3.2 AIR QUALITY

This section discusses existing air quality within the study area and anticipated Project impacts on air quality, which are mainly from vehicular/equipment exhaust and fugitive dust emissions during construction, operations, and decommissioning. Potential mitigation measures are also identified.

3.2.1 Study Methodology

The study area for air quality is the area within an approximately 20-mile radius from the Project. This study area is appropriate because, as explained in detail below, air quality impacts will be geographically limited. Potential impacts due to construction and decommissioning were determined by analyzing anticipated emissions from construction vehicles, equipment, and fugitive dust (blown dust from exposed soils, including construction sites). Potential impacts to air quality due to operation were determined by analyzing the contribution from fossil-fuel-fired equipment used for emergency power and use of maintenance worker vehicles.

3.2.2 Regulatory Framework

3.2.2.1 Ambient Air Quality Standards

In the early 1970s the USEPA established National Ambient Air Quality Standards (NAAQS) to define levels of air quality that protect public health and welfare from the known adverse effects of air pollutants. Ecology establishes Washington Ambient Air Quality Standards, referred to as WAAQS (Chapter 173-476 WAC). The NAAQS and WAAQS are shown in Table 3.2-1.

Table 3.2-1. Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS	WAAQS
Particulate Matter (PM_{10})	Annual Arithmetic Mean	No Standard	50 $\mu g/m^3$
	24 hour	150 $\mu g/m^3$	150 $\mu g/m^3$
Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	15 $\mu g/m^3$	No Standard
	24 hour	35 $\mu g/m^3$	No Standard
Ozone (O_3)	8 hour	0.08 ppm	No Standard
	1 hour	0.12 ppm	0.12 ppm
Carbon Monoxide (CO)	8 hour	9 ppm	9 ppm
	1 hour	35 ppm	35 ppm

Pollutant	Averaging Time	NAAQS	WAAQS
Sulfur Dioxide (SO_2)	Annual	0.03 ppm	0.02 ppm
	24 hour	0.14 ppm	0.10 ppm
	3 hour	0.5 ppm	No Standard
	1 hour	No Standard	0.40 ppm
Nitrogen Dioxide (NO_2)	Annual	0.053 ppm	0.05 ppm
Lead (Pb)	Quarterly	1.5 $\mu g/m^3$	No Standard
Total Suspended Particulates	Annual Geometric Mean	No Standard	60 $\mu g/m^3$
	24 hour	No Standard	150 $\mu g/m^3$

Notes:
$\mu g/m^3$ – micrograms per cubic meter
ppm – parts per million
Source: Ecology 2017a

Local air quality is measured against these national and state air quality standards. If measured data indicates that an area meets the standards, the area is designated by USEPA as an "attainment area." Areas that do not meet the standards are designated as "nonattainment areas." After air monitoring shows that a nonattainment area is meeting health-based air quality standards and has a 10-year plan for continuing to meet and maintain air quality standards, USEPA re-designates the areas as maintenance areas (Ecology 2017b).

In addition to Ecology, local clean air agencies protect air quality in Washington. The Olympic Region Clean Air Agency (ORCAA) and Southwest Clean Air Agency (SWCAA) regulate emissions sources within Thurston and Lewis counties, respectively.

3.2.2.2 New Source Review

In general, if potential emissions from the operation of stationary sources exceed certain thresholds, approval from the appropriate permitting authority is required before construction can begin. SWCAA administers permits through their air discharge permit process for projects within Lewis County (SWCAA 400-109 and 110) (SWCAA 2016), and ORCAA administers permits through the Notice of Construction Application process for projects within Thurston County (Rule 6.1) (ORCAA 2016). Operation of the Project will not cause such air pollutant emissions that will trigger the requirements of new source review in either of the counties.

Prevention of Significant Deterioration (PSD) regulations apply to proposed new or modified sources located in an attainment area that have the potential to emit criteria pollutants in excess of predetermined *de minimis* values (40 Code of Federal Regulations [CFR] Part 51). For new generation facilities, these values are 100 tons per year of criteria pollutants for 28 specific source categories, or 250 tons per year for sources not included in the 28 categories. Operation of the Project will not cause such air pollutant emissions that will trigger the requirements of PSD review in either of the counties.

3.2.2.3 Portable and Temporary Sources

Construction may require the use of a temporary, portable rock crusher and concrete batch plant, which could be locally supplied. As described in Section 2.5.2, crushed rock will be supplied from either existing commercial rock crushing operations (which are already permitted), or from a rock crusher temporarily re-established at an existing Weyerhaeuser quarry site. A concrete batch plant may be temporarily established within the turbine micrositing corridor associated with the WTG string on the ridge in Lewis County.

Establishment and operation of a temporary concrete batch plant in Lewis County will require a temporary permit issued by SWCAA in accordance with Regulation 400-036 (SWCAA 2016). Establishment of a temporary rock crusher, if in Lewis County, will be permitted by SWCAA under the same regulation; if the crusher is established in Thurston County, the permit will be issued by ORCAA under Regulation 4, Rule 4.5 and establishes operating requirements in Rule 6.1.7 (ORCAA 2016). Temporary permits are issued for a limited period of time (1 year or less). The application must provide sufficient information to enable SWCAA to determine that the operation will comply with the emissions standards for a new source and will not cause a violation of applicable NAAQS and WAAQS. The permit will specify emission control requirements for the temporary equipment. Typically, contractors who own and operate mobile crushing and batching plants are responsible for obtaining and maintaining appropriate permits for the temporary location and operation of such facilities at construction sites. Existing commercial rock crushing and concrete batching operations will be operated under their existing permits.

3.2.2.4 Construction Emissions

Construction emissions are not regulated in permitting of stationary sources, which cover the emissions resulting from the operation of a source. Mobile sources such as construction equipment and maintenance trucks are regulated separately under the Clean Air Act (CAA). Local air authorities regulate fugitive dust.

Regulations from SWCAA and ORCAA that apply to nuisance emissions, including from fugitive dust and equipment used during construction, are described below:

- SWCAA 400-040 General Standards for Maximum Emissions
- SWCAA 400-109 Air Discharge Permit Applications
- SWCAA 400-116 Maintenance of Equipment
- ORCAA Regulation 6 – Required Permits
  - Rule 6.1 Notice of Construction Required
- ORCAA Regulation 8 – Performance Standards
  - Rule 8.3 General Standards for Maximum Particulate Matter
  - Rule 8.5 Odor Control Measures
  - Rule 8.8 Control Equipment – Maintenance and Repair.

3.2.3 <u>Affected Environment</u>

3.2.3.1 Regional Climate and Precipitation

The study area is located in Lewis and Thurston counties, on the eastern edge of the Puget Trough ecoregion. This ecoregion is characterized by a maritime climate with warm, relatively dry summers and mild, wet winters. Annual precipitation ranges from 25 to over 60 inches. The drier areas are caused by rain shadows from the Olympic Mountains (WDFW 2005). Prevailing winds within the study area are primarily from the west, in an area with winter peaking winds.

The region experiences moderate temperatures throughout the year with maximum temperatures ranging from 40–78.8 degrees Fahrenheit (°F) and minimum temperatures ranging from 34.0–52.2 °F (WRCC 2010).

Temperature and precipitation data were obtained from the Western Regional Climate Center (2012) for Centralia, the weather station nearest to the Project. The coldest average monthly temperatures, from a low of around 33° F to a high of around 46° F, occur in January. The warmest average monthly temperatures, from a low of around 51° F to a high of around 78° F, occur in July and August. The maximum recorded temperature in Centralia was 107° F (recorded in July 2009), while the minimum recorded temperature was -4° F (recorded in January 1930).

Average annual precipitation is 45.9 inches with 6.8 inches of snowfall at lower elevations and greater snowfall at higher elevations (WRCC 2012).

3.2.3.2 Ambient Air Quality

Both Lewis and Thurston counties are currently designated as in attainment for all criteria pollutants (Ecology 2018). Although the Olympia/Tumwater/Lacey area in Thurston County is designated as a maintenance area for particulate matter (PM_{10}), the study area is located in an attainment area for all criteria pollutants.

The closest air quality monitoring station to the study area is the Ecology Chehalis-Market Boulevard station (350 North Market Boulevard) in Chehalis, approximately 7.4 miles to the southwest. This monitoring station measures particulate matter with an aerodynamic radius of 2.5 microns or less ($PM_{2.5}$). The monitoring station is located in an urban commercial area, with vehicles the typical emission source. Since the station was established in December 2009, the average reading has been 5.7 $\mu g/m^3$ with a standard deviation of 3.3 (Ecology 2017c).

Several large stationary sources of air pollution are located within the study area in Lewis County (Centralia), including two sawmills and two electric energy generation facilities[1] (SWCAA 2017). An aluminum beverage can manufacturer in Olympia and a bathware manufacturer in Yelm are the largest stationary sources within the study area in Thurston County (ORCAA 2017).

With the exception of the large stationary sources identified above, generally, emissions within the study area are produced by vehicle and mobile equipment emissions and fugitive dust. Vehicle emissions occur along transportation corridors such as the I-5 corridor and in communities adjacent to them, and to a lesser degree in the less populated areas within the study area. Mobile equipment emissions are generated during commercial forestry activities within the Project Area. Fugitive dust emissions are generated by ground-disturbing activities, which include forestry operations and vehicles traveling on dirt or gravel roads (such as forest roads), and other types of construction in general. Wood-

[1] One of these, the Chehalis Generation Facility, is a natural gas-fired combustion turbine electrical generation facility, and the other is the coal-fired Centralia Power Plant. The Centralia Plant is scheduled for full retirement by 2025.

burning stoves are a primary source of particulates (PM_{10}) and the main source of emissions in both counties, mainly in the winter (SWCAA 2009; Thurston Regional Planning Council 2016). In 2009, the SWCAA recorded exceedances of the NAAQS for fine particulate matter and ozone pollution in the Vancouver area (well outside of the study area).

3.2.4 Impacts of the Proposed Action

3.2.4.1 Construction

Air emissions generated by Project construction activities will consist of the following:

- Exhaust emissions from operation of construction equipment and construction vehicles
- Fugitive dust particles from ground disturbance associated with development and use of temporary and permanent Project site and access roads (including tree/vegetation clearing activities)
- Fugitive dust from mobile equipment and vehicles on construction access roads
- Emissions generated by quarrying and operation of portable, temporary concrete batch plant and rock crusher (if employed)
- Odors associated with exhaust from diesel equipment and vehicles.

Proposed equipment to be used during construction is shown on Table 2.4-2.

The amount of pollutants generated from vehicle exhaust emissions will be relatively small, given the size of the construction workforce (about 110 workers, with a peak of approximately 250 workers) and equipment fleet, and similar in nature to emissions occurring from commercial forest harvesting activity that currently occurs in the study area. The emissions will generally be dispersed among multiple active construction locations within the Project Area at any given time rather than concentrated at a specific location.

In addition to equipment and vehicle emissions, operation of construction equipment and vehicles will generate fugitive dust from travel on dirt and gravel roads and from soil-disturbing activities during construction, including site clearing (i.e., trees and vegetation) and grading activities. The amount of fugitive dust emissions will vary depending on the type of construction activity and weather conditions. No cleared woody material will be burned, either on or offsite.

As indicated in Section 2.5.2, the Applicant will either source aggregates and concrete from existing permitted quarries (which may include Weyerhaeuser's quarries or Columbia Granite in Thurston County for example) and batch plants, or may have portable crushing and batching equipment installed temporarily at the Project site. If needed, a mobile (temporary) batch plant will be located along the ridge roughly in the center of the WTGs, near the proposed substation yard in Lewis County. A temporary rock crusher may be used at Weyerhaeuser's quarries. The primary air pollutant generated by the rock crusher and batch plant will be particulate matter, which will be generated by activities such as rock crushing and storing, moving, and loading sand and other aggregate materials used to make cement. In addition, both facilities will be powered by temporary diesel generators.

Operation of diesel equipment and vehicles during construction will produce limited odors, which will be most noticeable in the immediate vicinity of construction sites.

3.2.4.2 Operation

WTGs do not generate emissions during operation as they do not burn fossil fuels to produce energy. However, limited life cycle GHG emissions will result from the manufacturing of wind energy generation equipment. As a renewable energy resource, wind energy can displace the air pollutant emissions associated with other forms of electricity generation. Similarly, air emissions will not result from operation of the gen-tie line.

Emissions during operations will occur from infrequent onsite vehicular travel in association with Project site maintenance. Potential emissions generated by worker vehicles arriving and departing from the site will be small and localized.

An emergency generator, fueled with natural gas or liquefied petroleum gas, will be installed at the O&M Facility located in Thurston County to provide back-up power during outages and emergencies. The emergency generator will be rated at less than 500 horsepower standby and will be tested as per manufacturer's recommendation. Such generators, if used only for standby emergency generation and tested as required by the manufacturer, are exempt from registration by ORCAA (Rule 4.1 (b)(26). Emissions from any emergency generator that might be needed will be intermittent, localized, and immaterial. Emergency generators are not proposed in Lewis County.

Operation of the WTGs will not increase dispersion of airborne dust and pollen. WTGs remove energy from the air that passes through the rotor blades; therefore, the air downwind of a WTG actually moves more slowly than air on the upwind side. Facility operations and maintenance will result in combustion emissions and fugitive dust generated by vehicles traveling on access roads within the Project site.

Life cycle assessment (LCA) is a tool used to evaluate the environmental impacts over all the life stages of a product, providing a "cradle-to-grave" environmental profile. Recently, numerous LCAs have been conducted to assess the life time greenhouse gas (GHG) emissions of different types of electrical generation technologies, including wind energy generation. Published estimates of life cycle emissions of a variety of wind energy generation projects have ranged from 1.7 to 81 grams carbon dioxide - equivalent per kilowatt-hour (g CO_2-eq/kWh), with median at 12 g CO_2-eq/kWh. Recent studies have reviewed these results in consideration of similar LCA boundary calculation assumptions (i.e., "harmonized"), and concluded that once the studies were harmonized for consistent system boundaries and important system parameters, the range was reduced to 3.0 to 45 g CO_2-eq/kWh with a median of 11 g CO_2-eq/kWh. (Dolan and Heath 2012). LCA analysis has also been performed to identify the impact of wind speed on life cycle emissions, indicating that at higher wind speeds a two to three fold reduction in lifecycle emissions can be realized (Padey et al. 2012). Although larger WTGs require more materials and energy for manufacturing, LCA analysis has shown that they are more energy efficient and environmentally friendly than medium-scale WTGs (Munir 2016). Additionally, installing fewer, larger WTGs rather than many small WTGs produces lower carbon emissions and maximizes electricity generation (Smoucha 2016). LCAs have also been conducted for non-renewable energy generation technologies. For comparison, combined cycle natural gas generation results in average lifecycle GHG emissions of 466 g CO_2-eq/kWh, and coal-fired plants have average emissions of 1,124 g CO_2-eq/kWh (Skone et al. 2014). The main life cycle air emissions of wind energy generation projects occur during manufacturing of the WTG components due to the steel required for towers; however, end of life recycling of steel components further reduces this environmental impact (Haapala and Prempreeda 2014).

Project-related removal of forest vegetation is not anticipated to result in a significant reduction in regional carbon budget stored in forest reserves. Project construction will take place in the context of the existing use of the Project vicinity generally for commercial forestry, which includes regular cycles of clear cutting and reforestation. For example, at the Vail Tree Farm, Weyerhaeuser harvests approximately 50,000,000 board feet of timber per year over a cumulative harvest area of 2,000 acres (Lowe 2018). The Project contribution to timber harvest will be very small in the context of region-wide forestry activities. Further, at the completion of Project operation, some of the area harvested to implement the Project will be returned to active forestry at the landowners discretion (see Section 2.8), thereby restoring a portion of the carbon budget that was unavailable during the lifetime of the Project.

3.2.4.3 Decommissioning

Excavation, clearing, grading, and trenching will be required for removal of Project facilities. Decommissioning activities will generate emissions similar to those generated during construction, primarily from construction vehicle exhaust emissions and fugitive dust particles. Exhaust from heavy construction equipment and vehicles from workers arriving to and departing from the Project site will contribute to emissions.

The amount of pollutants generated from vehicle exhaust emissions and fugitive dust will be relatively small and similar to emissions from other equipment commonly used for construction and timber operations in Lewis and Thurston counties. Decommissioning will take place concurrently among multiple locations in and near the study area at any given time and will be dispersed rather than concentrated in a specific location.

3.2.5 Impacts of the No Action Alternative

Under the No Action Alternative, the Project would not be constructed. No construction or operation-related air emissions or fugitive dust emissions from the Project would be generated. Heavy equipment and fugitive dust emissions related to ongoing timber production would continue similar to existing levels. Electrical energy that would have been produced by the Project would likely need to be obtained from other renewable or non-renewable power generation sources.

3.2.6 Mitigation Measures

3.2.6.1 Construction and Decommissioning

Air quality impacts during the construction and decommissioning stages will be similar. The Applicant or its construction contractor will apply for and obtain air emission permits necessary for establishment of temporary rock crushers and concrete batch plants from Lewis County or Thurston County as applicable.

The Applicant will control fugitive emissions from construction and decommissioning in accordance with SWCAA and ORCAA regulations.

Mitigation measures to reduce or avoid impacts to air quality include the following best practices:

- All vehicles and equipment used during construction and decommissioning will comply with applicable federal and state air quality regulations for exhaust emissions

- Vehicles and equipment used during construction and decommissioning will be in good working condition and properly maintained to minimize exhaust emissions and odors
- Idling will be minimized, and equipment will be shut down when not in use
- Carpooling among construction workers will be encouraged
- Speed limits on Project private access roads will be a maximum of 25 mph to minimize fugitive dust emissions
- Truck beds will be covered in accordance with local, state, and federal requirements when transporting dirt or soil on public roads
- No cleared woody material will be burned, either on or offsite
- A fugitive dust plan will be implemented, which outlines monitoring and control measures that will reduce fugitive dust during construction
    - Construction materials that could be a source of dust will be managed to minimize fugitive dust emissions
    - Dust-suppressant chemicals will be applied only when needed, and the application will be timed to avoid or minimize wash-off by rainfall
    - Dust will be controlled as needed by spraying water on dry, exposed soil
    - If located at the Project construction site within Lewis County, operation of the portable rock crusher and portable concrete batch plant will follow applicable requirements of SWCAA, including notifying the agency prior to commencing operations and submitting an emission inventory report to the agency
    - Soil stockpiles will be monitored for wind erosion and treated if necessary to minimize surface losses
- Project access roads will be constructed and surfaced to DNR Forest Practices Act standards
- Following construction, areas disturbed during construction and not occupied by permanent Project facilities will be restored in a manner to prevent future erosion which may release fugitive dust
- After decommissioning, disturbed areas will be restored to prevent future erosion and fugitive dust.

Also see mitigation measures in Earth Resources (Section 3.1.6) and Water Resources (Section 3.3.6).

3.2.6.2 Operation

The Project will employ approximately 8 full-time workers during core operating hours, resulting in approximately 32 worker trips added to peak-hour background traffic. Operation of the Project will result in potential emissions generated by maintenance and operation vehicles; these emissions will be small, intermittent, and geographically localized. While operational air impacts will be minimal, the following BMPs will be implemented, as needed, to minimize potential impacts resulting from intermittent use of access roads by maintenance and operation vehicles:

- All vehicles and equipment used during operation and maintenance will comply with applicable federal and state air quality regulations for exhaust emissions
- Vehicles and equipment used during operation and maintenance activities will be in good working condition and properly maintained to minimize exhaust emissions and odors
- Idling will be minimized, and equipment will be shut down when not in use
- Speed limits on Project private access roads will be a maximum of 25 mph to minimize fugitive dust emissions
- Permanent Project access road surfaces will be selected and maintained to minimize fugitive dust emissions. Dust palliatives can be used if necessary.

3.2.7 Connected Action

Construction of the interconnection will involve delivery and installation of a step up transformer in the Tono substation yard, and conductoring to interconnect the gen-tie line to the step-up transformer, and the transformer to the remainder of the substation. These activities will not require excavation or significant ground disturbance either inside or outside the developed area of the yard. Gravel covering existing developed surfaces may be temporarily displaced by the installation activity and will be replaced or repaired to match pre-existing conditions. Construction related air pollutant emissions will be limited to emissions from the operation of construction vehicles used for the transformer installation, and minor amounts of dust generated from displacement and replacement of the existing graveled surface in the substation yard. Operation of the step-up transformer will not emit air pollutants. The final graveled surface in the yard will minimize dust emissions from windblown erosion at the transformer area.

3.2.8 Unavoidable Adverse Impacts

Project construction activities may result in temporary dust emissions resulting from ground disturbance and emissions from operation of construction equipment. Although such emissions are expected to be minor, the Applicant has proposed implementation of a fugitive dust plan and measures to minimize idling of equipment. Temporary rock crushing and concrete batching operations will be permitted in accordance with SWCAA and ORCAA as applicable. Operational emissions will be limited to motor vehicle emissions servicing the Project and temporary emissions associated with testing or emergency operation of an emergency generator, with non-significant impacts. As a result of emissions' minimal impact, and with the implementation of permits and mitigation measures as proposed, Project impacts to air quality will be mitigated to a level of non-significance.

3.2.9 References

Dolan, S. and Heath, G. 2012. Life Cycle Greenhouse Gas Emissions of Utility-Scale Wind Power, Systematic Review and Harmonization. *Journal of Industrial Ecology*. Volume 16, Issue s1. April 2012. Pages S136–S154.

Haapala, K.R. and Prempreeda, P. 2014*. Comparative Life Cycle Assessment of 2.0 MW Wind Turbines*. International Journal of Sustainable Manufacturing. Vol. 3, No. 2, pp.170.–185.

Lowe. A. 2018. Email correspondence between Arron Lowe, RES, and Irina Makarow, HDR "Skook Outstanding EIS questions." May 10, 2018.

Munir, N.B.; Huque, Z. and Kommalapati, R.R. 2016. Impact of Different Parameters on Life Cycle Analysis, Embodied Energy and Environmental Emissions for Wind Turbine System. *Journal of Environmental Protection*, 7, 1005-1015.

Olympic Region Clean Air Agency (ORCAA). 2016. Regulations of the Olympic Region Clean Air Agency. October 29, 2016. Available online: https://www.orcaa.org/makeitgo/uploads/ORCAA-Regulations.pdf. Accessed July 17, 2017.

ORCAA. 2017. Current Air Operating Permits. Available online: https://www.orcaa.org/services/current-air-operating-permits/. Accessed July 12, 2017.

Padey, P., I. Blanc, D. Le Boulch, and X. Zhao. 2012. A Simplified Life Cycle Approach for Assessing Greenhouse Gas Emissions of Wind Electricity. *Journal of Industrial Ecology*. Volume 16, Issue s1. April 2012. Pages S136–S154.

Skone, T., J. Littlefield, J. Marriott, G. Cooney, M. Jamieson, J. Hakian and G. Schivley. 2014. Life Cycle Analysis of Natural Gas Extraction and Power Generation. May 29. 2014. DOE/NETL-2014/1646. Available online: https://www.netl.doe.gov/energy-analyses/temp/NaturalGasandPowerLCAModelDocumentationNG%20Report_052914.pdf .

Smoucha, E., K. Fitzpatrick, S. Buckingham, and O. Knox. 2016. Life Cycle Analysis of the Embodied Carbon Emissions from 14 Wind Turbines with Rated Powers between 50kW and 3.4 Mw. *Journal of Fundamentals of Renewable Energy and Applications*. Volume 6, Issue 4, 1000211. June 15, 2016.

Southwest Clean Air Agency (SWCAA). 2009. 2009 Annual Report. Available online: http://www.swcleanair.org/docs/annualreports/anrpt2009.pdf.

SWCAA. 2016. SWCAA 400. General Regulations for Air Pollution Sources. October 9, 2016. Available online: http://www.swcleanair.org/permits/title5final.asp. Accessed July 17, 2017.

SWCAA. 2017. Proposed/Current Title V Permits. Available online: http://www.swcleanair.org/permits/title5final.asp. Accessed July 12, 2017.

Thurston Regional Planning Council. 2016. Regional Transportation Improvement Program for the Thurston Region. October 7, 2016.

Washington Department of Fish and Wildlife (WDFW). 2005. Washington's Comprehensive Wildlife Conservation Strategy. Available online: http://wdfw.wa.gov/publications/00727/. September 19, 2005.

Washington State Department of Ecology (Ecology). 2017a. Criteria Pollutants and Standards. Available online: http://www.ecy.wa.gov/programs/air/other/Criteria_Stnds.htm. Accessed July 12, 2017.

Ecology. 2017b. Air Quality – Nonattainment Areas. Available online: http://www.ecy.wa.gov/programs/air/sips/designations/nonattainment_areas.htm. Accessed July 12, 2017.

Ecology. 2017c. Washington's Air Monitoring Network. Available online: https://fortress.wa.gov/ecy/enviwa/. Accessed July 12, 2017.

Ecology. 2018. Website - Determining if areas in Washington meet national air quality standards. Available online: https://ecology.wa.gov/Regulations-Permits/Plans-policies/Areas-meeting-and-not-meeting-air-standards Accessed February 16, 2018.

Western Regional Climate Center (WRCC). 2010. Monthly climate summaries for Centralia, Washington from 1893–2010. Available online: http://www.wrcc.dri.edu/summary/Climsmwa.html.

WRCC. 2012. Period of Record General Climate Summary – Precipitation for Centralia, Washington from 1893-2012. Available online: https://wrcc.dri.edu/cgi-bin/cliGCStP.pl?wa1276.