Appendix C: Atmospheric Pollutant Analysis

Atmospheric Pollution Analysis: Umatilla New Pump Station and Pipeline

Methodology

- Calculate atmospheric pollutant releases by proposed action component requiring the development of equipment type, hours of equipment operation, fuel consumption rates specific to equipment type, and releases factors by fuel volume.
- Quantify gross and net releases estimates for (CO2, CH4, and N2O) as well as CO2e. Including carbon capture from wetland creation.
- Assumptions: Conservative estimates for equipment operation hours and fuel consumption rates. Equipment should be consistent with industry standard equipment and procedures.
- Releases from the proposed action would result in direct releases during construction, and indirect releases from the operation and maintenance (O&M). The temporal scope of analysis would extent across a 50-year period.
- Definition of Significance: Significant impacts would occur if proposed project activities produced quantities of atmospheric pollutant releases that would prevent the federal reduction goals from being met. The White House's (2021) release goal is to reduce U.S. atmospheric pollutant releases 50-52% below 2005 levels by 2030.
- Oregon set executive targets in 2020 to reduce atmospheric pollutant releases 45% below 1990 levels by 2035 and 80% below 1990 levels by 2050. Also, the state enacted statutory targets in 2007 to reduce atmospheric pollutant releases 75% below 1990 levels by 2050.

Development of Equipment Types

The proposed action was summarized into its primary construction components, as they exist on USACE property. These components were used to further determine the equipment types required for each project component (below). It is important to acknowledge that this is not an exhaustive list of exact equipment that would be utilized by the contractor for construction activities. Rather, this would represent a conservative estimate of the equipment types for industry standard practices.

Break Down of Proposed Action Components: (Not Necessarily Chronologically Ordered)

1. **Authorization and Pre-Construction Activities**:
    - USACE would issue a 2-year construction license to the CTUIR and COU to implement the proposed action on USACE owned lands.
    - The CTUIR and COU would acquire the appropriate federal/ state regulatory permits before implementation of the proposed action.
2. **New Pump Station Construction and Associated Features**
        - Location:

    - Along the Columbia River, adjacent to the existing pump station.
- Features:
    - Pump station: 48 feet long, 50 feet wide, 30 feet tall, 2,400 square feet footprint.
    - River intake structure with fish exclusion screens (NMFS compliant).
    - Concrete wet well with multiple pump bays.
    - Emergency electrical generator and fuel storage (on 300-square-foot concrete pads).
    - Expanded gravel parking area and access roads.

3. **Pipeline Installation**:

    - Extent:
        - Total pipeline: 4,550 feet, primarily on BIA and State of Oregon lands.
        - Small portion crosses USACE lands (<50 feet).
    - Capacity:
        - Designed to convey 8.57 cubic feet per second to the Wanaket Wildlife Area.
    - Construction:
        - Excavators, pipe layers, and compactors used for trenching, alignment, and stabilization.
        - Erosion control measures deployed to protect sensitive areas.

4. **Temporary Laydown Areas and Vegetation Removal**:

    - Staging Areas:
        - Two laydown areas (1 acre and 1.6 acres) west of the existing pump station, landward of the Lewis and Clark Commemorative Trail.
    - Activities:
        - Vegetation removal, minor excavation, and grading.
        - Standard equipment used, including excavators, dump trucks, and graders.

5. **In-Water Work**:

    - Cofferdam Installation:
        - Isolate the work area during ODFW in-water work window (Dec 1, 2023 – Mar 31, 2025).
    - Intake Structure and Foundation Work:
        - Excavation for intake structure and wet well foundation.
        - Use of turbidity curtains and erosion control barriers.
    - Equipment:
        - Excavators, backhoes, cranes, and barges for structural installation.

6. **Demolition of Existing Pump Station**

    - Activities:

    - Decommissioning and demolition of the existing pump station.
    - Site regrading and restoration with native vegetation.
- Utility Improvements:
    - Overhead lines replaced with underground lines.

7. **Environmental Safeguards**

- Erosion Control:
    - Implementation of silt fences, turbidity curtains, and stormwater management systems.
- Fish Salvage Operations:
    - Relocation of aquatic species from the work area during in-water construction.
- Regulatory Compliance:
    - Adherence to state and federal environmental laws, minimizing impacts on air, water quality, and noise.

8. **Post-Construction Activities**

- Operation and Maintenance:
    - Daily operation of the pump station and conveyance infrastructure.
- Restoration:
    - Removal of the cofferdam and restoration of in-water and land-based construction areas.

A preliminary breakdown of anticipated equipment for the proposed action was produced. Only equipment that would produce atmospheric pollutant releases during operation was included. Furthermore, the fuel type for each piece of equipment were also included, and this would be utilized to quantify releases later in this analysis. Only action components 2 through 8 are anticipated to produce atmospheric pollutant releases. It is important to acknowledge that this is not an exhaustive list of exact equipment that would be utilized by the contractor for construction activities. Rather, this would represent a conservative estimate of the equipment types for industry standard practices. The breakdown for equipment and fuel types is outlined within Table 1.

Table 1: Breakdown of Equipment and Fuel Types by Proposed Action Component

Component	Equipment Required	Fuel Type
2. Construction of New Pump Station	Excavators	Diesel
	Backhoes	Diesel
	Dump Trucks	Diesel

	Cranes	Diesel
	Concrete Mixers	Diesel
	Support Vehicles	Gasoline/Diesel
3. Pipeline Installation (50 feet on USACE property)	Excavators	Diesel
	Pipe Layers	Diesel
	Cranes	Diesel
	Compactors	Diesel
	Dump Trucks	Diesel
	Support Vehicles	Gasoline/Diesel
4. Temporary Laydown Areas	Graders	Diesel
	Rollers	Diesel
	Dump Trucks	Diesel
	Excavators	Diesel
	Brush Clearing Equipment (e.g., Mulchers, Dozers)	Diesel
	Support Vehicles	Gasoline/Diesel

5. In-Water Work	Cranes (Barge or Shore-Based)	Diesel
	Excavators	Diesel
	Barges	Diesel
	Tugboats	Diesel
	Dump Trucks	Diesel
	Support Vehicles	Gasoline/Diesel
6. Emergency Systems Setup	Transport Trucks (Fuel Tanks/Generators)	Diesel
	Cranes	Diesel
	Concrete Mixers	Diesel
7. Restoration and Demolition	Hydroseeders	Diesel
	Mulchers	Diesel
	Excavators	Diesel
	Dump Trucks	Diesel
	Support Vehicles	Gasoline/Diesel
8. Construction of Gravel Access Roads and Parking Area	Graders	Diesel
	Rollers	Diesel

	Dump Trucks	Diesel
	Excavators	Diesel
	Support Vehicles	Gasoline/Diesel

Estimated Operational Hours and Fuel Quantities

Input parameters are required to quantify atmospheric pollutant releases for the proposed action. It is important to acknowledge that these operational hours are purely speculative and largely dependent on external variables that are not available at the time of this analysis. External variables would include equipment type, number of pieces of equipment, environmental conditions, equipment size, equipment efficiency, operator competence, time of year, regulatory requirements, and more.

Assumptions made during the equipment hour estimations would include the contractor would have one of each type of equipment listed. The estimations are realistic, yet conservative.

Table 2 – Estimated hours of operation for equipment

Proposed Action Component	Equipment	Estimated Hours
2. Construction of New Pump Station	Excavators	300 hours
	Backhoes	150 hours
	Dump Trucks	200 hours
	Cranes	150 hours
	Concrete Mixers	120 hours
	Support Vehicles	200 hours
3. Pipeline Installation (50 feet on USACE property)	Excavators	50 hours
	Pipe Layers	20 hours
	Cranes	30 hours
	Compactors	20 hours
	Dump Trucks	40 hours

	Support Vehicles	30 hours
4. Temporary Laydown Areas	Graders	40 hours
	Rollers	20 hours
	Dump Trucks	40 hours
	Excavators	60 hours
	Brush Clearing Equipment	50 hours
	Support Vehicles	40 hours
5. In-Water Work	Cranes (Barge or Shore-Based)	100 hours
	Excavators	80 hours
	Barges	100 hours
	Tugboats	50 hours
	Dump Trucks	60 hours
	Support Vehicles	80 hours
6. Emergency Systems Setup	Transport Trucks	40 hours
	Cranes	20 hours
	Concrete Mixers	30 hours
7. Restoration and Demolition	Hydroseeders	30 hours
	Mulchers	20 hours
	Excavators	60 hours
	Dump Trucks	80 hours
	Support Vehicles	60 hours

8. Construction of Gravel Access Roads and Parking Area	Graders	60 hours
	Rollers	40 hours
	Dump Trucks	100 hours
	Excavators	50 hours
	Support Vehicles	50 hours

Fuel Consumption Rates and Fuel Quantities

Below is a table (Table 3) presenting the average fuel consumption rates for each piece of equipment listed in the previous table. These rates account for idle operation and active use, offering a conservative average fuel consumption value (in gallons per hour). In addition, speculative fuel quantities were calculated by multiplying the conservative fuel consumption rate by the estimated hour of construction operation per each type of equipment. Total fuel usage by fuel type are summarized in Table 4.

Table 3 – Fuel Consumption Rates and Fuel Quantities

Equipment Type	Total Operational Hours	Fuel Consumption Rate (Gallons/Hour)	Fuel Type	Total Fuel Usage (Gallons)
Excavators	600	6	Diesel	3,600
Backhoes	150	3	Diesel	450
Dump Trucks	520	7	Diesel	3,640
Cranes	300	5	Diesel	1,500
Concrete Mixers	150	4	Diesel	600
Support Vehicles	460	2	Gasoline	920

Pipe Layers	20	2.5	Diesel	50
Compactors	40	2.5	Diesel	100
Graders	100	4	Diesel	400
Rollers	60	3	Diesel	180
Brush Clearing Equipment	50	4	Diesel	200
Barges	100	10	Diesel	1,000
Tugboats	50	25	Diesel	1,250
Transport Trucks	40	8	Diesel	320
Hydroseeders	30	4	Diesel	120
Mulchers	20	3	Diesel	60

Table 4. Fuel Total by Fuel Type

Fuel Type	Total Fuel Usage (Gallons)
Diesel	14,470
Gasoline	920
Total	**15,390**

Quantification of Atmospheric Pollutant Releases

Atmospheric pollutant releases were calculated using Total Fuel Volume and multiplying by the appropriate conversion factors by Fuel Type (Table 5). All equipment types would require either diesel or gasoline fuel.

Table 5 - Releases Factors for Fuel Types by Volume (EPA)

Fuel	CO2 release Factor (MT CO2/gallon)	CH4 release factor (MT CH4/gallon)	N2O release factor (MT N2O/gallon)
Gasoline	**0.008959524**	**0.000000375**	**7.5E-08**

Ethanol (E100)	0.005766667	9.24E-08	9.24E-09
Diesel	**0.010228571**	**0.000000414**	**8.28E-08**
Biodiesel (B100)	0.009421429	1.408E-07	1.408E-08
Propane	0.005738095	0.000000273	5.46E-08
Aviation gasoline	0.008309524	0.000000375	7.5E-08
Jet fuel	0.00975	0.000000405	8.1E-08

Table 6 – Atmospheric Pollutant Quantification

Fuel Type	Total Fuel Usage (Gallons)	CO2 releases (MT)	CH4 releases (MT)	N2O releases (MT)	CO2 Equivalent (MT)
Diesel	14,470	148.0074224	0.00599058	1.20E-03	1.49E+02
Gasoline	920	8.24276208	0.000345	6.90E-05	8.27E+00
	Total	156250184.5	6335.58	1267.116	1.57E+02

The gross atmospheric pollutant releases for the proposed action displayed at the bottom of Table 6. However, these would only account for direct construction related releases. Gross CO2 equivalent releases amounts to approximately **157 metric tons**.

The NEAT model is utilized to determine net atmospheric pollutant releases and factors in carbon capture offsets as well as releases from concrete usage and long-term operation and maintenance (O&M) activities.

Carbon Capture Offsets, Concrete, and O&M:

The proposed action is not anticipated to result in the creation or elimination of wetland habitats. The action would result in restoration activities, especially at the location of the existing pump station, however, these restorative efforts would not result in habitat types that are accounted for within the NEAT model. Therefore, carbon capture offsets were not included in the overall net releases calculation.

The proposed action is estimated to require approximately 792 cubic yards of concrete for the construction of the new pump station foundation, the concrete working pads, the foundation for the intake structure, and other features. Concrete production and curing is a substantial contributor to overall project atmospheric pollutant releases. The NEAT tool utilizes concrete volumes to calculate estimated atmospheric pollutant contributions.

Operation and maintenance activities should be included to account for the proposed action's long-term atmospheric pollutant releases and is calculated over a 50-year time frame. Typical

operation and maintenance activities are included in Table 7. Furthermore, annual fuel estimations are included in within Table 8. Quantification of annual release are calculated in Table 9.

Table 7. Operation and Maintenance Activities.

Activity	Description	Frequency	Equipment/Resources Required	Fuel Type
Pump Maintenance	Lubricate, inspect, and replace worn pump components to ensure efficiency.	Semi-Annually	Cranes or lifts (for servicing pumps)	Diesel
Intake Structure Inspection	Inspect and clean intake screens and fish exclusion screens.	Quarterly	High-pressure water system, cleaning equipment	Gasoline
Fish Exclusion Screen Maintenance	Ensure fish exclusion screens are not obstructed and are functioning correctly.	Quarterly	Cleaning equipment, crane	Diesel
Concrete Structure Maintenance	Check for cracks, leaks, or wear in concrete structures such as the wet well, foundation, and pads.	Annually	Equipment for repairs (e.g., mixers, cranes)	Diesel
Electrical System Checks	Inspect and test electrical systems, including backup generator.	Semi-Annually	Diesel generator (for testing)	Diesel
Emergency Generator Testing	Test the emergency generator to ensure it operates when needed.	Monthly	Diesel generator	Diesel
Erosion and Sediment Control Inspection	Inspect erosion control measures and ensure proper functioning.	Monthly	Support vehicles (e.g., trucks, ATV)	Diesel
Parking Area and Road Maintenance	Maintain gravel parking area and access roads,	Annually	Graders, rollers	Diesel

	including grading and resurfacing if necessary.			
Piping System Inspection	Inspect and clean pipelines to prevent blockages or leaks.	Annually	Power washers	Diesel
Stormwater Management System Maintenance	Clean and inspect stormwater management systems to prevent clogs.	Annually	Vacuum trucks	Diesel

Table 8. Fuel Quantities for Operation and Maintenance Activities

Activity	Equipment/Resources Required	Operational Hours (per year)	Fuel Consumption Rate (gal/hr)	Fuel Type	Annual Fuel Quantity (gal)
Pump Maintenance	Cranes or lifts	40	5.5	Diesel	220
Intake Structure Inspection	Cleaning equipment, power washer	16	1.5	Gasoline	24
Fish Exclusion Screen Maintenance	Cleaning equipment, crane	20	5.5	Diesel	110
Concrete Structure Maintenance	Equipment for repairs (e.g., mixers)	12	6	Diesel	72
Electrical System Checks	Diesel generator (for testing)	20	3	Diesel	60
Emergency Generator Testing	Diesel generator	12	3	Diesel	36
Erosion and Sediment Control Inspection	Support vehicles (e.g., trucks, ATV)	30	2.5	Diesel	75

Parking Area and Road Maintenance	Graders, rollers	15	7	Diesel	105
Piping System Inspection	Power washers	16	1.5	Diesel	24
Stormwater Management System Maintenance	Vacuum trucks	10	6	Diesel	60

Table 9. Quantification for Annual Operation and Maintenance Activities.

Fuel Type	Total Annual Fuel Quantity (gallons)	CO2 Releases (MT)	CH4 Releases (MT)	N2O Releases (MT)
Diesel	**762**	7.794171102	0.000315468	6.31E-05
Gasoline	**24**	0.215028576	0.000009	1.80E-06
	Total	8.009199678	0.000324468	6.49E-05

Operation schedule and maintenance activities are not expected to occur on a consistent timeframe or even on an annual basis. These estimated quantities reflect releases on an annual basis. The total estimated annual operation maintenance releases are displayed at the bottom of Table 9. These releases quantities, along with the quantities for implementation of the proposed action components, were incorporated into the NEAT model to calculate net releases. Quantities were converted from metric tons to grams prior to input within the NEAT model. Net releases are approximately 702 metric tons of CO2 equivalent, and results are displayed at the bottom of Figure 1.

NEAT Model Inputs and Assumptions:

- Construction Releases Years 2025 to 2027.
- No Carbon capture offsets.
- 792 cubic yards of concrete.
- Annual Operation and Maintenance Activities.

Alternative 2						
Pollutant Emissions (Clean Air Act)	**Grams**	**Pounds**	**Metric Tons**	**Grams**	**Pounds**	**Metric Tons**
Reactive Organic Gases aka Volatile Organic Compounds (ROG/VOC)	0	0	0	0	0	0
Carbon Monoxide (CO)	0	0	0	0	0	0
Sulfur Oxides (SOx)	0	0	0	0	0	0
Nitrous Oxides (NOx)	0	0	0	0	0	0
Particulate Matter - 2.5 micron ($PM_{2.5}$)	0	0	0	0	0	0
Particulate Matter - 10 micron (PM_{10})	0	0	0	0	0	0
Lead - (Pb)	0	0	0	0	0	0
Greenhouse Gas Emissions (NEPA)						
Carbon Dioxide (CO_2)	700,408,114	1,544,137	700	700,408,114	1,544,137	700
Methane (CH_4)	22,559	50	0	22,559	50	0
Nitrous Oxide (N_2O)	4,512	10	0	4,512	10	0
Carbon Dioxide Equivalents (CO_2e)	702,316,604	1,548,344	702	702,316,604	1,548,344	702

Figure 1. Proposed Action Net Releases (NEAT Model)

Economic Effects

	Social Costs of Greenhouse Gas Emissions in 2020 Dollars ($)				
Alternative 2	**Construction Costs**	**O&M**	**Wetlands and Aquatic Habitat**	**Embodied Carbon**	**Total Social Costs by GHG**
Carbon Dioxide (CO_2)	$20,313	$86,243	$0	$19,543	$126,099
Methane (CH_4)	$10	$62	$0	N/A	$72
Nitrous Oxide (N_2O)	$51	$226	$0	N/A	$276
Total Social Costs By Activity	$20,373	$86,531	$0	$19,543	

Alternative 2 Gross Total	**$126,447**
Alternative 2 Net Total	**$126,447**

Figure 2. Economic Effect for the Proposed Action.

The economic effect of carbon is a metric used to estimate the economic damages associated with an incremental increase in carbon dioxide releases each year. It reflects the long-term impacts of carbon releases on aspects like agricultural productivity, human health, property damages from increased flood risks, and changes in ecosystem services. By assigning a monetary value to these impacts, the SCC helps policymakers and organizations assess the benefits of reducing atmospheric pollutant releases and inform long-term weather pattern-related decision-making. The estimated net economic effects of implementing the proposed action were calculated using the NEAT model. The NEAT model calculates the economic effect of the construction components of the Proposed Action as well as the operation and maintenance activities over the course of a 50-year period of analysis. The economic effect of the proposed action is approximately $126,447 (Figure 2).

Impacts Analysis

Oregon and Washington inventories report releases, most recently in 2017 and 2013, respectively. Both inventories are created by state environmental agencies and evaluate multiple s, which are then converted to CO2e for comparison by sector.

Oregon's total atmospheric pollutant releases have declined from 70 million metric tons of CO2 e (MMT CO2 e) in 2000 to 65 MMT CO2 e in 2017 (Oregon Department of Environmental Quality [ODEQ] 2018a). In 2016, transportation (39 percent) and electricity use (26 percent) together account for the majority of releases (ODEQ 2018a). Transportation releases have stayed constant in Oregon at or around 24 MMT CO2 e since 2000, while electricity releases fluctuated but have declined to about 16 MMT CO2 e from 23 MMT CO2 e since 2000.

There are currently no Federal release or economic effect thresholds. However, the White House's (2021) release goal is to reduce U.S. releases 50-52% below 2005 levels by 2030. The state of Washington enacted statutory targets in 2020 to reduce atmospheric pollutant releases

by 45% by 2030, 70% by 2040, and 95% by 2050, all compared to 1990 levels. The targets also aim for net-zero releases by 2050.

Within Umatilla County, there are a total of three facility level producers of atmospheric pollutant releases that meet the EPA's (GHGRP) reporting threshold of 25,000 metric tons of CO_2e. Together, these facilities emit approximately 2,799,659 metric tons of CO_2e annually (as of 2023 data). Roughly 50% of total U.S Releases are accounted for by large emitting facilities subject to the RP. The remaining percentage of contributing releases would be consistent with an urbanized areas adjacent to agricultural lands. Releases sources are typically produced from transportation, use of industrial facilities, residential and commercial buildings, waste management, crop production, and commercial ranching practices.

The releases produced by the proposed action would be negligible in comparison to the top facility level emitters within the county, and likely even more so inconsequential when compared to annual State and even National releases. Furthermore, these facility level emitters report on an annual basis, whereas the construction releases from the proposed action would be short-term, temporary releases. Operational and maintenance activities would represent long-term releases, but these releases would be negligible in comparison to releases sources and quantities representative of the area. Therefore, it can reasonably be determined that the proposed action would not meaningfully impact any state or federal atmospheric pollutant release reduction goals or have any measurable impact to local, regional, or global long-term weather pattern change.

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