Conconully Safety of Dams Modification Project Final Environmental Assessment

Air Quality and Climate Impact Analysis Memorandum

November 2025

Analysis Area

The analysis area for air quality and climate is the project area, including Conconully Dam, Conconully Reservoir, and the east bank of the reservoir from the cemetery to the dam, as shown in **Map 1-1** in **Appendix A** of the environmental assessment (EA).

Affected Environment

Air Quality

Air quality in Washington is regulated by the United States Environmental Protection Agency (EPA) and the Washington State Department of Ecology. The EPA, under the authority of the Clean Air Act (CAA), has set National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants that have the potential to result in adverse human health and environmental impacts (EPA 2022). The Washington State Department of Ecology implements, maintains, and enforces NAAQS for Okanogan County. NAAQS include maximum thresholds for carbon monoxide (CO), lead[1], nitrogen dioxide (NO_2)[2], ozone[3], particulate matter (including fine particulate matter with diameter of 2.5 micrometers or less [$PM_{2.5}$] and coarse particulate matter with diameter of 10 micrometers or

[1] The final rule was signed October 15, 2008. The 1978 lead standard (1.5 micrograms per cubic meter [$\mu g/m^3$]) remains in effect until 1 year after an area is designated for the 2008 standard. The one exception is in areas designated nonattainment for the 1978 standard, where the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

[2] NO_2 is used as the indicator for the larger group of nitrogen oxides (NO_x), which react with other chemicals in the air to form both particulate matter and ozone as well as impairing visibility by creating haze.

[3] The final rule was signed October 1, 2015, and effective December 28, 2015. The previous (2008) ozone standards additionally remain in effect in some areas. Revocation of the 2008 ozone standards and transitioning to the 2015 standards will be addressed in the implementation rule for the current standards.

less [PM_{10}]), and sulfur dioxide (SO_2)[4]. The EPA sets primary standards to provide public health protection and secondary standards to safeguard public welfare, including visibility and protection against damage to animals, crops, vegetation, and water resources (EPA 2018). **Table 1** displays current NAAQS for the EPA-designated criteria air pollutants.

Table 1. NAAQS for EPA-designated criteria air pollutants.

Pollutant	Averaging Time	National Standards		
		Primary	Secondary	Form
Ozone	8 hours	0.070 ppm	Same as primary	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
CO	8 hours	9 ppm	—	Not to be exceeded more than once per year
	1 hour	35 ppm	—	
NO_2	Annual (arithmetic mean)	53 ppb[a]	Same as primary	Annual mean
	1 hour	100 ppb[a]	—	98th percentile of 1-hour daily maximum concentration, averaged over 3 years
SO_2	Annual (arithmetic mean)	—	—	—
	24 hours	—	—	—
	3 hours	—	0.5 ppm	Not to be exceeded more than once per year
	1 hour	75 ppb[a]	—	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
PM_{10}	24 hours	150 µg/m^3	Same as primary	Not to be exceeded more than once per year on average over 3 years
$PM_{2.5}$	Annual (arithmetic mean)	9 µg/m^3	15 µg/m^3	Annual mean averaged over 3 years
	24 hours	35 µg/m^3	Same as primary	98th percentile, averaged over 3 years
Lead	Rolling 3-month average	0.15 µg/m^3	Same as primary	Not to be exceeded

Source: EPA 2024a
Cells with a dash (—) indicate there is no standard for that pollutant or averaging time.
[a] ppb—parts per billion.

Geographic areas that meet or are cleaner than the national standards for criteria air pollutants are called attainment areas, whereas areas that fail to meet the standards are designated as nonattainment

[4] The final rule was signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards (0.03 parts per million [ppm] annual and 0.14 ppm 24-hour) were revoked in that same rulemaking; however, these standards remain in effect until 1 year after an area is designated for the 2010 standard. One exception is in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

areas. The classification of an area is designated separately for each pollutant. Okanogan County is currently at attainment for all criteria air pollutants under NAAQS (EPA 2025).

Annual criteria air pollutant emissions are provided by the EPA through the National Emissions Inventory (NEI), which is a compilation of air emissions based on data provided by state, local, and Tribal agencies supplemented by EPA data. The NEI is released every 3 years; the most recent available data are provided in the 2020 NEI that was published in 2023 (EPA 2023).

Estimated 2020 criteria pollutant emissions for Okanogan County are provided in **Table 2**. As shown in this table, fire was the largest source of emissions for all criteria air pollutants aside from volatile organic compounds (VOCs). VOCs are included in the NEI and regulated by the EPA because they are a precursor to the formation of ground-level ozone, which is a criteria air pollutant. The large amount of emissions of air pollutants from fires recorded in the 2020 NEI corresponds to the occurrence of four different fires that had footprints of over 1,000 acres each in Okanogan County, including the Palmer Fire, which burned approximately 17,988 acres (WDNR 2020). Emissions from fires in 2020 represented 85 percent of total CO emissions, 50 percent of total NO_x emissions, 83 percent of total PM_{10} emissions, 91 percent of total $PM_{2.5}$ emissions, 98 percent of total SO_2 emissions, and 37 percent of total VOC emissions in Okanogan County. Other area sources, primarily organic trace gas emissions from living organisms such as plants, animals, and microorganisms, accounted for 62 percent of total VOC emissions in Okanogan County in 2020.

Table 2. 2020 NEI criteria air pollutant emissions by source type for Okanogan County (tons per year).

Source	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOCs
Mobile sources[1]	5,282	991	52	37	2	480
Point sources[2]	240	33	7	6	4	22
Fire sources[3]	74,797	1,610	8,160	6,917	736	17,813
Dust sources[4]	0	0	1,315	272	0	0
Other area sources[5]	7,235	618	351	336	12	29,977
Total	**87,554**	**3,252**	**9,885**	**7,568**	**754**	**48,292**

Source: EPA 2023

[1] Mobile sources include commercial marine vessels, locomotives, and on-road and nonroad vehicles and equipment.

[2] Point sources include large emissions-producing facilities such as airports, refineries, power plants, landfills, and wastewater treatment plants.

[3] Fire sources include forest wildfires and prescribed forest burning.

[4] Dust sources include agricultural (crop and livestock) dust, construction dust, paved road dust, and unpaved road dust.

[5] Other area sources include, but are not limited to, industrial process such as construction, oil and gas exploration and production, and petroleum refining; agricultural (crop and livestock) production; combustion (including agricultural combustion, residential grilling, and cremation); natural (biogenic) sources; commercial, industrial, and nonindustrial solvent use; and waste disposal.

Air quality is an environmental concern primarily because it can affect human health by harming respiratory, cardiovascular, and neurological health (EPA 2018). A secondary concern is the potential effect of criteria air pollutant emissions on vegetation and wildlife and on visibility in Class

I areas.[5] $PM_{2.5}$, NO_x, and SO_2 emissions impair visibility by creating haze. Ground-level ozone can harm sensitive vegetation during the growing season, and SO_2 can contribute to acid rain, which can harm sensitive ecosystems (EPA 2018). Airborne odors caused by emissions of criteria air pollutants can be distressing to local populations, including sensitive receptors. Potentially sensitive receptors are any groups or individuals who are particularly vulnerable to air pollution. These typically are children, the elderly, or any other persons with health complications. Potentially sensitive receptors in and near the project area are residences, businesses, and those recreating near the project or along travel routes.

Climate

The project area is located in the Salmon Creek Watershed, which lies within the Columbia River Basin that spans parts of Washington, Oregon, Montana, Idaho, and southwestern Canada. Climate in the Salmon Creek Watershed is semi-arid, with warm, dry summers and cool, wet winters (Northwest Power Planning Council 2001). The Cascade Mountain Range to the west acts as a barrier to the eastward movement of moist, mild air in winter and cool air in summer from the Pacific Ocean. Higher elevation mountainous terrain in the vicinity of the project area contributes to increased precipitation and colder temperatures in comparison with the valleys and lowlands to the south, as air masses cool when they are forced to rise over elevated landforms. Sufficient cooling of air masses leads to condensation of water vapor into clouds as well as increased amounts of precipitation (WRCC 2025).

Table 3 displays monthly normal values for total precipitation, mean maximum temperature, mean minimum temperature, and mean average temperature recorded by the National Oceanic and Atmospheric Administration for Okanogan County over the time period of 1991 to 2020. The annual total precipitation normal for Okanogan County in this period was approximately 23 inches, with normal values ranging from a low of 0.54 inches of precipitation in August to 4.05 inches of precipitation in December. Monthly mean average temperatures in Okanogan County over the time period ranged from 22.3 degrees Fahrenheit (°F) in December to 69.6°F in July (NOAA 2025).

Persistent changes in average climatic conditions and their level of variability that are observed over extended time periods of decades or longer are defined as climate change (IPCC 2012). The most recent Intergovernmental Panel on Climate Change Climate Change Synthesis Report, which was published in 2023, reported an increase in average global surface temperature of 1.98°F in 2011–2020 relative to the baseline value from 1850–1900. The rise in global surface temperature between 1970 and 2020 was more rapid than in any other 50-year period in the last 2,000 years. Observed instances of more frequent and intense extreme weather patterns such as heatwaves, droughts, and heavy precipitation were attributed to increases in greenhouse gas (GHG) emissions with a high level of statistical confidence (IPCC 2023).

[5] Class I areas, as defined under the CAA, provide special air quality and visibility protection to national wilderness areas larger than 5,000 acres and national parks larger than 6,000 acres in order to preserve, protect, and enhance air quality. The closest Class I area to the project area is the Pasayten Wilderness, which is approximately 41 miles away.

Table 3. Monthly climate normal values for Okanogan County (1991-2020).

Month	Total Precipitation Normal (Inches)	Mean Max. Temperature Normal (°F)	Mean Min. Temperature Normal (°F)	Mean Avg. Temperature Normal (°F)
January	3.61	29.2	15.8	22.5
February	2.35	36.6	19.3	28.0
March	1.99	46.0	25.8	35.9
April	1.05	57.5	32.6	45.0
May	1.13	68.2	41.4	54.8
June	1.04	74.6	48.4	61.5
July	0.61	84.5	54.7	69.6
August	0.54	84.1	53.3	68.7
September	0.76	74.4	44.5	59.4
October	2.09	56.5	33.6	45.0
November	3.84	38.5	24.9	31.7
December	4.05	28.2	16.4	22.3
Annual	23.06	56.5	34.2	45.4

Source: NOAA 2025

According to the United States Global Change Research Program's Fifth National Climate Assessment, incremental increases in average global surface temperature are expected to exacerbate harmful climate impacts in Washington from extreme weather such as more frequent, intense, and pronounced heatwaves and droughts, which increase the risk of severe wildfire occurrence. Increasingly, frequent and severe wildfires not only present a safety concern to human communities, but also correspond to reduced air quality from smoke as well as heightened emissions of GHGs. Warming temperatures are also projected to degrade lake habitats by promoting harmful algal blooms and expanding the range of invasive species (Jay et al. 2023).

The Bureau of Reclamation's 2021 SECURE Water Report provided projections of shifts in the climatic conditions for the Columbia River Basin in the mid-21st century (2040–2069) relative to a baseline of conditions in 1970–1999 for both lower and higher GHG emission scenarios. Under both scenarios, annual precipitation in the Columbia River Basin was projected to increase, but snowpack was projected to decline as warmer temperatures melt snow sooner and cause more winter precipitation to fall as rain. This change would shift seasonal streamflow to occur earlier in the year, which would deplete snowmelt as a source of late spring runoff and exacerbate drier conditions in summer months. Projected increases in temperatures and drought occurrence, duration, and severity would lead to water supply shortages and reduced reservoir levels from changes to the timing and quantity of runoff, significant increases in evapotranspiration, and increased irrigation requirements (Reclamation 2021).

Greenhouse Gases

GHG emissions impact climatic conditions by trapping some of the solar radiation in the atmosphere that would otherwise have been emitted back into space. Common GHGs produced as a result of human-related activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The primary anthropogenic source of CO_2 emissions is the combustion of fossil fuels (oil,

natural gas, and coal), solid waste, and trees. Shifts in land cover also impact CO_2 concentrations; deforestation and soil degradation release stored CO_2 into the atmosphere and reforestation captures CO_2 out of the atmosphere. Primary human-related sources of CH_4 emissions include fossil fuel production and transport, livestock farming, and agriculture. N_2O emissions occur primarily during agricultural and industrial activities and the combustion of fossil fuels and solid waste (EPA 2024b).

The EPA quantifies the degree of climate impacts for a given GHG using a unit of measurement called carbon dioxide equivalent (CO_2e) that is calculated using 100-year and 20-year global warming potentials. Global warming potentials are measures of the amount of radiative energy the emission of 1 ton of a given gas will absorb over a period of 100 years relative to the emission of 1 metric ton of CO_2. CO_2 absorbs less radiation than other GHGs but remains in the climate system for thousands of years. CO_2 has a 100-year and 20-year warming potential value of 1 since it is used as the reference for other GHGs. CH_4 has a higher global warming potential than CO_2, with a 100-year global warming potential of 29.8 and a 20-year global warming potential of 82.5, owing to its higher energy absorption and its status as a precursor that can chemically react with other compounds to form ozone. CH_4 emissions only remain in the atmosphere for a decade on average. The 100-year and 20-year global warming potentials of N_2O are 273, and emissions of N_2O remain in the atmosphere for over 100 years on average (EPA 2024c).

The GHG emissions for Okanogan County displayed in **Table 4** were obtained from the EPA's 2020 NEI (EPA 2023). According to these data, fires were the largest source of CO_2 and CH_4 emissions in Okanogan County in 2020, accounting for 78 percent of total CO_2 emissions and 99 percent of CH_4 emissions. Emissions from fires represented 53 percent of total 100-year CO_2e and 56 percent of total 20-year CO_2e for Okanogan County in 2020. Mobile sources represented the only N_2O emissions in Okanogan County in 2020 (EPA 2023).

Table 4. 2020 NEI criteria GHG emissions by source type for Okanogan County (metric tons per year).

Source	CO_2	CH_4	N_2O	100-Year CO_2e	20-Year CO_2e
Mobile sources[1]	295,521	36	7	298,432	300,316
Point sources[2]	12,806	0	0	12,806	12,806
Fire sources[3]	1,094,924	3,433	0	1,197,226	1,378,142
Total	**1,403,251**	**3,469**	**7**	**1,508,464**	**1,691,264**

Source: EPA 2023

[1] Mobile sources include commercial marine vessels, locomotives, and on-road and nonroad vehicles and equipment.

[2] Point sources include large emissions-producing facilities such as airports, refineries, power plants, landfills, and wastewater treatment plants.

[3] Fire sources include forest wildfires and prescribed forest burning.

Environmental Consequences

Methods and Criteria

Analysis Indicators

Air Quality

- Particulate matter emissions from on-road equipment
- Particulate matter emissions from nonroad vehicles and equipment
- Acres of surface disturbance

Climate

- GHG emissions from on-road equipment
- GHG emissions from nonroad vehicles and equipment
- Acres of vegetation removal

Assumptions

- Operations and maintenance- (O&M-) related emissions under the action alternatives will be similar to current conditions (the No Action alternative) once construction is complete because personnel levels and emission sources are not anticipated to change.

Alternative A – No Action

Air Quality

Under the No Action alternative, air pollutant emissions in the project area from O&M of the dam as well as vehicle use by visitors, residents, and local businesses would continue. These primarily include criteria air pollutant emissions and small amounts of hazardous air pollutant emissions from fuel combustion in vehicle and equipment use. There are limited disturbed surfaces that can produce fugitive dust emissions on the project site. Continued O&M of the dam would not be expected to produce any odors.

Climate

Historical trends and future climate projections showing increased warming, droughts, and wildfire occurrence as well as shifts in the quantity, type, and seasonality of precipitation are projected to continue, as described under the Affected Environment section for climate. Associated impacts on the project area could include reduced reservoir levels from drought conditions and increased evapotranspiration due to higher temperatures. Increased severe wildfires could pose a risk of damages to the surface of Conconully Dam and its components. Burned areas would be more susceptible to increased runoff (Ecology 2024).

Greenhouse Gas Emissions

Under the No Action alternative, GHG emissions in the project area from O&M of the dam as well as vehicle use by visitors, residents, and local businesses would continue. Carbon sequestration from soils and vegetation on the site would continue at similar rates.

Alternative B – Proposed Action

Air Quality

The proposed action to reduce the risk of dam failure would have temporary adverse impacts on air quality from the project activities described in **Section 2.2**, Description of Alternatives of the EA. Construction activities would generate fugitive dust during surface-disturbing activities and from travel on unpaved areas. Criteria air pollutants would also be emitted by the combustion of fuel in commuter vehicles, trucks, construction equipment, and generators.

Site preparation, excavation, construction, transportation, and site closeout would result in temporary impacts on air quality for the duration of construction from the generation of criteria air pollutants regulated under the CAA through the combustion of fuels from on-road and nonroad equipment. Sources of combustion emissions would include the following:

- Gasoline- and diesel-powered off-road trucks, construction equipment, and power tools
- Generators
- Delivery trucks and tractor trailers to bring in and move out materials and supplies
- Water trucks used for dust suppression

Sources of short-term and localized fugitive dust emissions include the following:

- Activities such as tree clearing, stripping, and grubbing and site grading to construct the access road and use the borrow area
- Soil disturbance associated with construction of the access road and stability berm and from excavation of the borrow area
- Travel of construction equipment, commute vehicles, delivery trucks, and water trucks on unpaved surfaces
- Wind erosion of disturbed surfaces
- Entrained dust caused by delivery trucks on paved roads

The emissions of fugitive dust would be greatest during site-grading and material-handling activities. Emissions would vary over the course of construction, based on the activities during each construction phase. Dust from travel on unpaved access roads and the administrative/storage/staging area would occur over the duration of construction. The amount of fugitive dust emissions would depend on the type of activity, weight of equipment, area disturbed, vehicle speed, wind speed, silt content, and soil moisture. Emissions would be localized to the area surrounding any given construction activity and would cease when construction ends.

Best management practices (BMPs) requiring dust abatement and control, maintenance of emissions control equipment, and minimization of combustion emissions would be implemented (**Appendix F** of the EA) to minimize air quality impacts during construction. These practices would minimize the amount of airborne fugitive dust and criteria air pollutant emissions generated by the project actions to the maximum extent practicable. The fugitive dust and criteria air pollutant emissions from project activities would not be a major portion of the overall emissions of fugitive dust and criteria air pollutants in Okanogan County, which are mainly sourced from fires according to the 2020 NEI data (EPA 2023).

Implementing fugitive dust and combustion emission control BMPs would minimize impacts on local air quality and on the sensitive receptors described in the Affected Environment section. These measures would be further defined in construction contracts, construction permits, stormwater pollution prevention plans, and dust control plans.

The post-project permanent disturbance area would increase in size compared with the No Action alternative, but most areas of increased disturbance would be surfaced in materials resistant to the generation of fugitive dust. The 7-acre portion in the southwest corner of the borrow area that would provide the material for the construction of project components would be contoured and sloped to a natural grade to avoid excessive erosion. Stabilization activities at the borrow area would include grading to drain runoff, contouring to match the landscape, and restoration efforts following the Revegetation Plan (**Appendix E** of the EA).

Noxious odors were not identified as an issue of concern during scoping and are not expected to result from project activities.

The generation of fossil fuel combustion under Alternative B would cause temporary impacts on air quality in Okanogan County; however, emissions of criteria pollutants from the project would represent a minor contribution to the total annual air emissions in Okanogan County compared with other sources identified in the Affected Environment section. The generation of fugitive dust under Alternative B would cause short-term impacts on air quality; however, with the implementation of BMPs, there would be no impacts on air quality that would require additional environmental commitments to meet any laws, regulations, or guidelines applicable to this project.

Climate

Climate conditions under Alternative B would be similar to those described under the No Action alternative, albeit with a higher contribution of GHG emissions associated with combustion of fossil fuels during construction of project components.

Greenhouse Gas Emissions

Under Alternative B, site preparation, construction, transportation, and site closeout would be temporary sources of GHG emissions (CO_2, NO_2, and CH_4) through the combustion of fuels from on-road and nonroad equipment, as described above under air quality. BMPs that reduce combustion-related criteria pollutant emissions, such as using electric-powered pumps, where feasible, and repairing equipment with excessive emissions, would also generally reduce GHG emissions. GHG emissions associated with combustion of fuels in on-road and nonroad equipment

used in construction of project components would not be a major portion of overall GHG emissions in Okanogan County, which are mainly sourced from fires, according to the 2020 NEI data (EPA 2023).

In addition to GHG emissions, minor amounts of carbon in soils and vegetation would be released during surface-disturbing activities. Vegetation would be removed to develop the borrow area needed for project construction. While carbon would cease to accumulate in vegetation that is removed, some of the carbon contained in the vegetation would likely remain sequestered in harvested wood products. Revegetation in the borrow area as part of site restoration under Alternative B would reinstate carbon accumulation provided by vegetation on the site (EPA 2018).

In addition to Alternative B, other past, present, and reasonably foreseeable future actions in or near the project area, such as the Salmon Creek River Mile 8 Restoration Project, could have impacts on air quality and climate conditions associated with combustion of fossil fuels and travel on unpaved roads by equipment and vehicles used during construction. The potential future occurrence of wildfires in Okanogan County represents the largest reasonably foreseeable future source of criteria air pollutant and GHG emissions that would impact air quality and climate conditions in or near the project area.

Alternative C – Preferred

Air Quality

Impacts on air quality in the project area associated with construction activities under Alternative C would be essentially the same as those occurring under Alternative B. Changes to the amount of surface disturbance occurring under Alternative C resulting from the west alignment of outlet works and corresponding adjusted locations of the stability berm, toe drain, stilling basin, and valve house would be negligible in terms of their impact on criteria air pollutant emissions.

Climate

Climate conditions and GHG emissions under Alternative C would be the same as those described for Alternative B.

Acronyms

BMP	best management practice
CAA	Clean Air Act
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
EA	environmental assessment
EPA	United States Environmental Protection Agency
°F	degrees Fahrenheit
GHG	greenhouse gas
$\mu g/m^3$	microgram per cubic meter
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NO_x	nitrogen oxides
NO_2	nitrogen dioxide
N_2O	nitrous oxide
O&M	operations and maintenance
$PM_{2.5}$	particulate matter with diameter of 2.5 micrometer or less
PM_{10}	particulate matter with diameter of 10 micrometer or less
ppb	parts per billion
ppm	parts per million
SO_2	sulfur dioxide
VOC	volatile organic compound

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