3.2 Air Quality

This air quality analysis addresses the following geographical areas for specific types of impacts:

- The area within 1 block of congested streets and construction zones for localized impacts
- The Puget Sound air basin for regional smog impacts
- The study area (current plan area and Orton Junction expansion area) for greenhouse gas (GHG) impacts

3.2.1 Affected Environment

Climate

The Puget Sound region has a modified marine climate. For most of the year the region's weather is dominated by influxes of clean, moist ocean air that penetrate at low elevations from the Chehalis gap to the south and the Strait of Juan de Fuca to the north. Temperatures are generally moderate with few extremely cold or hot days throughout the year. Wind-driven mixing regularly occurs which effectively disperses air pollutants.

During periods when onshore airflow is interrupted, the combined effects of urban activities, the weather and topography lead to stagnation and rising air pollution. The Olympic Mountains to the west and the Cascade mountain range to the east form the sides of a bowl when air pollution becomes trapped in the urban basin.

Air Pollution Regulation

Three agencies have air quality jurisdiction in the Puget Sound: the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the Puget Sound Clean Air Agency (PSCAA).

National ambient air quality standards have been established for the six common pollutants: carbon monoxide (CO), ozone, sulfur dioxide (SO_2), lead, and nitrogen dioxide (NO_2). For these pollutants, federal law requires meeting the national primary standards that protect health and establishes deadlines for states to develop and implement plans to achieve the air quality standards.

Ecology and the PSCAA have established state and local ambient air quality standards for the same six pollutants that are at least as stringent as the national standard, and in the case of sulfur dioxide, more stringent. Table 3.2-1 compares the national, state, and local air quality standards.

While the federal act covers a variety of issues, to specifically address Washington State's air quality problems, the state's Clean Air Act was passed in 1991. The act addresses the following:

- **Emissions.** Strengthened vehicle emissions testing.
- **Usage.** Increased fuel efficiency and alternative fuels.
- **Conformity.** In areas that exceed federal air quality standards, transportation funds shall be used only on projects that improve—or do not worsen—air quality.

- **Transportation Demand Management (TDM).** The number of vehicle miles traveled will be reduced through an emphasis on moving people rather than single occupant vehicles. Large public employers (100 or more employees) in eight counties as well as state government have adopted TDM plans to reduce vehicle use. The Sumner City Council passed ordinance 1587 establishing a TDM program for large employers on April 19, 1993.
- **Operating Permits.** Large industries (100 or more tons per year of federal criteria pollutants, 10 or more tons per year of federally listed toxic pollutants) must obtain five year renewable operating permits. Industries that pollute less, but still cause public health or environmental problems must also obtain these permits. Many industries in current plan area require operating permits.
- **Wood Stoves.** Emission standards are required for new wood stoves and fireplaces to be certified and sold at retail.
- **Outdoor Burning.** Phases slash burning by 50% over 10 years. Outdoor burning has been phased out and banned, particularly in areas that do not meet federal clean air standards. The study area is under a burn ban, because it is in an air quality maintenance area for CO and ozone.

Table 3.2-1. Ambient Air Quality Standards

	National			
Pollutant	**Primary**	**Secondary**	**Washington State**	**Puget Sound**
Ozone				
1-hour average[b]	0.12 ppm	0.12 ppm	0.12 ppm	0.12 ppm
Nitrogen dioxide				
Annual average	0.05 ppm	0.05 ppm	0.05 ppm	0.05 ppm
1-hour average	0.100 ppm	0.100 ppm	0.100 ppm	0.100 ppm
Carbon monoxide				
8-hour average	9 ppm		9 ppm	9 ppm
1-hour average	35 ppm		35 ppm	35 ppm
Particulate matter (PM_{10})				
Annual geometric average	50 ug/m^3	50 ug/m^3	50 ug/m^3	50 ug/m^3
24-hour average[a]	150ug/m^3	150 ug/m^3	150 ug/m^3	150 ug/m^3
Sulfur dioxide (SO_2)				
Annual average	0.03 ppm		0.02 ppm	0.02 ppm
30-day average				0.04 ppm
24-hour average	0.14 ppm		0.10 ppm	0.10 ppm[c]
3-hour average		0.50 ppm		
1-hour average[d]			0.25 ppm	0.25 ppm
1-hour average			0.40 ppm	0.40 ppm[c]
5-minute average[e]				1.00ppm
Lead				
Calendar quarter average	1.5 ug/m^3	1.5 ug/m^3		1.5 ug/m^3
Particulate matter (TSP)				
Annual geometric average			60 ug/m^3	60 ug/m^3
24-hour average			150 ug/m^3	150 ug/m^3

ppm = parts per million;ug/m^3 = micrograms per cubic meter;

Annual, quarter and 30 day standards never to be exceeded; shorter term standards not to be exceeded more than once per year.

[a] Standard attained when expected number of days per year with a 24 hour concentration above 150 ug/m is equal to one or less.

[b] Standard attained when expected number of days per year with an hourly average above 0.12 ppm in equal to one or less.

[c] Sulfur Dioxide short-term standard never to be exceeded.

[d] Not to be exceeded more than twice in seven days.

[e] Not to be exceeded more than once in eight hours.

In Washington, air pollution sources include motor vehicle emissions, industrial processes, wood stoves and fireplaces, outdoor burning, and construction as shown in Table 3.2-2. Motor vehicles alone contribute approximately 88% of the carbon monoxide, 54% of volatile organic compounds, and 86% of NO_2. Vehicle weight, age, engine type, fuel economy, and maintenance significantly affect emissions, as does the ambient air temperature, altitude, vehicle load, and speed. Pollutant emissions are the worst at idle and decline with increasing speed to approximately 50 miles per hour, then increase slightly with greater speeds.

Table 3.2-2. Types of Ambient Air Pollutants

Pollutant	Source	Health Effects	Environmental Effects
Ozone (ground level ozone is the principal component of smog)	Chemical reaction of pollutants; oxides of nitrogen and volatile organic compounds (VOCs), unstable carbon containing compounds, examples include formaldehyde, acetone	Breathing problems, reduced lung function, asthma, irritates eyes, stuffy nose, reduced resistance to colds and other infections, may speed the aging of lung tissue.	Ozone can damage plants and trees; smog can cause reduced visibility.
Nitrogen Dioxide (NO_2, one of the oxides of nitrogen); smog forming chemical	Burning of gasoline, natural gas, coal, oil, etc. Cars are an important source of NO_2	Lung damage, illnesses of breathing passages and lungs (respiratory system)	NO_2 is an ingredient of acid rain (acid aerosols), which can damage trees and lakes. Acid aerosols can reduce visibility.
Carbon Monoxide (CO)	Burning of gasoline, wood, natural gas, coal, oil, etc.	Reduces ability of blood to bring oxygen to body. Carbon monoxide may be particularly hazardous to people who have heart or circulatory problems and who have damaged lungs or breathing passages	
Particulate Matter (PM_{10} & $PM_{2.5}$)	Burning of wood, diesel and other fuels; industrial plants; agriculture (plowing, burning off fields); unpaved roads	Nose and throat irritation, lung damage, bronchitis, early death	Particulates are the main source of haze that reduces visibility.
Sulfur Dioxide (SO_2)	Burning of coal and oil, especially high-sulfur coal from the Eastern United States; industrial processes (paper, oil refining, metals)	Breathing problems, may cause permanent damage to lungs	SO_2 is an ingredient in acid rain (acid aerosols), which can damage trees and lakes. Acid aerosols can also reduce visibility.
Lead	Paint (houses, cars), smelters (metal refineries); manufacture of lead storage batteries	Brain and other nervous system damage; children are at special risk	Lead can harm wildlife.

Source: Ecology 2008a and 2008b.

Attainment Status for Pierce County

Based on measured ambient air quality data from the agencies' network of air quality monitors, EPA and Ecology designate all portions of the state as either "attainment" or "nonattainment" with respect to the National Ambient Air Quality Standards (NAAQS). Areas designated as nonattainment have exceeded NAAQS limits for those pollutants. If, as is the case of most of the state, the measured concentrations in a nonattainment area improve so they are consistently below the NAAQS limits, Ecology and EPA can reclassify the nonattainment area to a "maintenance area." In that case, Ecology and the regional planning agencies are required to implement a "maintenance plan" to ensure ongoing emission reductions and continuous compliance with the NAAQS limits. Typical

emission reduction requirements specified in maintenance plans include continuation of motor vehicle inspection and maintenance programs that were originally established while the area was designated as nonattainment.

The Puget Sound region (including the study area) is currently designated as a maintenance area for CO and an attainment area for all other air pollutants. However, in March 2008, the EPA lowered its 8-hour ozone standard from 0.08 parts per million (ppm) to 0.075 ppm to better protect public health. Under the new standard, the 3-year average (2006 through 2008) concentration measured at the Enumclaw station in King County exceeded the 8-hour ozone standard for the 3-year period from 2006 to 2008. Based on those measured values, Ecology has tentatively recommended to EPA that the Puget Sound region, might eventually be redesignated to be an ozone nonattainment area (Ecology 2009).

However, states have until March 2011 to finalize their formal recommendations regarding ozone nonattainment area redesignations, and Ecology is still considering its options. Until Ecology makes its formal recommendation in 2012, the region is still designated an attainment area for ozone.

Similarly, in 2010, EPA enacted a new, more stringent1-hour average ambient air quality standard for NO_2. At this time it is not known which regions in the country will be redesignated based on the new standard. However, as of this time the region is still considered an attainment area for NO_2.

Air Quality Permitting Requirements for Pierce County

This section describes air quality permitting requirements for proposed new public- and private-sector projects in the study area and regional vicinity.

Construction

Particulate matter is generated from construction sites as well as from trucks coming to and leaving roadway construction sites. According to *CARB Emissions Inventory Procedural Manual, Volume II—Area Source Emissions* (EPA 1997), a typical commercial construction site generates 1.2 tons of particulate emissions per acre of construction area per month. PSCAA Regulation 1, Section 9.15, "Fugitive Dust Control Measures," requires all construction sites to implement dust controls to minimize emissions of windblown dust.

Outdoor Burning

Outdoor burning and wood smoke from fireplaces are of concern. These activities contribute a large amount of carbon dioxide, particulate matter, and volatile compounds as well as toxic air pollutants. Wood stoves and fireplaces are the primary source of combustion particulate emissions (i.e., soot and other tiny particles). The entire study area is currently located in the "no-burn" zone for outdoor fires.

Outdoor burning and fireplace use can be restricted during times of poor air quality. More restrictive burn ban requirements began in the 2008–2009 heating season. The changes were prompted by a more protective law enacted by the 2008 Washington State Legislature to align with stricter air quality health standards adopted in late 2006 by the EPA.

- A Stage 1 Burn Ban is called on the basis of weather conditions and rising pollution levels. During a Stage 1 burn ban, no burning is allowed in wood-burning fireplaces, uncertified wood stoves or fireplace inserts unless this is the only adequate source of heat.

- A Stage 2 burn ban is called when fine particle pollution levels reach a trigger value set by state law. During a Stage 2 burn ban, no burning is allowed in any wood-burning fireplaces, wood stoves or fireplace inserts (certified or uncertified) or pellet stoves, unless this is the only adequate source of heat.

In January 2009, the agency called its first Stage 2 burn ban since 1991 (PSCAA 2010).

Stationary Air Emission Sources

Stationary air pollutant sources are regulated by either PSCAA or Ecology. New "minor sources" (facilities that emit less than 100 tons per year of any single air pollutant, listed below) are required to apply for a Notice of Construction (NOC) air quality permit issued by PSCAA. The application for an NOC permit requires the facility to install Best Available Control Technology to reduce emissions, to conduct computer modeling to demonstrate that the facility's emissions will not cause ambient concentrations to exceed the NAAQS limits, and to minimize the impacts of odors and toxic air pollutants.

New "major sources," facilities that emit more than 100 tons per year of any single air pollutant, are required to obtain a Prevention of Significant Deterioration (PSD) permit and an Air Operating Permit from Ecology. The requirements for a PSD permit are more stringent than for an NOC permit. Facilities with a PSD permit must comply with lower ambient air quality limits, and must demonstrate they will not cause visibility or acid deposition problems at national parks and wilderness areas in the region.

All air-contaminating operations and equipment sources, other than motor vehicles, are registered with and regularly inspected by PSCAA. Considered "major" by PSCAA are those sources emitting 25 tons or more of volatile organic compounds (VOC) or toxic air contaminants per annum; and sources emitting 25 tons or more of $PM_{2.5}$, PM_{10}, oxides of sulfur, oxides of nitrogen (NOx), or CO per annum.

Several stationary sources of pollutants are located in the study area and vicinity.

Conformity Analyses for State-Funded or Federally-Funded Transportation Projects

Cars and trucks on public roads are the largest single source of emissions in Pierce County and the Puget Sound region. However, until the early 1990s there were no air quality regulations applicable to public roadway projects. In 1990, EPA and the Washington legislature enacted new regulations requiring federal- or state-funded highway projects to evaluate their local and regional air quality impacts. Transportation projects proposed for construction within nonattainment areas or maintenance areas are subject to the Transportation Conformity regulations specified under federal regulations (40 CFR Part 93) and state regulations (Chapter 173-420 WAC).

The permitting agency must demonstrate conformity for state and federally funded transportation projects by the following steps:

- Confirm that the project is included in the regional Transportation Improvement Plan (TIP).
- Confirm that the regional emissions (including the proposed project) described in the TIP are within the allowable emission budget specified by Ecology.
- Use an EPA-approved air quality dispersion model to assess CO concentrations at the most heavily congested intersections.

Greenhouse Gas and Climate Change Issues

The issue of how emissions from human activities may affect the global climate has been the subject of extensive international research during the past several decades. There is now a broad consensus among atmospheric scientists that emissions caused by humans have already caused measurable increases in global temperature and are expected to result in significantly greater increases in temperature in the future. However, there is still considerable uncertainty about the exact magnitude of future global impacts and the best approach to mitigate the impacts.

The United Nations' Intergovernmental Panel on Climate Change (2007) published its most recent sets of 5-year progress reports summarizing worldwide research on global climate change between 2001 and 2007. These reports indicated that some level of global climate change is likely to occur and that there is a significant possibility of adverse environmental effects. Several alternative mitigation measures were evaluated by the worldwide scientific community to reduce global emissions, including the first round of worldwide reductions in GHGs, as prescribed by the Kyoto Protocol.

Global climate change is a cumulative issue related to worldwide GHG emissions rather than emissions from any individual facility. No single project emits enough GHG to influence global climate change by itself. GHGs emitted anywhere on the planet remain active for roughly 100 years and eventually disperse throughout the world. Therefore, future climate change in Washington State would be influenced as much by, for example, new industrial activity in China as it would be by the future changes in the study area.

In response to growing worldwide concerns, Washington State Governor Christine Gregoire issued Executive Order 07-02 in February 2007. The Executive Order established GHG reduction goals to:

- reduce emissions to 1990 levels by 2020 and 50% below 1990 levels by 2050;
- increase Green Economy jobs to 25,000; and
- reduce expenditures on fuel imported into Washington State by 20% by 2020 (Ecology 2008a).

In 2008, Engrossed Substitute House Bill 2885, an act to create a framework to reduce GHG emissions in Washington State, codified the GHG reduction goals of Executive Order 07-02, and also added a fourth requirement to help achieve the GHG reduction targets:

- Decrease the annual per capita vehicle miles traveled (VMT) 18% by 2020, 30% by 2035, and 50% by 2050.

3.2.2 Impacts

Impacts Common to All Alternatives

Construction Emissions

During construction, dust from excavation and grading could cause temporary, localized increases in the ambient concentrations of fugitive dust and suspended particulate matter. Construction activity must comply with PSCAA regulations requiring reasonable precautions to minimize dust emissions (Regulation I, Section 9.15). Regardless, construction activity could cause localized fugitive dust impacts at homes and businesses near the construction site.

Construction activities would likely require the use of diesel-powered, heavy trucks and smaller equipment such as generators and compressors. These engines would emit air pollutants that could slightly degrade local air quality in the immediate vicinity of the activity. However, these emissions would be temporary and localized, and the resulting construction tailpipe emissions would likely be far outweighed by emissions from existing traffic around the study area.

Some construction activities could cause odors detectible to some people in the vicinity of the activity, especially during paving operations using tar and asphalt. Such odors would be short-term and localized. Stationary equipment used for the construction activities must comply with PSCAA regulations requiring the best available measures to control the emissions of odor-bearing air contaminants (Regulation I, Section 9.11). In addition, no slash burning would be permitted in association with any of the alternatives.

Construction equipment and material hauling could temporarily general traffic flow on city streets adjacent to a construction area. If construction delays traffic enough to significantly reduce travel speeds in the area, general traffic-related emissions would increase. Given that there is heavy traffic during some periods of the day, scheduling haul traffic during off-peak times (e.g., between 9:00 a.m. and 4:00 p.m.) would have the least effect on other traffic and would minimize indirect increases in traffic related emissions.

Emissions from Commercial and Industrial Operations

Under all alternatives, the study area is expected to experience commercial and industrial growth. It is likely that new development would occur near either current or future residential property. Unless properly controlled, stationary equipment (such as gas stations), mechanical equipment (such as commercial boilers and heating units), and trucks at loading docks at office and retail buildings could cause air pollution issues at adjacent residential property. However, the new commercial and industrial facilities would be required to register their pollutant-emitting equipment with PSCAA (Regulation I and Regulation II). PSCAA requires all commercial and industrial facilities to use Best Available Control Technology to minimize emissions. The agency may require applicants with high emissions facilities to conduct an air quality assessment to demonstrate that the proposed emissions would not expose offsite areas to odors or air quality concentrations exceeding regulatory limits. Therefore, it is unlikely that new commercial and industrial operations would cause significant air quality issues.

Emissions from Vehicle Travel

Tailpipe emissions from vehicles traveling on public roads would be the major source of air pollutant emissions associated with any of the alternatives. Potential air quality impacts caused by increased tailpipe emissions are divided into two general categories: CO hot spots caused by localized emissions at heavily congested intersections; and regional photochemical smog caused by combined emissions throughout the Puget Sound region.

Localized Hot-Spot Air Quality Impacts

Development under the alternatives would increase vehicle travel on existing public roads. However, it is unlikely that the increased traffic and congestion would cause localized air pollutant concentrations at local intersection to form a hot-spot (i.e., a localized area where air pollutant concentrations exceed the NAAQS limits). PSCAA operates ambient air pollution monitors at some of the most heavily congested intersections in the Puget Sound region, and none of those monitors

have indicated exceedances over the past several years. Furthermore, EPA's ongoing motor vehicle regulations have provided steady decreases in tailpipe emissions from individual vehicles, and it is possible that those continuing decreases from individual vehicles could more than offset the increase in vehicle traffic. For these reasons, it is unlikely that air quality impacts at local intersections would be significant.

Regional Air Quality Impacts

Although population and vehicle travel in the study area would increase under all alternatives, the increase in tailpipe emissions would be very small relative to the overall regional tailpipe emissions within the Puget Sound air basin. Photochemical smog (the regional haze produced by ozone and fine particles) is caused by regional emissions throughout the Puget Sound region, rather than localized emissions from any individual neighborhood. Photochemical smog was a serious concern in the Puget Sound region before the late 1980s, but federal tailpipe emissions regulations have reduced vehicular emissions enough so the region is currently a designated attainment area for ozone. To track the reduction of regional tailpipe emissions, Ecology's SIP for ozone and CO set allowable emissions budgets for Puget Sound regional transportation emissions, with the understanding that as long as regional emissions are below the allowable budgets then photochemical smog impacts are unlikely to resume. Regional transportation emissions budgets were set for three pollutants: CO, NOx, and VOC. Based on PSRC's air quality conformity analysis (PSRC 2007 and 2009), forecasted regional emissions for its 2030 planning year are far below the allowable budgets:

- CO: 50% of budget (PSRC 2009)
- NOx: 16% of budget (PSRC 2007)
- VOCs: 21% of budget (PSRC 2007)

Therefore, future regional transportation-related emissions generated by future development within the study area would have to increase by a tremendous amount for the community's contribution to regional photochemical smog to become an air quality concern. None of the alternatives would cause a substantial percentage increase in regional VMT throughout the Puget Sound air basin. Therefore, it is concluded none of the alternatives would result in a significant to regional air quality.

Mobile Source Air Toxics

The mobile source air toxics (MSATs) are compounds emitted from highway vehicles and non-road mobile equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline. The EPA has identified six priority MSATs: benzene, formaldehyde, acetaldehyde, diesel particulate matter/diesel exhaust organic gases, acrolein, and 1,3-butadiene.

The EPA has issued a number of regulations that will dramatically decrease MSATs by mandating the use of cleaner fuels and cleaner engines. The MSAT regulations were issued under the authority in Section 202 of the federal Clean Air Act. In its regulations, EPA examined the impacts of existing and newly promulgated mobile source control programs, including the reformulated gasoline program, national low emission vehicle standards, Tier 2 motor vehicle emissions standards,

gasoline sulfur control requirements, proposed heavy-duty engine and vehicle standards, and on-highway diesel fuel sulfur control requirements. According to a Federal Highway Administration analysis, even if nationwide VMTs increase by 64%, reductions of 57% to 87% in MSATs are projected from 2000 to 2020 (Federal Highway Administration 2006).

According to the traffic analysis, the future VMT would be higher than existing levels. However, the magnitude of the EPA-projected MSAT emissions reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Impacts Specific to the UGA Expansion (Orton Junction) Alternative

Greenhouse Gas Emissions Calculation Methods

The main difference in air quality impacts between the alternatives is related to GHG emissions. This section describes the forecast GHG emissions from the UGA Expansion (Orton Junction) Alternative.

The GHG emissions spreadsheet developed by King County was used to estimate life cycle "business as usual" emissions, not including any special project-level emissions reductions (King County 2007b). The King County spreadsheet was used to estimate future emissions in the study area associated with the alternatives. The spreadsheet estimates GHG emissions to construct the building, and estimates the life-cycle emissions generated by the building occupants over the presumed life of the building. It uses statewide estimates for vehicle travel, building occupancy, and space heating, so the spreadsheet is a relevant tool for providing an approximate estimate of GHG emissions anywhere in Washington State. The spreadsheet assumes the office and commercial buildings in Washington State will be occupied for between 58 to 62 years, and estimates life-cycle emissions within that time period. Three types of life-cycle emissions are estimated by the King County spreadsheet:

Embodied emissions. These are the emissions generated by construction of the building, including extraction, production, and eventual disposal of the building materials used to construct the structure. These do not include embodied emissions during the operating life of the facility to account for consumer productions purchased by residents and workers.

Energy. These are emissions generated by space heating and electrical supply to the building during its lifespan. The spreadsheet incorporates energy intensity factors specific to Washington State.

Transportation. These include tailpipe emissions generated by on-road vehicles used by building occupants after the building is constructed. The transportation emissions do not account for vehicles passing through the study area, unless they are directly associated with the buildings being evaluated. These emissions account for "upstream" emissions during extraction and refining of the fossil fuel used over the lifespan of the building. The transportation emissions do not account for vehicle travel by delivery trucks carrying goods to or from buildings, nor do they account for vehicle travel by customers at retail or commercial buildings. The spreadsheet was modified to assume a future fleet wide fuel economy of 35 miles per gallon, consistent with EPA's newly proposed Corporate Automobile Fuel Economy (CAFE) vehicle mileage standard.

In addition to the life-cycle calculations described above, "soil carbon" emissions generated by converting agricultural land and forest land (on mining sites) to urbanized land uses were estimated using the Buildcarbonneutral.org spreadsheet (BuildCarbonNeutral 2010). That spreadsheet

calculates "soil carbon" emissions resulting from clearing carbon-containing vegetation from rural parcels. The spreadsheet allows the user to specify the acreage and vegetation type for the land being converted, along with the land use and vegetation coverage of the urbanized land use being created.

Land Use Values for GHG Calculations

Table 3.2-3 lists the assumed land use values that were assumed for calculating GHG emissions for each alternative. The values listed under "existing" represent current land use. The values listed for each alternative represent the net increase compared to existing conditions.

Table 3.2-3. Land Use Values for Greenhouse Gas Emission Calculations

		Net Increase under Alternatives Compared to Existing Conditions		
Type (Residential) or Principal Activity (Commercial)	**Existing**	**No Action**	**UGA Expansion**	**UGA Modification**
Single-Family Home (DUs)	2,787	1,664	2,078	1,404
Multi-Family Unit in Large Building (DUs)	714	544	569	569
Multi-Family Unit in Small Building (DUs)	683	106	106	106
Mobile Home (DUs)	305	0	0	0
Education (1,000 SF)	198	0	0	0
Retail (Other Than Mall) (1,000 SF)	613	833	1,405	1,405
Office (1,000 SF)	34	0	0	0
Service (1,000 SF)	502	833	1,405	1,405
Warehouse and Storage (1,000 SF)	1,909	5,404	5,404	5,404
Other (Manufacturing) (1,000 SF)	718	1,029	1,029	1,029
Vacant (1,000 SF)				
Resource Land/Agricultural Land Conversion (Acres)				
Conversion to Single-Family	—	203	226	203
Agricultural land		45	68	45
Mineral land[1]		158	158	158
Conversion to Others	—	164	307	294
Agricultural land		73	216	203
Mineral land[1]		91	91	91

DUs = dwelling units; SF = square feet

[1] Treated as a forest land conversion as the sites are not fully mined yet.

Calculated GHG Emissions

As shown in Table 3.2-4, the UGA Expansion Alternative would generate the highest increases in population and square footages of mixed-use development. This would result in GHG emissions higher than under the other alternatives. Table 3.2-4 summarizes the calculated study area GHG emissions for each alternative and presents the overall emission increase for each action alternative relative to the No Action Alternative. GHG calculations are presented for the assumed 60-year life cycle and as annualized emissions. Under the No Action Alternative, citywide emissions would be

135,163 metric tons per year of CO_2 equivalent, of which 695 tons per year would be "soil carbon" emissions generated by conversion of agricultural and mineral (forest) land. The UGA Expansion Alternative would result in an increase of 23,531 metric tons per year compared to the No Action Alternative.

Table 3.2-4. Comparison of GHG Emissions in the Study Area

Land Use Category for GHG Emission Estimates	60-Year Life Cycle GHG Emissions (metric tons CO_2-equivalent)			Average Annual GHG Emissions During 60-Year Project Lifetime (metric tons CO_2-equivalent per year)		
	No Action	UGA Expansion	UGA Modification	No Action	UGA Expansion	UGA Modification
Buildings	8,068,107	9,478,467	8,658,326	134,468	157,974	144,305
"Soil Carbon" Emissions from Agriculture/ Mineral Land Conversion	41,673	43,178	43,032	695	720	717
Total GHG Emissions	8,109,780	9,521,645	8,701,358	135,163	158,694	145,023
Net Emission Increase (Alternatives Minus No Action)	—	1,411,865	591,578	—	23,531	9,860

There is currently no practical method to assign a significance determination to the forecast GHG emission increase for this alternative. It is well understood that global concentrations of GHG in the atmosphere are the cumulative effect of emissions throughout the world; however, the specific emissions associated with the alternatives would not cause any discernible local or worldwide impacts. Furthermore, no federal, state or local regulations or guidelines currently govern significance criteria for GHG emissions generated by non-industrial emission sources within communities.

The federal Council for Environmental Quality (CEQ) published guidance for evaluating GHG under the National Environmental Policy Act (CEQ 2010). That guidance suggests that proposed actions that increase GHG emissions by more than 25,000 metric tons per year should be subject to a reasonable quantitative analysis. The CEQ guidance emphasizes that the 25,000 metric ton per year emission value does not constitute a significance threshold, but is simply a trigger to warrant more detailed quantitative analysis. The UGA Expansion Alternative would increase GHG emissions by 23,531 metric tons per year compared to No Action. That emission forecast is lower than CEQ's trigger value of 25,000 metric tons per year. In that case it is concluded the quantitative GHG emission analysis described in this section is appropriate to evaluate GHG impacts.

Regardless, the City acknowledges the need for all communities to develop in a manner that minimizes fuel consumption, single-occupancy vehicle usage, and GHG emissions. Therefore, regardless of the lack of a governing significance determination the City will consider mitigation measures to reduce GHG emissions. These mitigation measures are described under "Other Potential Mitigation: Greenhouse Gas Reduction Measures."

Regional Air Quality Emissions

Daily vehicle miles traveled (VMT) can be used as an indicator of air pollutant emissions. Table 3.2-5 shows the contribution of regional VMT from the UGA Expansion (Orton Junction) Alternative (increase over the No Action Alternative) to Puget Sound regional VMT. The net increases in VMT forecast under this alternative are inconsequentially small compared to the Puget Sound regional VMT and its implied impact on regional emissions and photochemical smog. Therefore, the UGA Expansion (Orton Junction) Alternative would cause a negligible impact on regional air quality.

Table 3.2-5. UGA Expansion (Orton Junction) Alternative Contribution to Forecast 2030 Regional Vehicle Miles Traveled

Variable	UGA Expansion Alternative[1]	Region[3]	Proposed Alternative Contribution to Region
Daily VMT	1,033[2]	92,738,880	0.001%

Source: PSRC 2009.

VMT = vehicle miles traveled

1 Increase above the No Action Alternative

2 VMT on Sumner freeways, arterials, and collectors.

3 Puget Sound regional VMT totals for 2030 based on CO Maintenance Area boundaries that addresses urban Puget Sound.

Impacts Specific to the UGA Modification Alternative

As shown in Table 3.2-3, the UGA Modification Alternative would generate increases in population and square footage of development lower than the UGA Expansion (Orton Junction) Alternative. Its employment square footage would be higher than the No Action Alternative, though population and dwellings would be slightly lower. Likewise, annual GHG emissions in the study area would fall between those for the other alternatives. As listed in Table 3.2-4, the UGA Modification Alternative would cause a GHG emission increase of 9,860 metric tons per year compared to the No Action Alternative.

Similar to the UGA Expansion Alternative, there is no practical method to assign a significance determination to this GHG increase. Regardless, the City acknowledges the need for all communities to develop in a manner that minimizes fuel consumption, single-occupancy vehicle usage, and GHG emissions. Therefore, regardless of the lack of a governing significance determination the City will consider mitigation measures to reduce GHG emissions. These mitigation measures are described under “Other Potential Greenhouse Gas Measures.”

Daily VMT can be used as indicators of air pollutant emissions. In terms of VMT, the UGA Modification Alternative would have similar but slightly greater levels than the UGA Expansion Alternative, because the UGA Modification Alternative has slightly higher volumes on the highways due to longer trip lengths associated with less internalization of trips in the broader study area. Table 3.2-6_ shows the contribution of regional VMT from the UGA Modification Alternative (increase over the No Action Alternative) to Puget Sound regional VMT. The net increases in VMT forecast as a result of this alternative are inconsequentially small compared to the Puget Sound regional VMT and its implied impact on regional emissions and photochemical smog. Therefore, the UGA Modification_Alternative would cause a negligible impact on regional air quality.

Table 3.2-6. UGA Modification Alternative Contribution to Forecast 2030 Regional Vehicle Miles Traveled

Variable	UGA Modification Alternative[1]	Region[3]	Proposed Alternative Contribution to Region
Daily VMT	1,067[2]	92,738,880	0.002%

Source: PSRC 2009.

VMT = vehicle miles traveled

1 Increase above the No Action Alternative

2 VMT on Sumner freeways, arterials, and collectors.

3 Puget Sound regional VMT totals for 2030 based on CO Maintenance Area boundaries that addresses urban Puget Sound.

Impacts Specific to the No Action Alternative

For this analysis the No Action Alternative represents the future "business as usual" scenario that is typically used as the basis of comparison to evaluate future GHG emissions. As listed in Table 3.2-3 the No Action Alternative would generate increases in dwellings and square footage of mixed use compared to existing conditions. This would result in annual study area GHG emissions higher than existing conditions. As listed in Table 3.2-4, the No Action Alternative would generate an estimated 135,163 metric tons per year of GHG emissions, of which 695 tons per year would be "soil carbon" emissions generated by conversion of agricultural and mineral (forest) land.

The No Action Alternative would produce 102,656 VMT, less than 1% of the Puget Sound regional VMT forecast for 2030 for the CO Maintenance Area (PSRC 2009). As noted under "Impacts Common to All Alternatives," the alternative is not expected to have regional air quality impacts as PSRC has emission budgets far below what is allowed for tailpipe emissions.

3.2.3 Mitigation Measures

Incorporated Plan Features

The Transportation Element of the *City of Sumner Comprehensive Plan* (City Comprehensive Plan) includes the following goals and policies that would reduce air pollutant emissions related to traffic.

- 2. The City of Sumner will provide a transportation system that is compatible with State and regional plans, plans of adjacent jurisdictions, and with public transit providers.
- 2.4 Continue to work with Pierce Transit and Sound Transit to support and enhance a multimodal transportation system by ensuring that the City's transportation plans and facilities are consistent with public transit plans and programs.
- 3.6 Provide a highly interconnected network of streets, sidewalks, bicycle lanes, and trails for ease and variety of travel.
- 4. Promote use of alternative transportation modes by providing an interconnected system of pedestrian and bicycle facilities.
- 4.5 A system of separated, multi-purpose trails should be constructed to serve transportation and recreation needs of the community. It should also connect with adjacent communities to facilitate regional connectivity. The trail system and connections to the arterial, collector, and other pedestrian and bicycle facilities should be made per the Sumner/Pacific Master Trail Plan.

- 5. Develop and expand an integrated system of public transportation alternatives and demand management programs to provide mobility alternatives and reduce the need to expand the general capacity of arterials and collector streets in the City.
- 5.1 Continue working with Pierce Transit and Sound Transit to expand and enhance bus transit service to regional destinations and to serve growing areas of Sumner.
- 5.2 Continue working with Pierce Transit, Sound Transit, WSDOT, and local agencies to enhance access to the regional commuter rail system and Sumner's commuter rail station.
- 5.6 Support and coordinate with Pierce Transit, Sound Transit, and WSDOT on the development of an expanded regional park-and-ride system to support use of alternative transportation modes in the Sumner area.
- 6.3 Support continuing efforts for improving air quality throughout the Sumner area and develop a transportation system compatible with the goals of the Federal and State clean air acts.

Under the Land Use Element of the City Comprehensive Plan, the Commuter Rail/Regional Transit Sub-Element includes the following goals that would reduce air pollutant emissions:

- 1. Support regional transit connections in the Sumner Planning Area.

The City's current Transportation Plan promotes the implementation of a bicycle network throughout the current plan area.

Applicable Regulations and Commitments

- Rules and regulations as promulgated by federal and state Clean Air Acts, Ecology, and PSCAA.
- Ordinance 1587 requires commute reduction by large employers.

Other Potential Mitigation Measures

General

- The City could develop environmental policies specific to addressing air quality protection and impacts.
- The City could require air quality impact analyses of major developments in its planning area.
- The City could limit or prohibit the use of wood stoves.
- The City could encourage the use of fuels other than gasoline and diesel.

Construction Emission Control

- The City should require all construction contractors to implement air quality control plans for construction activities in the study area. The air quality control plans should include best management practices (BMPs) to control fugitive dust and odors emitted by diesel construction equipment.
- During construction, dust from excavation and grading could cause temporary, localized increases in the ambient concentrations of fugitive dust and suspended particulate matter. The following BMPs would be used to control fugitive dust.
    - Use water sprays or other non-toxic dust control methods on unpaved roadways.
    - Minimize vehicle speed while traveling on unpaved surfaces.

  - Prevent trackout of mud onto public streets.
  - Cover soil piles when practical.
  - Minimize work during periods of high winds when practical.
- Mobile construction equipment and portable stationary engines would emit air pollutants including NOx, CO, and diesel particulate matter. These emissions would be temporary and localized. It is highly unlikely that the temporary emissions would cause ambient concentrations at adjoining parcels to approach the federal limits. Typical mitigation measures to minimize air quality and odor issues caused by tailpipe emissions include the following:
  - Maintain the engines of construction equipment according to manufacturers' specifications.
  - Minimize idling of equipment while the equipment is not in use.
- Burning of slash or demolition debris would not be permitted without express approval from PSCAA. No slash burning is anticipated for any construction projects in the study area.

Greenhouse Gas Reduction Measures

Neither Ecology nor EPA is likely to adopt any GHG emissions standards or GHG reduction requirements in the near future. It is the City's responsibility to implement its GHG reduction requirements for new developments.

GHG emissions reductions could be provided by using prudent building design and construction methods to use recycled construction materials, reduce space heating and electricity usage, and reduce water consumption and waste generation. Table 3.2-7 lists a variety of mitigation measures that could reduce GHG emissions caused by transportation facilities, building construction, space heating, and electricity usage (Ecology 2008b). The table lists potential GHG reduction measures, and indicates where the emissions reductions might occur. The City could require development applicants to identify the reduction measures in their projects, and explain why other measures are not included or are not applicable.

Table 3.2-7. Potential Greenhouse Gas Reduction Measures

Reduction Measures	Comments
Site Design	
Plant trees and vegetation near structures to shade buildings	Reduces onsite fuel combustion emissions and purchased electricity plus enhances carbon sinks.
Minimize building footprint.	Reduces onsite fuel combustion emissions and purchased electricity consumption, materials used, maintenance, land disturbance, and direct construction emissions.
Design water efficient landscaping.	Minimizes water consumption, purchased energy, and upstream emissions from water management.
Minimize energy use through building orientation.	Reduces onsite fuel combustion emissions and purchased electricity consumption
Building Design and Operations	
Apply LEED (Leadership in Energy and Environmental Design) standards (or equivalent) for design and operations	Reduces onsite fuel combustion emissions and off-site/indirect purchased electricity, water use, waste disposal
Purchase Energy Star equipment and appliances for public agency use.	Reduces onsite fuel combustion emissions and purchased electricity consumption
Incorporate on-site renewable energy production, including installation of photovoltaic cells or other solar options.	Reduces onsite fuel combustion emissions and purchased electricity consumption.
Design street lights to use energy efficient bulbs and fixtures	Reduces purchased electricity.
Construct “green roofs” and use high-albedo roofing materials.	Reduces onsite fuel combustion emissions and purchased electricity consumption
Install high-efficiency HVAC systems.	Minimizes fuel combustion and purchased electricity consumption.
Eliminate or reduce use of refrigerants in HVAC systems.	Reduces fugitive emissions. Compare refrigerant usage before/after to determine GHG reduction.
Maximize interior day lighting through floor plates, increased building perimeter and use of skylights, celestories and light wells.	Increases natural/day lighting initiatives and reduces purchased electrical energy consumption.
Incorporate energy efficiency technology such as: super insulation motion sensors for lighting and climate control efficient, directed exterior lighting	Reduces fuel combustion and purchased electricity consumption.
Use water conserving fixtures that surpass building code requirements.	Reduces water consumption.
Reuse gray water and/or collect and reuse rainwater.	Reduces water consumption with its indirect upstream electricity requirements.
Use recycled building materials and products.	Reduces extraction of purchased materials, possibly reduces transportation of materials, encourages recycling and reduction of solid waste disposal.

Reduction Measures	Comments
Use building materials that are extracted and/or manufactured within the region.	Reduces transportation of purchased materials
Use rapidly renewable building materials.	Reduces emissions from extraction of purchased materials
Conduct 3rd party building commissioning to ensure energy performance.	Reduces fuel combustion and purchased electricity consumption.
Track energy performance of building and develop strategy to maintain efficiency.	Reduces fuel combustion and purchased electricity consumption.
Transportation	
Size parking capacity to not exceed local parking requirements and, where possible, seek reductions in parking supply through special permits or waivers.	Reduced parking discourages auto dependent travel, encouraging alternative modes such as transit, walking, biking etc. Reduces direct and indirect VMT
Develop and implement a marketing/information program that includes posting and distribution of ridesharing/transit information.	Reduces direct and indirect VMT
Subsidize transit passes. Reduce employee trips during peak periods through alternative work schedules, telecommuting, and/or flex-time. Provide a guaranteed ride home program.	Reduces employee VMT
Provide bicycle storage and showers/changing rooms.	Reduces employee VMT
Utilize traffic signalization and coordination to improve traffic flow and support pedestrian and bicycle safety.	Reduces transportation emissions and VMT
Apply advanced technology systems and management strategies to improve operational efficiency of local streets.	Reduces emissions from transportation by minimizing idling and maximizing transportation routes/systems for fuel efficiency.
Develop shuttle systems around business district parking garages to reduce congestion and create shorter commutes.	Reduces idling fuel emissions and direct and indirect VMT

Source: Ecology 2008b.

3.2.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on regional or local air quality are anticipated. Temporary, localized dust and odor impacts could occur during the construction activities. The regulations, incorporated plan features, and other mitigation measures described above are adequate to mitigate any adverse impacts anticipated to occur as a result of study area growth increases.