

Chapter 4 Environmental Consequences – Effects on Ecosystems

What is addressed in this chapter?

This chapter describes the existing natural environment and how the alternatives may impact natural resources. This chapter specifically addresses the following elements:

- Earth
- Hazardous Materials
- Water
- Plants and Animals
- Climate Change

Several exhibits within this chapter identify the locations and/or conditions of natural resources. The mapping information used to create these exhibits came from a variety of sources, are intended only as general depictions, and may not be accurate to the parcel level. During the MPD process, natural resources will be analyzed parcel level detail will be analyzed accordingly.

Climate

Air Quality

1 Are there currently air quality problems in the region and study area?

There are three air pollutants of major concern in the Puget Sound region:

- **Carbon monoxide (CO)**, which is largely from motor vehicle exhaust.
- **Ozone**, which is contributed by motor vehicles, as well as other sources.
- **Particulate matter**, which includes both solid matter and liquid droplets suspended in the air. Exhaust from diesel-powered vehicles is a source of particulates, but the majority is from wood smoke and industrial sources.

The Black Diamond area is in compliance with the federal air quality standards for these pollutants.

Three agencies have jurisdiction over the ambient air quality in the project area: the United States Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the Puget Sound Clean Air Agency (PSCAA). As part of the Clean Air Act, the EPA established ambient air quality standards for six criteria pollutants. Two classes of ambient air quality standards were established: primary standards to protect the public health and secondary standards to protect the public welfare and the environment (for example, soils, vegetation, and wildlife).

When measured concentrations of a pollutant exceed the National Ambient Air Quality Standards (NAAQS), an area is designated as a non-attainment area for that pollutant. The Seattle-Everett-Tacoma area experienced carbon monoxide levels in excess of standards in the 1970s, 80s, and 90s.

What is carbon monoxide?

Carbon monoxide is a colorless, odorless gas, produced by incomplete burning of carbon-based fuels, including gasoline, oil, and wood. When carbon monoxide gets into the body, the carbon monoxide combines with chemicals in the blood and prevents the blood from bringing oxygen to cells, tissues, and organs.

What is ozone?

Ozone is a highly reactive form of oxygen created by sunlight-activated chemical transformations of nitrogen oxides and volatile organic compounds (hydrocarbons) in the atmosphere. Ozone is a pulmonary irritant that affects lung tissues and respiratory functions.

Programs to improve the emissions of motor vehicles implemented on a nationwide level, as well as regional actions such as inspection of vehicle emissions systems, have led to a reduction in pollutants such that the area now meets carbon monoxide standards. The Seattle-Tacoma urban area was redesignated an attainment area for carbon monoxide in 1997.

The region, including the study area, is designated a “maintenance area,” which requires implementation of measures to ensure continued compliance with air quality standards. One of the measures is continued periodic inspection of vehicle emission control systems to ensure proper operation prior to relicensing vehicles. An additional maintenance measure is review of transportation projects to ensure that the projects do not produce violations of air quality standards.

The NAAQS for ozone allows no more than one day per year, when averaged over the most recent three years, to be above the standard. While there was one exceedance of the ozone standard at the Enumclaw Station and one exceedance at the Pack Forest Station in 1998, there were no exceedances in the most recent three years (2000, 2001, and 2002). The Puget Sound region has therefore complied with the ozone standard in the past five years. The project area is within the maintenance area for ozone as defined by the EPA. In March, the EPA adopted new regulations moving the standard for ozone from 0.08 part per million (ppm) to 0.075 ppm. Measured ozone concentrations at several regional stations have exceeded the new 8-hour ozone standard, so the area could again become a nonattainment area for this pollutant. Because ozone is a regional issue, the project contribution must be considered as a contribution to overall regional emissions.

Three areas in Seattle, Tacoma, and Kent have been designated non-attainment areas because PM10 concentrations sometimes exceed health standards. The Black Diamond area is not within the boundaries of those non-attainment areas.

What are particulates?

Particulates are solid material and liquid droplets suspended in the air. Motor vehicles, wood burning, and industrial activity are major sources of particulate matter. Particulate matter in the respiratory tract may produce injury by itself, or it may increase the effects other gases have on the body.

2 Are long term air quality problems expected?

The major potential long term air quality impact of the project is from automobile emissions from additional traffic generation of the proposal. An adverse impact is not expected, as outlined below.

In order to assess the potential impacts of the proposal, the potential levels of carbon monoxide (CO) were analyzed for the most congested intersections in the vicinity. Of the various vehicular emissions, CO is the pollutant emitted in the largest quantity and is therefore analyzed as a general indicator.

Analysis was performed for the cumulative traffic generation scenarios developed for the transportation analysis. This includes both Master Planned Development projects in Black Diamond as well as projected increases in traffic from other development.

Air quality dispersion modeling was used to calculate peak-hour CO concentrations at the most congested intersection using worst case meteorological conditions and other model inputs. The analysis is considered to be conservative and provide a worst case assessment.

The model results reflect a general trend in vehicle emissions characterized by future projected improvements in the emissions from vehicles as the result of federal standards. These improvements in vehicle emissions are expected to result in an improvement in overall emissions that outweighs the increase in traffic volumes.

Exhibit 4-17

Intersection Modeling results (ppm)

Intersection	Averaging Period	2007 Existing	2025 Alternatives	
			Baseline	Cumulative Condition
Witte Road SE and SR169 ^a	1-hour	9.3	7.3	7.9
	8-hour	7.7	6.3	6.7
Pipeline (Ravensdale Road) and SR 169 ^b	1-hour	–	–	12.0
	8-hour	–	–	8.4
Roberts Drive/Lawson Connector and SR 169 ^b	1-hour	–	–	9.1
	8-hour	–	–	6.8

^a Approved WSDOT screening methods including WASIST modeling were used to determine compliance with ambient standards at this intersection within the CO Maintenance area. Background concentration = 4.0 ppm

^b CAL3QHC was used to determine compliance at the dual intersection of Ravensdale Road and Roberts Drive at SR 169 because screening methods did not show compliance with standards. Also, these intersections are not signalized in 2007 or 2025 baseline conditions so modeling was not performed. Background concentration = 3.0 ppm

Notes:

1-hr CO standard is 35 ppm; 8-hr CO standard is 9 ppm.

Modeling used Synchro data provided by Parametrix.

Source: ENVIRON International Corporation 2009

3 During construction, are air quality problems expected?

During construction, dust from excavation and grading would contribute to ambient concentrations of suspended particulate matter. The construction contractor is required to comply with the PSCAA's Regulation I, Section 9.15 requiring reasonable precautions to avoid dust emissions. This environmental protection may include application of water or other dust suppressants during dry weather.

Extensive clearing will be required for development. For large clearing projects, disposal of non-marketable trees and shrubs may involve slash burning. If slash burning is used, these activities will be limited during periods of impaired air quality, per requirements of the Puget Sound Clean Air Agency.

Construction would require the use of heavy trucks and smaller equipment such as generators and compressors. These engines would emit air pollutants that would slightly degrade local air quality, but these emissions and resulting concentrations would be far outweighed by emissions from traffic normally in and around the study area.

Some phases of construction would cause odors detectible to some people away from the project site. This would be particularly true during paving operations with asphalt. Such odors would be short-term.

Construction equipment, material hauling, and detours can affect traffic flow in a project area. If construction delays traffic enough to substantially reduce travel speeds in the area, general traffic-related emissions would increase.

4 What measures can reduce air quality effects of the project?

Dust produced by construction is required to meet standards of the Puget Sound Clean Air Agency. A number of techniques are available for control:

- Areas of exposed soils, such as storage yards and construction roadways, can be sprayed with water or other dust suppressants if necessary.
- Areas that might be exposed for prolonged periods during construction can be covered with gravel or receive temporary pavement.
- Areas not designated for future impervious surface can be covered with mulch or planted with a vegetation ground cover.
- The amount of soils tracked out of the construction area by trucks would be reduced by wheel washing and covering dusty truckloads.

Emissions from construction equipment and trucks would be reduced by using well-maintained equipment. Avoiding prolonged periods of vehicle idling and engine-powered equipment would also reduce emissions.

Trucking materials to and from the project area would be scheduled to minimize congestion during peak travel times. This would minimize secondary air quality impacts caused by traffic having to travel at reduced speeds.

Greenhouse Gas Emissions

1 What are green house gases (GHG) and what long-term climate change effects are expected?

Greenhouse gasses are gasses in the atmosphere that absorb and emit radiation, which is the fundamental cause of the greenhouse effect. Common greenhouse gasses in the earth's atmosphere include water vapor, carbon dioxide, methane, nitrous oxide, ozone, and chlorofluorocarbons. Greenhouse gases, mainly water vapor, are essential to helping determine the temperature of the Earth; without them this planet would likely be so cold as to be uninhabitable. Although many factors such as the sun and the water cycle are responsible for the Earth's weather and energy balance, if all else was held equal and stable, the planet's average temperature should be considerably lower without greenhouse gases.

In 2007 the United Nations Intergovernmental Panel on Climate Change (IPCC) found that “warming of the climate system is unequivocal...and most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic (human-caused) greenhouse gas concentrations (primarily carbon dioxide).”

There is a growing scientific consensus that global temperature increases of more than 2 degrees Celsius above pre-industrial levels would lead to devastating global impacts.

Leading scientists have projected that stabilization of atmospheric carbon dioxide emissions to avoid temperature increases greater than 2 degrees Celsius will require a reduction of greenhouse gas emissions to approximately 80 percent below current levels by the year 2050.

Measuring Climate Change

In 2008, the Governor and the Legislature of the State of Washington directed the Washington State Departments of Ecology and Community, Trade and Economic Development to convene a Washington Climate Action Team (CAT). As part of the CAT's work, a SEPA Implementation Working Group (IWG) was established to ensure that consideration of climate change is included in SEPA processes and documents.

2 Where do GHG emissions come from?

GHG emissions associated with development come from multiple sources:

- The extraction, processing, transportation, construction, and disposal of building materials;
- Landscape disturbance;
- Energy demands created by a development after it is completed; and
- Transportation demand created by a development after development is complete.

3 What policies and standards apply?

SEPA includes the prevention or elimination of damage to the environment and the biosphere as one of its purposes. SEPA requires proponents of major actions that will have a probable, significant adverse environmental impact to prepare an environmental impact statement.

Ecology rules require proponents of major actions subject to SEPA to complete a checklist that addresses the impact of the proposal on the environment. The SEPA checklist specifically includes a requirement to analyze the impact of the proposal's emissions on air quality, which includes climate.

In December 2007, Ecology and the Community, Trade and Economic Development (CTED) Department, in conjunction with the Center for Climate Strategies, released official greenhouse gas emissions estimates for 1990 through 2020. These projections forecast statewide emissions through 2020 based on an assumption that there are no changes in public policies or citizen behavior. The forecast includes expected growth in population, employment, business activity, and the built environment.

In 2008, the Washington State Legislature passed and the governor enacted into law House Bill 2815 which establishes statewide targets for greenhouse gas reductions. These targets are to reduce annual greenhouse emissions to 1990 levels in 2020, to 25 percent below 1990 levels in 2035, and to do Washington's part to reach global climate stabilization by reducing emissions to 50 percent below 1990 levels in 2050.

The King County GHG worksheets with emissions results for each alternative can be found in Appendix Q.

4 How do the alternatives compare for impacts to climate change?

King County has developed a GHG emissions worksheet (King County Department of Development and Environmental Services, SEPA GHG Emissions Worksheet, Version 1.7 12/26/07) that estimates all GHG emissions that will be created over the life span of a project. This includes emissions associated with obtaining construction materials, fuel used during construction, energy consumed during the buildings operation, and transportation by building occupants. Results using this methodology for each alternative are summarized in Exhibit 4-18 and included in spreadsheet format in Appendix Q.

The Applicant provided additional GHG emissions information and analysis, which is also included in Appendix Q. The emissions generated under this scenario provided by the Applicant include a 25 percent reduction for meeting LEED standards, which is not reflected in Exhibit 4-18. Reductions for meeting LEED are appropriate should the housing be constructed to meet these standards, and should therefore be recalculated for each MPD phase. The Applicant’s analysis also does not include the school facilities or commercial/office space in their calculations. These should also be added as appropriate to each phase, when calculations are revisited.

Emissions created by Development

GHG emissions associated with development come from multiple sources:

- The extraction, processing, transportation, construction, and disposal of materials and landscape disturbance (Embodied Emissions)
 - Energy demands created by the development after it is completed (Energy Emissions)
 - Transportation demands created by the development after it is completed (Transportation Emissions)
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Exhibit 4-18

Greenhouse Gas Emissions – Summary of Impacts

Alternative	Total Project Emissions ^a
1	5,694,333 MTCO ₂ e
2	8,853,679 MTCO ₂ e
3	5,485,844 MTCO ₂ e

^a Total Project Emissions are given in MTCO₂e - Metric Tons Carbon Dioxide Equivalent. This is the standard measurement of the amount of CO₂ emissions that are reduced or sequestered from the environment. A single ton of carbon dioxide equates to 2,204.62 pounds of CO₂.

5 How do the alternatives compare for impacts to climate change?

Alternative 1

Alternative 1 includes only residential units and commercial uses, and involves no educational uses. Acreages of impervious surfaces were estimated based on allowances in the City's zoning code. Pavement (the road network) associated with Alternative 1 was estimated at 20 percent of the buildable land area. Compared to Alternative 2, Alternative 1 is expected to generate 3,159,346 MTCO₂e less emissions over the lifetime of the project.

However, because development under Alternative 1 would occur incrementally over time, and does not include several key elements of an MPD (substantial open space, coordinated roads and trails systems, mixed use development with opportunities for live-work), Alternative 1 may in fact ultimately have a more negative impact due to higher vehicle miles traveled (VMT) associated with rural development not tied to office/commercial/retail centers.

Alternative 2

Alternative 2 is the most intensive development alternative evaluated in this document. In comparison to Alternative 1, Alternative 2 includes 1,650 more residential units and more commercial square footage. Alternative 2 also provides educational uses that Alternative 1 does not. In comparison to Alternative 3, Alternative 2 includes 2,100 more residential units and 36 acres more commercial development. Alternative 2 is expected to generate substantially more emissions over the lifetime of the project than Alternatives 1 and 3.

Because Alternative 2 would be developed in a coordinated, master planned fashion, with mixed use (live-work) opportunities, GHG emissions could in reality be greatly reduced. With facilities to support safe walking, biking, and the housing density to support carpools, as well as the potential for on-site park and ride locations, Alternative 2 may see a reduced VMT and therefore may in fact have an overall lower lifetime impact than Alternative 1.

Alternative 3

Alternative 3 includes less residential units than Alternatives 1 and 2. This alternative also includes less commercial acreage than Alternatives 1 and 2. Acreages of pavement associated with Alternative 3 were estimated to be the same as those associated with Alternative 2 (backbone streets). Compared to Alternative 2, Alternative 3 is expected to generate 3,367,835 MTCO₂e less emissions than Alternative 2 and 208,489 MTCO₂e less emissions than Alternative 1 over the lifetime of the project.

Alternative 3 would be developed in a coordinated, master planned fashion, with mixed use (live-work) opportunities, and facilities to support safe walking, biking, and the housing density to support carpools, as well as the potential for on-site park and ride locations. Because it has fewer residential units and lower commercial and office area than Alternative 2, it is likely the least impact in terms of emissions generation.

Alternative 4

Alternative 4 was not specifically analyzed, but it could be expected to produce the lowest emissions, due to the least amount of proposed development.

6 How could these impacts be mitigated?

GHG emissions reduction can be achieved in addressing each potential source. This could be done in the following ways:

- Minimize the extraction, processing, transportation, construction, and disposal of building materials through use of on-site materials, recycling, and proper waste management;
- Minimize landscape disturbance by retaining as much of the site in its current natural vegetated state;
- Reduce energy demands created by the development after it is completed, and increase the use of solar, wind, and other renewable sources; and
- Reduce transportation demand created by the development after development is complete, including ensuring adequate facilities are provided for alternative modes such as transit, bicycling and walking, and potentially forming a Transportation Management Association to mandate trip reduction.