of Ferndale, Washington. For 2005, the maximum 24-hour SO_2 concentration was 24 $\mu g/m^3$, below the 260 $\mu g/m^3$ 24-hour NAAQS standard.

Air Toxics

Any other air pollutants that are not criteria pollutants, and that may be emitted into the air in quantities that can cause adverse health effects, can be classified as air toxics. These health effects cover a wide range of conditions from lung irritation to birth defects to cancer. There are no NAAQS for these pollutants, but the 1990 Clean Air Act Amendments listed almost 200 of these air toxics (or HAPs) and directed the EPA to develop control technology standards for sources that emitted them. There is some overlap in the grouping of pollutants. Particulate matter can contain air toxics particles, and lead is both on the HAP list and a criteria pollutant. Many of the VOCs that contribute to the formation of ozone are also HAPs. Air toxics come from a wide variety of sources, including traditional industrial and utility sources, smaller manufacturing and commercial sources, on-road mobile sources (such as cars, trucks, and buses), residential activities (such as oil burning for home heating and painting houses), and non-road mobile sources such as construction equipment.

Odors

Odors are one of the most obvious forms of air pollution to the general public. While offensive odors seldom cause physical harm, they can present a significant problem for both the source and the surrounding community. Offensive odors may cause agitation, anger, and concern to the public about the possibility of health effects, especially in residential neighborhoods located near sources. Most people respond to offensive odors as objectionable if they are sensed over the duration of a single human breath, typically two to five seconds.

Odors are regulated by the NWCAA. Over the past 10 years, the NWCAA has received several odor-related complaints in the downtown Bellingham area and has given several notices of violation to various facilities for being out of compliance. Violations in the downtown area have been primarily due to charred wood particulate from wood-working industries and nitrogen oxide emissions from the Encogen Generating facility (Franzmann, A., 2007, personal communication).

Sensitive Receptors

Sensitive receptors are population groups (children, the elderly, athletes, or the acutely and chronically ill) that are more likely to experience adverse health effects associated with air quality impacts. Facilities or land uses designated for more frequent use by sensitive receptors

include residential areas, schools, retirement homes, convalescent homes, hospitals, and medical clinics.

As noted above, the maximum detected air pollutant concentrations in 2005, the most recent year of reported air quality data in Whatcom County, are 6 to 10 times less than the NAAQS. With such good air quality, it is expected that construction activities conducted with the implementation of appropriate air quality control measures required by local regulations will not result in any adverse air quality impacts that would cause exceedances of the NAAQS beyond the boundaries of the construction sites. The location of the project adjacent to Bellingham Bay further provides for an effective mixing zone and dispersion of concentrated pollutants via typical marine weather patterns. As such, no significant air quality impacts to offsite receptors are anticipated in conjunction with construction activities. However, it is the intent of this report to discuss the New Whatcom Redevelopment actions and any effects on the existing or future receptors; therefore, a study area extending to at least 500 feet has been established for discussion purposes.

The major sensitive receptors surrounding the project have been loosely grouped into three areas (Figure 1). The sensitive receptors discussed in this report include the residential houses, condominiums, and apartments located south of Cornwall Avenue and west of Maple Street, which are referred to as the South Receptors. With the exception of the condominium and apartment residents at the northern end of the South Receptor area, some topographic features dramatically limit project-related air quality effects from reaching most of receptors in this area. The majority of homes are situated on a densely vegetated bluff located a horizontal distance of 300 to more than 1,000 feet from the project area. They are also at an elevation of nearly 100 feet above the elevation of the New Whatcom site. The analysis of air quality includes this area because some proposed project plans include features that will improve or redevelop roadway infrastructure within the existing area of these South Receptors.

The downtown core, where people shop, eat, work, and use park facilities around the project area from Maple Street to C Street is a general area of receptors referred to as the Downtown Receptors within this report. The receptors in residential condominiums and the houses north of C Street to Broadway are referred to as the North Receptors. The North Receptors are also located on a bluff approximately 250 feet or more from the New Whatcom site. Additionally, the planned residential and commercial areas of the proposed project would create future sensitive receptors within the mixed-used development and planned condominiums and apartments. It is noted, however, that the transition away from heavy industrial use to mixed use will result in a net improvement to air quality in the project area.

Sources of Air Pollution in the Project Area

Air pollutant emissions in Bellingham are from point, area, and mobile sources. Point sources are stationary sources that include, but are not limited to, industrial sources and power plants. Area sources include consumer products and smaller stationary sources, such as dry cleaners. Mobile sources consist of on-road sources and non-road sources. On-road sources include cars and trucks. Non-road sources include, but are not limited to, lawn mowers and other landscaping equipment, construction equipment, trains, large and small marine water vessels, and agriculture equipment.

Point Sources

There are a number of point sources currently operating at the existing New Whatcom site. These include the Georgia Pacific tissue mill, which is scheduled to close by the end of 2007; a number of small industrial businesses; and the Puget Sound Energy Encogen Generating Station (ENC), which is located at the project site on Cornwall Avenue adjacent to downtown Bellingham. ENC is a 163-net-megawatt (MW), combined cycle, natural gas-fired power generating plant. ENC uses natural gas as the primary fuel source, but distillate fuel oil is available as backup to allow continued generation of power in the event of a natural gas shortage. Fuel oil is used for periodic readiness testing of the turbines. Air emissions from the ENC facility are regulated by NWCAA Air Operating Permit No. 004R1, which was issued August 18, 2006.

Emission points at ENC include: three combustion turbine generators with a capacity of 41.5 MW each; a natural gas-fired auxiliary boiler with a heat input of 92.7 million British thermal units (MMBTU)/hour; and two aboveground fixed roof fuel oil storage tanks with a nominal storage capacity of 470,000 gallons each. Emission controls on the three combustion turbine generators include steam injection and selective catalytic reduction with ammonia injection for the reduction of NO_X. Additionally, the quantity of sulfur in the natural gas or diesel fuel is less than 0.05 percent by weight. The auxiliary boiler is equipped with low NO_X burners and selective catalytic reduction with ammonia injection. The fixed roof storage tanks are used to store only low vapor pressure distillate fuel.

Air pollutants emitted by ENC include PM_{10}, anhydrous ammonia (NH_3), SO_2, CO, NO_X, VOCs, and formaldehyde. Maximum emission rates allowed under ENC's air operating permit and 5 years of actual emission quantities for ENC are described in the table below:

ENC Emissions Quantities: Maximum Allowable & Actual						
		Actual Emissions Inventory Data				
Pollutant	**Maximum Allowable (Tons/Yr)**	**2001**	**2002**	**2003**	**2004**	**2005**
PM_{10}	32.85	11	16	9	6	6
NH_3	79.75	36	33	28	13	--
SO_2	18.25	12	8	7	4	5
CO	131.04	38	26	22	13	14
NO_X	175	144	100	82	51	51
VOCs	66.07	3	1	1	1	0
Formaldehyde*	--	1.4	0.9	0.8	0.5	--
* Formaldehyde is not regulated under the air operating permit; however, it is reported for the purposes of maintaining a regional emissions inventory.						

Source: NWCAA 2007.

Air emissions from ENC constitute only a small amount of Whatcom County's total emissions. The table below shows ENC's pollution contribution compared to all major sources and other various minor source contributors in Whatcom County in 2005.

ENC's Annual Emissions in the Context of the Greater Community (2005)					
	PM_{10}	**SO_2**	**NO_X**	**VOCs**	**CO**
Whatcom County's totals (Tons)	450	3,676	3,793	1,359	12,586
ENC totals (Tons)	6	5	51	<1	14
ENC's contribution (as a percentage of Whatcom County's totals)	1.3%	0.1%	1.3%	<0.1%	0.1%

Source: NWCAA website 2007.

Although larger point sources such as Alcoa Primary Metals, British Petroleum, Conoco Phillips, Darigold, and others are located within Whatcom County and surrounding areas (Island and Skagit counties), and contribute to the air quality within the general region, they do not directly impact air quality in the project area to the same extent as the ENC facility due to its close proximity. Furthermore, the emissions from these point sources have consistently declined at such a rate they are not discussed in detail within this report. As evidence of declining air emissions, the NWCAA prepares an annual emission inventory of criteria and toxic

air pollutants for the larger point sources in its jurisdiction. There are 15 Title V Air Operating Permit sources (i.e., "major sources," as defined by EPA) and one other large electrical power plant within the Tri-County area. The NWCAA requires each source to report certain process and emission information by April 15 for the previous year. Each December, after the calculations are deemed accurate and complete, the emission information is posted on the NWCAA website. Between 2004 and 2005, emission reductions ranging from 0.5 percent to more than 23 percent of PM_{10}, SO_2, NO_x, VOCs, and CO were achieved (i.e., air pollutant emissions in 2005 were 0.5 to 23 percent less than those reported in 2004). It is expected that the emissions from such industrial sites will continue to decline with improvements in technology, and strict federal regulations aimed at addressing global climate change.

The main contributing sources within the area are on-road vehicles and non-road sources including trains and marine vessels. These contributing sources will be discussed in further detail within the following sections.

On-Road Vehicles

Emissions from individual cars or passenger trucks are generally low, relative to smokestack plumes that many people associate with air pollution. But in numerous cities across the country, the personal automobile is the single greatest pollution category, as the collective emissions from millions of vehicles on the road add up. Today's automobile produces approximately 90 percent less pollution than cars built in the 1960s. However, the benefits of these improvements have been largely offset by several factors: a rapid expansion in the number of cars on the roads, including an increase in fuel-intensive light trucks and sports utility vehicles; an increase in the number of miles driven each day; and changes in the composition of gasoline. As a result, on-road motor vehicles still contribute significantly to air pollution, accounting nationwide for 51 percent of the carbon monoxide, 30 percent of the carbon dioxide, 34 percent of the nitrogen oxides, nearly one-third of VOCs emitted in the United States, and 10 percent of fine particulate matter ($PM_{2.5}$).

In the Pacific Northwest, car and truck emissions are a higher percentage of total emissions than the national averages, primarily because there are fewer stationary industrial sources. Within Whatcom County, the current growth forecast for the area estimates that the number of on-road vehicles will continue to increase each year through 2026.

Non-Road Sources

The growth in freight transportation activity has, in some cases, outpaced the decline in per vehicle emission rates. For example, total U.S. NO_x emissions from commercial marine vessels and aircraft have increased over the past 20 years. In other cases, the decline in emission rates has more than compensated for growth in freight activity and led to a drop in total U.S. emissions, particularly VOCs and CO. Pollutant emissions from other major sources, such as light duty vehicles and power plants, are declining in many cases. As a result, freight transportation is contributing a growing share of the total emissions of some pollutants. For example, freight was responsible for 20 percent of the nation's total NO_x emissions in 1980; today that percentage is 27 percent.

At the same time that freight transportation's contribution to air pollution is growing, there is a heightened concern about the health and environmental effects of diesel engine emissions. Most freight trucks, locomotives, and marine ships are powered by diesel engines, which are a major source of emissions of NO_x and PM. Freight transportation is also a large and growing source of greenhouse gas emissions that contribute to global climate change, particularly carbon dioxide (CO_2) emissions (EPA 2007b). These concerns, and the implementation of the federal 8-hour ozone and fine particulate ($PM_{2.5}$) standards, will require many regions across the country to find new ways to control NO_x and PM emissions from freight transportation sources.

Rail

In 1998, the EPA established emission standards for NO_x, hydrocarbons, CO, PM and smoke for newly manufactured and remanufactured locomotives and locomotive engines, which had previously been unregulated. In the late 1990s, Locomotive NO_x emissions were estimated to represent about 5.5 percent of NO_x emissions from all mobile and stationary sources in the U.S. Locomotive PM and hydrocarbon emissions are both estimated to represent less than 0.25 percent of total national emissions. Thus, the focus of the EPA's regulation was on NO_x emission reductions. These standards were designed to achieve approximately a two-thirds reduction in NO_x emissions, which would be equivalent to removing more than 30 million passenger cars from the road.

There are three separate sets of emission standards, with the applicability of the standards dependent on the date a locomotive is first manufactured. The first set of standards (Tier 0) apply to locomotives and locomotive engines originally manufactured from 1973 through 2001, and any time they are remanufactured in calendar year 2000 or later. The regulations

require that post-1972 locomotives be covered by an EPA Certificate of Conformity when they are remanufactured. The certificate certifies that the locomotive was remanufactured in a specific manner so that it complies with the EPA's emission standards. Such regulation of the remanufacturing process is critical because locomotives are generally remanufactured five to 10 times during their total service lives (typically 40 years or more). Standards that would apply only to locomotives originally manufactured after the effective date of the rule would not achieve significant emission reductions until those future locomotives replaced a significant number of locomotives in the existing fleet. The second and third sets of standards (Tier 1 and Tier 2) apply to locomotives and locomotive engines originally manufactured on or after January 1, 2002 and January 1, 2005, respectively. These locomotives and locomotive engines are also required to meet the same standards at each subsequent remanufacture. The EPA has also established a rigorous emission testing program to make sure that locomotives comply with these standards for the life of the locomotive.

Based on discussions with Burlington Northern Santa Fe (BNSF) railway, an average of four freight trains make round-trip circuits through the Bellingham area each day en route to and from Canada. Other train activity includes three local freight trains serving businesses within the City of Bellingham, and one night freight train from Bellingham to Everett (Fishman 2007).

Passenger service along the BNSF railway is operated by Amtrak. The nearest station is the transit center south of the New Whatcom site located at 401 Harris Avenue in Bellingham. Amtrak's Cascades route provides service along the BNSF railway from Vancouver, British Columbia to Eugene, Oregon. Amtrak operates four daily trains with two southbound trains and two northbound trains.

Marine Vessels

Marine diesel engines used on a variety of different types of vessels ranging in size and application from small recreational runabouts to large ocean-going vessels are significant contributors to air pollution in many of our nation's cities, coastal areas, and ports. Marine diesel engines produced today must meet EPA-established emissions requirements, but the current standards are relatively modest and these engines continue to emit significant amounts of NO_x and PM, both of which can contribute to serious public health problems.

The EPA is addressing emissions from marine engines in two ways, through fuel standards and through emission limits.

In May 2004, as part of the Clean Air Non-Road Diesel Rule, the EPA finalized new requirements for non-road diesel fuel that will decrease the allowable levels of sulfur in fuel used in marine vessels by 99 percent. These fuel improvements, which begin to take effect in 2007, will create immediate and significant environmental and public health benefits by reducing PM from new and existing engines.

Current marine vessel traffic in the area includes large vessels that navigate along the waterway, and recreational and commercial vessels that navigate along the waterway and travel to and from the existing Port of Bellingham Squalicum marina immediately north of the New Whatcom site. This facility currently serves recreational vessels and provides a boat launch area for users wishing to haul in and haul out.

IMPACTS

Construction Impacts

All EIS alternatives are expected to have some level of initial and ongoing, phased redevelopment as the area is changed from an industrial land use to a mixed use site. For purposes of environmental review, it is assumed that the infrastructure projects would be generally similar for all redevelopment alternatives, although Alternative 1, the Higher Density Alternative, would entail the largest level of infrastructure improvements. Each of the redevelopment actions, however, will include similar forms of construction activities such as clearing, grading, excavating, demolition, material supply delivery, and heavy equipment usage. Each of the alternatives includes various forms of new roadway development, marina and in-water development, and recreational development (parks and trails) that will be implemented in a limited initial phase and completed over 20 years. Some of these alternatives also include the relocation of a portion of the railroad. If a planned action that includes railroad relocation is selected, a specific air quality construction permit may need to be obtained by BNSF or the Washington State Department of Transportation.

Construction activities, including soil disturbance, dust emissions, and combustion pollutants from onsite construction equipment and from offsite trucks hauling dirt, cement or building materials, will create a temporary addition of pollutants to the local air shed. These emissions will vary in both time and space as the construction activities vary with schedule and location. Due to the temporary and variable nature of emissions associated with construction activities, it is difficult to quantitatively model the impacts of these activities on the surrounding

air quality. It is noted that best management practices (BMPs) for dust control may be implemented to maintain PM concentrations in ambient air at acceptable levels.

Each phase of construction will require different types and scales of construction equipment operating at different locations within the New Whatcom site. Thus, it is not obvious which activity would be likely to produce the highest offsite or onsite concentrations for the different pollutants and averaging times governed by ambient air quality standards. Experience shows that construction activities would primarily produce PM and NO_x emissions associated with diesel-exhaust combustion emissions and earthwork. Lesser amounts of CO, SO_2, and VOC emissions would also be generated by construction-related activities such as temporary portable power generation or the operation of support vehicles

The construction effort will generate emissions from the exhaust of combustion engines, which contribute to atmospheric loading of both NO_2 and PM_{10}/$PM_{2.5}$. These emissions typically result from:

- Exhaust from the diesel construction equipment used for site preparation, grading, excavation, and construction of onsite structures
- Exhaust from water trucks used to control construction dust emissions
- Exhaust from pickup trucks and diesel trucks used to transport workers and materials around the construction site
- Exhaust from diesel trucks used to deliver concrete, equipment, and construction supplies to the construction site
- Exhaust from automobiles used by workers to commute to the construction site.

Additional PM_{10} and $PM_{2.5}$ emissions from earth-moving and related activities are expected from:

- Site preparation and finish grading/excavation at the construction site
- Onsite travel on unpaved surfaces
- Aggregate and soil loading and unloading operations
- Wind erosion of areas disturbed during construction activities.

Most construction-related emissions are expected to be released from mobile sources (i.e., heavy equipment) during construction of new roadways or site preparation activities for new buildings; however, emissions also will be generated during finish construction, such as during application of paints or other coatings. These similar emissions are also expected from

any in-water work efforts from diesel-powered tugs and marine construction vessels and any work involving the location of new utilities and new parks/trails.

The emissions created from onsite construction are not expected to pose a significant risk due to the distance of the North, Downtown, and South sensitive receptors from the onsite area and the location of the project adjacent to Bellingham Bay, and the effective air mixing zone that exists. The greatest potential short-term impacts to existing North, Downtown and South receptors are expected to occur during the construction of intersection improvements that will occur as the new onsite roadway network is joined to existing offsite roadway features.

Although new sensitive receptors will be created as part of all of the alternatives, as stated above, individual projects performed will be phased and occur in a variety of redevelopment areas, thus removing the risk of long-term, construction-related air quality effects to any one receptor location or the creation of any chronic construction-related air impacts. Additionally, the construction of new roadways, trenching for new utility lines, and preparation of parks and trail areas often require restricting access to pedestrians, thus removing sensitive receptors from the immediate vicinity where emissions are at their highest concentration. This is viewed as the most effective means of reducing any short-term air impacts to sensitive receptors for new mixed used areas that will be created during the phased construction effort.

Alternative 1 (Higher Density Alternative)

The development of Alternative 1 would involve the construction of the most extensive infrastructure, roadway, and utility systems. For this reason, Alternative 1 presents the greatest potential for construction-related air quality impacts throughout the project duration. Alternative 1 calls for the development of approximately 7.5 million square feet of total floor space for mixed use redevelopment. Major roadway infrastructure projects assumed to be completed under Alternative 1, and phased through 2026, include:

- Upgrading C Street, F Street, and Hilton Avenue to improve access to Area 1
- Upgrading Laurel Street between Cornwall Avenue and the Whatcom Waterway
- Extending Commercial Street to Oak Street
- Extending Cornwall Avenue to Area 10
- Upgrading the Central Avenue Wharf
- Extending Central Avenue to Laurel Street

- Building Maple Street through Area 2
- Extending Bay Street to Laurel Street
- Constructing the Broadway Pedestrian Connection
- Completing potential bridge access to the site located at Bay, Laurel, Cornwall, and Commercial
- Constructing the Wharf Street Flyover
- Potentially constructing a pedestrian bridge over the Whatcom Waterway.

From an air quality perspective, however, the combination and timing of the onsite roadway improvements among the Redevelopment Alternatives (Alternatives 1 through 3) do not pose significant differences and have limited ability to impact the North, South, and Downtown receptors due to their distance from the New Whatcom site. It is assumed that the new roadway connections to the existing City street network pose the greatest potential of short-term construction impacts to the existing sensitive receptors due solely to proximity. These localized improvements within the existing City roadway network included:

- Improvements at Central Avenue to allow access to Chestnut Street (Area 2)
- New bridge connection at Bay Street (Area 2)
- New bridge connection at Commercial Street (Area 5)
- New bridge connections at Cornwall Avenue and Laurel Street (Area 7)
- New fly-over at Wharf Street to provide connection to the intersection of North State and North Forest Street (Area 9).

The above-noted roadway improvements have the greatest potential to impact the existing sensitive receptors in the area. However, as these improvements will be phased over 20 years and will be temporary in nature, only short-term construction impacts will result.

Alternative 2 (Medium Density Alternative)

Alternative 2 is considered the medium-range development scenario and is designed with a lesser density than Alternative 1 and a less extensive infrastructure system. Alternative 2 calls for the development of approximately 6.0 million square feet of total floor space for mixed-use redevelopment.

Major infrastructure projects to be completed under Alternative 1 but not under Alternative 2 include:

- Providing the Broadway Pedestrian Connection
- Completing potential bridge access to the site located at Cornwall Avenue
- Constructing a potential Wharf Street Flyover.

Construction impacts under Alternative 2 are expected to be short-term and are not expected to be significant.

Alternative 2A (Medium Density Alternative with Delayed Railroad Relocation and Modified Roadway System)

Alternative 2A would be similar to Alternative 2 except for the following differences:

- Railway relocation would occur by 2026 instead of 2016
- Bridge access to the site would be completed at Cornwall Avenue
- Cornwall Avenue would remain open between the railroad crossing and Oak Street.

Delaying the railway relocation until the second phase of development would generate air quality impacts to a greater number of receptors than Alternative 2 because the establishment of new mixed uses on the site (employment and residential uses) would result in a new receptor population on the New Whatcom site. Construction impacts under Alternative 2a are expected to be short-term and are not expected to be significant.

Alternative 3 (Lower Density Alternative)

Alternative 3 represents the lowest level of density, infrastructure, and amenities of the redevelopment alternatives. Alternative 3 calls for the development of approximately 4.0 million square feet of total floor space for mixed-use redevelopment.

Major infrastructure projects to be completed under Alternatives 1 or 2 but not under Alternative 3 include:

- Extending Commercial Street to Oak Street
- Providing the Broadway Pedestrian Connection
- Completing potential bridge access to the site located at Cornwall, Laurel, and Commercial

- Constructing a potential Wharf Street Flyover.

Furthermore, Alternative 3 would remain in its current alignment, requiring significantly less construction activity. As the planned improvements will be phased over 20 years and will be temporary in nature, only short-term construction impacts will result.

Alternative 4 (No Action Alternative)

The No Action Alternative calls for anticipated industrial growth if the proposed actions are not approved. Alternative 4 estimates that development of approximately 1.1 million square feet of new industrial uses plus the existing uses would occur on the New Whatcom site. Limited infrastructure development would also occur, but it is assumed that no other new parks or amenities would be constructed.

In relationship to the rest of the redevelopment alternatives, Alternative 4 is expected to have the least construction-related impact on air quality.

Operational Impacts

Under each of the following alternatives, except the No Action Alternative, decommissioning of the ENC Plant on the New Whatcom site is assumed to occur by 2026. The ENC Plant may relocate to another offsite facility; however, the details of this move are not known at this time. The result of the decommissioning effort would remove up to approximately 77 tons (according to 2005 reported emissions) of criteria pollutants entering the atmosphere per year, as noted in the above table. Based on the transition from historical industrial operations to mixed use neighborhoods with increased traffic, the anticipated reduction in criteria pollutants associated with implementation of the New Whatcom redevelopment will result in a net benefit to Whatcom County's air quality.

Alternative 1 (Higher Density Alternative)

This section addresses potential operational impacts resulting from criteria air pollutant emissions associated with the assumed mixed used redevelopment. Operational emissions, and the related potential air quality impacts, would result from the main air polluting sources in the area, on-road (vehicles) and non-road (trains and marine vessels) sources. Emissions and potential impacts associated with each source category are described below.

2016 Impacts

On-Road Emissions

Alternative 1 provides for the most intensive changes to the roadway infrastructure by 2016. The development of Cornwall Avenue and the Laurel and Bay Street bridges, as well as the planned roadway network in development area 1 would increase the travel and distribution of traffic within this previously industrial area and surrounding downtown areas. Traffic within the new roadway network would not be expected to pose any significant risk to existing sensitive receptors within the area due mainly to the distance of the roadways (more than 500 feet) to the existing receptor groups (South, Downtown and North receptors).

Despite the growing population, increased traffic within the area, and increase in general development, Whatcom County is in attainment for all air quality criteria pollutants and there are currently no air quality violations on or near the New Whatcom site. Development of the roadway and related infrastructure of the project, and operational impacts resulting from the land uses completed during the initial phase, would provide for a relatively small contribution to the regional concentrations of criteria pollutants (PM, CO, and O_2). Because the area is in attainment for CO, a "hot spot" analysis is assumed not to be required; however, preliminary CO screening is discussed below, for discussion purposes. Additionally, some air pollutants, such as ozone, result from the buildup and chemical interaction of multiple pollutants from multiple sources, including oxides of nitrogen (NO_x) and VOCs. Therefore, ozone impacts must be evaluated by regional air quality planning agencies, rather than on a project-by-project basis. The NWCAA has documented the area's compliance with the ozone NAAQS and plans to maintain that compliance in the Ozone State Implementation Plan.

Although traffic within the downtown roadway network surrounding the project area is expected to generally increase through 2016 due to growth**,** within a regional context, air quality modeling has shown that, compared to the existing conditions, CO concentrations throughout the entire Puget Sound region are expected to continue to drop in the future (EPA 2005). Many of the potential air quality impacts from on-road sources throughout the general project area are expected to be offset by an increase in efficiency of future vehicles and cleaner fuels and fuel options available to consumers. These general trends in air quality reinforce the conclusion that air quality following the initial phase of development would remain in compliance and is expected to improve with the development of new fuels and technologies.

To demonstrate this further, data from the traffic and transportation report were reviewed and the three worst-performing intersections (greatest amount of vehicles and vehicular idle

time) within the existing offsite roadway network were analyzed for future CO emissions with the Washington State Intersection Screening Tool (WASIST). The WASIST is a computerized screening model used for estimating worst-case carbon monoxide (CO) concentrations near signalized intersections and metered roadways. The results from WASIST are based on EPA-approved models MOBILE6 version 2.03 and CAL3QHC. The purpose of the screening model is to allow the user to conservatively estimate the highest CO concentrations that would be found at an intersection without having to perform a more time-consuming, detailed analysis.

Three signalized intersections were included in the screening analysis for 2016 as they represent intersections within the greater Bellingham area with the worst expected traffic delays (Level of Service E or F) within the existing roadway network. Although the intersections are outside of the New Whatcom action area, these intersections with a poorer Level of Service can result in greater amounts of idling time, which could increase emissions. Although some of the intersections on site or within the immediate surrounding area have traffic volumes that may be similar or slightly greater than the intersections selected for screening, because the Level of Service is expected to be greater (Level of Service A, B, C, or D), idling time will be reduced, which results in fewer air quality emissions. The analyzed intersections are:

- North State Street/Ohio Street
- North State Street/James Street/Iowa Street
- Birchwood Avenue/Meridian Street.

The screening analysis was completed for these intersections and the results indicate that a more in-depth WASIST air quality analysis is not required because the conservative assumptions used in the screening analysis return acceptable levels of air quality impacts. The results for the worst-case receptor (purposely placed only 10 feet from the intersection) at each of the three intersections are below the 1-hour average NAAQS for CO of 35 ppm and the 8-hour average standard of 9 ppm; the modeled results were a 1-hour concentration of 7.8 ppm and an 8-hour concentration of 6.8 ppm. All three of these intersections conform to both the 1-hour and 8-hour NAAQS for project-level analysis.

Expected traffic volumes and vehicle delay times at other intersections both at the New Whatcom site and off site within the existing roadway network will be lower than the intersections analyzed above; therefore, it is reasonable to infer that mobile source CO emissions will conform to the NAAQS at both onsite and offsite intersections. This allows for the conclusion that vehicular traffic will not result in unacceptable operational impacts of the North, Downtown, South or onsite, newly created receptors.

Non-Road Emissions

The ENC facility has been permitted in accordance with federal, state, and local regulations that protect ambient air quality with respect to potential receptors that could be occupational or residential. Therefore, the transition from industrial to mixed use receptors during the New Whatcom redevelopment will not result in unacceptable levels of exposure to new residential receptors. In other words, the emissions allowed under ENC's current air permit are considered protective of human health for residential receptors as well as industrial receptors.

Rail

Although railroad emissions were regulated under the EPA's 1998 rule, in March 2007 the EPA proposed a revised three-part program that would significantly reduce emissions from diesel locomotives of all types: line-haul, switch, and passenger rail. The proposal would set new Tier 3 exhaust emission standards and idle reduction requirements for locomotives that would begin in 2009. The proposal would also tighten emission standards for existing locomotives when they are remanufactured; these standards would take effect as soon as certified systems are available (as early as 2008 but no later than 2010). Finally, the proposal would set long-term Tier 4 standards for newly built engines based on the application of high-efficiency catalytic, post-combustion technology, beginning in 2015 for locomotives.

Officials at BNSF have indicated that the rail industry traffic in the Bellingham area is expected to increase minimally. This minimal increase in rail traffic is expected to increase the frequency by one to two round-trip trains per day (Fishman 2007). Three of the four redevelopment alternatives assume that a portion of current railroad corridor on the site will be relocated to the eastern and southern border of the site; Alternative 1 assumes the relocation of the railroad corridor by 2016. Under Alternative 1, a portion of the railway would move approximately 500 feet to the east and south. This relocation will position the rail line adjacent to the bluff, similar to the current configuration near the North Receptors. Although this move could increase the NO_x and PM concentrations for some receptors, the frequency of trains in the area and the distance to receptors following the relocation (assuming the closest receptor would be at least 150 feet from the rail line) would limit the duration of potential exposure. Effects resulting from the railway relocation would vary depending on the sensitive receptor proximity and orientation to the railroad emissions. Because only a portion of the rail line will be relocated, it is expected that condominiums and apartments located near Laurel Street may be

the only receptors that experience potential impacts with the relocation of the railway. This analysis did not consider specific emission rates of the current or future railroad operations; however, the existing operation of the rail line immediately adjacent to some of the Downtown Receptors and North Receptors has not resulted in any reported air quality concerns or impacts. Therefore, moving the rail line in the eastern and southern portion of the project area, combined with the EPA proposed regulations to improve locomotive emissions, is not anticipated to result in any significant impacts. The railroad corridor relocation, however, would be subject to a specific permitting and environmental review process that could be undertaken by BNSF/Washington State Department of Transportation in the future. A review of air quality is likely to be part of that environmental process.

Marine Vessels

Although marine vessels have only been loosely regulated for air quality emissions, the March 2007 EPA proposal also provides for a new emission control program that would significantly reduce emissions from most marine diesel engines. These include marine propulsion engines used on vessels from recreational and small fishing boats to yachts, tugs, and freighters, and marine auxiliary engines ranging from small generator sets to large generators on ocean-going vessels. The proposal aims to cut PM emissions from these engines by 90 percent and NO_x emissions by 80 percent. The proposal would set new Tier 3 exhaust emission standards that would take effect in 2009 for the smallest marine diesel engines and in 2012 for most engines. The EPA proposal would also set long-term Tier 4 standards for newly built large marine diesel engines based on the application of high-efficiency catalytic, after-treatment technology, beginning in 2014. The proposal also explores a remanufacturing program for existing large marine diesel engines similar to the locomotive program. A final rule is anticipated by the end of 2007.

The proposed project provides for a new marina on the New Whatcom site. Alternative 1 allows for a marina for moorage of recreational vessels and the relocation of a haul-in and haul-out boat launch, currently operating at the Squalicum Marina immediately north of the New Whatcom site. The new marina provides for an increased capacity of boat moorage in the Bellingham Bay area, however, under Alternative 1, fewer slips would be constructed than under the No Action alternative. The development of the proposed project would also add to the appeal of the area, thus increasing the travel of marine vessels to and from the area. This increase is also expected to be observed in the number of recreational boaters hauling in or out

of the marina via the boat launch. Although the small recreational vessels will increase and potentially bring the public within closer proximity to emissions, the large marine vessel traffic is expected to decrease under Redevelopment Alternatives 1 through 3. Although this change may not provide any overall net increase or decrease in the air quality emissions generated by marine vessels in the short term, smaller vessels tend to have lower, cleaner emission outputs with main engines that are regularly maintained than large marine vessels. In addition, smaller vessels have a shorter life span than large marine vessels and can be expected to be replaced with vessels that benefit from technology and manufacturing designed to reduced emission output. The quicker replacement rate of recreational marine vessels could lend to improved air quality in the long term. Although the number of marine vessels within the area is not expected to significantly increase emissions, trucks hauling vessels to and from the site would be the greater contributor of emissions to sensitive receptors within the area. As these vehicles are part of the daily vehicles within the area, vehicular traffic traveling to and from the marina will not result in any significant impacts. Neither the marine vessels within the new marina nor those brought to and from the site via the boat launch are expected to result in any significant air quality impacts, as similar facilities have already been operating, without incident, at the adjacent Squalicum Marina and other marinas along Puget Sound.

2026 Impacts

Following the phased infrastructure development under Alternative 1, a high-density development supporting jobs, housing, and goods and services, would be located in a formerly industrial area.

Newly developed residential and commercial property would bring residents and visitors to the area within close proximity to the roadway network creating new sensitive receptors. The same three intersections included in the screening analysis for 2016 were also screened for 2026 in order to evaluate any long-term potential impact to the existing receptors and the newly created receptors. These intersections were originally selected as they represent intersections with the worst expected traffic delays and volumes within the existing roadway network.

The WASIST screening of the intersections in 2026 yielded similar output results as seen for 2016. A 1-hour average of 7.0 ppm of CO and an 8-hour average of 6.5 ppm of CO were observed at each of the worst-case receptors at each of the three intersections. These results show only a small increase in the 1-hour concentration of CO, and a reduction in the 8-hour concentration of CO. Despite the 10 years of added traffic growth to the area, CO

emissions are not expected to increase and result in any significant impacts to the existing South, Downtown, or North receptors or the newly created receptors at the New Whatcom site. These results indicate that, similar to the roadway and intersections within the existing downtown area, emissions from vehicles would not be expected to pose an environmental health hazard to those who live or work within the New Whatcom redevelopment area.

As mentioned above, improved environmental health will also be realized following the closure of the Encogen facility, which is assumed to occur under Alternatives 1 through 3 by 2026. This closure could result in the removal of 77 tons of criteria pollutants from the New Whatcom area.

In an effort to meet the original goals of improved environmental health in the New Whatcom redevelopment plan, some design features have been incorporated into the project plan that would help in reducing single occupant vehicle trips and encouraging the use of mass transit, thus reducing emissions generated and the exposure of receptors within the area. As part of the land use planning, the proposed project is aimed to encourage appropriate housing in and near industrial and business areas. Mixed-use development is designed to maximize walking and minimize vehicle use by providing housing, employment, education, shopping, recreation, and any support facilities within convenient proximity. The project includes mixed uses and places high-density residential uses adjacent to transit and within walking distance of the transit features. High-density residential use is also within walking distance to parks and civic use areas as well as the marina and other recreational activities.

Industrial developments that are incorporated into New Whatcom redevelopment plans will be subject to federal, state, and local air quality regulations. The regulatory framework for air quality requires compliance with standards that are protective of human health, taking into consideration the potential presence of sensitive populations. Therefore, industrial activities associated with the New Whatcom redevelopment are not expected to result in unacceptable air quality impacts to local receptor populations.

Alternative 2 (Medium Density Alternative)

2016 Impacts

Alternative 2 provides for similar air emissions as those described under Alternative 1. This alternative also removes some of the roadway infrastructure associated with Cornwall Avenue adjacent to development areas 5, 6, and 7, near the South and Downtown receptors. This may reduce emissions for South Receptors that are located on or near Laurel Street.

Under Alternative 2, both railroad and marine vessel traffic and emissions are expected to generate the same types and levels of emissions as described for Alternative 1 and significant air quality impacts are not anticipated.

2026 Impacts

Alternative 2 provides for a moderate residential and commercial development density within the project area. In comparison to Alternative 1, this reduction in development density, both in residential dwellings and commercial facilities, reduces the potential air quality effects to new residents and visitors of the area. Due to the distance from the New Whatcom area, the similarities of the development, and only slight changes in overall traffic volumes throughout the area, the South, Downtown, and North receptors would not experience much change in air quality as a result of the development density changes. Significant air quality impacts are not expected under Alternative 2.

Alternative 2A (Medium Density Alternative with Delayed Railroad Relocation and Modified Roadway System

2016 Impacts

This alternative provides the same impacts as described for Alternative 1 and Alternative 2 above; however, any potential air quality impacts resulting from the relocation of the railway would not occur during the initial phase of development. The operation of the railway will continue in its current location until a latter phase of development. Newly created receptors will be in closer proximity to the railroad emissions until the effort to move the railway was completed. This proximity, however, is not expected to pose any significant risks as the railway runs adjacent to a number of receptors (Downtown Receptors) without incident. No significant impacts are anticipated.

2026 Impacts

The same as described for Alternative 2 above. Moving the railway relocation to the second phase of the development would delay any potential air quality impacts to newly established receptors or South Receptors to later in the project. However, changes in fuel and regulations are expected to provide for dramatic emission reductions from rail sources by 2026 and planned action that includes railroad relocation may require specific permitting and

environmental analysis by BNSF or the Washington State Department of Transportation. Under these assumptions, no significant impacts are anticipated.

Alternative 3 (Lower Density Alternative)

2016 Impacts

Of all the redevelopment alternatives, Alternative 3 provides for the least potential air quality emission impacts and discharges within the project area. All emissions are expected to be less than those described under Alternative 1 and significant impacts are not anticipated.

2026 Impacts

The final buildout of Alternative 3 provides the lowest density development of all the redevelopment actions. Additionally, under Alternative 3, the railroad will remain in its current location. As with the higher density redevelopment actions, no significant impacts are anticipated.

No Action Alternative

Under the No Action Alternative, similar emissions are expected at the North Receptors due to the roadway and infrastructure within development area 1. Additionally, the marina and relocation of the boat ramp will also be developed. Under the No Action Alternative, the marina will provide a greater number of boat slips than under any of the redevelopment Alternatives 1 through 3.

It is assumed that the Encogen facility will remain in its current location and operation will continue beyond 2026. The No Action Alternative assumes that 1.1 million square feet of existing facilities will be reused for industrial activities and an additional 1.1 million square feet of new industrial facilities will be developed. The increase in industrial activities on the New Whatcom site is expected to increase large truck traffic on site and the surrounding offsite roadways.

The increase in industrial activities has the potential to provide the greatest increase in pollutant loading within the air shed for normal operations; however, the No Action Alternative assumes that each of the industrial operations will obtain and comply with all necessary air quality permits and that no significant air quality impacts are anticipated.

Indirect/Cumulative Impacts

This project is planned for and coincides with the expected population growth of Whatcom County. The development of the proposed project not only provides for some of the residential needs and economic commercial growth, but provisions for onsite amenities at the Bellingham waterfront would naturally lend to increased travel to the area by visitors. This travel is expected in the form of vehicular traffic and additional use of recreational marine vessels.

As noted in the above discussion of air quality impact, no significant effects related to air quality are expected from the proposed project, including significant increases in air pollutant emissions or deterioration of ambient air quality. Air quality impacts related to growth and non-transportation projects can be expected to contribute to long-term cumulative effects through the increase in area sources. Area sources are small, stationary sources that usually do not emit large amounts of criteria pollutants or air toxics, but area sources are numerous. Some examples of area sources include dry cleaners, printers, machine shops, gasoline service stations, wastewater treatment plants, and automobile painting and repair shops. Consumers who use household items are another area source. The added growth of the area and the increase in economic development within the New Whatcom site is expected to add to the number of area sources.

The contribution of the proposed project to cumulative temporary air quality impacts is not expected to be significant in consideration of construction mitigation measures described below. Other proposed projects in the area, including residential developments and other potential roadway projects, may produce temporary cumulative adverse air quality impacts in the area during construction. The timing of construction for these planned developments is uncertain and there is no indication that they are all to be constructed concurrently.

The operation of other planned projects with the New Whatcom redevelopment action includes a National Oceanic and Atmospheric Administration (NOAA) research docking facility. As part of this docking facility, four home-ported vessels are expected to be housed and serviced at the site. These vessels are expected to depart in the late spring for Alaska, and return in the late fall, although NOAA is constantly changing and refining their operational missions. An additional four transient vessels are also possible, arriving from other home bases for shipyard work or data transfer operations. NOAA's average vessels are around 225 feet long. NOAA vessels are often in cooperative operations with other state and federal government vessels, which adds to the complexity of their scheduling needs. Vessels may sit

idle for extended periods or may come and go on a daily basis as they calibrate their electronic equipment.

In addition to the planned marina as part of all redevelopment actions and the no-action alternative, the added NOAA vessels could increase the PM and NO_x emission at the waterfront area. Each of the NOAA vessels would be required to conform to applicable EPA regulations and are not expected to create any significant air quality impacts.

MITIGATION MEASURES

Construction Impact Mitigation

The construction contractor(s) would be required to comply with all relevant federal, state, and local air quality regulations, including the preparation of a plan for minimizing dust and odors to comply with NWCAA Section 300 and 301 Regulations. The Associated General Contractors of Washington's Guide to Handling Fugitive Dust from Construction Projects provides practical examples of suggested best management practices necessary to comply with air quality regulations involved in the construction process. The following is a list of possible mitigation measures specified in the guide that could be implemented to reduce potential air quality impacts during construction of the project.

- Use only equipment and trucks that are maintained in optimal operational condition.
- Require all off-road equipment to be retrofitted with emission reduction equipment (i.e., require participation in Puget Sound Region Diesel Solutions by project sponsors and contractors).
- Use biodiesel or other lower-emission fuels for vehicles and equipment.
- Use carpooling or other trip reduction strategies for construction workers.
- Implement restrictions on construction truck idling (e.g., limit idling to a maximum of 5 minutes).
- Locate construction equipment away from conduits to sensitive receptors such as fresh air intakes to buildings, air conditioners, and sensitive populations.
- Locate construction staging zones where diesel emissions won't be noticeable to the public or near sensitive populations such as the elderly and the young.
- Spray exposed soil with water or other suppressant to reduce emissions of PM_{10} and deposition of particulate matter.

- Pave or use gravel on staging areas and roads that would be exposed for long periods.

- Cover all trucks transporting materials, wet materials in trucks, or provide adequate freeboard (space from the top of the material to the top of the truck bed), to reduce PM_{10} emissions and deposition during transport.

- Provide wheel washers to remove particulate matter that would otherwise be carried offsite by vehicles to decrease deposition of particulate matter on area roadways.

- Remove particulate matter deposited on paved, public roads, sidewalks, and bicycle and pedestrian paths in the project area to reduce mud and dust; sweep and wash streets continuously to reduce emissions.

- Cover dirt, gravel, and debris piles as needed to reduce dust and wind-blown debris.

- Route and schedule construction trucks to reduce delays to traffic during peak travel times to reduce air quality impacts caused by a reduction in traffic speeds.

Operational Impacts Mitigation

The most effective air quality emission control measures for the proposed project would include transportation control measures and indirect source control. Transportation control measures include reducing vehicle trips, use, miles traveled, and traffic congestion. Indirect sources are those facilities that generate or attract mobile sources that can result in emissions of pollutants for which there is a federal or state ambient air quality standard. These facilities and uses include shopping centers, schools, residential uses, etc.

Operational emissions attributable to the increased number of vehicles traveling to and from residential areas and/or commercial business are not expected to increase over the significance thresholds for any criteria pollutants. However, in order to promote a healthy and cleaner air environment, it is recommended that all feasible transportation control measures be implemented, which may include:

- Provide preferential parking spaces for employee carpools and vanpools

- Provide on-street bus shelters and well-lit paths that are located away from intersections.

- Schedule truck deliveries and pickups for off-peak hours where feasible

- Work with the City of Bellingham to implement or contribute to public outreach programs that promote alternative methods of transportation

- Require that delivery trucks turn off their engines if the anticipated duration of idling exceeds 3 minutes.

Emissions from railroad and marine vessels will be required to adhere to any existing or future federal and state regulations for air emissions. Additionally, any future industrial uses will need to apply for individual permits from the NWCAA and adhere to the emission standards outlined for operation.

REFERENCES

EPA. 2007a. *SO_2: What Is It? Where Does It Come From?* http://www.epa.gov/air/urbanair/so2/what1.html. U.S. Environmental Protection Agency. Accessed on August 16, 2007.

EPA. 2007b. Regulatory Announcement: *EPA Proposal for More Stringent Emission Standards for Locomotives and Marine Compression-Ignition Engines*. EPA 420-F-07-015. U.S. Environmental Protection Agency. March.

EPA. 2005. *Air Quality Summary Report Through 2005*. U.S. Environmental Protection Agency.

FHWA. 2005. *Assessing the Effects of Freight Movement on Air Quality at the National and Regional Level*. Federal Highway Administration. April.

Fishman, S. 2007. E-mail message from Ms. Stefanie Fishman, The Transpo Group, to Mr. Chip Halbert, Landau Associates. Re: *BNSF Info*. May 21.

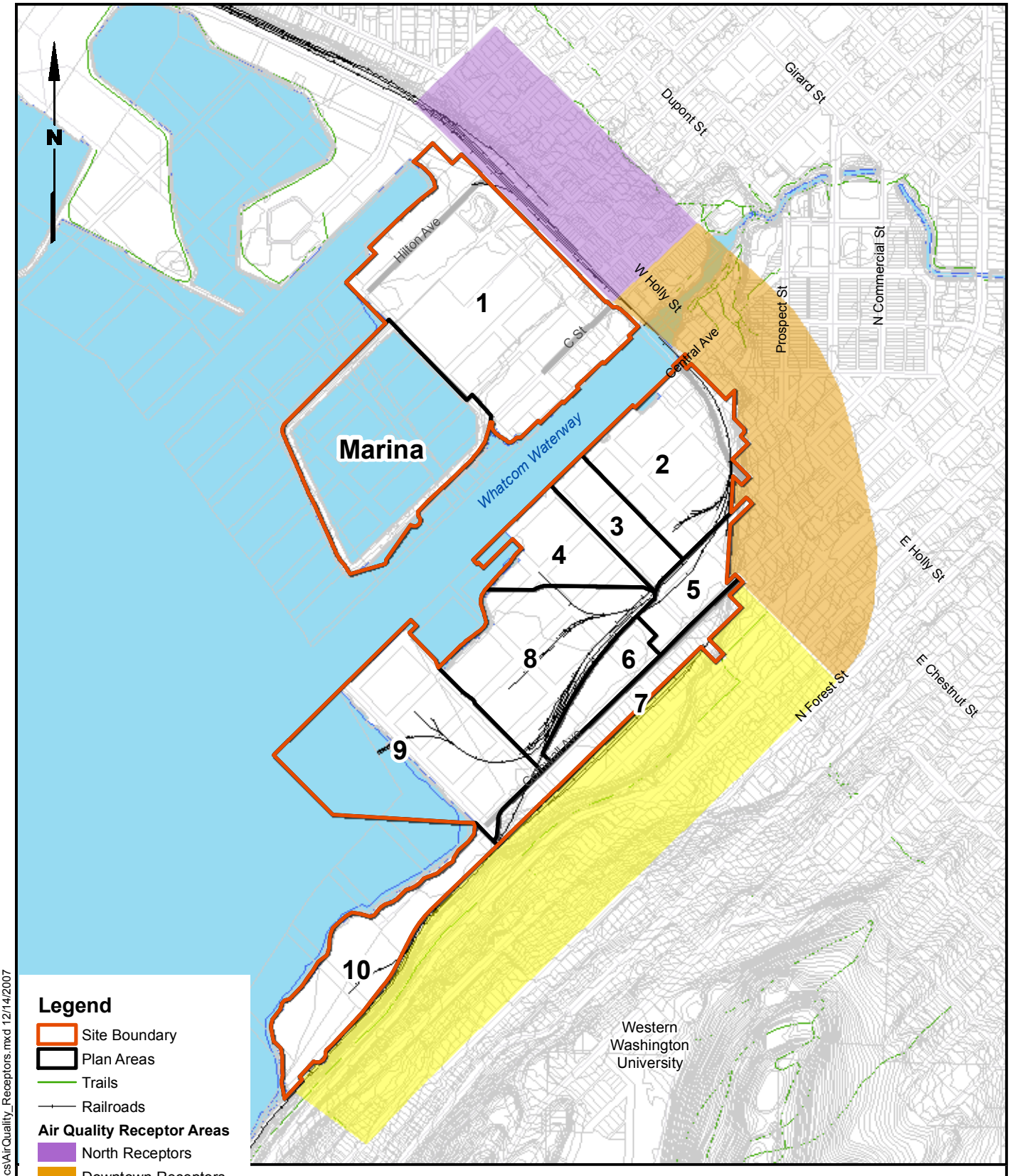
Franzmann, A. 2007. Personal communication (conversation with Mrs. Shannon Khounnala, Landau Associates). Mr. Axel Franzmann, Northwest Clean Air Agency. Re: *Air Quality Standards in Whatcom County*. August 22.

NWCAA. 2007. *Notices of Violation Reports*. Selection Criteria: Between January 1, 1997 and August 20, 2007. All Registration Numbers. Sources: Puget Sound Energy, Encogen Generating Station; Oeser Company; Georgia-Pacific West, Inc.; Mt. Baker Products, Inc.; Absorption Corporation. Reports run in response to August 15, 2007 Request for Public Records by Mark Brunner, Landau Associates. Northwest Clean Air Agency.

NWCAA website. 2007. *Northwest Clean Air Agency – Emission Inventories*. http://www.nwcleanair.org/airQuality/inventories.htm . Accessed on July 5.

ATTACHMENTS

Figure 1: Air Quality Receptor Areas
Table 1: Summary of National and Regional Ambient Air Quality Standards
Table 2: Criteria Pollutants: Sources and Health Effects



Data Source: CollinsWoerman 2007; Landau Associates 2007

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LANDAU ASSOCIATES

New Whatcom Redevelopment Bellingham, Washington	**Air Quality Receptor Areas**	Figure 1

TABLE 1
SUMMARY OF NATIONAL AND REGIONAL AMBIENT AIR QUALITY STANDARDS
NEW WHATCOM REDEVELOPMENT PROJECT
BELLINGHAM, WASHINGTON

Pollutant	National Primary Standard	National Secondary Standard	Ecology Standard	NWCAA Local Standard
CO One-Hour Average (Not to be exceeded more than once per year)	35 ppm	None	35 ppm	35 ppm
8-Hour Average (Not to be exceeded more than once per year)	9 ppm	None	9 ppm	9 ppm
PM_{10} Annual Arithmetic Mean (Attainment based on three-year average)	50 µg/m^3	50 µg/m^3	50 µg/m^3	50 µg/m^3
24-Hour Average Concentration	150 µg/m^3	150 µg/m^3	150 µg/m^3	150 µg/m^3
$PM_{2.5}$ Annual Arithmetic Mean (Attainment based on 3-year average of annual mean concentrations from single or multiple community-oriented monitors)	15 µg/m^3	15 µg/m^3	15 µg/m^3	15 µg/m^3
24-Hour Average Concentration	65 µg/m^3	65 µg/m^3	65 µg/m^3	65 µg/m^3
NO_2 Annual Arithmetic Mean (Should never be exceeded)	0.053 ppm	0.053 ppm	0.05 ppm	0.053 ppm
Ozone 1-Hour Average (to lapse after demonstration based upon existing standard, not to be exceeded more than once per year)	0.12 ppm	0.12 ppm	0.12 ppm	0.12 ppm
8-Hour Average	0.08 ppm	0.08 ppm	0.08 ppm	0.08 ppm

Source: EPA website 2006.

Units: ppm = Parts per million
µg/m^3 = Micrograms per cubic meter of air

TABLE 2
CRITERIA POLLUTANTS: SOURCES AND HEALTH EFFECTS
NEW WHATCOM REDEVELOPMENT PROJECT
BELLINGHAM, WASHINGTON

Pollutant	Characteristics	Major Sources	Health Effects
Ozone	A highly reactive photochemical pollutant that is formed at ground level from emissions of reactive organic gases and nitrogen oxides (NO_x) in the presence of sunlight. Ozone is a major component of photochemical smog.	Combustion sources such as engines in automobiles and factories, and evaporation of solvents and fuels.	• Eye irritation • Respiratory function impairment
Carbon Monoxide (CO)	An odorless, colorless, and poisonous gas. It is formed during the incomplete combustion of fuels.	Automobile exhaust, combustion of fuels, combustion of wood in woodstoves and fireplaces.	• Increase of carboxyhemoglobin – Impairment of oxygen transport in the bloodstream • Aggravation of cardiovascular disease • Impairment of central nervous system function • Fatigue, headache, confusion, dizziness • Can be fatal in the case of very high concentrations in enclosed places
Sulfur Dioxide(SO_2)	A colorless gas with a pungent, irritating odor.	Diesel vehicle exhaust, oil-powered power plants, industrial processes.	• Aggravation of chronic obstruction lung disease • Increased risk of acute and chronic respiratory disease
Nitrogen Dioxide (NO_2)	Reddish brown gas that discolors the air. It is formed during combustion.	Automobile and diesel truck exhaust, industrial processes, fossil-fueled power plants.	• Increased risk of acute and chronic respiratory disease
Particulate Matter (PM_{10} & $PM_{2.5}$)	Solid and liquid particles of dust, soot, aerosols, and other matter that are small enough to remain suspended in the air for a long period of time.	Combustion, automobiles, diesel engines, field burning, factories, and unpaved roads. Also a result of photochemical processes.	• Aggravation of respiratory effects like asthma and emphysema • May cause heart and lung problems • May carry toxic materials deep into the respiratory system

Pollutant	Characteristics	Major Sources	Health Effects
Lead (Pb)	A toxic heavy metal found in dust and soils.	Lead gasoline additives (these have primarily been phased out), metal refineries, manufacture of lead storage batteries, paint.	• Brain and other nervous system damage • Carcinogenic • Digestive and other health problems