FACT SHEET FOR NPDES PERMIT WA0991051

Project Macoma LLC

Date of Public Notice: 07/19/2024

Permit Effective Date: xx/xx/xxxx

Purpose of this fact sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for Project Macoma LLC.

This fact sheet complies with Section 173-220-060 of the Washington Administrative Code (WAC), which requires Ecology to prepare a draft permit and accompanying fact sheet for public evaluation before issuing an NPDES permit.

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for Project Macoma LLC, NPDES permit WA099105, are available for public review and comment from July 19, 2024, until August 18, 2024. For more details on preparing and filing comments about these documents, please see Appendix A - Public Involvement Information.

Project Macoma LLC reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, discharges, or receiving water prior to publishing this draft fact sheet for public notice.

After the public comment period closes, Ecology will summarize substantive comments and provide responses to them. Ecology will include the summary and responses to comments in this fact sheet as Appendix E - Response to Comments and publish it when issuing the final NPDES permit. Ecology generally will not revise the rest of the fact sheet. The full document will become part of the legal history contained in the facility's permit file.

TABLE OF CONTENTS

I. Introduction

The Federal Clean Water Act (FCWA, 1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), administered by the federal Environmental Protection Agency (EPA). The EPA authorized the state of Washington to manage the NPDES permit program in our state. Our state legislature accepted the delegation and assigned the power and duty for

conducting NPDES permitting and enforcement to Ecology. The Legislature defined Ecology's authority and obligations for the wastewater discharge permit program in 90.48 RCW (Revised Code of Washington).

The following regulations apply to industrial NPDES permits:

- Procedures Ecology follows for issuing NPDES permits (chapter 173-220 WAC)
- Water quality criteria for surface waters (chapter 173-201A WAC)
- Water quality criteria for ground waters (chapter 173-200 WAC)
- Whole effluent toxicity testing and limits (chapter 173-205 WAC)
- Sediment management standards (chapter 173-204 WAC)
- Submission of plans and reports for construction of wastewater facilities (chapter 173-240 WAC)

These rules require any industrial facility owner/operator to obtain an NPDES permit before discharging wastewater to state waters. They also help define the basis for limits on each discharge and for performance requirements imposed by the permit.

Under the NPDES permit program and in response to a complete and accepted permit application, Ecology must prepare a draft permit and accompanying fact sheet and make them available for public review before final issuance. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments, during a period of thirty days (WAC 173-220-050). (See *Appendix A-Public Involvement Information* for more detail about the public notice and comment procedures). After the public comment period ends, Ecology may make changes to the draft NPDES permit in response to comment(s). Ecology will summarize the responses to comments and any changes to the permit in Appendix E.

II. Background information

Table 1 - Facility information

Applicant:	
Facility name and address	Project Macoma LLC, 1301 Marine Drive Terminal 7 Port Angeles, WA 98363
Contact at facility	Name: Todd Pelman Title: Chief Engineer Telephone #: (415) 275-0449
Responsible official	Name: Todd Pelman Title: COO and Chief Engineer Address: 950 Commercial Street San Carlos, CA 94070 Telephone #: (415) 275-0449 Email: tp@ebbcarbon.com
Industry type	Commercial Physical and Biological Research

Applicant:	
Type of treatment	Best Management Practices (BMPs), Outlined in the Biological Assessment of February 2024
Fee category	Facilities Not Otherwise Classified
SIC codes	8731
NAIC codes	541715
Facility location (NAD83/WGS84 reference datum)	Latitude: 48.12623 Longitude: -123.45706
Discharge waterbody name and location (NAD83/WGS84 reference datum)	Port Angeles Harbor Latitude: 48.129410 Longitude: -123.457300
Intake structures	Latitude: 48.129410 Longitude: -123.457300

Permit status

This is a new permit applicant. Ecology received the permit application on February 22, 2024, and it was accepted on March 4, 2024.

Figure 1 - Facility location map (Source: Project Macoma Biological Assessment Report)

II.A. Facility description

1. History

Project Macoma, LLC, (Project Macoma) a wholly owned subsidiary of Ebb Carbon, LLC (Ebb Carbon), is proposing a temporary small-scale marine carbon dioxide removal (mCDR) pilot project sited at Terminal 7 of the Port of Port Angeles (Port) in Port Angeles, Washington (Figure 1). Ebb Carbon has developed a mCDR technology to safely and permanently remove carbon dioxide from the atmosphere while reducing seawater acidity locally. Ebb Carbon's mCDR technology removes acid from seawater, generating alkaline-enhanced seawater in the process. The alkaline-enhanced seawater is returned to the ocean, which enables the ocean to draw down and store additional carbon dioxide (CO2) from the atmosphere.

2. Cooling water intakes

CWA § 316(b) requires the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. Since July 2013, Ecology has required a supplemental application for all applicants using EPA Form 2-C.

Project Macoma is a new applicant and was not required to submit form 2C. Project Macoma submitted forms 1 and 2D to obtain a NPDES permit and discharge their processed seawater to the Port Angeles Harbor. Project Macoma indicated that no cooling water intake is associated with the facility in their NPDES permit application.

Project Macoma is proposing to draw seawater through its intake structure and deacidify it via mCDR system. This deacidfied alkaline enhanced seawater is proposed to be discharged back to Port Angeles Harbor. The intake structure would consist of a pipe that is attached to the barge, equipped with fish screening and mesh that complies with state and federal regulations. The intake pipe length is 39 inches with diameter of 14.25 inches. The intake design velocity is 0.20 feet per second (fps) and this intake design velocity was recommended by the United States Department of Fish and Wildlife. The following three drawings (figures 2-4) provide details on the intake screen.

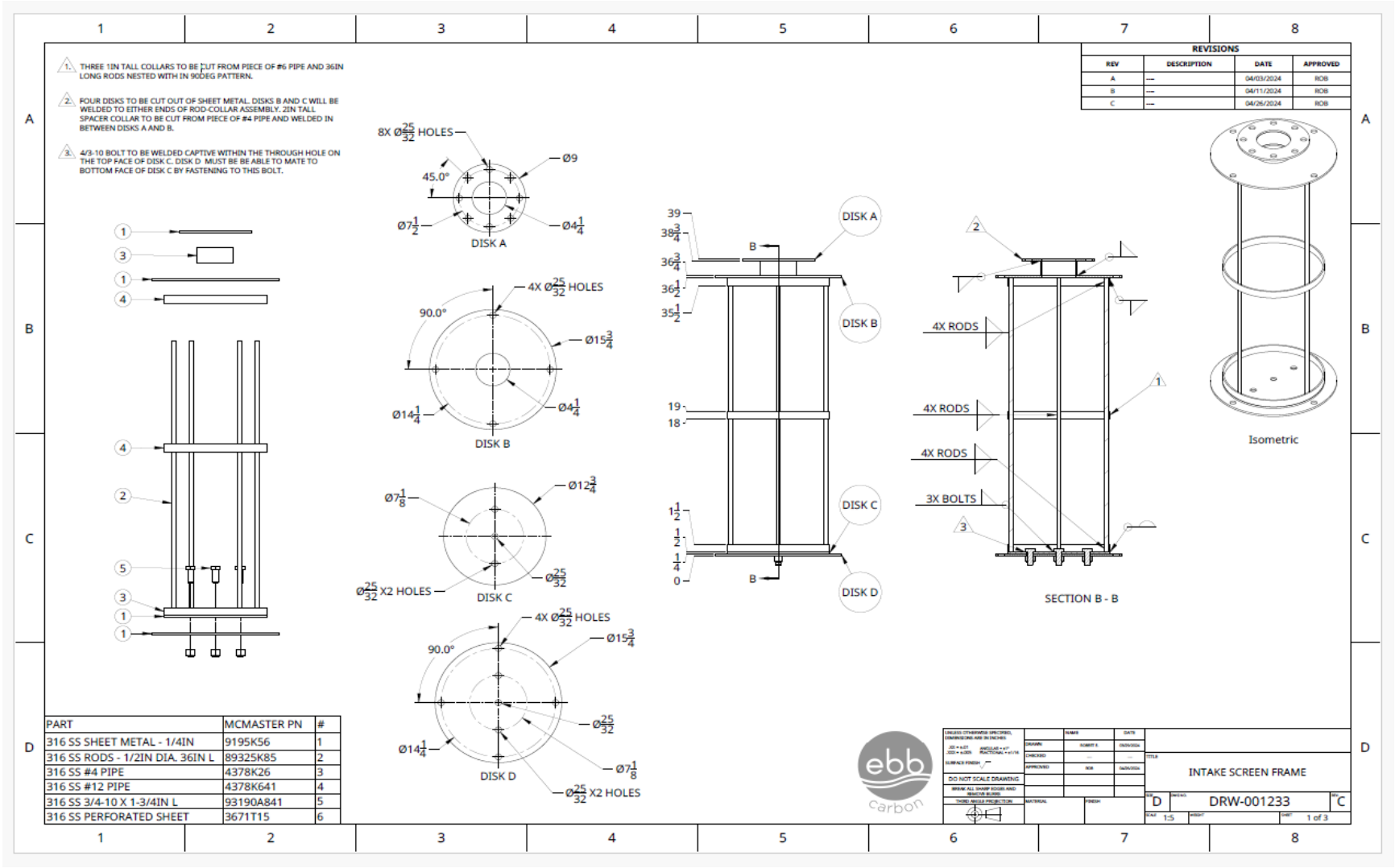

Figure 2: Intake screen frame

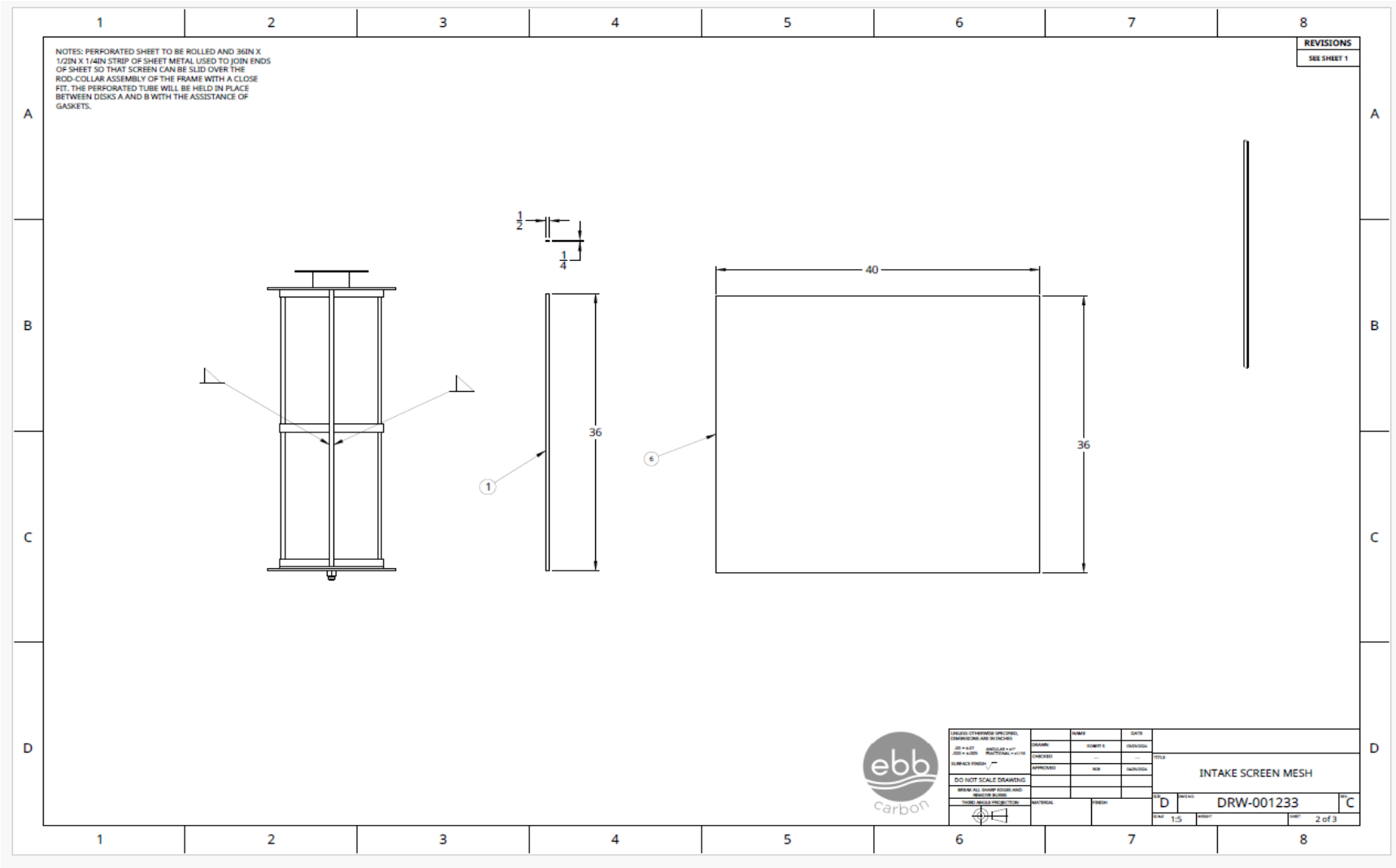

Figure 3: Intake screen mesh

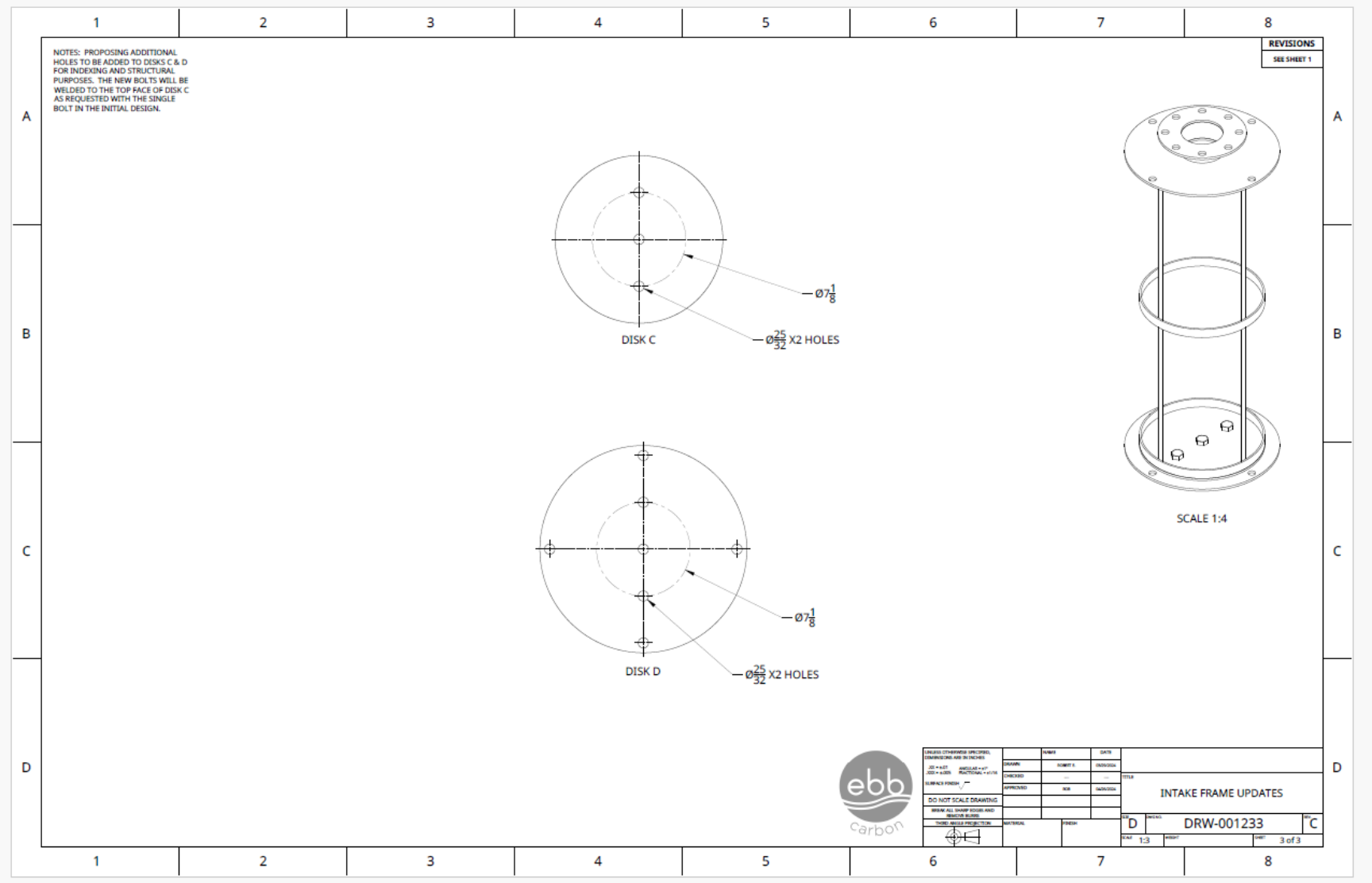

Figure 4: Intake frame updates

3. Industrial processes

The proposed pilot project owned and operated by Project Macoma, would intake seawater via a barge moored at the Terminal 7 dock, pipe the seawater over the existing Terminal 7 pier structure to a modular treatment facility on land, and process and deacidify the seawater before returning it to Port Angeles Harbor via the barge-based outfall system (Figure 5).

Once pumped onshore, the seawater will undergo a series of process steps in a temporary modular facility. First, the seawater is pretreated to soften it and create a concentrated brine. The brine then undergoes an electrochemical process that separates the brine into acidic (hydrochloric acid [HCl]) and alkaline (sodium hydroxide [NaOH]) streams. The acidic stream is then neutralized through a reaction with locally sourced alkaline materials.[1]

The process steps noted above result in the following three process streams:

Alkaline Product Stream: A saltwater solution with enhanced alkalinity produced via the electrochemical process.
Neutralized Acid Stream: The aqueous stream that results from reacting the acidic stream produced by the electrochemical process with alkaline minerals.
Pretreatment Stream: Saltwater that is filtered out during the initial filtration steps.

Under routine operations, the three process streams would be discharged as a single combined flow through the outfall. Project Macoma anticipates that it would also conduct scientific operations in which one or two of the component flow streams are discharged for limited durations (on the order of a few times per month for data collection and to further the understanding of potential impacts of the discharge to water chemistry/water quality. Project Macoma also anticipates conducting maintenance during which the characteristics of the discharge would vary. Predicted flow, pH, and temperature, at the time of discharge for the proposed operating scenarios are summarized in Table 2. Monitoring of impacts to water quality and aquatic organisms would occur during the pilot project.

[1] February 1, 2024, Ebb Carbon Marine Carbon Removal Pilot Project (Project Macoma)/Engineering Report http://ecyapwq/Paris/DocumentDownloader.aspx?id=473462

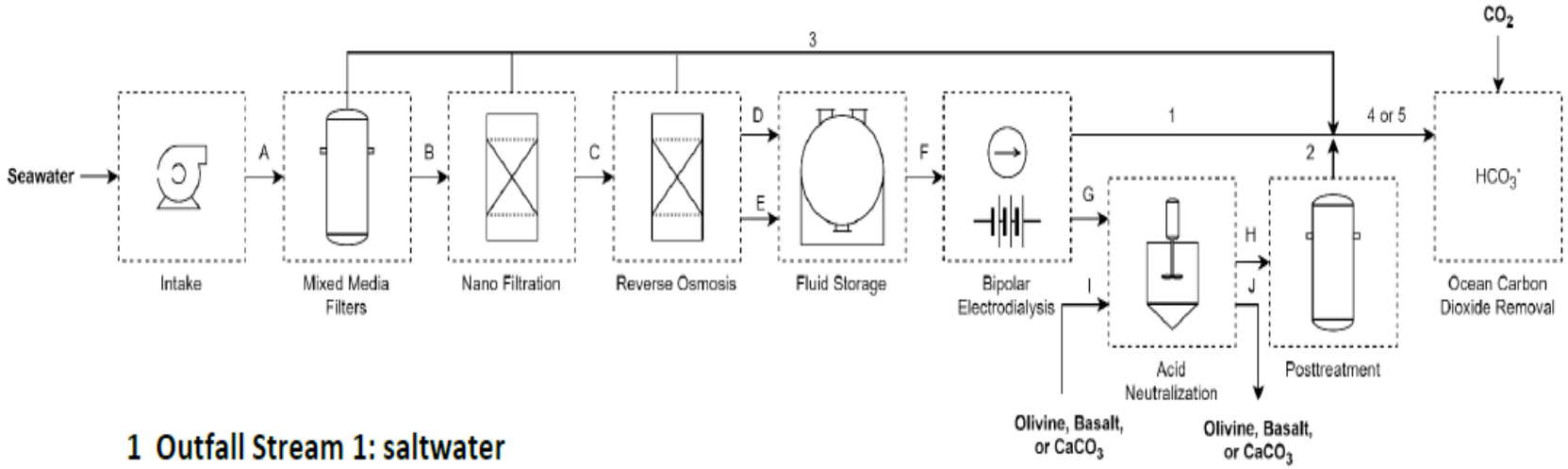

Figure 1. Process flow diagram

Letters indicate process streams, numbers indicate outfall streams.

Figure 5: Process flow diagram (Source: Project Macoma engineering report).

Table 2 – Processed oceanwater discharge streams at the end of pipe

Scenario	Discharge flow, gpd	Temperature, °C	pH, standard units
A. Scientific Operations			
Alkaline, product only	18,700[1]	30	12.0
B. Routine Operations			
All 3 Process Flows[1]	246,350[2]	20.4	9.8
C. Maintenance Operations			
Neutralized Acid +Pretreatment Reject	70,000[3]	19.3	6.8

[1]Maximum per single tidal cycle limit is the highest allowable discharge during a single tidal cycle. This discharge is allowed a few times a month. The permittee must notify Ecology at the beginning and end of the discharge.
[2]Maximum daily effluent limit is the highest allowable daily discharge.
[3]Maximum weekly effluent limit is the highest allowable weekly discharge.

4. Solid wastes

The permittee is required to manage sludge and/or solid waste generated at the facility to dispose off at the appropriate treatment facility and/or transfer station.

5. Discharge outfall

The proposed outfall discharge will be a barge-mounted multi-port diffuser located as shown Figure 6. Water depth at the barge location, immediately adjacent to the pier, is approximately 25 feet mean lower low water (MLLW). The diffuser design parameters were selected to combine different momentum and negative buoyancy regimes to maintain the effluent plume near the water surface (promoting CO2 absorption) and maximize dilution. Specifically, port depth and discharge angle, were used to generate initial plume trajectory upward through the water column before momentum dissipates and negative buoyancy draws the effluent plume downward prior to reaching equilibrium with ambient density. Input parameters used for model analyses include the following:

Number of Ports = 25

Port Diameter = 0.5 inches

Port Spacing = 2 feet

Port Discharge Angle = 45 degrees

Port Depth = 2 meters

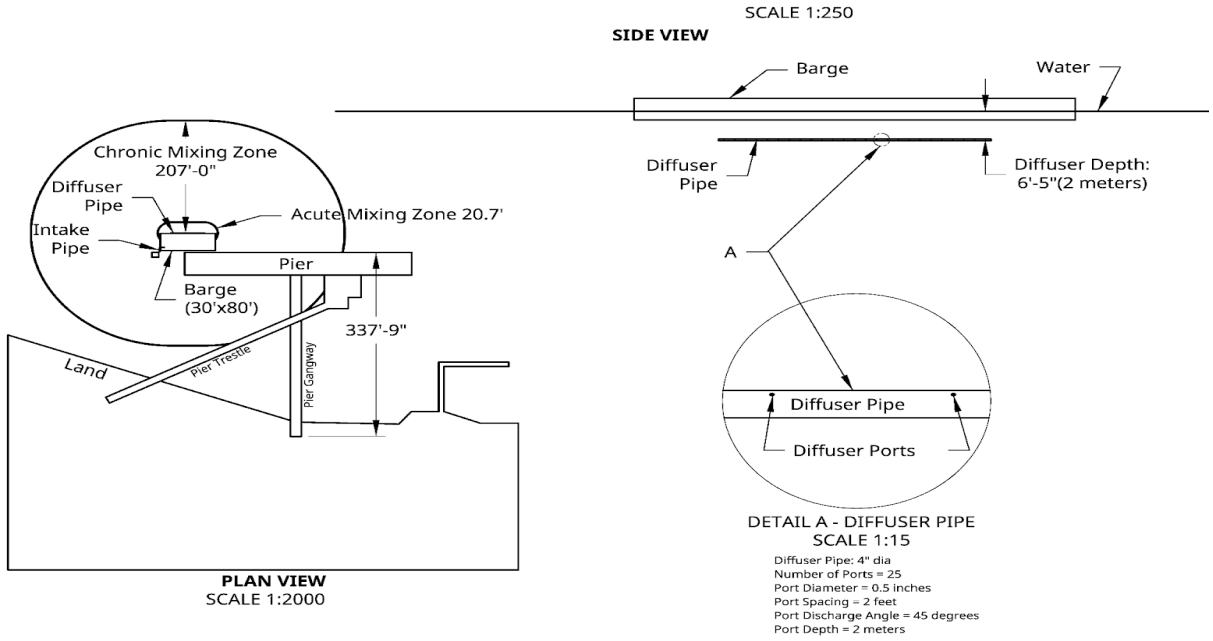

Figure 6: Discharge outfall details.

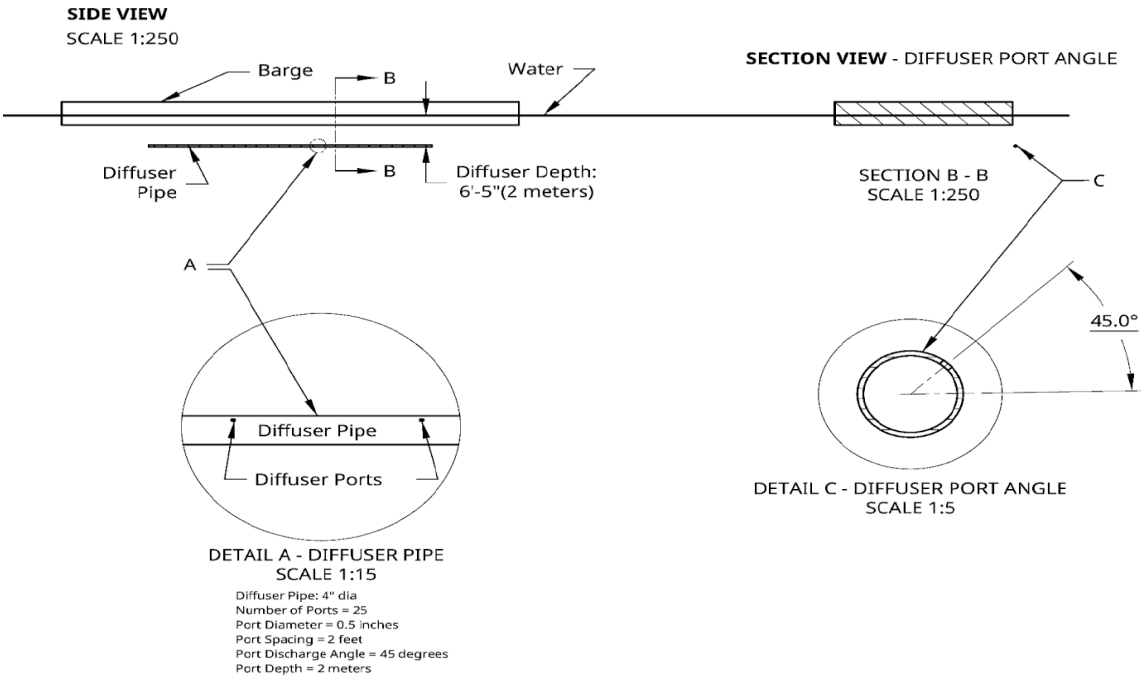

Figure 7: Discharge outfall details.

II.B. Description of the receiving water

Project Macoma discharges to Port Angeles Harbor. Other nearby point source outfall includes the City of Port Angeles wastewater treatment outfall. Significant nearby non-point sources of pollutants include stormwater runoff.

The ambient background data used for this permit includes the following from Ecology marine monitoring site PAH003 - Port Angeles Harbor.

Table 3 - Ambient background data

Parameter	Value
Temperature (October - April)	10.0 °C
Temperature (May-September)	11.4 °C
pH	7.8 standard units
Dissolved Oxygen	7.3 mg/L

II.C. Process water characterization.

Project Macoma reported the effluent characteristics for the discharge in the permit application on February 22, 2024. The wastewater effluent is characterized as follows:

Table 4 – Effluent process water characterization

Parameter	Scientific Operations Alkaline Product only	Routine Operations Combined streams (Pretreat reject, alkaline and acid neutralization)	Maintenance Operations (Pretreat reject and acid neutralization)
pH, standard units	13.5	9.8	6.8
Temperature, °C	30	20.4	19.3
Nickel, ug/L	ND (non-detect)	0.151	0.178
Cobalt, ug/L	ND	ND	ND
Chromium, ug/L	ND	ND	ND
Arsenic, ug/L	ND	7.564	8.912
Cadmium, ug/L	ND	0.030	0.036
Mercury, ug/L	ND	0.303	0.356
Molybdenum, ug/L	ND	0.015	0.018
Lead, ug/L	ND	0.378	0.446
Selenium, ug/L	ND	2.874	3.387
Zinc, ug/L	ND	0.045	0.053

II.D. State environmental policy act (SEPA) compliance

To meet the intent of SEPA, new discharges must undergo SEPA review during the permitting process. The facility filed a SEPA checklist with Port of Port Angeles on February 24, 2024. The Port of Port Angeles issued a determination of non-significance for the project on March 1, 2024.

III. Proposed permit limits

Federal and state regulations require that effluent limits in an NPDES permit must be either technology- or water quality-based.

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and chapter 173-220 WAC).
- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC), or the Federal Water Quality Criteria Applicable to Washington (40 CFR 131.45).
- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, etc.). Ecology evaluated the permit application and

determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation.

Ecology does not usually develop limits for pollutants not reported in the permit application but may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants. During the five-year permit term, the facility's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent [40 CFR 122.42(a)]. Until Ecology modifies the permit to reflect additional discharge of pollutants, a permitted facility could be violating its permit.

III.A. Design criteria

Under WAC 173-220-150(1)(g), flows and waste loadings must not exceed approved design criteria. The engineering report dated March 26, 2024, was prepared by Brown and Caldwell. Processed water of 241,272 gpd would be generated at the facility which would be discharged to Port Angeles Harbor via new barge-mounted multi-port diffuser.

III.B. Technology-based effluent limits

Ecology must ensure that facilities provide all known, available, and reasonable Applicable mixing zone dimensions for discharges that meet all known, available, and reasonable methods of prevention control and treatment (AKART) are established in Washington Administrative Code (WAC) 173 201A-400. mCDR is a new technology and there is no AKART defined for this type of technology. The design of the system increases localized pH values to achieve project goals, removing CO_2 safely and responsibly, while trying to prevent concentrating toxic parameters or other parameters that may impact aquatic life uses within the mixing zone. The proposed discharge will deploy Ecology Safety Methodology (ESM) and conduct a continuous monitoring for pH, dissolved oxygen, temperature, and turbidity. The ESM adaptative management practices are addressed under permit condition S8. The permittee is required to adjust pH level from 13.5 to 12.0 standard units at the discharge point before releasing alkaline enhanced process into Port Angeles Harbor. Ecology also mandates that the permittee conduct acute toxicity to assess the effects of pH change and meet acute toxicity limit as described under permit condition S12. Permit condition S1 also requires the permittee to release a limited volume of alkaline stream only during the ebb tide. Ecology is proposing the following TSS, temperature and pH limits at the discharge point.

Table 5 - Technology-based limits for Routine Operations at the discharge point, Outfall 001

Parameter	Average monthly limit	Maximum daily limit
Total Suspended Solids	-	30 mg/L
Temperature	-	20.4 °C

Parameter	Daily minimum	Daily maximum
pH	7.0 standard units	9.8 standard units

Table 6 - Technology-based limits for Maintenance Operations at the discharge point, Outfall 001

Parameter	Average monthly limit	Maximum daily limit
Total Suspended Solids	-	30 mg/L
Temperature	-	19.3°C

Parameter	Daily minimum	Daily maximum
pH	7.0 standard units	8.5 standard units

Table 7 - Technology-based limits for Scientific operations at the discharge point, Outfall 001

Parameter	Average monthly limit	Maximum daily limit
Total Suspended Solids	-	30 mg/L
Temperature	-	30 °C

Parameter	Daily minimum	Daily maximum
pH	7.0 standard units	12.0 standard units

III.C. Surface water quality-based effluent limits

The Washington State surface water quality standards (chapter 173-201A WAC) are designed to protect existing water quality and preserve the beneficial uses of Washington's surface waters. Waste discharge permits must include conditions that ensure the discharge will meet the surface water quality standards (WAC 173-201A-510). Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide total maximum daily load study (TMDL).

1. Numeric criteria for the protection of aquatic life and recreation

Numeric water quality criteria are listed in the water quality standards for surface waters (chapter 173-201A WAC). They specify the maximum levels of pollutants allowed in receiving water to protect aquatic life and recreation in and on the water. Ecology uses numerical criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

2. Numeric criteria for the protection of human health

Numeric criteria for the protection of human health are promulgated in Chapter 173-201A WAC and 40 CFR 131.45. These criteria are designed to protect human health from exposure to pollutants linked to cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also

include radionuclide criteria to protect humans from the effects of radioactive substances.

3. Narrative criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1)) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

- Adversely affect designated water uses.
- Cause acute or chronic toxicity to biota.
- Impair aesthetic values.
- Adversely affect human health.

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-200) and of all marine waters (WAC 173-201A-210) in the state of Washington.

4. Antidegradation

The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330) is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to have an impact on the water quality of surface water.
- Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply all known, available, and reasonable methods of prevention, control, and treatment (AKART).
- Apply three tiers of protection (described below) for surface waters of the state.

  Tier I: ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollutions.

  Tier II: ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities.

  Tier III: prevents the degradation of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

A facility must prepare a Tier II analysis when all three of the following conditions are met:

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.

- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

Facility specific requirements – Ecology determined that this facility must meet Tier II requirements. A Tier II analysis focuses on evaluating feasible alternatives that would eliminate or significantly reduce the level of degradation. The analysis also includes a review of the benefits and costs associated with the lowering of water quality. New discharges and facility expansions are prohibited from lowering water quality without providing overriding public benefits.

The results of the engineering report/mixing zone analysis show that discharging alkaline-enhanced seawater is likely to result in a measurable change in the pH of the receiving waters at the boundary of the chronic mixing zone by more than 0.1 standard units (SU) during operations. Project Macoma submitted a TIER II analysis with their engineering report on March 26, 2024, to comply with WAC 173-201A-320 and address analysis requirements.

Ecology is proposing permit conditions such as monitoring the water quality and biological changes to avoid any negative impact on the receiving water body. The reason Ecology is allowing this permit with conditions is due to the overall potential benefits seen from this work, as the following outlines.

The TIER II analysis states that the drawdown of atmospheric CO2 effected by Ebb's technology is necessary and in the public interest. Permanently removing CO2 from the atmosphere is necessary to keep global warming below 1.5°C or 2.0°C above pre-industrial levels to avert the worst consequences of climate change for all. Developing this technology in Washington State will help the state meet its greenhouse gas reduction goals, combat the impacts of ocean acidification (OA), and continue leading in the development and deployment of innovative negative emissions technologies. Project Macoma has developed monitoring and operational protocols to protect the marine environment from unintended consequences, and Project Macoma will comply with all permit terms and conditions.

The permittee is required to conduct a baseline water quality and biological study and submit it to Ecology before starting their operations. The permittee is required to submit the USFWS approved Ecology Safety Methodology (ESM)/mitigation plan which is required under permit condition S8. The permittee is required to submit the ESM before starting their operation. This ESM would include adaptive management strategies that would be deployed to adjust the pilot project's operation based on the ongoing monitoring results. Operations would be ceased immediately if any negative impacts are observed on the receiving water body. The negative impacts would include changes to water quality parameters, aquatic vegetation, and aquatic organism behavior (gill flaring, avoidance, lack of startle response).

Ecology also uses a conservative approach to apply dilution factors in conducting water quality-based analysis. The water quality model computed minimum chronic dilution factor of 580 was divided by two to account for reflux. Therefore, a chronic dilution factor of 290 (Table 16: pH Water Quality Analysis Summary, fact sheet page 30) was used in this analysis for alkaline stream. The permittee is required to adjust pH level from 13.5 to 12.0 standard units at the discharge point before releasing alkaline process water into Port Angeles Harbor. Ecology also mandates that the permittee conduct acute toxicity to assess the effects of pH changes and meet acute toxicity as described under permit condition S12. Permit condition S1 also requires the permittee to release a limited volume of alkaline stream during the ebb tide.

5. Mixing zones

A mixing zone is the defined area in the receiving water surrounding the discharge port(s), where wastewater mixes with receiving water. Within mixing zones, the pollutant concentrations may exceed water quality numeric standards, so long as the discharge doesn't interfere with designated uses of the receiving water body (for example, recreation, water supply, and aquatic life and wildlife habitat, etc.) The pollutant concentrations outside of the mixing zones must meet water quality numeric standards.

State and federal rules allow mixing zones because the concentrations and effects of most pollutants diminish rapidly after discharge, due to dilution. Ecology defines mixing zone sizes to limit the amount of time any exposure to the end-of-pipe discharge could harm water quality, plants, or fish.

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control, and treatment (AKART). Mixing zones typically require compliance with water quality criteria within a specified distance from the point of discharge and must not use more than 25% of the available width of the water body for dilution (WAC 173-201A-400 (7)).

Ecology uses modeling to estimate the amount of mixing within the mixing zone. Through modeling Ecology determines the potential for violating the water quality standards at the edge of the mixing zone and derives any necessary effluent limits. Steady-state models are the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur. Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 4 means the effluent is 25% and the receiving water is 75% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Each aquatic life acute criterion is based on the assumption that organisms are not exposed to that concentration for more than one hour and more often than one exposure in three years. Each aquatic life chronic criterion is based on the assumption that organisms are not exposed to that concentration for more than four consecutive days and more often than once in three years.

The two types of human health-based water quality criteria distinguish between those pollutants linked to non-cancer effects (non-carcinogenic) and those linked to cancer effects (carcinogenic). The human health-based water quality criteria incorporate several exposure and risk assumptions. These assumptions include:

- A 70-year lifetime of daily exposures.
- An ingestion rate for fish or shellfish measured in kg/day.
- An ingestion rate of two and four tenths (2.4) liters/day for drinking water (increased from two liters/day in the 2016 Water Quality Standards update).
- A one-in-one-million cancer risk for carcinogenic chemicals.

This permit authorizes a small acute mixing zone, surrounded by a chronic mixing zone around the point of discharge (WAC 173-201A-400). The water quality standards impose certain conditions before allowing the discharger a mixing zone:

a. Ecology must specify both the allowed size and location in a permit.

The proposed permit specifies the size and location of the allowed mixing zone (as specified below).

b. The facility must fully apply “all known, available, and reasonable methods of prevention, control and treatment” (AKART) to its discharge.

Ecology has determined that the Ecology Safety Methodology/Mitigation Plan provided by Project Macoma meets the requirements of AKART (see Permit Condition S8). Ecology also uses a conservative approach to apply dilution factors in conducting water quality-based analysis. The water quality model computed minimum chronic dilution

factor of 390 was divided by two to account for reflux. Therefore, a chronic dilution factor of 195 was used in this analysis.

c. Ecology must consider critical discharge conditions.

Surface water quality-based limits are derived for the water body's critical condition (the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or designated waterbody uses). The critical discharge condition is often pollutant-specific or waterbody-specific.

Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology uses the water depth at mean lower low water (MLLW) for marine waters. Ecology's Permit Writer's Manual (Ecology, 2018) describes additional guidance on criteria/design conditions for determining dilution factors. The following critical conditions were used to model the discharge (tables 8, 9 and 10).

Table 8 - Critical conditions used to model the discharge (Alkaline product only)/Scientific Operation

Critical Condition	Value
Water depth at MLLW	25 feet
Density profile with a difference of 1.04 sigma-t units between 49.2 feet and the surface	
10th current speeds for acute mixing zone	2 cm/sec
50th percentile current speeds for chronic and human health mixing zones	5 cm/sec
Maximum average monthly effluent flow for chronic and human health non-carcinogen	0.00164 m^3/sec
Maximum daily flow for acute mixing zone	0.00164 m^3/sec
1-DAD-MAX effluent temperature	30 °C

Table 9 - Critical conditions used to model the discharge (Neutralized acid + Pretreatment reject)/Maintenance Operation

Critical Condition	Value
Water depth at MLLW	25 feet
Density profile with a difference of 0.88 sigma-t units between 32.8 feet and the surface	

Critical Condition	Value
10th current speeds for acute mixing zone	2 cm/sec
50th percentile current speeds for chronic and human health mixing zones	5 cm/sec
Maximum average monthly effluent flow for chronic and human health non-carcinogen	0.0091 m^3/sec
Maximum daily flow for acute mixing zone	0.0091 m^3/sec
1-DAD-MAX effluent temperature	19.3 °C

Table 10 - Critical conditions used to model the discharge (All Process flows)/Scientific Operation

Critical Condition	Value
Water depth at MLLW	25 feet
Density profile with a difference of 0.88 sigma-t units between 32.8 feet and the surface	
10th current speeds for acute mixing zone	2 cm/sec
50th percentile current speeds for chronic and human health mixing zones	5 cm/sec
Maximum average monthly effluent flow for chronic and human health non-carcinogen	0.0108 m^3/sec
Maximum daily flow for acute mixing zone	0.0108 m^3/sec
1-DAD-MAX effluent temperature	20.40 °C

d. Supporting information must clearly indicate the mixing zone would not:

- Have a reasonable potential to cause the loss of sensitive or important habitat.
- Substantially interfere with the existing or characteristic uses.
- Result in damage to the ecosystem.
- Adversely affect public health.

Ecology established Washington State water quality criteria for toxic chemicals using EPA criteria. EPA developed the criteria using toxicity tests with numerous organisms and set the criteria to generally protect the species tested and to fully protect all commercially and recreationally important species.

EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for one hour. They set chronic standards assuming organisms are exposed to the pollutant at the criteria concentration for four days. Dilution modeling under critical conditions generally shows that both acute and chronic criteria concentrations are reached within minutes of discharge.

The discharge plume does not impact drifting and non-strong swimming organisms because they cannot stay in the plume close to the outfall long enough to be affected. Strong swimming fish could maintain a position within the plume, but they can also avoid the discharge by swimming away. Mixing zones generally do not affect benthic organisms (bottom dwellers) because the buoyant plume rises in the water column. Ecology has additionally determined that the effluent will not exceed 33 degrees C for

more than two seconds after discharge; and that the temperature of the water will not create lethal conditions or blockages to fish migration.

Ecology evaluates the cumulative toxicity of an effluent by testing the discharge with whole effluent toxicity (WET) testing.

Ecology reviewed the above information, the specific information on the characteristics of the discharge, the receiving water characteristics and the discharge location. Based on this review, Ecology concluded that the discharge does not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristics uses, result in damage to the ecosystem, or adversely affect public health if the permit limits and conditions are met. The permittee is required to adhere to the ESM/mitigation plan that is outlined in permit condition S8. This ESM includes adaptive management strategies that would be deployed to adjust the pilot project's operation based on the ongoing monitoring results. Operations would be ceased immediately if any negative impacts are observed on the receiving water body. The negative impacts would include changes to water quality parameters, aquatic vegetation, and aquatic organism behavior.

e. The discharge/receiving water mixture must not exceed water quality criteria outside the boundary of a mixing zone.

Ecology conducted a reasonable potential analysis, using procedures established by the EPA and by Ecology, for each pollutant and concluded the discharge/receiving water mixture will not exceed water quality criteria except pH outside the boundary of the mixing zone if permit limits are met.

f. The size of the mixing zone and the concentrations of the pollutants must be minimized.

At any given time, the effluent plume uses only a portion of the acute and chronic mixing zone, which minimizes the volume of water involved in mixing. The plume mixes as it rises through the water column therefore much of the receiving water volume at lower depths in the mixing zone is not mixed with discharge. Similarly, because the discharge may stop rising at some depth due to density stratification, waters above that depth will not mix with the discharge. Ecology determined it is impractical to specify in the permit the actual, much more limited volume in which the dilution occurs as the plume rises and moves with the current.

Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate to the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example,

Ecology uses the expected 95th percentile pollutant concentration, the 90th percentile background concentration, the centerline dilution factor, and the lowest flow occurring once in every ten years to perform the reasonable potential analysis.

Because of the above reasons, Ecology has effectively minimized the size of the mixing zone authorized in the proposed permit.

g. Maximum size of mixing zone.

The authorized mixing zone does not exceed the maximum size restriction.

h. Acute mixing zone.

- The discharge/receiving water mixture must comply with acute criteria as near to the point of discharge as practicably attainable.
- The pollutant concentration, duration, and frequency of exposure to the discharge will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.

As described above, the toxicity of any pollutant depends upon the exposure, the pollutant concentration, and the time the organism is exposed to that concentration. Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organisms near the point of discharge (below the rising effluent).

- Comply with size restrictions.

The mixing zone authorized for this discharge complies with the size restrictions published in chapter 173-201A WAC.

i. Overlap of mixing zones.

This mixing zone does not overlap another mixing zone.

III.D. Designated uses and surface water quality criteria

1. Marine water aquatic life uses and associated criteria

The aquatic life uses and the associated criteria for this receiving water are identified below. All indigenous fish and non-fish aquatic species must be protected in waters of the state.

Excellent quality

Aquatic life uses: salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning.

Table 11 - Excellent quality criteria

Criteria	Value
Temperature – Highest 1D MAX	16°C (60.8°F)
Dissolved Oxygen – Lowest 1-Day minimum	6.0 mg/L
Turbidity	5 NTU over background when the background is 50 NTU or less; or A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.
pH	pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

2. Shellfish harvesting use and criteria

To protect shellfish harvesting, fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.

3. Recreational use and criteria

The recreational use is primary contact recreation. Enterococci organism levels within an averaging period must not exceed a geometric mean of 30 CFR or MPN per 100 mL, with no more than 10 percent of all samples (or any single sample when less than ten sample values exist) obtained within the averaging period exceeding 110 CFU or MPN per 100 mL.

4. Miscellaneous marine water uses

The miscellaneous marine water uses are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

III.E. Water quality impairments

The waterbody at the vicinity of the outfall is placed under category 2 (water of concern) for bacteria, PCB and 2,3,7,8-TCDD TEQ. Ecology's assessment defines category 2 as follows:

"Water bodies in this category have some evidence of a water quality problem, but not enough to show persistent impairment. These are water bodies that we want to continue to test."

III.F. Evaluation of surface water quality-based effluent limits for narrative criteria

Ecology must consider the narrative criteria described in WAC 173-201A-260 when it determines permit limits and conditions. Narrative water quality criteria limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge which have the potential to adversely affect designated uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health.

Ecology considers narrative criteria when it evaluates the characteristics of the wastewater and when it implements all known, available, and reasonable methods of treatment and prevention (AKART) as described above in the technology-based limits section. When Ecology determines if a facility is meeting AKART it considers the pollutants in the wastewater and the adequacy of the treatment to prevent the violation of narrative criteria.

III.G. Evaluation of surface water quality-based effluent limits for numeric criteria

1. Mixing zones and dilution factors

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants; their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as biological oxygen demand (BOD) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

With technology-based controls (AKART), predicted pollutant concentrations in the discharge exceed water quality criteria. Ecology therefore authorizes a mixing zone in accordance with the geometric configuration, flow restriction, and other restrictions imposed on mixing zones by chapter 173-201A WAC.

Chronic mixing zone – WAC 173-201A-400(7)(b) specifies that mixing zones must not extend in any horizontal direction from the discharge ports for a distance greater than 200 feet plus the depth of water over the discharge ports and may not occupy more than 25% of the width of the water body as measured during MLLW.

The horizontal distance of the chronic mixing zone is 207 feet. The mixing zone extends from the bottom to the top of the water column.

Acute mixing zone – WAC 173-201A-400(8)(b) specifies that in estuarine waters a zone where acute criteria may be exceeded must not extend beyond 10% of the distance established for the chronic zone. The acute mixing zone extends 20.7 feet in any direction from any discharge port. The mixing zone extends from the bottom to the top of the water column.

Ecology determined the dilution factors that occur within these zones at the critical condition using the outfall dilution model UM3, as included in the most recent release of the United States Environmental Protection Agency (USEPA)-supported Visual Plumes modeling package (https://www.epa.gov/ceam/visual-plumes). The dilution factors are listed below.

Table 12 - Dilution factors (Alkaline Product only)

Criteria	Acute	Chronic
Aquatic Life	240	580
Human Health, Carcinogen		580
Human Health, Non-carcinogen		580

Table 13 - Dilution factors (Neutralized acid + pretreatment reject)

Criteria	Acute	Chronic
Aquatic Life	160	415
Human Health, Carcinogen		415
Human Health, Non-carcinogen		415

Table 14 - Dilution factors (All process flow)

Criteria	Acute	Chronic
Aquatic Life	145	390
Human Health, Carcinogen		390
Human Health, Non-carcinogen		390

Ecology determined the impacts of dissolved oxygen deficiency, pH, temperature as described below, using the dilution factors in the above Table 12.

Dissolved Oxygen

The proposed discharge is not anticipated to contain chemical and/or biological oxygen demand. Therefore, compliance with dissolved oxygen (DO) criteria was evaluated using a volumetric mixing calculation. Input values for the calculation were conservatively selected as follows:

Chronic Dilution Factor–The minimum dilution for all scenarios in Table 12 (390:1) was selected and divided by a factor of two to account for reflux. DO analyses assume a dilution factor of 195:1

Ambient DO–Ambient DO concentrations at the proposed discharge location are assumed to be 7.3 mg/L, based on the Ecology Fact Sheet analyses for the Port Angeles municipal wastewater treatment facility (Ecology 2016).

Effluent DO–The minimum effluent DO for any discharge scenario is estimated to be 7.0 mg/L based upon sample analyses of process streams at the PNNL–Project Macoma facility.

The mixed DO concentration meets the applicable minimum water quality criteria (6.0 mg/L), has a negligible DO concentration change with respect to background and therefore is below the Tier II threshold for measurable change (0.2 mg/L).

pH

Table 13 summarizes the minimum dilution factor (accounting for reflux), effluent pH, mixed pH, ambient pH, and pH change for each scenario. Table 13 shows except for scenario 1, all discharge scenarios meet applicable pH water quality criteria with a pH between 7.0 and 8.5 standard units. Table 13 shows that scenarios 1, and 3 exceed measure change of 0.1 unit (WAC-173-201A-320(3)(d)) with respect to background pH. Project Macoma submitted TIERII analysis with their engineering report on March 26, 2024, to comply with WAC173-201A-320 and address TIERII analysis requirements. TIER II analysis is discussed on page 19 and 20 of this fact sheet.

Table 15: pH Water Quality Analysis Summary (Source mixing zone study, March 21, 2024, page 11, table 6-2)

Scenario	Chronic Dilution[1]	Effluent pH (S.U)	Mixed pH (S.U)	Ambient pH (S.U)	pH (SU) Change
1. Alkaline product only, pH 13.5	290:1	13.5	9.5	7.8	1.4
2. Neutralized acid only + pretreatment	207:1	6.8	7.8	7.8	No Change
3.All process flow	195:1	9.8	8.3	7.8	+0.5

[1]Chronic dilution divided by two to account for reflux.

The pH would be monitored at the site prior to and during release of each scenario. Per the monitoring and adaptive management strategies identified in the Ecological Safety Methodology, observations of any negative impact on the aquatic organisms would trigger an immediate shutdown of operations.

2. Turbidity

Turbidity measured by Ecology in Sequim Bay (Station SEQ002) ranged between 0.5 and 2.0 NTU in 2014. Assuming a worst-case dilution of 195:1 and an ambient turbidity of 2.0 NTU, a discharge turbidity of 100 NTU would increase ambient turbidity approximately 0.5 NTU. This meets surface water quality criteria, stated in Table 9 of this fact sheet.

Turbidity, among other water quality parameters (pH, temperature, and dissolved oxygen), would be continuously monitored with sensors mounted at various locations to document water quality conditions at various distances throughout the pilot project operation. If an increase in turbidity above the Washington State water quality standards attributable to the pilot project operations occurs, Project Macoma, would stop discharging alkaline-enhanced seawater immediately and begin troubleshooting to determine the possible trigger and to correct the system to reduce turbidity consistent with the pilot project's Ecological Safety Methodology.

3. Toxic pollutants

Federal regulations (40 CFR 122.44) require Ecology to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards.

The following toxic pollutants are present in the discharge: arsenic, cadmium, chromium, lead, mercury, nickel, selenium, and zinc. Ecology conducted a reasonable potential analysis (See Appendix D) on these parameters to determine whether it would require effluent limits in this permit. No valid ambient background data were available for arsenic, cadmium, chromium, lead, mercury, nickel, selenium, and zinc. Ecology used zero for background. This analysis showed that there is no reasonable potential that the permittee would exceed water quality criteria.

4. Temperature

The state temperature standards for marine waters (WAC 173-201A-210) include multiple elements:

a. Annual 1-Day maximum criteria
b. Incremental warming restrictions
c. Guidelines on preventing acute lethality and barriers to migration of salmonids

Ecology evaluates each criterion independently to determine reasonable potential and derive permit limits.

a. Annual 1-Day maximum criteria

Each marine water body has an annual maximum temperature criterion [WAC 173-201A-210(1)(c)(i)-(ii) and WAC 173-201A-612]. These threshold criteria (e.g., 13, 16, 19, 22°C) protect specific categories of aquatic life by controlling the effect of human actions on water column temperatures. The threshold criteria apply at the edge of the chronic mixing zone. Criteria for marine waters and some fresh waters are expressed at the highest 1-Day annual maximum temperature (1-DMax). Ecology concludes that there is no reasonable potential to exceed the temperature standard when the mixture of ambient water and effluent at the edge of the chronic mixing zone is less than the criteria of 13°C.

b. Incremental warming criteria

The water quality standards limit the amount of warming human sources can cause under specific situations [WAC 173-201A-210(1)(c)(i)-(ii)]. The incremental warming criteria apply at the edge of the chronic mixing zone. At locations and times when background temperatures are cooler than the assigned threshold criterion, point sources are permitted to warm the water by only a defined increment (T_i), calculated as:

$T_i = 12/(T_{amb} - 2)$

This increment is permitted only to the extent doing so does not cause temperatures to exceed the annual maximum criteria.

c. Guidelines to prevent acute mortality or barriers to migration of salmonids. These site-level considerations do not override the temperature criteria listed above.
   i. Instantaneous lethality to passing fish: The upper 99th percentile daily maximum effluent temperature must not exceed 33°C; unless a dilution analysis indicates ambient temperatures will not exceed 33°C 2-seconds after discharge.
   ii. General lethality and migration blockage: Measurable (0.3°C) increases in temperature at the edge of a chronic mixing zone are not allowed when the receiving water temperature exceeds either a 1DMax of 23°C or a 7DADMax of 22°C. When adjacent downstream temperatures are 3°C or cooler, the 1DMax at the edge of the chronic mixing zone must not exceed 22°C.
   iii. Lethality to incubating fish: Human actions must not cause a measurable (0.3°C) warming above 17.5°C at locations where eggs are incubating.

Reasonable potential analysis

Compliance with temperature criteria was evaluated using Ecology's Reasonable Potential Analysis (RPA) methodology and supporting PermitCalc spreadsheets (See appendix D). Input values for the calculations were conservatively selected as follows:

- Chronic Dilution Factor–The minimum nearfield dilution for all scenarios Table 21(390:1) was selected and divided by a factor of two to account for reflux. Temperature analyses assume a dilution factor of 195:1.
- Ambient Temperature–Ambient surface temperature data for the 29 sample dates at Ecology Station PAH003 were evaluated to develop 90th percentile values for May–September (11.4°C) and October– April (10.0°C).
- Effluent Temperature–The maximum effluent temperature for any discharge scenario is 30°C.

Using the above input values, there is no reasonable potential to exceed water quality criteria for temperature. The incremental temperature increase within the area of nearfield mixing is predicted to be 0.1°C or less, which is below the Tier II threshold for measurable change (+ 0.3°C).

III.H. Human health

Washington's water quality standards include numeric human health-based criteria for priority pollutants that Ecology must consider when writing NPDES permits.

Ecology determined the effluent may contain chemicals of concern for human health, based on the application data indicating the discharge contains regulated chemicals. Ecology evaluated the discharge's potential to violate the water quality standards as required by 40 CFR 122.44(d) by following the procedures published in the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001) (USEPA, 1991) and Ecology's *Permit Writer's Manual* (Ecology, 2018) to make a reasonable potential determination. The evaluation showed that the discharge has no reasonable potential to cause a violation of water quality standards, and an effluent limit is not needed.

III.I. Sediment quality

The aquatic sediment standards (chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400).

Through a review of the discharger characteristics and of the effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the sediment management standards.

III.J. Groundwater quality limits

The groundwater quality standards (chapter 173-200 WAC) protect beneficial uses of groundwater. Permits issued by Ecology must not allow violations of those standards (WAC 173-200-100).

Project Macoma does not discharge wastewater to the ground. No permit limits are required to protect groundwater.

III.K. Whole Effluent Toxicity

The water quality standards for surface waters forbid discharge of effluent that has the potential to cause toxic effects in the receiving waters. Many toxic pollutants cannot be measured by commonly available detection methods. However, laboratory tests can measure toxicity directly by exposing living organisms to the wastewater and measuring their responses. These tests measure the aggregate toxicity of the whole effluent, so this approach is called whole effluent toxicity (WET) testing. Based on the mixing zone study report of March 21, 2024, page 11, Table 6-2, the mixed pH for the scientific operations would be 9.5 standards units at the chronic mixing zone boundary with a dilution factor of 290. Therefore, Ecology is requiring the permittee to pretreat their scientific operations, alkaline enhanced stream and adjust the pH from 13.5 to 12.0 standard units and comply with permit requirements at the edge of chronic mixing zone, as specified under the permit condition S1. Ecology is also requiring the permittee to conduct the acute toxicity testing for their scientific operations, as specified under permit condition S12. Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater using acute toxicity tests find early indications of any potential lethal effect of the effluent on organisms in the receiving water.

Using the screening criteria in WAC 173-205-040, Ecology determined Project Macoma effluent has the potential to cause aquatic toxicity for its scientific operations. The proposed permit contains WET testing requirements as authorized by RCW 90.48.520 and 40 CFR 122.44, using procedures from WAC 173-205. The proposed permit requires the facility to conduct acute toxicity testing and meet the acute toxicity limit as described under the permit condition S12. The effluent limit for acute toxicity is: No acute toxicity detected in a test sample representing the acute critical effluent concentration (ACEC)of 0.83 percent. The acute critical effluent concentration (ACEC) is the concentration of effluent at the boundary of the acute mixing zone during critical conditions.

Laboratories accredited by Ecology for WET testing must use the proper WET testing protocols, fulfill the data requirements, and submit results in the correct reporting format according to the procedures in the *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria* (Publication 95-80) (Ecology, 2016). Ecology recommends that the Project Macoma send a copy of the acute toxicity sections(s) of its NPDES permit to the laboratory.

III.L. Permit Limits at the discharge Point and at the edge of the authorized mixing zone

Table 16 – Permit limits and Compliance Points

Permit limits for routine operations at the discharge point, Outfall 001Parameter	**Average monthly limit**	**Maximum daily limit**
Flow	-	246,350 gpd
Total Suspended Solids	-	30 mg/L
Temperature	-	20.4°C

Parameter	**Minimum**	**maximum**
pH	7.0 standard units	9.8 standard units

Permit limits for Maintenance Operations at the discharge point, Outfall 001

Parameter	**Average monthly limit**	**Maximum weekly limit**
Flow	-	70,000 gpd
Total Suspended Solids	-	30 mg/L
Temperature	-	19.3 °C

Parameter	**Minimum**	**maximum**
pH	7.0 standard units	8.5 standard units

Permit limits for Scientific operations at the discharge point, Outfall 001

Parameter	Average monthly limit	Maximum discharge per single tidal cycle
Flow	-	18,700 gpd
Total Suspended Solids	-	30 mg/L
Temperature, °c	-	30 °C
Tidal Conditions	Ebb tide only	

Parameter	Minimum	maximum
pH	7.0 standard units	12.0 standard units

Routine Operations Permit limits: Chronic Mixing Zone Boundary Compliance Point 001 (CP001)

Parameter	Maximum Limits
Temperature (May-September)[a]	12.68°C
Temperature (October – April)[a]	11.50°C
pH[b]	within the range of 7.0 to 8.5 standard units with a human-caused variation within the above range of less than 0.5 units.

Scientific Operations (Alkaline Stream) Permit limits: Chronic Mixing Zone Boundary Compliance Point 001 (CP001)

Parameter	Maximum Limits
Temperature (May-September)[a]	12.68°C
Temperature (October – April)[a]	11.50°C
pH[b]	within the range of 7.0 to 8.5 standard units with a human-caused variation within the above range of less than 0.5 units.

IV. **Monitoring requirements**

Ecology requires monitoring, recording, and reporting (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits.

If a facility uses a contract laboratory to monitor wastewater, it must ensure that the laboratory uses the methods and meets or exceeds the method detection levels required by the permit. The permit describes when facilities may use alternative methods. It also describes what to do in certain situations when the laboratory encounters matrix effects. When a facility uses an alternative method as allowed by the permit, it must report the test method, detection level (DL), and quantitation level (QL) on the discharge monitoring report or in the required report.

IV.A. Effluent water monitoring

Project Macoma is required of continuous monitoring for pH, temperature, dissolved oxygen, and turbidity. The monitoring schedule is detailed in the proposed permit under Special Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, and significance of pollutants.

IV.B. Mixing Zone Boundary Compliance Point Monitoring.

Project Macoma is required of continuous monitoring for pH, temperature, dissolved oxygen, and turbidity. The monitoring schedule is detailed in the proposed permit under Special Condition S.2

IV.C. In-Line and In-water Monitoring

Project Macoma will be conducting an in-water times series monitoring for temperature, dissolved oxygen, pH, and turbidity. The Project Macoma will be deploying the following Ocean Chemistry sensors (Figure 8) to conduct monitoring for the above stated parameters.

Table 17 – Monitoring at Initial Dilution Zone (150 feet from the diffuser), for Routine Operations, Monitoring Point 002 (MP002)

Latitude: 48.129289 Longitude: -123.457211

Parameter	Units & speciation	Minimum sampling frequency	Sample type
pH	standard units	Continuous[1]	Metered/Recorded
DO	mg/L	Continuous	Metered/Recorded
Turbidity	NTU	Continuous	Metered/Recorded
Temperature	°C	Continuous	Metered/Recorded

Table 18 – Monitoring at Initial Dilution Zone (150 feet from the diffuser), for Alkaline Operations, Monitoring Point 002 (MP002)

Latitude: 48.129289 Longitude: -123.457211

Parameter	Units & speciation	Minimum sampling frequency	Sample type
pH	standard units	Continuous[1]	Metered/Recorded
DO	mg/L	Continuous	Metered/Recorded
Turbidity	NTU	Continuous	Metered/Recorded
Temperature	°C	Continuous	Metered/Recorded

Figure 8: Ocean Chemistry Sensor.

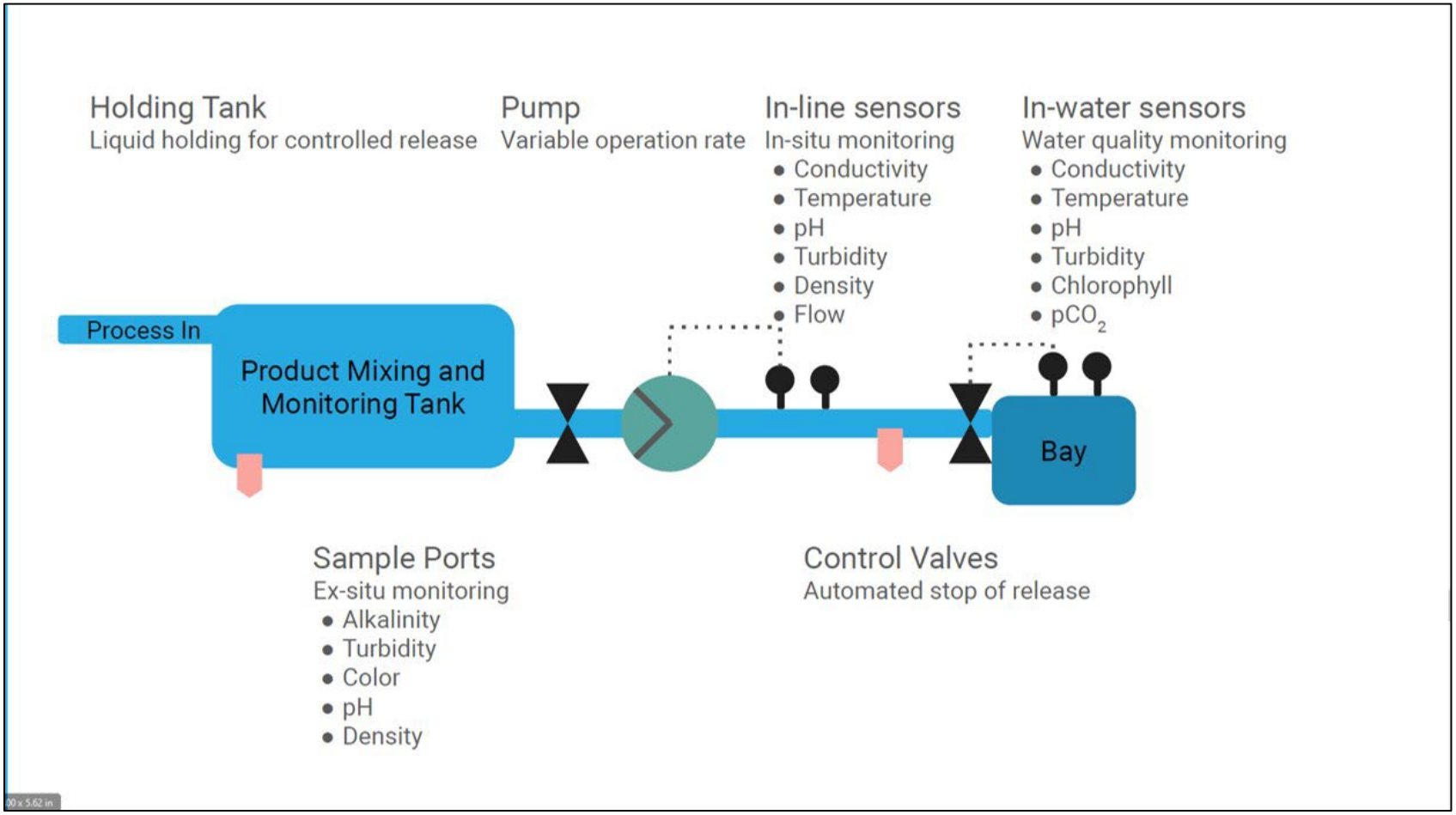

Figure 9: Diagram of control valves and in-line and in-water monitoring.

As shown in figure 8, the permittee will continuously monitor the discharge point, as well as designated locations around the mixing zone boundary, for the parameters shown on the diagram.

IV.D. Ambient Water Quality Monitoring

The permittee is required to conduct ambient water quality monitoring for the following parameters:

Table 19 – Ambient Water Quality Monitoring (AWQ001)

Latitude: TBD Longitude: TBD

Parameter	Units & speciation	Minimum sampling frequency	Sample type
pH	standard units	Continuous[1]	Metered/Recorded
DO	mg/L	Continuous	Metered/Recorded
Turbidity	NTU	Continuous	Metered/Recorded
Temperature	°C	Continuous	Metered/Recorded

IV.E. Lab accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC[2], Accreditation of Environmental Laboratories, to prepare all monitoring data (with the exception of certain parameters).

V. Other permit conditions

V.A. Reporting and record keeping

Ecology based Special Condition S3 on its authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges (WAC 173-220-210).

V.B. Non routine and unanticipated wastewater

Occasionally, this facility may generate wastewater which was not characterized in the permit application because it is not a routine discharge and was not anticipated at the time of application. These wastes typically consist of waters used to pressure-test storage tanks or fire water systems or of leaks from drinking water systems.

The permit authorizes the discharge of non-routine and unanticipated wastewater under certain conditions. The facility must characterize these waste waters for pollutants and examine the opportunities for reuse. Depending on the nature and extent of pollutants in this wastewater and on any opportunities for reuse, Ecology may:

- Authorize the facility to discharge the wastewater.
- Require the facility to treat the wastewater.
- Require the facility to reuse the wastewater.

V.C. Spill plan

This facility stores a quantity of chemicals on-site that have the potential to cause water pollution if accidentally released. Ecology can require a facility to develop best management

[2] https://apps.leg.wa.gov/WAC/default.aspx?cite=173-50

plans to prevent this accidental release [Section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080].

V.D. Solid waste control plan

Project Macoma must prevent pollution of the waters of the state through inappropriate disposal of solid waste or through the release of leachate from solid waste.

V.E. Outfall evaluation

The proposed permit requires Project Macoma to conduct an outfall inspection and submit a report detailing the findings of that inspection (Special Condition S. 10). The inspection must evaluate the physical condition of the discharge pipe and diffusers and evaluate the extent of sediment accumulations in the vicinity of the outfall.

V.F. Operation and maintenance manual

Ecology requires industries to take all reasonable steps to properly operate and maintain their wastewater treatment system in accordance with state and federal regulations [40 CFR 122.41(e) and WAC 173-220-150 (1)(g)]. The facility will prepare and submit an operation and maintenance manual as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150). Implementation of the procedures in the operation and maintenance manual ensures the facility's compliance with the terms and limits in the permit.

V.G. mCDR water intake requirements

Project Macoma has an intake with a maximum design flow of 0.25 MGD. Impingement BTA Determination: The owner or operator of an existing facility must comply with one of the alternatives listed in 40 CFR 125.94(c). Project Macoma complies with this requirement by maintaining the design velocity of 0.2 feet per second which is less than 0.5 feet per second as recommended under 40 CFR 125.94(c). This intake design velocity of 0.2 feet per second was developed with the consultation of the US Department of Fish and Wildlife.

Entrainment BTA Determination: EPA has not promulgated specific compliance options for the entrainment standard. Ecology must establish BTA standards for entrainment on a site-specific basis. 40 CFR 125.98(f) includes various factors for consideration in the entrainment determination. Project Macoma prepared a biological assessment report to assess the impact of this research project on water quality and biological activities in the Port Angeles Harbor/Estuary. The intake structure would be fitted with a screen and maintain velocity of 0.2 feet per second to alleviate the risk of entrainment and impingement.

Operation and Maintenance: The permit includes general operation and maintenance requirements as well as reporting requirements to ensure that the intake structure continues to be operated as designed.

V.H. General conditions

Ecology bases the standardized General Conditions on state and federal law and regulations. They are included in all individual industrial NPDES permits issued by Ecology.

VI. Permit issuance procedures

VI.A. Permit modifications

Ecology may modify this permit to impose numerical limits, if necessary to comply with water quality standards for surface waters, with sediment quality standards, or with water quality standards for groundwaters, after obtaining new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state or federal regulations.

VI.B. Proposed permit issuance

This proposed permit includes all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of three years; however, the process water discharge authorization is only for two years from the start of the pilot project discharge.

VII. References for text and appendices

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February 1, 2024, Ebb Carbon Marine Carbon Removal Pilot Project (Project Macoma)/Engineering Report

http://ecyapwq/Paris/DocumentDownloader.aspx?id=473462

March 21, 2024, Ebb Carbon/Project Macoma, Mixing Zone Study
http://ecyapwq/Paris/DocumentDownloader.aspx?id=479860

February 24, Marine Carbon Dioxide Removal Pilot Study (Project Macoma) Biological Assessment
http://ecyapwq/Paris/DocumentDownloader.aspx?id=476735

March 26, 2024- Project Macoma LLC's NPDES/SWD Permit Application; Statement of Compliance with WAC 173-201A-320, Tier II Criteria
http://ecyapwq/Paris/DocumentDownloader.aspx?id=480226

Washington State and Ecology website general reference links:

Laws and Regulations[3]

Permit and Wastewater Related Information[4]

[3] http://leg.wa.gov/LawsAndAgencyRules/Pages/default.aspx
[4] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance

Appendix A – Public Involvement Information

Ecology proposes to issue a permit to Project Macoma. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology placed a Public Notice of Application on April 3, 2024 and April 10, 2024 in Peninsula Daily News to inform the public about the submitted application and to invite comment on the issuance of this permit.

Ecology will place a Public Notice of Draft on July 19, 2024, in Peninsula Daily News to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice:

- Tells where copies of the draft Permit and Fact Sheet are available for public evaluation (a local public library, the closest Regional or Field Office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Urges people to submit their comments, in writing, before the end of the Comment Period
- Tells how to request a public hearing of comments about the proposed NPDES permit.
- Explains the next step(s) in the permitting process.

Frequently Asked Questions about Effective Public Commenting[5]

You may obtain further information from Ecology by telephone, 360-706-4191, or by writing to the address listed below.

Water Quality Permit Coordinator

Department of Ecology

Southwest Regional Office

P.O. Box 47775

Olympia, WA 98504-7775

The primary author of this permit and fact sheet is Aziz Mahar, P.E.

[5] https://apps.ecology.wa.gov/publications/SummaryPages/0307023.html

Appendix B – Your Right to Appeal

You have a right to appeal this permit to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of the final permit. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2) (see glossary).

To appeal you must do the following within 30 days of the date of receipt of this permit:

- File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours as defined in WAC 371-08-305 and -335. "Notice of appeal" is defined in WAC 371-08-340.
- Serve a copy of your appeal and this permit on Ecology on the Department of Ecology mail, in person, or by email (see addresses below).
- You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

Filing with the PCHB

For the most current information regarding filing with the PCHB:
visit https://eluho.wa.gov/[6] or call 360-664-9160.

Service on Ecology

Street Address:

Department of Ecology
Attn: Appeals Processing Desk
300 Desmond Drive SE
Lacey, WA 98503

Mailing Address:

Department of Ecology
Attn: Appeals Processing Desk
PO Box 47608
Olympia, WA 98504-7608

E-Mail Address:

ecologyappeals@ecy.wa.gov

[6] https://eluho.wa.gov/

Appendix C – Glossary

1-DMax or 1-day maximum temperature – The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.

7-DADMax or 7-day average of the daily maximum temperatures – The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.

Acute toxicity – The lethal effect of a compound on an organism that occurs in a short time period, usually 48 to 96 hours.

AKART – The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and RCW 90.48.520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

Alternate point of compliance – An alternative location in the groundwater from the point of compliance where compliance with the groundwater standards is measured. It may be established in the groundwater at locations some distance from the discharge source, up to, but not exceeding the property boundary and is determined on a site specific basis following an AKART analysis. An "early warning value" must be used when an alternate point is established. An alternate point of compliance must be determined and approved in accordance with WAC 173-200-060(2).

Ambient water quality – The existing environmental condition of the water in a receiving water body.

Ammonia – Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Annual average design flow (AADF) – average of the daily flow volumes anticipated to occur over a calendar year.

Average monthly (intermittent) discharge limit – The average of the measured values obtained over a calendar months' time taking into account zero discharge days.

Average monthly discharge limit – The average of the measured values obtained over a calendar months' time.

Background water quality – The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [WAC 173-200-020(3)]. Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

Best management practices (BMPs) – Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5 – Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD_5 is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass – The intentional diversion of waste streams from any portion of a treatment facility.

Categorical pretreatment standards – National pretreatment standards specifying quantities or concentrations of pollutants or pollutant properties, which may be discharged to a POTW by existing or new industrial users in specific industrial subcategories.

Chlorine – A chemical used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic toxicity – The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean water act (CWA) – The federal Water Pollution Control Act enacted by Public Law 92 500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance inspection-without sampling – A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance inspection-with sampling – A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition, it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite sample – A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction activity – Clearing, grading, excavation, and any other activity, which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous monitoring – Uninterrupted, unless otherwise noted in the permit.

Critical condition – The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Date of receipt – This is defined in RCW 43.21B.001(2) as five business days after the date of mailing; or the date of actual receipt, when the actual receipt date can be proven by a preponderance of the evidence. The recipient's sworn affidavit or declaration indicating the date of receipt, which is unchallenged by the agency, constitutes sufficient evidence of actual receipt. The date of actual receipt, however, may not exceed forty-five days from the date of mailing.

Detection level – or method detection limit means the minimum concentration of an analyte (substance) that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results as determined by the procedure given in 40 CFR part 136, Appendix B.

Dilution factor (DF) – A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction, for example, a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Distribution uniformity – The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Early warning value – The concentration of a pollutant set in accordance with WAC 173-200-070 that is a percentage of an enforcement limit. It may be established in the effluent, groundwater, surface water, the vadose zone or within the treatment process. This value acts as a trigger to detect and respond to increasing contaminant concentrations prior to the degradation of a beneficial use.

Enforcement limit – The concentration assigned to a contaminant in the groundwater at the point of compliance for the purpose of regulation, [WAC 173-200-020(11)]. This limit assures that a groundwater criterion will not be exceeded, and that background water quality will be protected.

Engineering report – A document that thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or WAC 173-240-130.

Enterococci – A subgroup of fecal streptococci that includes *S. faecalis*, *S. faecium*, *S. gallinarum*, and *S. avium*. The enterococci are differentiated from other streptococci by their ability to grow in 6.5% sodium chloride, at pH 9.6, and at 10°C and 45°C.

E. coli – A bacterium in the family Enterobacteriaceae named Escherichia coli and is a common inhabitant of the intestinal tract of warm-blooded animals, and its presence in water samples is an indication of fecal pollution and the possible presence of enteric pathogens.

Fecal coliform bacteria – Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab sample – A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Groundwater – Water in a saturated zone or stratum beneath the surface of land or below a surface water body.

Industrial user – A discharger of wastewater to the sanitary sewer that is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial wastewater – Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated stormwater and, also, leachate from solid waste facilities.

Interference – A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Local limits – Specific prohibitions or limits on pollutants or pollutant parameters developed by a POTW.

Major facility – A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum daily discharge limit – The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum day design flow (MDDF) – The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.

Maximum month design flow (MMDF) – The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Maximum week design flow (MWDF) – The largest volume of flow anticipated to occur during a continuous 7-day period, expressed as a daily average.

Method detection limit (MDL) – See Detection level.

Minor facility -- A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing zone – An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The permit specifies the area of the authorized mixing zone that Ecology defines following procedures outlined in state regulations (chapter 173-201A WAC).

National pollutant discharge elimination system (NPDES) – Section 402 of the Clean Water Act, the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to

issue these permits. NPDES permits issued by Washington State are joint NPDES/State permits issued under both state and federal laws.

pH – The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral and large variations above or below this value are considered harmful to most aquatic life.

Pass-through – A discharge which exits the POTW into waters of the State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

Peak hour design flow (PHDF) – The largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Peak instantaneous design flow (PIDF) – The maximum anticipated instantaneous flow.

Point of compliance – The location in the groundwater where the enforcement limit must not be exceeded, and a facility must comply with the Ground Water Quality Standards. Ecology determines this limit on a site-specific basis. Ecology locates the point of compliance in the groundwater as near and directly downgradient from the pollutant source as technically, hydrogeologically, and geographically feasible, unless it approves an alternative point of compliance.

Potential significant industrial user (PSIU) – A potential significant industrial user is defined as an Industrial User that does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

- Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;
- Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

Ecology may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation level (QL) – also known as Minimum level (ML) – The term ‘‘minimum level’’ refers to either the sample concentration equivalent to the lowest calibration point in a method or a multiple of the method detection limit (DL), whichever is higher. Minimum levels may be obtained in several ways: They may be published in a method; they may be based on the lowest acceptable calibration point used by a laboratory; or they may be calculated by multiplying the DL in a method, or the DL determined by a laboratory, by a factor of 3. For the purposes of

NPDES compliance monitoring, EPA considers the following terms to be synonymous: ‘‘quantitation limit,’’ ‘‘reporting limit,’’ and ‘‘minimum level’’.

Reasonable potential – A reasonable potential to cause or contribute to a water quality violation, or loss of sensitive and/or important habitat.

Responsible corporate officer – A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Sample Maximum – No sample may exceed this value.

Significant industrial user (SIU) –

- All industrial users subject to Categorical Pretreatment Standards under 40 CFR Chapter I, Subchapter N and 40 CFR 403.6 and;
- Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

Upon finding that the industrial user meeting the criteria in the second paragraph has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

Slug discharge – Any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge to the POTW. This may include any pollutant released at a flow rate that may cause interference or pass through with the POTW or in any way violate the permit conditions or the POTW’s regulations and local limits.

Soil scientist – An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5, 3, or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

Solid waste – All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

Soluble BOD_5 – Determining the soluble fraction of Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of soluble organic material present in an effluent that is utilized by bacteria. Although the soluble BOD_5 test is not specifically described in Standard Methods, filtering the raw sample through at least a 1.2 um filter prior to running the standard BOD_5 test is sufficient to remove the particulate organic fraction.

State waters – Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater – That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based effluent limit – A permit limit based on the ability of a treatment method to reduce the pollutant.

Total coliform bacteria – A microbiological test, which detects and enumerates the total coliform group of bacteria in water samples.

Total dissolved solids – That portion of total solids in water or wastewater that passes through a specific filter.

Total maximum daily load (TMDL) – A determination of the amount of pollutant that a water body can receive and still meet water quality standards.

Total suspended solids (TSS) – Total suspended solids are the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly,

suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset – An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water quality-based effluent limit – A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.

Appendix D — Technical Calculations

Marine Temperature Reasonable Potential and Limit Calculation

Based on WAC 173-201A-200(1)(c)(i)--(ii) and Water Quality Program Guidance. All Data inputs must meet WQ guidelines.

INPUT	May-Sep	Oct-Apr
1. Chronic Dilution Factor at Mixing Zone Boundary	195.0	195.0
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	11.4 °C	10.0 °C
3. 1DADMax Effluent Temperature (95th percentile)	30.0 °C	30.0 °C
4. Aquatic Life Temperature WQ Criterion	16.0 °C	16.0 °C
OUTPUT		
5. Temperature at Chronic Mixing Zone Boundary:	11.50 °C	10.10 °C
6. Incremental Temperature Increase or decrease:	0.10 °C	0.10 °C
7. Maximum Incremental Temperature Increase 12/(T-2)	1.28 °C	1.50 °C
8. Maximum Allowable Temperature at Mixing Zone Boundary:	12.68 °C	11.50 °C
A. If ambient temp is warmer than WQ criterion		
9. Does temp fall within this warmer temp range?	NO	NO
10. **If YES - Use TMDL-based or performance-based limit - Do Not use this spreadsheet**	---	---
B. If ambient temp is cooler than WQ criterion but within 12/(T_{amb}-2) of the criterion		
11. Does temp fall within this Incremental temp. range?	NO	NO
12. Temp increase allowed at mixing zone boundary, if required:	---	---
C. If ambient temp is cooler than (WQ criterion - 12/(T_{amb}-2))		
13. Does temp fall within this Incremental temp. range?	YES	YES
14. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT	NO LIMIT
RESULTS		
15. Do any of the above cells show a temp increase?	**NO**	**NO**
16. Temperature Limit if Required?	**NO LIMIT**	**NO LIMIT**

Reasonable Potential Calculation

Facility	Project Macoma, Miant
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	72.0	195.0
Human Health Carcinogenic		195.0
Human Health Non-Carcinogenic		195.0

Pollutant, CAS No. & NPDES Application Ref. No.		NICKEL - 7440020 9M - Dependent on hardness	ARSENIC (dissolved) 7440382 2M	CADMIUM - 7440439 4M Hardness dependent	MERCURY 7439976 8M	LEAD - 7439921 7M Dependent on hardness	SELENIUM 7782492 10M	ZINC- 7440666 13M hardness dependent			
Effluent Data	# of Samples (n)	1	1	1	1	1	1	1			
	Coeff of Variation (Cv)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)	0.178	8.912	0.036	0.356	0.446	3.387	0.053			
	Calculated 50th percentile Effluent Conc. (when n>10)										
Receiving Water Data	90th Percentile Conc., ug/L	0	0	0	0	0	0	0			
	Geo Mean, ug/L	0			0		0	0			
Water Quality Criteria	Aquatic Life Criteria, ug/L Acute	74	69	42	1.8	210	290	90			
	Aquatic Life Criteria, ug/L Chronic	8.2	36	9.3	0.025	8.1	71	81			
	WQ Criteria for Protection of Human Health, ug/L	100	-	-	0.15	-	200	1000			
	Metal Criteria Translator, decimal Acute	0.99	1	0.994	0.85	0.951	-	0.946			
	Metal Criteria Translator, decimal Chronic	0.99	-	0.994	-	0.951	-	0.946			
	Carcinogen?	N	Y	N	N	N	N	N			

Aquatic Life Reasonable Potential

Effluent percentile value		0.950	0.950	0.950	0.950	0.950	0.950	0.950			
s	$s^2=\ln(CV^2+1)$	0.555	0.555	0.555	0.555	0.555	0.555	0.555			
Pn	$Pn=(1\text{-confidence level})^{1/n}$	0.050	0.050	0.050	0.050	0.050	0.050	0.050			
Multiplier		6.20	6.20	6.20	6.20	6.20	6.20	6.20			
Max concentration (ug/L) at edge of...	Acute	0.015	0.767	0.003	0.026	0.037	0.292	0.004			
	Chronic	0.006	0.283	0.001	0.011	0.013	0.108	0.002			
Reasonable Potential? Limit Required?		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**			

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month											
LTA Coeff. Var. (CV), decimal											
Permit Limit Coeff. Var. (CV), decimal											
Waste Load Allocations, ug/L	Acute										
	Chronic										
Long Term Averages, ug/L	Acute										
	Chronic										
Limiting LTA, ug/L											
Metal Translator or 1?											
Average Monthly Limit (AML), ug/L											
Maximum Daily Limit (MDL), ug/L											

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	0.554513	0.5545	0.5545	0.5545
Pn	Pn=(1-confidence level)1/n	0.050	0.050	0.050	0.050
Multiplier		2.489527	2.4895	2.4895	2.4895
Dilution Factor		195	195	195	195
Max Conc. at edge of Chronic Zone, ug/L		0.002272	0.0045	4.3E-02	0.0007
Reasonable Potential? Limit Required?		**NO**	**NO**	**NO**	**NO**

Reasonable Potential Calculation

Facility	Project Macoma, Scientific Op
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	72.0	195.0
Human Health Carcinogenic		195.0
Human Health Non-Carcinogenic		195.0

Pollutant, CAS No. & NPDES Application Ref. No.			NICKEL - 7440020 9M - Dependent on hardness	ARSENIC (dissolved) 7440382 2M	CADMIUM - 7440439 4M Hardness dependent	MERCURY 7439976 8M	LEAD - 7439921 7M Dependent on hardness	SELENIUM 7782492 10M	ZINC- 7440666 13M hardness dependent			
Effluent Data	# of Samples (n)		1	1	1	1	1	1	1			
	Coeff of Variation (Cv)		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		0.151	7.564	0.03	0.303	0.378	2.874	0.045			
	Calculated 50th percentile Effluent Conc. (when n>10)											
Receiving Water Data	90th Percentile Conc., ug/L		0	0	0	0	0	0	0			
	Geo Mean, ug/L		0			0		0	0			
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	74	69	42	1.8	210	290	90			
		Chronic	8.2	36	9.3	0.025	8.1	71	81			
	WQ Criteria for Protection of Human Health, ug/L		100	-	-	0.15	-	200	1000			
	Metal Criteria Translator, decimal	Acute	0.99	1	0.994	0.85	0.951	-	0.946			
		Chronic	0.99	-	0.994	-	0.951	-	0.946			
	Carcinogen?		N	Y	N	N	N	N	N			

Aquatic Life Reasonable Potential

Effluent percentile value			0.950	0.950	0.950	0.950	0.950	0.950	0.950			
s	$s^2=\ln(CV^2+1)$		0.555	0.555	0.555	0.555	0.555	0.555	0.555			
Pn	Pn=(1-confidence level)$^{1/n}$		0.050	0.050	0.050	0.050	0.050	0.050	0.050			
Multiplier			6.20	6.20	6.20	6.20	6.20	6.20	6.20			
Max concentration (ug/L) at edge of…		Acute	0.013	0.651	0.003	0.022	0.031	0.247	0.004			
		Chronic	0.005	0.240	0.001	0.010	0.011	0.091	0.001			
Reasonable Potential? Limit Required?			**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**			

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month												
LTA Coeff. Var. (CV), decimal												
Permit Limit Coeff. Var. (CV), decimal												
Waste Load Allocations, ug/L		Acute										
		Chronic										
Long Term Averages, ug/L		Acute										
		Chronic										
Limiting LTA, ug/L												
Metal Translator or 1?												
Average Monthly Limit (AML), ug/L												
Maximum Daily Limit (MDL), ug/L												

Human Health Reasonable Potential

s	$s^2=\ln(CV^2+1)$	0.554513		0.5545		0.5545	0.5545			
Pn	Pn=(1-confidence level)1/n	0.050		0.050		0.050	0.050			
Multiplier		2.489527		2.4895		2.4895	2.4895			
Dilution Factor		195		195		195	195			
Max Conc. at edge of Chronic Zone, ug/L		0.001928		0.0039		3.7E-02	0.0006			
Reasonable Potential? Limit Required?		**NO**		**NO**		**NO**	**NO**			

Appendix E — Response to Comments

The following comments were received during the Public Notice of TIERII/Antidegradation Necessary and overriding public interest determinations.

The public notice lasted from April 3, 2024, through May 2, 2024. Below is a listing of the comments received. Each comment is followed by the corresponding response.

Comment 1: **Elliott Menashe, Greenbelt Consulting, www.greenbeltconsulting.com, April 7, 2024**

I have just been made aware of the application for an NPDES Permit (# WA0991051) for Project Macama, the Marine Carbon Dioxide Removal Pilot Project. See attached.

It is my understanding that the application is for a pilot project by a subsidiary of Ebb Carbon, the founders of which include executives from Google, Tesla, and Amazon. The project partners are Battelle and the University of Washington. The Lower Elwha Klallam Tribe is listed also. The goal of the project is to test the feasibility of 'scrubbing' CO2 from marine water using intensive chemical technology by a process that will create a stream of heated water that would be returned to Port Angeles Harbor via a barge-based outfall system.

The facility is to be built on Terminal 7 in Port Angeles harbor. Outflow/effluent will be from 17 to 30 degrees C and pH of 2.3-13.9. The application states that the pH of the outflow water could be altered from approximately 8 to 13.5 pH for "short periods of time".

Project proponents state that preliminary mixing analyses indicate that surrounding pH would return to ambient within the nearfield mixing zone, approximately 21 feet from the discharge point at the barge. Water quality would return to ambient approximately 40 feet around the discharge.

In short, the project creates a hostile 'dead zone' of caustic hot water with temperatures up to 30 degrees C and pH of 13-14 that is to be resolved by 'mixing' with harbor water that contains post-larval and juvenile salmon and forage fish. The Port of Port Angeles issued a DNS on this project (202400935) on 3/1/2024. Remarkably, the state DoE conditionally approved an industrial use permit for the project on March 4, 2024.

I am disturbed that such a project, which obviously has the likelihood of causing severe ecological disruption, could be considered.

This project is proposed within the drift cell of the Elwha, one of the largest ecosystem restoration projects in the world. Salmon, including Chinook, coho, pink, chum, bull trout, steelhead, and cutthroat are all well documented to use this reach of shoreline for juvenile and adult migration. The southern Strait of Juan de Fuca is a migration corridor linking the inland Salish sea regions with the larger northeast Pacific systems.

Federal and state-listed juvenile Chinook and coho from as far away as Snake, Columbia, and Klamath River systems are documented to use the Elwha nearshore, which includes this shoreline, as a migratory corridor. Adult, juvenile, and larval forage fish, including surf smelt, sand lance, and herring, are all well documented to use these exact shorelines (including the project area) for migration. Important forage fish species, such as surf smelt, and sand lance use the shorelines in Port Angeles harbor for spawning.

The importance of these shorelines for these species (deemed critical for the Salish sea) and linkages to the larger Salish Sea and northeast Pacific ecosystem is reflected in the decades long restoration efforts that the state RCO, DoE and federal agencies have spent investigating and restoring the Port Angeles harbor (including for deeper basin wood waste and shallower creosote structures), and extensive shoreline restoration of Ediz Hook as well as the Elwha drift cell.

These restoration efforts have cost literally millions of dollars. The Ediz Hook restoration work, started in 2003 by WDFW and now assumed by the LEKT, is an example of how long this restoration work has been going on. In 2021 NOAA cited western Port Angeles harbor as one of the highest priority sites for restoration in the Salish Sea for juvenile salmon and forage fish.

Juvenile salmon and forage fish are extremely sensitive to water quality perturbations, which can negatively impact population trends both through individual lethal/sub-lethal, and cumulative effects. Recognizing these vulnerabilities, the federal and state regulatory agencies have created water quality standards and protective zones for Salish Sea shorelines to prevent harm. The Macama project would clearly contravene those standards.

The proposed Macoma project openly exceeds these standards, and has designed the effluent to be discharged to the coastal zone where large numbers of juvenile salmon and forage fish must use as their migratory corridor. This proposed project would contribute toxic water discharge with levels of pH and temperatures that well exceed state water quality standards into the migratory corridor of federally and state listed species of fish, and along a shoreline where significant resources continue to be spent to restore ecological functions, including water quality. I am amazed that this location was found to be even remotely appropriate for this project.

The north Olympic Peninsula supports the few remaining pristine shorelines and forests for our coastal cold water northeast Pacific systems. This drift cell is also the site of ongoing intensive, global scale ecosystem conservation and restoration efforts. The endangered and threatened and ecosystem building species that depend on this exact location of shoreline for migration are susceptible to water quality disruptions that this project admits it will create. It is clear that this project is not appropriate for this shoreline.

I cannot understand how the scrubbing of CO2 that results in an effluent that is more toxic than the initial water quality, using caustic and toxic chemicals, is more beneficial to the environment than the original pretreated water. It is inconceivable how such a project could

even remotely be claimed to have "overriding public interest", especially at a site such as Port Angeles Harbor. It seems like a more appropriate pilot project site would be one at which water quality is already poor and there are fewer environmental risks.

I ask that the NPDES permit for the Macama project be denied. Thank you for your consideration of my concerns.

Ecology's Response: Thank you for your comments on this two-year Marine Carbon Dioxide Removal (mCDR) pilot project. The permittee is required to monitor water quality at the discharge point and at the mixing zone boundary for pH, temperature, turbidity, and dissolved oxygen. These monitoring results will be available to the public. The permittee must also meet permit limits for pH and temperature at both the discharge point and the edge of the mixing zone boundary. Additionally, the permittee required to adjust pH levels from 13.5 standard units to 12.0 standard units at the discharge point before releasing alkaline-enhanced process water into Port Angeles Harbor. Ecology mandates that the permittee conduct acute toxicity testing to assess the effects of pH changes.

The proposed draft permit requires the permittee to submit the United States Fish and Wildlife Service (USFWS) approved Ecology Safety Methodology (ESM) before starting operations. If any negative impacts are observed during in-water monitoring or surveillance, the permittee will be required to cease the discharge, implement the ESM protocol, and adjust operations to resolve the issue before resuming their operations.

Comment 2: Anne Shaffer, PhD, Executive Director and Lead Scientist, Coastal Watershed Institute

P.O. Box 266, Port Angeles Washington, 98362, 360.461.0799, April 8, 2024

We are providing the following comments on the Project Macoma permitting.

Project Macoma is important marine carbon dioxide removal (mCDR) project proposed for the north Olympic Peninsula area. It's a pilot project by a subsidiary of Ebb Carbon, the founders of which include executives from Google, Tesla, and Amazon. The project partners are the Port of Port Angeles, Battelle, and the University of Washington. From the JARPA application SEPA checklist materials submitted to the Port and Washington Department of Ecology (DoE), the goal of the project is to test the feasibility of 'scrubbing' CO2 from marine water using intensive chemical technology, by a process that will, quote: 'create an alkaline enhanced stream that would be returned to Port Angeles Harbor via the barge-based outfall system. The facility is to be built on Terminal 7 in Port Angeles harbor. Both intake and outflow structures ***will be shallow. Outflow/effluent will be from 17 to 30 degrees C and pH of 2.3-13.9, quote:' the pH of the water could be altered from approximately 8 to 13.5 pH for 'short periods of time' (a single tidal cycle)'*** *(emphasis added)*

In short, the project creates a hostile 'dead zone' of caustic hot water with temperatures up to 30 degrees C and pH of 13-14 in the nearshore of Port Angeles Harbor, a region of the Elwha

drift cell, that is to be resolved by 'mixing' with harbor water that is the migration corridor/contains post-larval and juvenile salmon and forage fish.

An earlier version of the project was conducted off a pier in Sequim Bay. In this phase, post treatment effluent was run thru a water treatment facility before being released back into marine waters. Inexplicably, the Port Angeles Harbor project doesn't include this treatment phase, and instead releases caustic, hot water directly into the nearshore.

The Port of Port Angeles, the project sponsor, issued itself a SEPA Determination of Non Significance (DNS). DoE is still considering their NPDS permit. If approved, this is precedent setting. It allows clearly avoidable impacts to a federally protected nearshore ecosystem/habitats/ and species, and does so in the Elwha drift cell, one of the most celebrated and significant drift cells in the Salish Sea.

The Coastal Watershed Institute provided an initial set of comments to the SEPA review (attached). Instead of addressing these, Ebb Carbon applied to DoE for a 'determination that lowering of water quality is necessary and in the overriding public interest'. In translation: they are proposing that mCDR research supersedes both the federal Endangered Species Act, and the Elwha River Fisheries and Ecosystem Recovery Act. Remember, this project is proposed in the nearshore of the Elwha watershed and drift cell where literally hundreds of millions of dollars have been spent to restore ESA ecosystems exactly when the ESA species and ecosystems are starting to restore.

We strongly recommend that state, federal, and Tribal co-managers and resource agencies reject these decisions and instead require that full and substantive avoidance mitigation measures for this project, including its' water quality impacts. Particularly in light of the critical nature of nearshore habitats of the Salish Sea region, the hundreds of millions of dollars of public tax dollars spent on current and past ecosystem restoration actions in the region for the last quarter of a century, and the potential negative impacts of this project on ecosystem scale restoration response now underway. At a minimum, the effluent from this project must be conveyed to a water treatment system (as was apparently required for Sequim Bay/Dungeness drift cell) and treated so that the water quality of the project effluent is equal or better than the water quality at withdrawal.

And of course in the current framework we also recommend that EPA require that the Washington Department of Ecology require the applicant to apply all known and reasonable technology (AKART) to their discharge to meet State of Washington Water Quality Standards for protection of migratory fish life documented to be within the discharge zone, and that all numeric and narrative water quality standards are met.

Finally, it should be considered that this project is basically a "proof of concept" phase for a commercial product that will be offered for sale by a for-profit corporation using Waters of the State for private gain without mitigation. In our opinion, implementation of Project Macoma in its' current form only benefits Project Macoma and parent company Ebb Carbon, not the public

and not the ecological resource we all want (and have invested so much public tax dollar) to conserve and restore. Remarkable that we are even having to post this.

Ecology's Response: Thank you for your comments on this two-year mCDR pilot project. The permittee is required to monitor water quality at the discharge point and at the mixing zone boundary for pH, temperature, turbidity, and dissolved oxygen. These monitoring results will be available to the public. The permittee must also meet permit limits for pH and temperature at both the discharge point and the edge of the mixing zone boundary. Additionally, the permittee must adjust pH levels from 13.5 standard units to 12.0 standard units at the discharge point before releasing alkaline-enhanced process water into Port Angeles Harbor.

Ecology requires that the permittee conduct acute toxicity testing to assess the effects of pH changes caused by the discharges will cause acute mixture toxicity. The proposed draft permit requires the permittee to submit USFWS approved ESM before starting operations. The ESM protocol, along with pH adjustment from 13.5 to 12 standard units and acute toxicity testing, is part of the AKART methods designed to protect water quality and biological activity. If any negative impacts are observed during in-water monitoring or surveillance, the permittee will be required to cease the discharge, implement the ESM protocol, and adjust operations to resolve the issue before resuming their operations.

The Permittee is also required to collect receiving water information necessary to determine if the effluent causes a violation of the Water Quality Criteria outside of the boundary of a mixing zone as result of the discharge. Additionally, the receiving water study will provide supporting information to evaluate whether the discharge at the edge of the mixing zone does not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the water body, result in damage to the ecosystem, or adversely affect public health as determined by the department.

Comment #3 Peter G. William, (650) 302-3565, <petergw123@gmail.com, April 8, 2024

I am writing in opposition to the Marine Carbon Dioxide Removal Pilot Project (Project Macoma) proposal in Port Angeles harbor. As noted in the Coastal Water Institute (CWI) letter (attached), there are numerous flaws in this proposal from the location proposed to the biological assessment provided. The points CWI has raised strongly suggest that other locations would be logical and preferable.

Beyond this, Ebb Carbon's application for a 'determination that lowering of water quality is necessary and in the overriding public interest' seems like an attempt to push through approval without addressing CWI's concerns. It certainly does not suggest maintaining process integrity in reviewing the Project Macoma proposal. Thank you for your consideration.

Ecology's Response: Thank you for your comments on this two-year mCDR pilot project. Please see Ecology's response to comments 1 and 2.

Comment #4: Ross Horner 254-266-4770, rosshorner@yahoo.com, April 8, 2024

I am emailing with a request that Project Macoma be rejected by those involved who speak for the citizens of this area. Project Macoma is being run by a for-profit company. This means that their primary goal is to generate financial returns rather than prioritize the well-being of the environment or the local community. There might be concerns about the company cutting corners or not investing enough in sustainable practices to maximize their profits. It's important to ensure that any project, especially those with potential environmental impacts, is held accountable and closely monitored to ensure that the company's profit-driven motives don't overshadow the long-term health of the ecosystem.

Another concern could be the potential disruption it may cause to the local wildlife and their habitats. Large-scale projects often involve extensive construction and development, which can lead to the destruction of natural environments. This could result in the displacement or even endangerment of certain species that call the area home. It's essential to carefully assess the environmental impacts of such projects and implement appropriate measures to mitigate any harm caused. By prioritizing the preservation of the local ecosystem, we can ensure a sustainable and balanced approach to development. Please Reject this Project and keep these large for profit backers out of our community and our Sea.

Ecology's Response: This is a small-scale, two-year pilot project. The proposed draft permit includes a pH limit of 12.0 standard units, an acute toxicity test, and the USFWS-approved ESM, along with an adaptive management plan to mitigate any negative impacts on receiving water quality and biological activity. The ESM protocol, along with pH adjustment from 13.5 to 12 standard units and acute toxicity testing, is part of the AKART methods designed to protect water quality and biological activity. Please also see the responses to comments 1 and 2.

Comment #5 Eulalia Engel, cascadiadiy@gmail.com, April 9, 2024

I am emailing with a request that Project Macoma be rejected by those involved who speak for the citizens of this area.

Project Macoma is being run by a for-profit company. This means that their primary goal is to generate financial returns rather than prioritize the well-being of the environment or the local community. There might be concerns about the company cutting corners or not investing enough in sustainable practices to maximize their profits. It's important to ensure that any project, especially those with potential environmental impacts, is held accountable and closely monitored to ensure that the company's profit-driven motives don't overshadow the long-term health of the ecosystem.

Another concern could be the potential disruption it may cause to the local wildlife and their habitats. Large-scale projects often involve extensive construction and development, which can lead to the destruction of natural environments. This could result in the displacement or even endangerment of certain species that call the area home. It's essential to carefully assess the environmental impacts of such projects and implement appropriate measures to mitigate any harm caused. By prioritizing the preservation of the local ecosystem, we can ensure a

sustainable and balanced approach to development. Please Reject this Project and keep these large for profit backers out of our community and our Sea.

Ecology's Response: Thank you for your comments on this two-year mCDR pilot project. Please also see Ecology's response to comments 1 and 2.

Comment #6 Ms. Shaun Hubbard, Friday Harbor WA 98250, email: shaunalice@gmail.com, April 11, 2024

Whereas I applaud innovative solutions to clean up pollution, I would not want the water and its the endangered species near the Elwha River mouth to be used as a potentially dangerous experiment after all the efforts, time, and dollars put into the river's revival. There is a reason for state limits for temperature and PH of discharge water. Do not allow any exceptions. Please think of a better way. Thank you.

Ecology's Response: Thank you for your comments on the Project Macoma mCDR two-year pilot project. Please see Ecology's response to comments 1&2.

Comment #7 Peter Jepsen, Sequim, WA 98382, jtec@seanet.com, April 12, 2024

Thank you for the opportunity to comment on the request by Ebb Carbon's Macoma project to discharge non-compliant effluent in the Port Angeles harbor. The project intends, in the words of the Coastal Watershed Institute (CWI), to create a "hostile 'dead zone' of caustic hot water with temperatures up to 30°C and pH of 13-14 that is to be resolved by 'mixing' with harbor water that contains post-larval and juvenile salmon and forage fish". The CWI has done an excellent job of addressing the negative environmental effects of the project in detail and in explaining how the project is not in the public interest.

I question the suitability of the project to the Port Angeles harbor and the state of Washington. The Engineering Report for the Ebb Carbon Project Macoma states that the Port of Port Angeles is suitable for this facility because, among other reasons, "*The state of Washington excels in low carbon energy production, which is key for EC [Ebb Carbon] to achieve net carbon removal from the atmosphere*" (1). Washington is indeed a leader in renewable energy production, 90% of which is hydropower (2) but, as the climate warms, the snowpack on which hydropower is dependent is decreasing. In the water year 2023 (October 2022 – October 2023), the state's hydropower output fell 23% because of drought and low snowpack. The drought and low snowpack conditions are continuing through 2024 and "*According to climate models, by 2050, we [Washington state] can expect a snowpack drought more than 40 percent of years*" (3). Consequently, the argument that the Macoma project is suitable to Port Angeles, and to the state of Washington, is not valid because it is based on a source of energy that is expected to diminish significantly in the near future.

The DOE has the authority to allow discharge that degrades ambient water quality if the project is in the overriding public interest. A project that has immediate negative environmental effect and that bases its success and suitability on a source of energy that has diminished by 23% in

the last year, and is expected to continue to lessen in the future, is not in the overriding public interest. It is in the public interest to use Washington's low carbon energy to fulfill immediate and future clean power requirements, as in the state's quest to switch from gasoline to electric vehicles, not to support an experimental project that has direct negative effects on local water quality and whose success is based on a diminishing supply of clean electricity.

I understand the need to control and reduce CO_2 emissions, but this project has immediate negative impact on an environment that is already stressed, is dependent on a source of clean energy that is diminishing, and is experimental, i.e. of no proven value, consequently it does not serve the public interest. I urge you to deny the Macoma project's request to discharge non-compliant effluent into the waters of the Port Angeles harbor; the project has no overriding public interest.

Citations:

(1) https://apps.ecology.wa.gov/paris/FacilitySummary.aspx?FacilityId=100001224 , Project_Macoma-WA0991051-Engineering_Report_March_20_2024 (Page 9)
(2) https://www.eia.gov/state/analysis.php?sid=WA
(3) https://ecology.wa.gov/blog/march-2024/water-supply-update

Ecology's Response: Thank you for comments on this two-year Project Macoma's mCDR pilot project. Please see Ecology's response to comments 1 & 2.

Comment # 8, David Parks, email: crescentenvironmental@gmail.com, April 14, 2024

Thank you for the opportunity to comment on the request by Ebb Carbon's Project Macoma to discharge non-compliant effluent in Port Angeles harbor, Clallam County, Washington (1). The project intends, to discharge caustic (high pH) hot water with temperatures up to 30°C and pH of 13-14 into Port Angeles Harbor (Strait of Juan de Fuca) that contains post-larval and juvenile salmon and forage fish without any protections for fish life or fish behavior.

I question the suitability of the project for the Port Angeles harbor and the State of Washington because of the lack of data provided by the applicant on the effects of the proposed discharges on juvenile forage fish and salmon, particularly in the post-larval stage.

The Washington Department of Ecology has the authority to allow discharges that degrade ambient water quality if the project is in the overriding public interest. Project Macoma is proposed to test an industrial process for commercial purposes that is unproven in its' viability to remove carbon from seawater at a meaningful scale. Why has project Macoma not tested this technology in a closed system for its' effects on forage fish and salmon? Where are the data that show that forage fish and salmon will not be harmed by Ebb Carbon/Project Macoma discharges that exceed state water quality standards?

The Washington State Water Quality Standards (WAC 173-201A) require that dischargers apply All Known and Reasonable Technology (AKART) to meet State Water Quality Standards. The Washington Department of Ecology has conditionally approved the discharge permit without any information on what AKART will be required, if any, to protect fish life and behavior. The

application of AKART to the Industrial Permit should have been included in the application for waiving the water quality standards because of overriding public interest and in the SEPA documents.

Ebb Carbon/Project Macoma has not stated why this project is in the overriding public interest. Where is the cost/benefit analysis that shows an overriding public benefit? Ebb Carbon/Project Macoma should be required to provide a Cost Benefit Analysis demonstrating an overriding public benefit prior to approval of the Industrial Discharge Permit.

Approval of Ebb Carbons'/Project Macoma Industrial Discharge Permit and application for waiver of water quality standards in the overriding public interest will be fundamentally unfair to other companies and individuals who have Industrial Discharge Permits in Clallam County. Why is Ebb Carbon/Project Macoma receiving special treatment with respect to the Industrial Discharge Permit and State Water Quality Standards? Would Ecology provide the same relief to McKinley Paper?

I urge you to deny Project Macomas' request to discharge non-compliant effluent into the waters of Port Angeles harbor; this commercial/industrial project has no overriding public interest. Ebb Carbon should be held to the same water quality standards as other industrial dischargers in the Port Angeles Harbor basin.

Ecology's Response: This is a small-scale, two-year pilot project. The proposed draft permit includes a pH limit of 12.0 standard units, acute toxicity test, and the USFWS-approved ESM, along with an adaptive management plan to mitigate any negative impacts on receiving water quality and biological activity. The ESM protocol, along with pH adjustment from 13.5 to 12 and acute toxicity testing, are part of the AKART methods designed to protect water quality and biological activity. Please also see Ecology's responses to comments 1 and 2.

Comment # 9: Kirie Pedersen and family, Brinnon, WA98320, kirie.pedersen@gmail.com, April 21, 2024

As shoreline property owners and taxpayers since 1946, our extended family and friends have dedicated our lives to preserving and protecting the shorelines of the Olympic Peninsula. We urge you to decline the Macoma/Ebb Carbon project and Application to Override Public Interest as referenced above.

Hundreds of millions of tax dollars, as well as thousands of hours of volunteer work by non-profit groups, teachers, children, and private citizens like us have supported nearshore ecosystem restoration. As structured, this proposed project fails to meet Washington State Water Quality Standards to protect the nearshore and the migratory species within the discharge zone.

The proposal appears to be a pilot for development of a commercial product offered for sale by a for-profit corporation. If approved, the impact of releasing caustic hot water directly into the nearshore sets a precedent for adverse impact to a federally protected nearshore ecosystem.

We fail to see how this project is "in the overriding public interest" as the DoE application states. As currently proposed, mCDR research supersedes the federal Endangered Species Act and the Elwha River Fisheries and Ecosystem Recovery Act just as ESA species and ecosystems are finally starting to restore.

I draw your attention to the following: "Many ocean scientists remain deeply skeptical of marine geoengineering. At a meeting of the International Maritime Organization last October, dozens of governments called for deferring marine geoengineering, including ocean-alkalinity enhancement, over concerns about 'deleterious effects that are widespread, long-lasting, or severe.'"

Ecology's Response: Thank you for your comments on this two-year mCDR pilot project. The permittee is required to monitor water quality at the discharge point and at the mixing zone boundary for pH, temperature, turbidity, and dissolved oxygen. These monitoring results will be available to the public. The permittee must also meet permit limits for pH and temperature at both the discharge point and the edge of the mixing zone boundary. Additionally, the permittee must adjust pH levels from 13.5 standard units to 12.0 standard units at the discharge point before releasing alkaline-enhanced process water into Port Angeles Harbor.

Ecology requires that the permittee conduct acute toxicity testing to assess the effects of pH changes caused by the discharges will cause acute mixture toxicity. The proposed draft permit requires the permittee to submit USFWS approved ESM before starting operations. The ESM protocol, along with pH adjustment from 13.5 to 12 and acute toxicity testing, is part of the AKART methods designed to protect water quality and biological activity. If any negative impacts are observed during in-water monitoring or surveillance, the permittee will be required to cease the discharge, implement the ESM protocol, and adjust operations to resolve the issue before resuming their operations.

The Permittee is also required to collect receiving water information necessary to determine if the effluent causes a violation of the Water Quality Criteria outside of the boundary of a mixing zone as result of the discharge. Additionally, the receiving water study will provide supporting information to evaluate whether the discharge at the edge of the mixing zone does not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the water body, result in damage to the ecosystem, or adversely affect public health as determined by the department.

Comments #10: Marcela Mulholland, Marcela Mulholland, Deputy Director of Partnerships

Carbon Removal Alliance, email: marcela@carbonremovalalliance.org, April 25, 2024
Thank you for the Department of Ecology's continued attention to the health of our natural environment and to the agency's forthcoming determination regarding Project Macoma, the proposed pilot project seeking to remove legacy carbon pollution from the atmosphere and improve water quality in Port Angeles. Given our organization's commitment to high quality carbon removal we are eager to support Project Macoma's NPDES/SWD Permit application.

We strongly urge the Department of Ecology to issue Project Macoma (i) a final determination that its proposed discharge of processed ocean water to Port Angeles Harbor is necessary and in the overriding public interest under WAC 173-201A-320(1) and (ii) an NPDES/SWD permit under Section 402 of the Clean Water Act and Chapter 90.48 Revised Code of Washington.

The Carbon Removal Alliance narrows the gap between innovators and policymakers working to remove carbon from our atmosphere. We're a coalition made up of 25 of the industry's most promising companies. Led by long-time carbon removal thinkers with close ties in Washington, the Alliance translates the realities of building carbon removal projects into federal programs that help the field scale. Unlike typical trade associations, we're a nonprofit driven by our principles of high-quality and permanent removals. Alliance members are responsible for virtually all of the permanent carbon removal to date and represent an emerging class of companies who can help the US meet its climate goals. We're building an industry worthy of public and private sector investment — one that's categorically good for the climate, economy, and people. We believe that Project Macoma is aligned with this vision.

Project Macoma is designed to address two climate-related problems, too much CO_2 pollution in the air and coastal acidification, with a single technology. The proposed pilot project would remove up to 1,000 net tonnes of carbon dioxide (CO_2) pollution from the atmosphere while reducing coastal acidification in local receiving waters in Port Angeles Harbor by temporarily restoring the pH closer to pre-anthropogenic conditions. Washington State, its communities, and economy are particularly vulnerable to the effects of both climate change and coastal acidification. Innovative, science-based pilot projects like Project Macoma are sorely needed to safely advance rigorous research and development solving for these existential threats.

The marine carbon dioxide removal (mCDR) technology that Project Macoma would use is currently being demonstrated at the Pacific Northwest National Laboratory (PNNL) at Sequim in partnership with PNNL, the U.S. Department of Energy, the National Oceanic and Atmospheric Administration (NOAA), and the University of Washington.

Project Macoma represents a promising approach to carbon dioxide removal that is permanent, net-negative, additional and verifiable - all of which are necessary to avoid the worst impacts of climate change. The carbon that Project Macoma will remove will be safely stored in the ocean for over 10,000 years and is 100% additional, meaning the CO_2 reduction would not have occurred otherwise. Emissions associated with operations of the pilot project are relatively small and will be quantified and netted against the quantity of CO_2 removed from the atmosphere. Fossil fuel requirements will be minimal because Project Macoma has intentionally proposed that their system be sited at the Port of Port Angeles, which relies on renewable resources to supply the power grid.

Project Macoma is exactly the kind of science-led project that the State's Blue Ribbon Panel on Ocean Acidification, Marine Resources Advisory Council, Legislature, and Governor Inslee have called for. Project Macoma will increase the marine ecosystem's ability to capture and store additional carbon from the atmosphere while prioritizing equity and environmental justice. Our

expertise indicates that Project Macoma has the potential to meaningfully redress both legacy carbon emissions and local ocean acidification impacts.

Thank you for the opportunity to provide feedback on this important matter and for Ecology's continued dedication to mitigating greenhouse gas emissions and protecting communities and ecosystems from the worst impacts of climate change.

The plan to remove acid from Port Angeles harbor is a terrible idea. Removing acid means that alkalinity will be raised. Alkalinity burns a fish's gills. We are trying to enhance our environment, not kill our fish. This is the wrong place for this experiment. Our harbor is already stressed. This plan is no different than the old saying from years ago, "the solution to pollution is dilution". It was wrong then and it's wrong now. You wish to lower acidity in a vast area and hope dilution happens quickly enough not to kill the fauna in our harbor. This is a terrible plan. Please put a stop to this.

Ecology's Response: This is a small-scale, two-year pilot project. The proposed draft permit includes a pH limit of 12.0, an acute toxicity test, and the USFWS-approved ESM, along with an adaptive management plan to mitigate any negative impacts on receiving water quality and biological activity. The ESM protocol, along with pH adjustment from 13.5 to 12 standard units and acute toxicity testing, is part of the AKART methods designed to protect water quality and biological activity. Please also see the responses to comments 1 and 2.

Comments #11: Mark White, email: bottomfish1978@live.com, April 25, 2024

The plan to remove acid from Port Angeles harbor is a terrible idea. Removing acid means that alkalinity will be raised. Alkalinity burns a fish's gills. We are trying to enhance our environment, not kill our fish. This is the wrong place for this experiment. Our harbor is already stressed. This plan is no different than the old saying from years ago, "the solution to pollution is dilution". It was wrong then and it's wrong now. You wish to lower acidity in a vast area and hope dilution happens quickly enough not to kill the fauna in our harbor. This is a terrible plan. Please put a stop to this.

Ecology's Response: This is a small-scale, two-year pilot project. The proposed draft permit includes a pH limit of 12.0, an acute toxicity test, and the USFWS-approved ESM, along with an adaptive management plan to mitigate any negative impacts on receiving water quality and biological activity. The ESM protocol, along with pH adjustment from 13.5 to 12 standard unit and acute toxicity testing, is part of the AKART methods designed to protect water quality and biological activity. Please also see the responses to comments 1 and 2.

Comment # 12: Marilyn Beech, Port Angeles, WA 98362, marilynbeech@gmail.com, April 26, 2024

This concerns the marine carbon dioxide removal project proposed for Terminal 7 at the Port Angeles harbor by Ebb Carbon Inc. While carbon removal is definitely a worthwhile goal and benefit to humanity, two of the major players involved, Tesla and Google, do not have a

reputation for caretaking the best interests of anyone. They are for-profit companies and can be trusted to put profit before anything else. While I applaud anyone's efforts to deal with climate issues I would feel a lot better about letting them into our vulnerable ecosystem if there were guardrails in place ahead of time that would give the people who live here some agency in what happens to our harbor. We don't want to create another Love Canal situation.

To that end I think it would help if you were to ask for:

1. A local non-profit, such as Coastal Waterways Institute, that will be paid through Federal Climate Change funds or the State of Washington (not Ebb, Inc.) and will be tasked with:

    a. Monitoring all aspects of the project and tracking changes to aquatic habitat and the health of all plant and animal life in the harbor;

    b. Given authority to shut down the project if Ebb Inc. does not respond to changes deemed dangerous by the monitoring agency.

2. Ebb Inc. will set up a website open to the public where all monitoring data can be accessed in real time. The people of this area should be considered partners in this project and given the tools to assess the state of the harbor at any time.

Given how important the Port Angeles harbor is to the livelihoods of many people who live here as well as an area with prehistoric ties to the Elwha Klallam tribal people and an important source of food, caution with a project like this that could easily destroy marine life is critical. I think that the people of Port Angeles would be happy to be part of a solution to some of the climate change issues, but we don't want to be left permanently maimed.

Ecology's Response: Thank you for your comments on this two-year mCDR pilot project. The permittee is required to monitor water quality at the discharge point and at the mixing zone boundary for pH, temperature, turbidity, and dissolved oxygen. **These monitoring results will be available to the public**. The permittee must also meet permit limits for pH and temperature at both the discharge point and the edge of the mixing zone boundary. Additionally, the permittee must adjust pH levels from 13.5 standard units to 12.0 standard units at the discharge point before releasing alkaline-enhanced process water into Port Angeles Harbor.

Ecology requires that the permittee conduct acute toxicity testing to assess the effects of pH changes caused by the discharges will cause acute mixture toxicity. The proposed draft permit requires the permittee to submit USFWS approved ESM before starting operations. The ESM protocol, along with pH adjustment from 13.5 to 12 and acute toxicity testing, is part of the AKART methods designed to protect water quality and biological activity. If any negative impacts are observed during in-water monitoring or surveillance, the permittee will be required to cease the discharge, implement the ESM protocol, and adjust operations to resolve the issue before resuming their operations.

The Permittee is also required to collect receiving water information necessary to determine if the effluent causes a violation of the Water Quality Criteria outside of the boundary of a mixing zone as result of the discharge. Additionally, the receiving water study will provide supporting information to evaluate whether the discharge at the edge of the mixing zone does not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the water body, result in damage to the ecosystem, or adversely affect public health as determined by the department.

Comment #13: Joanna Klitzke, Carbon Removal Procurement & Ecosystem Strategy Lead for Stripe Climate, jklitzke@stripe.com, April 28, 2024

Thank you for the Department of Ecology's continued attention to the health of our natural environment and to the agency's forthcoming determination regarding Project Macoma, the proposed pilot project seeking to remove legacy carbon pollution from the atmosphere and improve water quality in Port Angeles. Given our organization's commitment to supporting atmospheric carbon removal solutions that can reduce the most catastrophic impacts of climate change, we are eager to support Project Macoma's NPDES/SWD Permit application.

We encourage the Department of Ecology to issue Project Macoma (i) a final determination that its proposed discharge of processed ocean water to Port Angeles Harbor is necessary and in the overriding public interest under WAC 173-201A-320(1) and (ii) an NPDES/SWD permit under Section 402 of the Clean Water Act and Chapter 90.48

Revised Code of Washington.

For context, we are an organization focused on accelerating the research, development, anddeployment of carbon dioxide removal solutions by making early purchases from promising technologies. Our in-house team of science and commercial experts, advised by a multidisciplinary group of 60+ independent scientific experts, evaluates the most promising carbon removal technologies for purchase. After our assessment in 2021, we supported Ebb and their pilot deployments.

Project Macoma is designed to address two climate-related problems, too much CO2 pollution in the air and coastal acidification, with a single technology. The proposed pilot project would remove up to 1,000 net tonnes of carbon dioxide (CO2) pollution from the atmosphere while reducing coastal acidification in local receiving waters in Port Angeles Harbor by temporarily restoring the pH closer to pre-anthropogenic conditions. Innovative, science-based pilot projects like Project Macoma are needed to safely advance rigorous research and development solving for the effects of climate change and coastal acidification on communities and the economy in Washington State.

The marine carbon dioxide removal (mCDR) technology that Project Macoma would use is currently being demonstrated at the Pacific Northwest National Laboratory (PNNL) at Sequim in partnership with PNNL, the U.S. Department of Energy, the National Oceanic and Atmospheric Administration (NOAA), and the University of Washington.

Project Macoma represents a promising approach to carbon dioxide removal that is permanent, net-negative, additional and verifiable - all of which are necessary to avoid the worst impacts of climate change. The carbon that Project Macoma will remove will be safely stored in the ocean for over 10,000 years and is additional, meaning the CO2 reduction would not have occurred otherwise. Emissions associated with operations of the pilot project are relatively small and will be quantified and netted against the quantity of CO2 removed from the atmosphere. Fossil fuel requirements will be minimal because Project Macoma has proposed that their system be sited at the Port of Port Angeles, which is supplied by clean energy.

Project Macoma is the kind of science-led project that the State's Blue Ribbon Panel on Ocean Acidification, Marine Resources Advisory Council, Legislature, and Governor Inslee have called for. Project Macoma will increase the marine ecosystem's ability to capture and store additional carbon from the atmosphere while prioritizing equity and environmental justice. Based on our experience reviewing Ebb's earlier project and interacting with Ebb over the last two years, we have found Ebb to be a team deeply committed to responsible, safe piloting, rigorous measurement, and scientific transparency. We would be excited to see this valuable project move forward. Thank you for the opportunity to provide feedback and for Ecology's continued dedication to mitigating greenhouse gas emissions and protecting communities and ecosystems from the worst impacts of climate change.

Ecology's Response: Comments noted, and thank you for providing comments on this two-year Project's mCDR pilot project.

Comment #14: Brad Ack' CEO, www.oceanvisions.org, +1-202-766-9386, April 30, 2024

I am writing with regards to the Department of Ecology's forthcoming determination regarding Project Macoma, a proposed pilot project seeking to remove legacy carbon pollution from the atmosphere and improve water quality in Port Angeles. Given our organization's commitment to addressing the climate crisis and restoring ocean health, we are pleased to support Project Macoma's NPDES/SWD Permit application.

Ocean Visions is a non-profit organization that catalyzes innovation at the intersection of the ocean and climate crises. We facilitate multi sector collaborations, working with leading research institutions, the private sector, and public-interest organizations to fully explore and advance responsible and effective ocean-based climate solutions. We support innovation, development, and demonstration of solutions that can address and hopefully exceed the scale and pace of negative change in the ocean. We have spent a good deal of time on evaluating ocean-based CDR approaches and providing technical and scientific services to startups in the space.

Project Macoma is designed to test an approach that addresses two climate-related problems, too much CO_2 pollution in the air and coastal acidification, with a single technology. The proposed pilot project would remove up to 1,000 net tonnes of carbon dioxide (CO_2) pollution

from the atmosphere while reducing coastal acidification in local receiving waters in Port Angeles Harbor by temporarily restoring the pH closer to pre-anthropogenic conditions.

Having previously served as Executive Director of the Puget Sound Recovery Program (precursor to the PS Partnership), I am well aware that Washington's communities and economy are vulnerable to the effects of both climate change and ocean acidification. Innovative, science-based pilot projects like Project Macoma are sorely needed to safely advance rigorous research and development solving for these existential threats.

Project Macoma represents the chance to help further test and prove a promising approach to carbon dioxide removal that would be permanent, net-negative, additional and verifiable—all of which are necessary to avoid the worst impacts of climate change. If successful, the carbon that Project Macoma will remove will be safely stored in the ocean for over 10,000 years and would be 100% additional, meaning the CO_2 reduction would not have occurred otherwise.

The marine carbon dioxide removal (mCDR) technology that Project Macoma would use is currently being demonstrated at the Pacific Northwest National Laboratory (PNNL) at Sequim in partnership with PNNL, the U.S. Department of Energy, the National Oceanic and Atmospheric Administration (NOAA), and the University of Washington.

In my view, Project Macoma is exactly the kind of science-led project that the State's Blue Ribbon Panel on Ocean Acidification, Marine Resources Advisory Council, Legislature, and Governor Inslee have called for. Project Macoma will increase the marine ecosystem's ability to capture and store additional carbon from the atmosphere while prioritizing equity and environmental justice. Thank you for the opportunity to provide feedback on this important matter and for Ecology's continued dedication to mitigating greenhouse gas emissions and protecting communities and ecosystems from the worst impacts of climate change.

Ecology's Response: Thank you for providing comments on this two-year Project's mCDR pilot project. Comments noted.

Comment #15: Jason C. Grillo, jason@airminers.com , **Co-Founder, Director of Strategic Partnerships, AirMiners PBC, Gig Harbor, Washington, April 30, 2024**

Thank you for the Department of Ecology's continued attention to the health of our natural environment and to the agency's forthcoming determination regarding Project Macoma, the proposed pilot project seeking to remove legacy carbon pollution from the atmosphere and improve water quality in Port Angeles. Given our organization's commitment to advancing climate resilience by removing excess carbon dioxide pollution from the atmosphere worldwide through marine and other carbon dioxide removal methods, we are eager to support Project Macoma's NPDES/SWD Permit application.

We strongly urge the Department of Ecology to issue Project Macoma (i) a final determination that its proposed discharge of processed ocean water to Port Angeles Harbor is necessary and in the overriding public interest under WAC 173-201A-320(1) and (ii) an

NPDES/SWD permit under Section 402 of the Clean Water Act and Chapter 90.48 Revised Code of Washington.

For background, AirMiners is a public benefit corporation dedicated to accelerating the pace of removing the first billion tons of excess carbon dioxide pollution from the atmosphere. We operate a global community of over 2,500 carbon removal innovators across all methods of CDR, and have graduated 150 startup companies from our accelerator program. Our team works with new marine CDR companies regularly, and have frequently featured key challenges and opportunities for marine carbon removal projects in our biweekly webinar series.

Project Macoma is designed to address two climate-related problems - too much CO_2 pollution in the air and coastal acidification - with a single technology. The proposed pilot project would remove up to 1,000 net tonnes of carbon dioxide (CO_2) pollution from the atmosphere while reducing coastal acidification in local receiving waters in Port Angeles Harbor by temporarily restoring the pH closer to pre-anthropogenic conditions. Washington State, its communities, and economy are particularly vulnerable to the effects of both climate change and coastal acidification. Innovative, science-based pilot projects like Project Macoma are sorely needed to safely advance rigorous research and development solving for these existential threats.

The marine carbon dioxide removal (mCDR) technology that Project Macoma would use is currently being demonstrated at the Pacific Northwest National Laboratory (PNNL) at Sequim in partnership with PNNL, the U.S. Department of Energy, the National Oceanic and Atmospheric Administration (NOAA), and the University of Washington.

Project Macoma represents a promising approach to carbon dioxide removal that is permanent, net-negative, additional and verifiable - all of which are necessary to avoid the worst impacts of climate change. The carbon that Project Macoma will remove will be safely stored in the ocean for over 10,000 years and is 100% additional, meaning the CO_2 reduction would not have occurred otherwise. Emissions associated with operations of the pilot project are relatively small and will be quantified and netted against the quantity of CO_2 removed from the atmosphere. Fossil fuel requirements will be minimal because Project Macoma has intentionally proposed that their system be sited at the Port of Port Angeles, which relies on renewable resources to supply the power grid.

Project Macoma is exactly the kind of science-led project that the State's Blue Ribbon Panel on Ocean Acidification, Marine Resources Advisory Council, Legislature, and Governor Inslee have called for. Project Macoma will increase the marine ecosystem's ability to capture and store additional carbon from the atmosphere while prioritizing equity and environmental justice. Our expertise indicates that Project Macoma would benefit the climate by removing excess greenhouse gas while benefiting the local community and fostering resilience of the precious marine environment of our state in a responsible manner.

Thank you for the opportunity to provide feedback on this important matter and for Ecology's continued dedication to mitigating greenhouse gas emissions and protecting communities and ecosystems from the worst impacts of climate change.

Ecology's Response: Thank you for providing comments on this two-year Project's mCDR pilot project. Comments noted.

Comments #16, Helle Andersen, Port Angeles, WA 98362, email: rickandhelle@gmail.com, May 1, 2024

RE: Marine Carbon Dioxide Removal Pilot Project (Project Macoma)'s National Pollutant Discharge Elimination System Application with the Department of Ecology.

I'm writing to provide comments on the proposed Marine Carbon Dioxide Removal Pilot Project to be located at the Port of Port Angeles' Terminal 7 in Port Angeles Harbor. My comments will focus on two aspects of the project – 1) the mixing analysis and 2) environmental impacts.

1) In the SEPA document Appendix A Port Angeles Mixing Analysis Technical Memorandum prepared by Brown and Caldwell it states on page 5 Section 5.2.2. that "Ambient current speed and direction data are not available for the proposed discharge location; however, current speed distribution was measured to support dilution analyses of the Port Angeles municipal wastewater treatment facility which discharges to Port Angeles Harbor near the Harbor mouth." Further on page 5 it states" For the present analyses, current speeds are conservatively assumed to be lower within the Harbor (10th percentile = 2 cm/s and 50th percentile = 5 cm/s). Ambient current direction was conservatively assumed to be co-flowing with the effluent (cross current flows result in higher predicted dilution)."

Port Angeles Harbor has been studied heavily because it encompasses two cleanup projects – Rayonier Mill and Western Port Angeles Harbor – led by Department of Ecology. In connection with these projects the following two current studies have been conducted:

- Port Angeles Harbor Conceptual Site Model Delineation of In-Water Site Boundaries prepared by Windward 2012.
- Port Angeles Harbor Current Data Collection and Analysis prepared by Evans Hamilton June 2008.

In addition, a much older study was conducted for EPA by Evans Hamilton in 1979 – Dynamics of Port Angeles Harbor and Approaches Washington.

Based on the quotes above and the list of references in the memorandum none of these studies were used in the modeling effort and there is no indication that they were reviewed in the process. Information in the Windward 2012 report suggests that the current in the inner harbor is less than the percentiles used in the model by Brown and Caldwell (see Figure 6). If correct this will impact the mixing zone such as the size of the plume, the distribution of the plume in the water column and the resident time for the plume near the outfall. To address this shortcoming the model should be run with lower current velocities.

2) In the Biological Assessment Section 4.3.1 page 23 it states "The shoreline is composed of a boulder riprap wall and lacks the complexity necessary for a diverse shoreline microhabitat. There is no overhanging vegetative cover or woody debris present that would provide refugia

for juvenile salmon and forage fish from predators and heat stress." It may be correct that the inner harbor lacks a diverse shoreline microhabitat, but the fact is that the nearshore environment of the inner harbor is extensively used by schooling forage fish a good part of the year. The schooling forage fish can easily be observed under and near the docks in the Boat Haven Marina adjacent to Terminal 7. Hence, the statement in the Biological Assessment (Section 8.2 page 55) that the project will cause adverse effects to Pacific Coast Salmon essential fish habitat (EFH), Coastal Pelagic Species EFH, and Pacific Coast Groundfish EFH should be expanded to include forage fish. The ramifications of impacting such an important component of the marine ecosystem should be part of NPDES review and approval process. The affected area (0.23 acre) may seem small, but over time a lot of fish species could be affected.

Impacts to planktonic larvae and organisms are poorly described in the assessment as the report primarily focuses on impacts to fish larvae and Chinook salmon prey. It should be noted and clarified than any planktonic organism caught within the plume will be adversely affected and during the process scenarios with very high and low pH (pH > 12 and < 3) a death zone will occur in the 40-foot radius throughout the duration of these processes (the durations are listed as a single tidal cycle and < 8 hours) and linger until the plume has dissipated.

Impacts of the project to mammals are addressed in the Biological Assessment by a review of threatened and endangered species and summed up in Table 1 page 3 with the determination "not likely to adversely affect" and "no jeopardy." Harbor seals, river otters and sealions are present in the inner harbor throughout the year and use the nearshore environment extensively. Impacts to these mammals should be included in the Biological Assessment. For example, potential impacts to their eyes caused by high and low pH could affect their ability to hunt and thereby their survival. If the revised Biological Assessment identifies potential adverse effects to these mammals, at a minimum, the Best Management Practices should be revised to include measures that prevent or discourage these mammals to enter into the 40-foot radius plume area and thereby reducing adverse impacts to these mammals.

In closing I would like to bring your attention to the extent the boat ramp located within the project area is used by sailors, kayakers, recreational crabbers and fishermen. In windy conditions junior sailors use the waters adjacent to and east of Terminal 7 for sailing and swimming, kayakers follow the shoreline cutting under Terminal 7 to stay out of the wind and enjoy the aquatic life under the pier, and recreational crabbers place their pots all over the inner harbor including close to Terminal 7. To ensure that no adverse effects occur to these groups of the local population the Best Management Practices should include placement of buoys delineating the 40-foot radius of the plume and considerations should be given to the timing of the operations with discharge with high and low pH (Scenarios 1b, 5b, and 2a).

Ecology's Response: Thank you for comments on this two-year mCDR pilot project. The scientific/enhanced alkaline stream is a batch discharge with a limited volume of approximately 18,700 gallons per day (gpd) and it will be discharged during the ebb tide. The permittee will flag the area of the discharge. The proposed draft permit includes a pH limit of 12.0 standard units, acute toxicity test, and the USFWS-approved ESM, along with an adaptive management

plan to mitigate any negative impacts on receiving water quality and biological activity. The ESM protocol, along with pH adjustment from 13.5 to 12 standard unit and acute toxicity testing, is part of the AKART methods designed to protect water quality and biological activity. Please also see Ecology's responses to comments 1 and 2.

Comment 17: Kyla Westphal, Relaying letter from Port Angeles Business Assoc., May 2, 2024

Port Angeles Business association support letter.

PABA Letter - Ebb Carbon Project.pdf

Ecology's Response: The Department of Ecology acknowledges the receipt of the letter from Port of Port Angeles Business Association in support of Project Macoma's mCDR two-year pilot project. Thank you.

Comment#18: Kelsey Furman, **Puget Soundkeeper Alliance,** kelsey@pugetsoundkeeper.org

Casey Allen -**Deschutes Estuary Restoration Team, May 2, 2024**

Re: Project Macoma Application and the Necessary and Overriding Public Interest Determination

Puget Soundkeeper (Soundkeeper)et al. respectfully submit these comments on and questions about the Project Macoma National Pollutant Discharge Elimination System (NPDES) Wastewater Discharge Permit. Soundkeeper is a member-based nonprofit organization that has spent 40 years working to protect and enhance the waters of the Puget Sound and the communities that depend on them. Our members care deeply about the health of the Sound and its watershed, as well as the likely and already present effects due to climate change and high levels of CO2 in the atmosphere. We are excited to hear about innovative ways to solve grave problems, but remain concerned about the possible, probable, and incidental negative impacts that often accompany new technologies. Furthermore, when a project includes an "overriding the public interest" finding, it is especially important and consistent with the social contract that harm reduction and mitigation be carefully and transparently developed and accessible to the public.

Transparent Analysis and Ongoing Monitoring

Soundkeeper asserts that a pilot project that is approved while overriding the public interest, should include full and transparent analysis of the potential negative impacts at the onset when early-stage decisions, planning, and design are being evaluated and discussed. **In addition to this upfront analysis, a comprehensive and transparent plan for ongoing monitoring is essential for a first-of-its-kind project such as Project Macoma. Each of these should be made available to the public in an easy to access and understand format, such as through publicly**

available webinars and by hosting the information on a public website and available in multiple languages.

Please disclose Ecology's independent analysis of the extent of the public interests served by the proposed reservations and the extent of any harm to the public interests caused by the reservations; the comprehensive and ongoing monitoring plan; and the process and procedures developed to meaningfully inform the public.

Overriding the Public Interest

A project should not override the public interest if it poses significant harm to the environment, wildlife, or ecosystems. Please analyze and disclose all risks associated with the project and the anticipated extent of the harm. This includes but is not limited to the pH standard. How long will the project effect pH? How far does the affected area reach? Will this negatively impact threatened or endangered species in the immediate vicinity?

A project should not override the public interest if it exacerbates social inequalities or disproportionately impacts vulnerable communities. Please meaningfully engage with the community that will or may be directly affected by this determination.

Please note that "the OCPI exception is very narrow..."[1] Further, it must not be used as an "end-run around" the normal processes.[2] If Ecology determines that this pilot project overrides the public interest, it should only make the decision after it has completed a thorough review and engaged with those it will impact the most.

Risks of Industrial Solutions

Industrialization can create new problems and/or contribute to the problem it is trying to fix. Before making a final determination, please determine the amount of CO2 that will result from construction and operation of the project including transportation of employees coming and going. Will it create as much or more CO2 than the project purports to address? How much CO2 does the project take out of the atmosphere after considering the amount it contributes? Can the project include green infrastructure like permeable pavements, rain gardens, planter boxes, etc. to better address its own carbon footprint? Ecology retains the discretion and should require that the applicant examine specific alternatives or provide additional information to conduct the analysis regarding ways to lower its own carbon footprint.[3]

Soundkeeper often focuses on addressing pollutants at the source of the problem. We understand that addressing sources of CO2 beyond the project's own carbon footprint is not the intent of the project. However, we have reservations with the potential to monetize the continuation of CO2 being released into the atmosphere and associated destructive habits. We would be remiss not to note the importance of addressing sources of CO2 emissions from "human activities, especially fossil fuel combustion and land use changes," that "have caused global atmospheric CO2 to increase by more than 50% since the pre-industrial era" and exacerbated issues like ocean acidification in Puget Sound. Project Macoma, and others that

follow, must remain a truly temporary project that does not further detract from the need to 1) decrease the amount of CO2 we put into the atmosphere and 2) preserve natural carbon sinks.

In addition to CO2, other discharges cause and contribute to the water quality problems experienced by the Puget Sound and its waterways. These discharges must be thoughtfully and thoroughly addressed by responsible planning, design, and implementation with consistent follow up and accountability. Please describe how and to what extent Ecology has considered these potential impacts, including how and to what extent these may affect the associated species and communities of concern.

Need for Monitoring and Backstops

Project Macoma states in its March 26, 2024, Permit Application and Statement of Compliance with WA 173-201A-320, Tier II Criteria, that it "will closely monitor the impacts of its discharge and will stop and adjust its operations if adverse impacts to the marine environment occur." Soundkeeper appreciates this statement but hopes to see Ecology require robust monitoring and data collection obligations that allow for ongoing improvements and adjustments as needed. What does monitoring entail for Project Macoma? What will it look out for specifically to indicate whether a pause in operation and adjustment is needed?

Backstops must be in place before the project begins to ensure the intended consequences do not exceed what is currently expected and unintended consequences do not inflict substantial and unrecoverable harm to the community or environment. For example, an expected consequence is that the project will exceed the water quality standards for pH. Is there a clear point at which the project would require an immediate cease of operation?

Conclusion

We look forward to learning more about this project and its potential so it can continue to work with our communities around the Puget Sound toward our shared public interest in protecting and enhancing our waterways and communities. While we wholeheartedly agree that it is vital to get CO2 out of the atmosphere and work on associated issues like ocean acidification in the Puget Sound, it is imperative that we do so in a responsible way that does not create additional harm or hurdles while keeping the public informed.

Ecology's Response: Thank you for your comments on this two-year mCDR pilot project. The scientific/enhanced alkaline stream is a batch discharge with a limited volume of approximately 18,700 gallons per day (gpd) and it will be discharged during the ebb tide. The permittee is required to conduct continuous monitoring for water quality at the discharge point and at the mixing zone boundary for pH, temperature, turbidity, and dissolved oxygen. These monitoring results will be available to the public. The permittee must also meet permit limits for pH and temperature at both the discharge point and the edge of the mixing zone boundary. Additionally, the permittee must adjust pH levels from 13.5 standard units to 12.0 standard units at the discharge point before releasing alkaline-enhanced process water into Port Angeles Harbor.

Ecology requires that the permittee conduct acute toxicity testing to assess the effects of pH changes caused by the discharges will cause acute mixture toxicity. The proposed draft permit requires the permittee to submit USFWS approved ESM before starting operations. The ESM protocol, along with pH adjustment from 13.5 to 12 standard units and acute toxicity testing, is part of the AKART methods designed to protect water quality and biological activity. If any negative impacts are observed during in-water monitoring or surveillance, the permittee will be required to cease the discharge, implement the ESM protocol, and adjust operations to resolve the issue before resuming their operations.

The Permittee is also required to collect receiving water information necessary to determine if the effluent causes a violation of the Water Quality Criteria outside of the boundary of a mixing zone as result of the discharge. Additionally, the receiving water study will provide supporting information to evaluate whether the discharge at the edge of the mixing zone does not have a reasonable potential to cause a loss of sensitive or important habitat, substantially interfere with the existing or characteristic uses of the water body, result in damage to the ecosystem, or adversely affect public health as determined by the department.

The permittee is also required to submit the project results report upon completion of the pilot project. This report will include a calculation of carbon sequestration and its benefits compared to water intake and discharge.

Project Macoma final comments.pdf

Comment #19: Roopa Dandamudi (email: Roopa.Dandamudi@xprize.org) relaying letter from Michael Leitch, P.Eng. M.Sc., XPRIZE Carbon Removal, May 2, 2024

Ebb Carbon support letter 5-2-24

Ecology's Response: The Department of Ecology acknowledges the receipt of the letter from Michael Leitch, P.Eng, M.SC., Sr. Technical Lead, XPRIZE Carbon Removal in support of Project Macoma's mCDR two-year pilot project. Thank you.