City of Tacoma Environmental Services

Please see the attached City of Tacoma Environmental Services comment letter and attachment 40. Please note that a first submission with the letter and attachments 1 - 39 was submitted separately due to the file size and number of files limitation.

City of Tacoma
Environmental Services Department

Submitted via Rulemaking Comment Portal

Marla Koberstein
State of Washington Department of Ecology
Water Quality Program
P.O. Box 47600
Olympia, WA 98504-7600

May 22, 2025

Re: City of Tacoma Comments on Draft Performance-Based Approach

Dear Ms. Koberstein:

The City of Tacoma ("Tacoma", "City") appreciates the opportunity to comment on the Washington State Department of Ecology ("Ecology") draft performance-based approach guidance document ("Performance-Based Approach") that will steer Ecology determinations for site-specific natural conditions standards.

Environmental health is a priority for the City of Tacoma. For over a decade, we have been a leader and steadfast partner in regional discussions on finding the right balance when it comes to nutrients and protecting the health of the Puget Sound. We are continuing to work collaboratively on sensible and sustainable long-term solutions that protect the Puget Sound. We also want to ensure that measures that are put into place will actually have the potential to make a measurable positive impact to the environment, and that we are using reliable science and the best available data to determine the appropriate actions at a sustainable cost for our ratepayers, particularly when there is a potential to significantly impact the housing supply and affordability for many households in Tacoma.

For decades, the mission of Puget Sound clean water utilities has been focused on protection of water quality and successful compliance with regulatory requirements for secondary treatment, wet weather controls, toxics reduction, stormwater management, and beneficial use of biosolids. These water quality protection efforts require utilities to extensively plan, fund, construct, operate, and maintain billions of dollars in investments in their complex wastewater infrastructure. New regulatory requirements with the potential to add significant technical, operational, and economic impacts need to be carefully balanced with the understanding of the necessity and expected benefits. It is especially important that uncertainties are addressed with permit structures that provide opportunities for adaptive management over time to ensure that investments are on-target, effective, and produce tangible results.

The City supports water quality standards, including those which will be calculated using the Performance-Based Approach, for dissolved oxygen that are protective of aquatic life and supported by sound science. Developing updated biologically based dissolved oxygen standards should be considered together with natural conditions criteria since natural conditions considerations only take effect when biologically based numeric criteria are not met. Such an approach might even negate the need for natural condition criteria in some circumstances.

Tacoma provides the following comments regarding the Performance-Based Approach:

The City reviewed the following Ecology documents regarding the new natural conditions regulations.

- A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington (24-10-017, May 2024)
- A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington (Second Draft) (25-10-022, March 2025)
- Performance-based approach methods document: marine dissolved oxygen. Public workshop and hearing. May 15, 2025.
- Concise Explanatory Statement Chapter 173-201A WAC Water Quality Standards for Surface Waters of the State of Washington – Natural Conditions: Summary of Rulemaking and Response to Comments (24-10-057, November 2024)
- Comment Letter from EPA Region 10 on the Washington State Department of Ecology's proposed amendments and additions to Chapter 173-201A Washington Administrative Code – Water Quality Standards for Surface Waters of the State of Washington, filed on May 10, 2024, and incorporation by reference the adoption of Ecology publication *A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington*.

The following review comments were focused on applying the Performance-Based Approach to develop standards for marine dissolved oxygen (DO), as that is the only parameter for which this draft provides a method of calculation; however, the City anticipates an opportunity to provide comment on future chapters Ecology issues addressing other conventional pollutants such as temperature and pH level.

1. **Ecology's performance-based approach is overly complex and based on an entirely hypothetical natural condition that depends upon the assumptions made about pre-anthropogenic conditions, which cannot be known, measured, or verified.**

Developing pre-anthropogenic conditions as part of setting natural conditions criteria is unlikely to meet Ecology's objectives that the process should result in predictable and repeatable criteria. This is because developing pre-anthropogenic conditions will require many assumptions in estimating load reductions from land-based sources (including groundwater and river/tributary inputs), atmospheric deposition, and ocean boundary conditions. In addition, human-induced structural changes will need to be estimated to remove impacts associated with shoreline hardening, dredging activities, and river control structures such as dams and diversions. Most likely a model (e.g., watershed, such as the Salish Sea Model) will need to be used to estimate the natural conditions criteria associated with the pre-anthropogenic conditions, which will have its own set of application assumptions.

It appears that Ecology has introduced an additional level of complexity in the March 2025 Second Draft of the performance-based approach that would require the development of individual natural conditions criteria for each layer of the 10 layers in the marine water column from top to bottom of Puget Sound. This appears complex and Ecology has not provided an explanation for how this will be applied in practice to Puget Sound. The March 2025 Second Draft does reference volume weighting horizontally, but notes that no vertical aggregation is allowed. No explanation is provided in the March 2025 Second Draft for how volume weighted horizontal aggregation of the various layers would be accomplished across the entire geography of Puget Sound, or by subbasin, or by embayment. Further, the Salish Sea Model includes 10 layers from top to bottom, but water depths vary throughout Puget Sound. So, while the surface layer may be common across Puget Sound, lower water depth layers at various locations would not align with each other.

EPA acknowledges that the performance-based approach Ecology is proposing has limited application in other States[1], so an established precedent that the process is predictable and repeatable is also limited and may not exist. This suggests that Ecology's novel application of the performance-based approach may result in unpredictable outcomes when applied to Washington waters. It is unlikely that Ecology's performance-based approach meets Ecology's own stated goal to "Increase clarity and transparency on the process we use to determine natural conditions in surface waters" given the complexity of the process and challenges in characterizing and accounting for pre-anthropogenic conditions predating European settlement, agricultural development, climate change, etc. The assumptions made to conduct the natural conditions

[1] EPA, 2015. A Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Aquatic Life Criteria for Temperature, Dissolved Oxygen, and pH: Interim Document. Office of Water, EPA 820-R- 15-001. February 2015.

analysis are likely to vary depending upon the individuals or institutions conducting the analysis and their opinions.

2. **Limited Opportunity for Public Comment and Transparency**

If the Performance-Based Approach is approved by EPA, the criteria derived from the methods in the approach become applicable for CWA purposes and remain the applicable criteria until EPA approves a change, deletion, or until EPA promulgates more stringent criteria if necessary to meet CWA requirements (40 CFR 131.21(c), (e)). The draft Performance-Based Approach states that, "aquatic life water quality criteria values developed using the performance-based approach are applicable to the waterbody immediately following the performance-based approach derivation process." The City is generally concerned that if the Performance-Based Approach is implemented, there will be a significant lack of transparency and opportunities for independent, scientific peer review and public input as Ecology works to set standards for a water body. There is additionally limited opportunity for public comment and transparency regarding the Salish Sea Model. Although Ecology anticipates publishing the model in June, Ecology is not offering any opportunity for public comment at that time. This is a critical point, as Ecology has made clear it intends to use the Salish Sea Model as an integral component of its Performance-Based Approach to set DO standards in Puget Sound; these standards will have a significant impact on municipalities and thus the public deserves an opportunity for input on this part of the approach. This is a theme that is brought up continually in our comments below.

3. **Ecology has not addressed the spatial and temporal applicability or the frequency of exceedance of the natural conditions criteria in order to establish a transparent process for interpretation of where and when and how often natural conditions apply.**

EPA recommends a performance-based approach call for definition of the spatial (e.g., monitoring location, embayment, assessment unit) and temporal (e.g., summer, low flow, diurnal) boundaries of natural conditions criteria. For example, the DO standards in Chesapeake Bay established designated use areas (e.g., open-water fish and shellfish use, deep-water seasonal fish and shellfish use, deep channel seasonal refuge use) with associated temporal, concentration, and duration definitions. In its Performance-Based Approach guidance document, Ecology mentions that "developing and calibrating a model of the existing conditions of the waterbody or watershed, including defining temporal and spatial boundaries" is a step in the process of developing natural conditions criteria, and boundary information used to develop site boundaries must include geospatial information and be documented in the QAPP. However, Ecology provides no further detail on the topic. Ecology also stated in its response to comments on its first draft of the Performance-Based Approach that defining spatial boundaries will be a part of natural conditions criteria development, so the agency is unable to provide an exact timeline of when that step of the process will be undertaken and when the natural conditions criteria will be available.

Further, Ecology has not addressed the allowable exceedance frequency of the natural conditions criteria that would allow a transparent interpretation of the *de minimis* impact to natural conditions criteria due to anthropogenic sources. For example, the EPA proposed DO rulemaking for the tidal Delaware River[2] and the Florida Department of Environmental Protection DO standards[3] use an acceptable criteria exceedance frequency of 10% (i.e., the DO magnitude can be exceeded 10% of the time in a season). These missing considerations are needed to develop natural conditions criteria that include the required magnitude, duration, and frequency components of water quality standards.

These omissions may result in Ecology's additional DO decrease (i.e., 10% or 0.2 mg/L) below the natural conditions criteria due to anthropogenic sources being interpreted as a not to exceed value at any point and at any time, which constitutes an extremely high bar for water quality assessments. It would be inappropriate to consider a numerical value which has simply been selected as a representation of a *de minimis* impact (i.e., within monitoring measurement error) that is not linked to maintenance of a specific aquatic life beneficial use.

Further, it would be inconsistent with the level of accuracy of water quality model predictions with and without anthropogenic sources when model skill assessment results exceed the selected *de minimis* DO decrease of 0.2 mg/L. Model skill assessment of the Salish Sea Model presented in the Journal of Geophysical Research[4] and in Ecology's Model Updates and Bounding Scenarios report[5] indicate overall Sound wide mean error (bias) ranging for DO from -0.7 to 1.0 mg/L and root mean square error (RMSE) ranging from 0.6 to 1.6 mg/L. These two statistics measure the difference between observed data and the model predictions with the model performance varying in the different regions of the Sound (i.e., Bellingham, Samish and Padilla Bays, Whidbey Basin, Admiralty Inlet, Main Basin, Hood Canal, South Sound). Although these model statistics results are similar to other complex marine DO modeling studies, the accuracy of the model needs to be accounted for when evaluating natural conditions DO criteria and the allowable DO decrease associated with anthropogenic sources.

[2] Federal Register, 2023. Water Quality Standards To Protect Aquatic Life in the Delaware River. EPA–HQ–OW–2023–0222. Vol. 88, No. 244, December 21, 2023.
[3] FDEP, Dissolved Oxygen Criteria for Class I, Class II, Class III, and Class III-Limited Waters. Chapter 62-302.533.
[4] Khangaonkar, T., Nugraha, A., Xu, W., Long, W., Bianucci, L., Ahmed, A., Mohamedali, T., & Pelletier, G., 2018. Analysis of hypoxia and sensitivity to nutrient pollution in Salish Sea. Journal of Geophysical Research: Oceans, 123, 4735–4761. https://doi.org/10.1029/2017JC013650.
[5] Washington State Department of Ecology, 2019. Puget Sound Nutrient Source Reduction Project, Volume 1: Model Updates and Bounding Scenarios. Publication No. 19-03-001, January 2019.

4. **Ecology must fully comply with state rulemaking requirements.**

The adoption of water quality standards is subject to the significant legislative rule (SLR) requirements of the state Administrative Procedures Act (APA). RCW 34.05.328. These include the following:[6]

- Statement of general goals and objectives. A detailed statement of the general goals and objectives of the statute that the rule implements. RCW 34.05.328 (1)(a).

- Statement of necessity and alternatives analysis. A determination that the rule is necessary to achieve the general goals and specific objectives, an analysis of alternatives to rulemaking, and analysis of the consequences of not adopting the rule. RCW 34.05.328 (1)(b).

- Preliminary and final cost-benefit analysis. A preliminary cost-benefit analysis must be prepared at the time a draft rule is published for public comment. A final cost-benefit analysis must be issued when the rule is adopted. RCW 34.05.328 (1)(c). The cost-benefit analysis must include a determination that the "probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented." RCW 34.05.328 (1)(d).

- Least burdensome alternative analysis. A determination, after considering alternative versions of the rule, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives identified under RCW 34.05.328 (1)(a). RCW 34.05.328(1)(e).

- Justification for more stringent requirements than federal law. Ecology must determine if the rule is more stringent than federal standards. If so, Ecology must determine that the difference is justified either by a state statute that explicitly allows the agency to differ from federal standards or by "substantial evidence" that the difference is necessary to achieve the general goals and specific objectives stated under RCW 34.05.328 (1)(a). RCW 34.05.328(1)(h).

- Implementation plan. Prior to adoption, Ecology must provide an implementation plan that describes how the agency intends to implement and enforce the rule

[6] In addition to these elements, the SLR also requires determinations that the rule does not require actions that violate the requirements of other state or federal laws, RCW 34.05.328 (1)(f), and that the rule does not impose more stringent requirements on private entities than on public entities unless required by federal law. RCW 34.05.328(1)(g).

including a description of the resources the agency intends to use, how the agency will inform and educate affected persons about the rule, how the agency will promote and assist voluntary compliance, and an evaluation of whether the rule achieves the purpose for which it was adopted. RCW 34.05.328 (3).

- Report to joint administrative rules review committee. After adopting a rule regulating the same subject matter as another provision of federal law, Ecology will be required to submit a report to the legislature identifying the existence of any overlap, duplication, or difference with federal law and making recommendations for any legislation necessary to eliminate or mitigate any adverse effects of such overlap, duplication or difference. RCW 34.05.328 (4).

The APA also requires that the Ecology water quality program identify the sources of information reviewed and relied upon by the agency in preparing a SLR. RCW 34.05.272. The APA further requires that a draft rule package include a small business economic impact statement (SBEIS) that complies with RCW 19.85.040. RCW 34.05.320 (1)(j). RCW 34.05.320. The SBEIS must include an evaluation of compliance impacts on small businesses and provide a determination of whether the rule will have a disproportionate cost impact on small businesses.

The draft Performance-Based Approach is not in full compliance with these important rulemaking requirements under state law as discussed in the following comments. Ecology claims that, since the Performance-Based Approach is only referenced and not part of the Water Quality Standards regulations, and revisions to the document would not change the adopted rule language, the agency is not required nor will be conducting a separate formal rulemaking for this document. However, if adopted, the Performance-Based Approach will be used to develop new standards that will have a significant impact on the operation, management, and financial capacity of municipalities across the state, and the violation of such standards would subject municipalities to penalty. RCW 34.05.328 (5)(c)(iii). Ecology is first and foremost an agency that promotes and enforces compliance with environmental regulations and permits. The department should take as equally important its obligations to fully comply with the significant legislative rule requirements. These requirements were first adopted as part of the 1995 Regulatory Reform Act under Governor Lowry. Ch. 403, Sec. 201, Laws of 1995. They serve to promote notice to the public and a necessary opportunity to fully understand and comment on the reasonableness of a proposed rule. These requirements are no less important to the legislative oversight of rulemaking under RCW 34.05.610-681. That oversight cannot function unless Ecology fully complies with the APA requirements for its rulemaking. Tacoma requests that Ecology address these deficiencies in a revised draft rule package that is subject to public notice and comment.

5. **Ecology has failed to reasonably consider alternatives.**

Before adopting a rule, agencies are required to analyze alternative versions of the rule, the consequences of not adopting the rule, and alternatives to rule making. RCW 34.05.328(1). A reasonable consideration of alternatives under the APA is akin to requirements under the State Environmental Policy Act (SEPA). Under SEPA, if an agency proposal may have significant adverse environmental impacts, the agency is required to prepare an Environmental Impact Statement (EIS) that includes an analysis of alternatives. RCW 43.21C.030. Washington courts have equated this alternatives analysis to be "one of the key building blocks, if not the heart of SEPA." *Escala Owners Association v. City of Seattle*, 2022 WL 2915536, at *8 (2022) (unpublished). Similarly, the National Environmental Policy Act (NEPA) requires the federal government to consider a "reasonable range of alternatives" to any proposed agency action that may have a significant impact on the environment. 42 USCA § 4332 (C)(3). NEPA requires that agencies, "give full and meaningful consideration to all reasonable alternatives," and "the existence of a viable but unexamined alternative renders an [assessment] inadequate." *N. Idaho Cmty. Action Network v. U.S. Dep't of Transp.*, 545 F.3d 1147, 1153 (9th Cir. 2008); *Wetlands Water Dist. V. U.S. Dep't of Interior*, 376 F.3d 853, 868 (9th Cir. 2004); *Western Watersheds Project v. Abbey*, 719 F.3d 1035, 1050-1052 (9th Cir. 2013) (the court was troubled by BLM's decision not to consider a reduced- or no-grazing alternative at a site- specific level and by the way BLM dismissed other alternatives without any detailed analysis.)

Ecology has failed to issue an alternatives analysis for its Performance-Based Approach. Importantly, by not issuing the required analysis, Ecology fails to consider one essential alternative: developing a biologically-based and site specific marine DO criteria to replace the current DO criteria (WAC 173-201A-210) or a Puget Sound biologically-based and site specific marine DO criteria. Ecology has ignored inputs from EPA, multiple municipalities, Tribes, and other parties urging the adoption of such a standard.[7] The current DO water quality standard is outdated (over 55 years old) and fails to consider the geography and hydrology of the Puget Sound.[8] Puget Sound is comprised of multiple deep-water basins separated by shallow sills, and many basins terminate in shallow inlets; the current marine DO standards are neither reasonable nor realistic in many locations due to these physical factors.[9] The state has identified waters not meeting the DO standard, but that determination does not confirm the waters are truly

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[7] On multiple occasions, EPA has communicated to Ecology that it understood Ecology was only interested in pursuing a performance-based approach, Ecology "Modeling Considerations Checklist" with comments from EPA (internally circulated by Kalman Bugica on April 17, 2023); Letter from Sara Thitipraserth, Director, Stillaguamish Tribe Natural Resources Department to Washington Department of Ecology and EPA (May 26, 2023); Letter from EPA to Vince McGowan, Water Quality Program Manager, Washington State Department of Ecology (Nov. 19, 2021); City of Tacoma, Comment Letter on the Department of Ecology's draft Puget Sound Nutrient General Permit and draft Fact Sheet (Aug. 16, 2021); Email from Chad Brown to Ronald L. Lavigne (Nov. 21, 2022); Michael Connor and William Stelle, *Elements of a Comprehensive Puget Sound Nutrients Program*; Petition to the Department of Ecology from Tad Shimazu and Lincoln Loehr (Jul. 17, 1998).

[8] Lincoln Loehr, Comment Letter on Proposed 2018 303(d) List of Impaired Waters (June 4. 2021); Gordon Holtgrieve, Comment Letter on Proposed Puget Sound Nutrient General Permit (August 16, 2021).

[9] Letter from Sara Thitipraserth, Director, Stillaguamish Tribe Natural Resources Department to Washington Department of Ecology and EPA (May 26, 2023).

impaired.[110] Currently, marine waters with 5 mg/L DO in many deep-water basins are considered non-compliant, when in fact this oxygen level poses no threat to affected organisms.[11] A DO concentration of 5 mg/L is identified as protective for most uses, included fish migration, rearing, and spawning; however, the proposed rule may trigger natural conditions criteria if a sector of water is below even 6 or 7 mg/L. One cannot justifiably assert there is impairment when DO is less than 6 or 7 mg/L but still meets the 5 mg/L level. Ecology intends to extend its proposed Performance-Based Approach to aquatic life criteria[12]; this will ultimately result in many areas qualifying as "impaired" without any scientific basis.[13]

Additionally, Ecology has acknowledged that the 0.2 mg/L human-caused difference is not biologically based.[14] The nutrient criteria were adopted in 1967 by a predecessor agency that made no effort to understand DO levels throughout the inland marine waters before adopting the criteria.[15] In 1985, the Chairman of the Pollution Control Hearings Board, in a decision to deny waiver appeals from wastewater treatment plants (WWTPs), stated that evidence supported the position that the WWTPs' primary-treated effluents were not significantly impacting the marine environment, but there were significant impacts related to economic costs and the added requirements of disposing additional sludge, which, "outweighed the undefined benefits of secondary treatment."[16] Further, the toxic hot spots of pollution in the Puget Sound are site-specific and largely unrelated to a majority of the wastewater (sewer) outfalls in Puget Sound, due to the active circulation within the Puget Sound and the tremendous volume of deep water

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[10] *Id*.
[11] *Id*.
[12] E-mail from Kalman Bugia, Wastewater Quality Standards Scientist, Washington State Dep't of Ecology, to Lincoln Loehr (Apr. 16, 2024).
[13] *See* Lincoln Loehr, Comment Letter on Proposed 2018 303(d) List of Impaired Waters (June 4. 2021); *See also* Gordon Holtgrieve, Comment Letter on Proposed Puget Sound Nutrient General Permit (August 16, 2021).
[14] Department of Ecology Water Quality Standards staff Mark Hicks admitted Ecology does not have supporting information on the technical basis for Ecology's existing criteria, and stated archive staff had the relevant records destroyed, Letter from Mark Hicks, Water Quality Standards Scientist, Washington Dep't of Ecology, to Lincoln Loehr, Environmental Analyst, Heller, Ehrman, White and McAuliffe (Jul. 8, 1998); *See also* Department of Ecology Nutrient Forum presentation on May 30, 2018.
[15] Letter from Mark Hicks, Water Quality Standards Scientist, Washington Dep't of Ecology, to Lincoln Loehr, Environmental Analyst, Heller, Ehrman, White and McAuliffe (Jul. 8, 1998); To contrast, Chesapeake Bay confronted the same need for nutrient reductions and developed new DO criteria with EPA's help based on sound scientific rationale, Memorandum from Lincoln Loehr, Oceanographer and Water Quality/Permitting Consultant, to Scott Redman (Feb. 29, 2020).
[16] Lincoln Loehr, The Exclusion of Science from Major Water Quality Decisions, 17 Marine Pollution Bulletin 489, 492 (1986).

which acts as a nutrient and DO buffer.[17] A glacial fjord with good tidal circulation, like the Puget Sound, is considerably different from a shallow river valley type of estuary.[18]

Despite these facts, Ecology has chosen to implement nutrient criteria and modeling that is incompatible with the state of science. Ecology justifies this decision by asserting EPA and Ecology staff have "vetted" the marine DO criteria. However, more is needed than having these agencies "verify" the criteria or "check for accuracy." The Clean Water Act requires that water quality criteria "based on sound scientific rationale" and establish numeric criteria based on "scientifically defensible methods." 40 CFR 131.11(a)(1)-(b)(1). Rather than address the concerns voiced by numerous parties and evaluate the implications of using a biologically-based standard instead of a performance-based approach that does not accord with sound scientific rationale, Ecology is attempting to reestablish the nutrient program it had in place previously without considering other, more sound alternatives.

Ecology failed to conduct a reasonable analysis of all alternatives and must therefore address these deficiencies in a revised draft rule package that is subject to public notice and comment.

6. **Ecology failed to conduct an analysis to determine whether its Performance-Based Approach is the least burdensome alternative.**

To adopt a significant legislative rule, an agency must determine it is the least burdensome alternative to achieve the goals and objectives of the authorizing statute. RCW 34.05.328(1). Ecology has not published a least burdensome alternatives analysis to conclude its Performance-Based Approach is the least-burdensome alternative to achieve the goal of nutrient reduction in the Puget Sound. The Performance-Based Approach will inevitably overburden WWTPs with the costs of implementing advanced treatment technology and in turn overburden communities that must absorb the costs through higher wastewater rates and housing prices.

7. **Ecology has failed to conduct a proper cost-benefit analysis in accordance with the APA.**

Ecology cannot adopt a significant legislative rule if it fails to properly conduct the analysis required under RCW 34.05.328. Ecology is required to conduct a preliminary cost-benefit analysis and determine that the probable benefits of the rule are greater than its probable costs, accounting for both the qualitative and quantitative benefits and costs and the specific directives

[17] *Id*.
[18] *Id*.

of the statute being implemented. RCW 34.05.328(1)(d). Ecology failed to conduct a cost-benefit analysis for its Performance-Based Approach.

The City, other utilities, and non-utility organizations[19] have shared with Ecology the significant cost concerns associated with nutrient regulations and the ultimate cost implications for the respective impacted communities. It appears that Ecology has not considered this raised concern and is attempting to use its proposed Performance-Based Approach to reestablish its previous nutrient program. It is important that Ecology consider the cost effectiveness and cost impacts for any regulatory program, including nutrients. Ecology should consider the potential costs through its ongoing refinement of the Salish Sea Model (SSM) and plans to impose numeric water quality based effluent limits on Puget Sound WWTPs in the upcoming voluntary Puget Sound Nutrient General Permit (PSNGP). The proposed Performance-Based Approach will result in standards requiring WWTPs to implement cost-prohibitive advanced treatment technologies to reduce nitrogen and limit nutrient discharges in the Puget Sound. Ecology should evaluate the cost benefit effectiveness as part of its consideration to implement of a Performance-Based Approach, in collaboration with WWTPs to better understand the site-specific cost impacts, as Ecology's nutrient program continues to evolve and shift.

Ecology has published its own technical and economic evaluation of nitrogen removal at municipal WWTPs that outlines the costs of treatment technologies.[20] Additionally, environmental and engineering consulting firm, HDR, published a "Treatment Technology Review and Assessment" that analyzes treatment technologies applicable to nitrogen removal and related costs of implementation.[21] Ecology can also compare costs to the "Nitrogen Optimization Plan and Report", which Ecology has indicated that it will require under the voluntary PSNGP, which could cost cities tens of millions of dollars to implement over the first two years.[22] Municipalities have frequently expressed such concerns over the cost of reducing nitrogen discharges; these are also costs that municipalities will then need to pass onto ratepayers.[23] Further, Ecology has published guidance for WWTPs to estimate the costs of

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[19] *See* Burke et al., *Puget Sound Wastewater Service Affordability Analysis: Implications for Implementation Strategies* (May 17, 2023).

[20] Department of Ecology, *Technical and Economic Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities* (June 2011).

[21] The report estimates that, "the incremental unit costs to implement an advanced treatment retrofit for 0.5 mgd would range between $30 to $96 per gallon per day of treatment capacity,", HDR, *Treatment Technology Review and Assessment* (Dec. 4, 2013), pg. 41.

[22] Declaration of Christie True, ¶¶ 9-10, *King County v. Dept. of Ecology*, No. 21-083 (PCHB 2021); Mot. For Stay, 2021-12-28 King County Motion for Stay, pg. 5, *King County v. Dept. of Ecology*, No. 21-083 (PCHB 2021).

[23] To comply with a TIN cap rule under the PSGNP, King County estimated it will need to spend between $25 and $150 million over the next five years, $100 to $200 million in the next 10 to 15 years, and between $9 billion and $14 billion on future nitrogen removal. This results in monthly sewer rate increases of between $20 and $130 per month per household, Brief for King County as Amicus Curiae, pg. 3, *City of Tacoma v. Ecology*,

treatment technology required for nitrogen removal; there is no reason the agency cannot use that same guidance to conduct its own analysis for the Performance-Based Approach. Ecology published its Final Treatment Plant Financial Capability Assessment Guidance Puget Sound Nutrient General Permit (Financial Guidance) for WWTPs to use when preparing reasonable treatment alternatives as a part of the upcoming PSNGP's required AKART analysis.[24] In this Financial Guidance, Ecology lays out the tools for performing this type of economic impact analysis. At both the Mt. Vernon and Olympia workshops provided to outline and answer questions regarding the Financial Guidance, Utility representatives heard Ecology make it clear that the agency is fully aware of how expensive it will be to implement a Performance-Based Approach under its Natural Conditions Rule.

Ecology intends for its Performance-Based Approach, in association with the Natural Conditions Rule, to simply be another step in reinstituting its nutrient program. It has published guidelines for performing compliance analyses that outlined specific requirements for nutrient reduction evaluations for WWTPs to analyze and implement. There is a multitude of resources, prepared by both Ecology and third parties, that preview the exorbitant costs of treatment technologies WWTPs will need to implement in response to the anticipated standards Ecology will set using the Performance-Based Approach.

Ecology specifically fails to account for both the qualitative and quantitative costs and benefits of its Performance-Based Approach, as required under RCW 34.05.328 (1)(d). It fails to provide any discussion of environmental justice impacts, environmental concerns apart from aquatic impacts, or the generation of additional waste, among other relevant issues. Ecology has previously recognized the potential environmental impacts of requiring WWTPs to adopt additional nutrient removal technology, including the likelihood that tertiary treatment will not only generate more effluent sludge that will require disposal, but will also require two to three times the amount of electrical energy currently used in WWTPs. *Nw. Env't Advocs. v. Dep't of Ecology*, 18 Wn. App. 2d 1005, 2021 WL 2556573, at *9 (2021) (unpublished). Ecology also ignored climate change impacts of its Performance-Based Approach, including the fact that nitrogen removal from wastewater converts some nitrogen in the wastewater to nitrous oxide, a greenhouse gas that is 300 more potent than carbon dioxide.[25] Ecology also fails to consider the

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28 Wn. App. 2d 221 P.3d 462 (2023) ("King County Amicus Brief"); If Ecology implements a new Total Inorganic Nitrogen loading limits of less than 3 mg/L year-round, estimated monthly wastewater rates could double in cost (even a limit of less than 8 mg/L year-round would increase rates by about $25/month), Puget Sound Clean Water Alliance Presentation on February 28, 2023.

[24] Department of Ecology, *Final Treatment Plant Financial Capability Assessment Guidance Puget Sound Nutrient General Permit (24-10-034)* (Oct. 2024).
[25] U.S. EPA, *Life Cycle and Cost Assessments of Nutrient Removal Technologies in Wastewater Treatment Plants* (Aug. 2021), pg. 4-7, https://www.epa.gov/system/files/documents/2023-06/life-cycle-nutrient-removal.pdf.

impact its Performance-Based Approach will have on increased wastewater utility rates.[26] This is both an economic and environmental issue; WWTPs will necessarily pass the cost of new treatment technology onto ratepayers and when living expenses increase in urban areas, housing development sprawls to rural areas where urban wastewater systems do not reach and rural septic can be far more polluting. *City of Tacoma v. Dep't of Ecology*, 28 Wn. App. 2d 221, 234 P.3d 462 (2023). Ecology also failed to evaluate qualitative or quantitative impacts on low-income and environmental justice communities.[27]

8. Ecology has failed to assess compliance costs to small businesses as required under the Regulatory Fairness Act.

Ecology cannot adopt a significant legislative rule if it fails to properly conduct the analysis required under the Regulatory Fairness Act (RFA), Ch. 19.85 RCW. The RFA requires agencies to evaluate the relative impact of proposed rules that impose costs on businesses in an industry and compare the relative compliance costs for small businesses to those of the largest businesses affected. RCW 19.85.

Implementation of the Performance-Based Approach will undeniably impose costs on any entity discharging to a WWTP on Puget Sound, and this group includes many entities that qualify as "small businesses." Ecology can readily assess the impact of its nutrient program on wastewater utility rates and needs to do so as part of this rulemaking.

9. Ecology has failed to comply with SEPA.

SEPA environmental review is required for any state agency decision on policies, plans, and programs, including adopting or amending rules, ordinances, or regulations to regulate future projects such as water quality rules, critical area ordinances, and other state and local regulations. RCW 43.21C.030. Lead agencies, such as Ecology, are required to review the SEPA environmental checklist and other available information to evaluate a proposed rule's likely environmental impacts. The agency must consider environmental information, along with technical and economic information, when deciding whether to approve a proposal. In every recommendation or report on proposals or major actions affecting the quality of the environment, the responsible agency official must submit a detailed statement on the environmental impact of the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, and alternatives to the proposed action. RCW 43.21C.030(c).

Ecology has failed to complete a SEPA environmental checklist for its Performance-Based Approach, despite its influence on future regulations. There is ample evidence supporting the

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[26] King County Amicus Brief.

[27] The number of ratepayers being billed more than 5% of their income for sewer services will increase with Ecology's proposed nutrient loading requirements, Puget Sound Clean Water Alliance Presentation on February 28, 2023.

probable impacts of the proposed approach on public services and utilities, namely the increased costs of treatment technologies that will necessarily be required to comply with the anticipated standards set by the Performance-Based Approach. These costs are well-documented by both Ecology and third-party studies.[28] Ecology is required to submit mitigation measures in response to anticipated impacts.

Ecology is required to submit an EIS in accordance with SEPA. It appears that Ecology plans to require advanced (tertiary) treatment as a result of the anticipated standards set using the Performance-Based Approach, which will have profound potential adverse impacts to the environment. Ecology has even previously recognized the potential environmental impacts of requiring WWTPs to adopt additional nutrient removal technology, including the likelihood that tertiary treatment will not only generate more effluent sludge that will require disposal, but will also require two to three times the amount of electrical energy currently used in WWTPs. *Nw. Env't Advocs. v. Dep't of Ecology*, 18 Wn. App. 2d 1005, 2021 WL 2556573, at *9 (2021) (unpublished). Ecology also ignored climate change impacts of its Performance-Based Approach, including the fact that nitrogen removal from wastewater converts some nitrogen in the wastewater to nitrous oxide, a greenhouse gas that is 300 more potent than carbon dioxide.[29] Additionally, the treatment technology required to comply with the proposed rule will ultimately increase wastewater utility rates and housing prices across the state, and when living expenses increase in urban areas, housing development sprawls to rural areas where urban wastewater systems do not reach and rural septic can create significant levels of pollution. *City of Tacoma v. Dep't of Ecology*, 28 Wn. App. 2d 221, 234 P.3d 462 (2023). Given that the Performance-Based Approach will necessarily require WWTPs implement advanced treatment technology that will have significant potential for adverse environmental impacts, Ecology is required to submit a full EIS analyzing the rule's probable environmental impacts.

In its required EIS, Ecology must also identify and assess the impacts of reasonable alternatives. RCW 43.21C.030. Washington courts have equated this alternatives analysis to be "one of the key building blocks, if not the heart of SEPA." *Escala Owners Association v. City of Seattle*, 2022 WL 2915536, at *8 (2022) (unpublished). The required discussion of alternatives to a proposal, "is of major importance, because it provides a basis for a reasoned decision among alternatives having differing environmental impacts." *Weyerhaeuser v. Pierce County*, 124

[28] Declaration of Christie True, ¶¶ 9-10, *King County v. Dept. of Ecology*, No. 21-083 (PCHB 2021); Mot. For Stay, 2021-12-28 King County Motion for Stay, pg. 5, *King County v. Dept. of Ecology*, No. 21-083 (PCHB 2021); King County Amicus Brief; Puget Sound Clean Water Alliance Presentation on February 28, 2023; Department of Ecology, *Technical and Economic Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities* (June 2011).
[29] U.S. EPA, *Life Cycle and Cost Assessments of Nutrient Removal Technologies in Wastewater Treatment Plants* at 4-7 (Aug. 2021), https://www.epa.gov/system/files/documents/2023-06/life-cycle-nutrient-removal.pdf.

Wn.2d 26, 38, 873 P.2d 498 (1994). Ecology is required to submit an EIS complete with a full alternatives analysis.

10. Ecology has failed to comply with obligations to conduct an environmental justice assessment in accordance with RCW 70A.02.060.

When considering a significant agency action, an agency must conduct an environmental justice assessment to inform and support its consideration of overburdened communities and vulnerable populations and to assist the agency with the equitable distribution of environmental benefits, the reduction of environmental harms, and the identification and reduction of environmental and health disparities. RCW 70A.02.060(1)(a). Ecology has failed to prepare an environmental justice assessment as required under RCW 70A.02.060(1)(a), despite the impacts its Performance-Based Approach will inevitably impart on overburdened and vulnerable communities.

By increasing compliance costs to WWTPs, the Performance-Based Approach will have a profound impact on utility rates and housing affordability; these consequences will create environmental justice disparities throughout Puget Sound. Using King County as an example, implementing treatment technology to remove nitrogen in compliance with the proposed performance-based DO rule could cost counties between $25 and $50 million in the next five years, $100 to $200 million in the next 10 to 15 years, and between $9 billion and $14 billion in total future expenses.[30] This could result in monthly wastewater rate increases of between $20 and $130 per month per household, representing a 40% to 230% increase to county residents' current monthly wastewater rates.[31] Rate increases of this staggering magnitude will impact housing affordability.[32] This rulemaking will make it increasingly difficult for Washington citizens, especially racial and social minorities, to be able to purchase or rent homes in the communities where they currently live and work.[33] Additionally, the Washington State Court of Appeals has acknowledged how a requirement (or necessity to comply with a state regulation) for advanced treatment technology may result in the unintended consequence of halting development, including affordable housing, shelters, and accessory dwelling units, while a WWTP raises funds necessary to implement the technology.[34]

In the utility industry, rates are established based on the cost of service, which is heavily influenced by treatment costs.[35] Any increased costs incurred by municipal utilities to comply

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[30] King County Amicus Brief at 3.
[31] *Id*.
[32] *Id*.; Brief for the Washington Association of Sewer and Water Districts as Amicus Curiae, pg. 9, *City of Tacoma v. Ecology*, 28 Wn. App. 2d 221 P.3d 462 (2023) ("WASWD Amicus Brief").
[33] Brief for the Building Industry Association of Washington, pg. 2, *City of Tacoma v. Ecology*, 28 Wn. App. 2d 221 P.3d 462 (2023) ("BIAW Amicus Brief").
[34] *See City of Tacoma*, 28 Wn. App. 2d at 234.
[35] WASWD Amicus Brief at 11-12.

with an Ecology rulemaking will be paid by their respective customers in the form of increased wastewater rates.[36] In some cases, smaller utility districts with fewer customers end up being impacted more by increased regulatory costs because they have a smaller customer base over which to share the financial burden.[37] Nearly all WWTPs in Washington do not currently have the advanced treatment that will likely be necessary for compliance with anticipated standards set through the Performance-Based Approach available at their plant, and do not have the current infrastructure to add the treatment technology without passing on significant costs to the customers they serve unless there is state or federal funding available.[38] The Building Industry Association of Washington and National Association of Home Builders estimate that a change of less than $1,000 to monthly bills would result in home ownership and renting being entirely unaffordable to most Americans, resulting in increased debt and homelessness.[39] Across Washington, the shortage of affordable homes to own and rent impacts extremely low-income households. Several factors play into housing affordability; the cost of monthly, recurring bills such as wastewater bills can place housing in jeopardy if increased.[40] Given the nature of the current treatment technology utilized by most WWTPs, it is not an exaggeration to say that every resident within the greater Puget Sound region is going to experience substantial rate increases associated with the Performance-Based Approach.[41] These rate increases and resulting increase in housing costs will inevitably have the greatest impact on vulnerable communities that likely already struggle with utility costs and housing affordability.

Ecology has failed to consider the impact its rulemaking will have on vulnerable communities, and it is required to conduct a full environmental justice assessment under RCW 70A.02.060.

11. Salish Sea Model Evaluation and Proposed Actions to Improve Confidence in Model Application in Context of Proposed Performance-Based Approach

The "Salish Sea Model Evaluation and Proposed Actions to Improve Confidence in Model Application" memorandum by University of Washington Puget Sound Institute (PSI) includes a general discussion of continued Salish Sea Model (SSM) improvements, as well as better communications with the public, stakeholders, and decision makers to gain broader acceptance

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[36] *Id*. at 13.
[37] *Id*. at 11.
[38] One of the only WWTP in Washington to have advanced technology is the Riverside Park Water Reclamation Facility in Spokane and the addition of advanced treatment was estimated to cost $126 million for the construction alone, not including additional maintenance, testing, and other associated costs, *The Riverside Park Water Reclamation Facility*, Spokane City (last viewed July 21, 2024), https://my.spokanecity.org/publicworks/wastewater/treatment-plant/; The City of Tacoma estimates the addition of advanced treatment will cost anywhere from $250 million to $750 million (2020 costs) in construction costs alone, *See*, *City of Tacoma*, 28 Wn. App. 2d at 233.
[39] BIAW Amicus Brief at 7.
[40] *Id*. at 13-14.
[41] *See* Burke et al., *Puget Sound Wastewater Service Affordability Analysis: Implications for Implementation Strategies* (May 17, 2023).

of the Salish Sea Model. The following comments are focused on dissolved oxygen in context of the proposed Department of Ecology Performance-Based Approach.

SSM Model Performance Statistics

A key focus of the PSI report was on model skill assessment in the shallow areas and at specific stations in Puget Sound. Most of the model statistics reported are domain/basin wide and consequently tend to be better as the +/- statistics average out across the entire Sound.

Figure 1 below presents root mean square error (RMSE) values from the report and plots them in comparison to the entire waterbody wide average. The horizontal line (orange) in the graph is the domain wide average RMSE. It is apparent from the figure that in some areas, the RMSE performance is similar to the overall average RMSE, but in other areas it is not. The RMSE is higher than the average in a number of the inlets to Puget Sound.

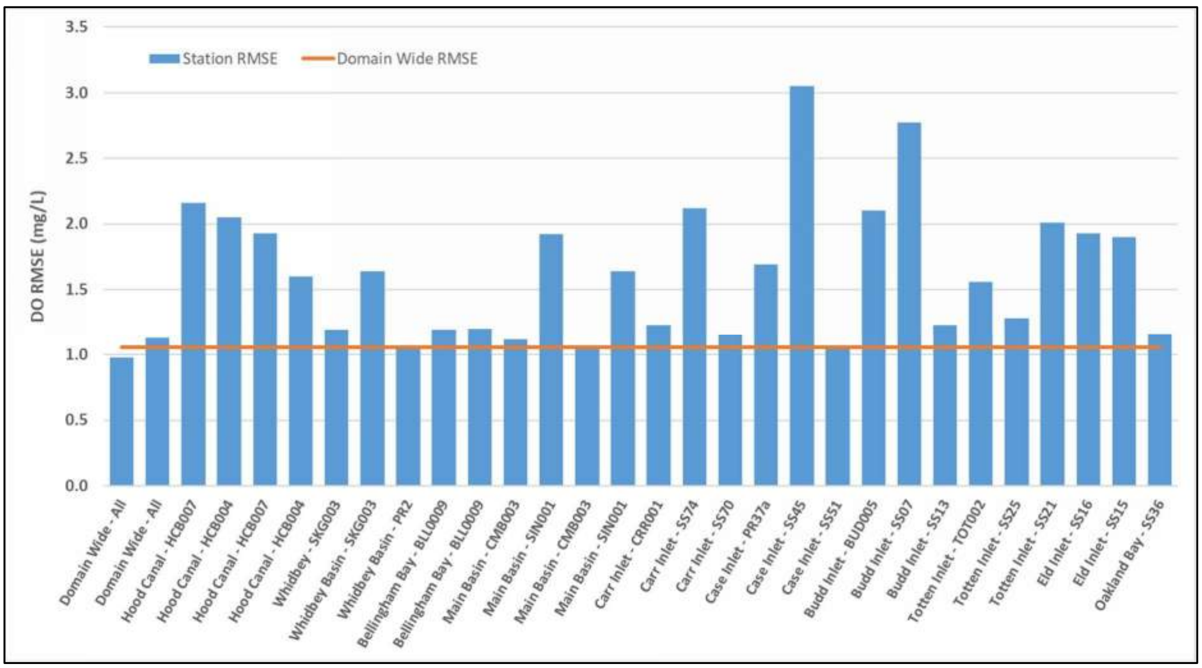

Figure 1. Comparison of Basin Wide Average RMSE with Specific Locations in Puget Sound

The Memorandum discusses the accuracy of the model-model calculations for the reference condition representing natural conditions versus the existing conditions, or the load reduction scenario SSM runs. One reference argued that the model accuracy between the 2 runs could cancel each other out and, therefore, the delta results are accurate. The Memorandum cautions that this is only one approach to the assessment and the topic should be explored further.

The Memorandum also addresses the sediment flux model and calculation of sediment oxygen demand (SOD) and nutrient fluxes. The SSM seems to calculate lower SOD than observed data.

Further, the model calculation of gross primary production was also less than observed. There are some issues with the data and model years that don't overlap.

SSM Natural Conditions Scenario

A question that may require further research into Ecology's Bounding Scenarios Report and examination of the SSM is whether the Natural Conditions scenario used in the SSM model is consistent with what Ecology is now proposing for its Performance-Based Approach. The Memorandum reports the Reference Condition Scenario as making changes to wastewater treatment plants and rivers. It has been understood that the municipal WWTP point source nutrient discharges to Puget Sound were removed from the Reference Condition in the SSM. However, the Memorandum notes that nutrients from Canadian sources and industrial treatment plants that not included in the Puget Sound Nutrient General Permit (PSNGP) are kept the same in the Reference Condition Scenario (see Figure 2 for insert from Memorandum below). This is inconsistent with Ecology's proposed Performance-Based Approach.

In Step 8 Estimating Natural Conditions of the March 2025 Second Draft, Ecology states that "All human-caused impacts must be accounted for and removed using all existing, readily available, and credible information to develop the natural conditions scenarios." The approach taken to the use of the Salish Sea Model for natural conditions does not appear to conform with this approach.

It appears that to be consistent with Ecology's proposed Performance-Based Approach, the SSM Reference Condition Scenario would need to be revised to remove both Canadian nutrient sources and industrial treatment plant discharges.

Figure 2. "Salish Sea Model Evaluation and Proposed Actions to Improve Confidence in Model Application" Technical Memorandum, page 10.

Reference Condition Scenario

What is changed from existing conditions?

- Natural loads of nitrogen and carbon for Washington's wastewater treatment plants and rivers are estimated from observations in pristine watersheds. These represent a pre-anthropogenic or pre-industrial nutrient loading.

What is kept the same?

- Nutrient inputs from:
  - Canadian sources including the Fraser River
  - Washington's industrial treatment plants and those not under the general permit
- Climate, hydrology, and ocean, and all other boundary and forcing conditions
- A unique reference condition is created for each year the model is run

12. The Proposed Performance-Based Approach Lacks Necessary Detail to Ensure Predictable, Repeatable Outcomes.

Tacoma echoes the concerns EPA voiced in its comments on the previous iteration of the Performance-Based Approach; many of these concerns are still apparent in the currently proposed draft. There are numerous steps and important details missing from the proposed Performance-Based Approach; as written, most sections lack necessary explanation of certain methods and procedures to implement the approach. Without such detail, the Performance-Based Approach lacks suitable safeguards to ensure predictable, repeatable outcomes.

First, the Performance-Based Approach includes a step to “Define site boundaries and model domain” but does not include sufficient detail on the parameters of such. For example, EPA stresses that the procedures in this step must include setting up the model grid and include the principle that the model grid accurately represents the physical characteristics of the waterbody. Procedures for documenting the decisions in translating bathymetric data to the model grid must also be included, including identifying data sources, procedures to analyze the data, and procedures for how to link the bathymetry to the model grid. This is an important step for building a water quality model. In its current form, the Performance-Based Approach appears to defer many of these additional steps to be conducted during QAPP development, as establishing the model grid is “project specific”. However, even when providing guidance for establishing the model grid in a QAPP, the Performance-Based Approach lacks the requirements noted by EPA. Further, data selected for populating boundary conditions must represent seasonal variability that impacts the waterbody and parameter of interest. The Performance-Based Approach currently contains no bounds on calibration or certainty that the model performance will be adequate for the purpose of establishing current conditions and natural conditions. EPA commented that Ecology must add text to the effect that models must only be calibrated to reflect the expected range in variability of conditions at a site. EPA specifically noted that the phrase stating that calibration can be done “…by comparing to documented model fit statistics from other similar applications using the same model” could be interpreted broadly in terms of accepting any application calibration no matter how good, and therefore must be revised. EPA commented that this calibration section must also state that the model must be able to simulate current and natural conditions. As this current phrase in the Performance-Based Approach could allow inappropriate model calibration, this language does not meet the federal requirement for a sound scientific rationale (40 CFR section 131.11(a)(1)). Despite these comments clearly illustrating the present concerns, this phrase remains in the proposed Performance-Based Approach and Ecology has not revised the section according to EPA’s comments.

Additionally, the Performance-Based Approach does not include a step to create a conceptual model specific to model application. For additional transparency, EPA recommended adding a requirement to develop a conceptual model by water body type and parameter, but Ecology did not follow suit. Further, the Performance-Based Approach fails to include necessary additional information on selection of a mechanistic model. EPA recommended including a list of models Ecology intends to use and procedures for identification of the appropriate model for a given application (including model selection criteria), as well as identifying any model limitations and ways to account for and address limitations. A section on model selection should also include Ecology peer-review requirements and open-source code. In addition, several other requirements for selecting a model must be added, such as sufficient resolution and processes/dynamics to capture all aspects of the interaction between the hydrodynamics/physical dynamics and biogeochemical processes, sources, cycling, and drivers. In its current form, the Performance-Based Approach simply states that, "model selection must be from a set of best-available modeling tools applicable for the specific purpose to estimate current and natural conditions based on the project requirements," which, "includes, but is not limited to, the Salish Sea Model and other models of comparable rigor." The Performance-Based Approach includes some criteria for model selection, but not nearly the amount of detail requested by EPA.

EPA also recommended including a model requirements review, which includes review of various model predications to assess performance. Further, this section should include the strengths and limitations of each model and procedures to address or compensate for those limitations. The Performance-Based Approach also lacks sufficient detail on model application and use; procedures must be added or minimum requirements included regarding how the model will be applied so that the Performance-Based Approach is transparent and repeatable. Specifically, the draft document lacks detail on what anthropogenic sources are removed, including process for removing both point and nonpoint sources. Ecology also fails to describe the methods and procedures for removal of anthropogenic sources that are not technically feasible to simulate in the model. There is also insufficient detail in the Performance-Based Approach section on site characterization data, which currently lacks the requirement to evaluate legacy effects resulting from past silviculture, agriculture, mining, and development. These activities influence channel form and thus, light, substrate, riparian growth, in-stream cover, sediment transport/turbidity and productivity. The EPA recommended including this information as a data requirement and evaluating the impact from these activities when establishing the natural conditions estimate.

Another concern shared between EPA and Tacoma is that the required elements section of the Performance-Based Approach includes a list of elements that need to be evaluated by the model but does not include the methods to do those evaluations or how they will be accounted for when modeling the natural conditions. EPA has recommended Ecology conduct a substantial re-write of this section for that reason, but the proposed Performance-Based Approach does not reflect such revision.

The Performance-Based Approach must also include certain general revisions across the entire document, such as additional binding language, procedures for how the steps will be executed, and minimum data requirements. Additionally, EPA has recommended substantial organizational revisions to ensure the approach provides a clear, sequential, and repeatable process, and Ecology has appeared to ignore these recommendations.

The Performance-Based Approach as it is drafted does not address the myriad of EPA concerns, which are shared by the City, and thus is not sufficient to produce predictable, repeatable outcomes. Ecology must address these concerns before moving forward with the approach.

1. Reference Attachments

As part of this review, the City referenced the documents attached to this letter. The City requests that Ecology review and consider these reference documents (and recommendations) as part of the proposed Performance-Based Approach revision efforts.

Thank you for this opportunity to comment on the draft documents for the proposed draft performance-based approach guidance document. We trust our comments are useful. If you have any questions or would like additional information please contact Teresa Peterson, P.E. at 253.591.5766 or tpeterson@cityoftacoma.org.

Sincerely,

Signed by:
Geoffrey M. Smyth, P.E.
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Initial
KF

Geoffrey M. Smyth, P.E.

Interim Director, Environmental Services

Attachments 1-40:

Attached as Separate Files with Comment Letter (File Names):

1. Modeling_Considerations_Checklist__R10_comments_ (1).docx
2. SEPADNS_NaturalConditions.pdf

Attached as One Combined File Named "Attachments 3-5":

3. Publication no. 11-10-060_Tetra Tech Report on Nutrient Upgrades Costs
4. EPA life-cycle-nutrient-removal

5. May 2025 PBA Public Webinar and Hearing slides (2025_05_NCC_PBA_Public_Webinar 4930-9195-0662 version 1)

Attached as One Combined File Named "Attachments 6 – 9

6. Ex. A to Petition - 2019 01-15 WDOE Salish Sea Model Bounding Scenarios Report 1903001 4810-7635-6819_1 (copy)
7. 2024.06.26_Salish-Sea-Model-Evaluation-and-Proposed-Actions-to-Improve-Confidence-in-Model-Application
8. "Researchers zero in on low-oxygen areas of concern in Puget Sound_ Encyclopedia of Puget Sound" article
9. "Natural Conditions" are at the center of disputes over dissolved oxygen standards_ Encyclopedia of Puget Sound article

Attached with Comment Letter PDF File:

10. 06.04.21 Loehr Comment on Draft PSNGP
11. 07.17.1998 Everett Petition to Revise DO Standards
12. 08.16.21 Holtgrieve Comment on Draft PSNGP
13. 1998-07-08 Mark Hicks Letter to Loehr re State Standards for Dissolved Oxygen (copy)
14. 2013 12-04 HDR Treatment Technology Review and Assessment 4852-0702-5351_1 (copy)
15. 2021-08-16 City of Tacoma Comment Letter PSNGP (copy)
16. 2021 12-28 King County's Declaration of Christie True (King Cty v. Dept of Ecology 4892-0931-6616_1
17. 2021 12-28 King County's Motion for Stay 4866-0819-2776_1
18. 2022-12-07 Notes on EPA Ecology Discussion of NC Process.msg
19. 2023-02-28 UW Puget Sound Institute - Puget Sound Clean Water Alliance (CWA) Affordability + Modeling Presentation (copy)
20. 2023 05-23 Stillaguamish Tribe of Indians ltr to Ecology re DO Criteria
21. 2024-04-12 Amicus Curiae Brief by Building Industry Association of Washington
22. 2024-04-15 Brief of Amicus Curiae from King County (copy)
23. 2024-04-15 Washington Association of Sewer & Water Districts' Motion for Leave to Join in Amicus Brief Filed by King County (copy)
24. 2024-04-16 Ecology Response to Natural Conditions Criteria Questions by Lincoln Loehr
25. 2410022 - Preliminary Regulatory Analysis

26. BrysonFinch_Marine DO Criteria Presentation 2018
27. Burke_et_al_2023_Wastewater_Affordability_Critical_Analysis_Summary_Report_05.017.23
28. City of Tacoma v. Dep't of Ecology (2023) (copy)
29. Connor & Stelle_Elements of a Comprehensive Puget Sound Nutrient Alternative
30. Ecology Final Treatment Plant Financial Capability Assessment Guidance Puget Sound Nutrient General Permit (24-10-034) (Oct. 2024).
31. Environmental Checklist 2023
32. EPA_ActionsNCC_Nov192021
33. Holtgrieve Scheuerell_Detailed Critique of Ahmed et al 2019
34. Holtgrieve & Scheuerell_Appendix
35. Loehr MPB 1986 article re 301(h) in Washington (2)
36. Loehr 2020.02.29 memo to Scott Redman
37. wawqs-action-letter-11-19-2021 (copy)
38. 2024 Draft PBA Guidance
39. 2025 Draft PBA Guidance

Attached as Separate File with Comment Letter (as a second submission online):

40. 2025 Draft PBA Guidance EPA Comment Letter on Natural Conditions Rulemaking

LINCOLN LOEHR

I submitted comments on the 2018 draft 303(d) list of impaired waters to Ecology on June 4, 2021. I am attaching them here as they are also relevant to the proposed Nutrient General Permit.

P. O. Box 226
Winthrop, WA 98862
June 4, 2021

Washington State Department of Ecology
Jeremy Reiman
PO Box 47600
Olympia, WA 98504-7600
303(d)@ecy.wa.gov

Subject: Comments on proposed 2018 303(d) list of impaired waters

Dear Mr. Reiman,

This comment pertains to all of the marine water category 5 (impaired) listings for dissolved oxygen. The listings are based on 53 year old dissolved oxygen criteria that are not biologically based, are lacking in any identified scientific rationale, are not scientifically defensible, and are not based on credible information and literature for developing and reviewing a surface water quality standard.

The dissolved oxygen criteria do not meet the federal requirements of 40 CFR 131.11, nor do they meet the requirements found in Chapter 2 of WQP Policy 1-11 "Ensuring Credible Data for Water Quality Management". Since Ecology is using non-credible criteria, there is no basis for asserting that the waters are impaired. The 0.2 mg/l change component of the criteria is not biologically based. The listings should be changed to Category 2 (unsure) and notation provided that the listings will be re-evaluated after Ecology goes through a credible process to develop new criteria involving scientific input and public and scientific review. EPA should be involved since they have experience with marine DO criteria development.

I urge Ecology to start with the Marine Dissolved Oxygen Criteria developed by EPA and adopted by three states for Chesapeake Bay, which EPA says "may also apply to other estuarine and coastal systems, with appropriate modifications." There are important considerations in the Chesapeake Bay criteria including differences in depth, duration of exposure (averaging periods), and seasonality that are lacking in our criteria.

To prescribe significant wastewater treatment changes for assumed impairment based on ancient, overly protective, non-credible criteria is essentially malpractice. Ecology likes to assert that they are confident that our criteria are protective. I would agree, but they are also needlessly over-protective and therefore not representative of impairment.

To illustrate the overly protective aspect of the criteria, the Good classification includes a numeric criterion of 5 mg/l which "meet or exceed the requirements for all uses including but not limited to, salmonid migration and rearing; 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." The Excellent quality classification includes a higher numeric criteria of 6 mg/l which meets all the same requirements protected by 5 mg/l. Similarly, the Extraordinary quality classification includes a higher numeric criteria of 7 mg/l which meets all the same requirements protected by 5 mg/l. The only function served by the Excellent and Extraordinary criteria is to be more protective than necessary. When the numeric criteria are crossed, that triggers the natural condition and the human caused decrease of 0.2 mg/l components of the criteria. So, a water with a designated criteria of 7, might be at 6.5 with more than 0.2 mg/l of that attributed to human caused decrease. We currently call that impaired, yet it is still higher than 5 mg/l which our criteria assert protects all uses.

I note that the freshwater dissolved oxygen criteria are similarly flawed, should be changed to Category 2 and notation provided to re-evaluate after a credible process to develop freshwater dissolved oxygen criteria. Ecology could start with EPA's freshwater dissolved oxygen criteria recommendations.

Ecology has asserted that effects levels documented in a 2008 report by Vaquer-Sunyer and Duarte support our criteria and even indicate that our criteria should be more stringent.[1] They further discuss a report by John Davis (1975)[2] as additional information also supporting our criteria. The data reviewed by Davis are also included in the Vaquer-Sunyer and Duarte report, so it isn't additional information. However, Vaquer-Sunyer and Duarte do not give specifics on what effects were measured in different tests. Davis does. Some effects have no significance for the well-being of the tested species, and therefore are not relevant to criteria development or assertions of impairment.

For example, the Ratfish (*Hydrolagus colliei*) is shown as having a DO threshold of 8.54 mg/l. Davis shows that below that threshold, the blood is less than 100% saturated. The Ratfish has large eyes, the better to see with in low light conditions. It lives in deep water in Puget Sound and along the continental shelf and slope along the west coast. In Puget Sound it makes up about 80% of the fish biomass in demersal trawl surveys. It makes up a sizeable percentage of the fish biomass in trawl surveys on the continental shelf as well. The deep water where it resides is substantially lower than 8.54 mg/l. If one was developing water quality criteria for marine dissolved oxygen, studies using blood oxygen saturation of less than 100% as a threshold would not be used. Criteria development has to consider what effects are most relevant to the survival of the species.

Chesapeake Bay states had DO criteria of 5 mg/l as an average and 4 mg/l as a minimum. Those criteria probably did go back to the 1968 Department of Interior water quality criteria recommendations. With help from EPA they developed newer, better criteria that recognized different types of water (surface, deep, bottom, nearshore, heads of tidal inlets) and had different criteria for each. Criteria had averaging periods, seasonality and depth considerations. The biological basis for the criteria were spelled out in detail. The new criteria were less stringent than the old criteria. The EPA recommendations were adopted by the states. The states did not choose to keep their more stringent criteria, which they could have said were more protective.

Sincerely yours,

Lincoln Loehr

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[1] See power point from May 30, 2018 Nutrient Forum meeting, and also DOE's August 2018 report, Washington State's Marine Dissolved Oxygen Criteria; Application to Nutrient. An Overview of the Purpose and Application of the Criteria in the Surface Water Quality Standards.

[2] John Davis. (1975). Minimal Dissolved Oxygen Requirements of Aquatic Life with Emphasis on Canadian Species: a Review.

HELLER EHRMAN WHITE & McAULIFFE

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ANCHORAGE
LOS ANGELES
PALO ALTO
PORTLAND
SAN FRANCISCO
TACOMA

July 17, 1998

17278-0001

Mr. Jerry Thielen
Rules Coordinator
Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Re: **Petition to the Department of Ecology to revise the dissolved oxygen standards and to halt dissolved oxygen related TMDL development and implementation until the revisions are complete.**

Dear Mr. Thielen:

In accordance with RCW 34.05.330, and on behalf of the City of Everett, we are submitting the attached petition for adoption of EPA's dissolved oxygen criteria as state water quality standards to replace those presently in rule at WAC 173-201A-030. We believe that there is no known technical basis to support our present standards and that EPA's criteria offer the best technical basis available. This petition carries ramifications to the State's 303(d) List and to the ongoing TMDL activities related to Dissolved Oxygen. We ask that all TMDL activities related to Dissolved Oxygen be curtailed until the state completes adoption of scientifically defensible Dissolved Oxygen standards.

As per RCW 34.05.330, the Department is required to respond to this petition within 60 days, by either (1) denying the petition in writing, stating its reasons for denial and specifically addressing the concerns raised by the petitioner, stating the alternative means by which it will address those concerns, or (2) initiating rulemaking proceedings.

We urge the Department to act on this petition by addressing this issue during the current triennial review of water quality standards.

Sincerely yours,

Tad H. Shimazu

Lincoln C. Loehr

cc: Mr. Tom Fitzsimmons

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07/17/98 3:29 PM

Petition to the Washington State Department of Ecology to revise the State's Surface Water Quality Standards for Dissolved Oxygen and to curtail further TMDL development for water bodies listed for Dissolved Oxygen until such revisions are completed

The existing Dissolved Oxygen standards are found in WAC 173-201A-030 (see Attachment A). The Dissolved Oxygen standards were adopted on or before 1967 (see Attachment B). At that time there was no EPA criteria document to help summarize the science or to provide a technical basis for the standard. (At that time there was no EPA.)

The state has no records identifying the basis behind the Dissolved Oxygen standards (see Attachment B). The implementation of the present Dissolved Oxygen standards has been simply habitual and unquestioned. The Dissolved Oxygen standards have not been reviewed or revised in any triennial review. Apparently neither the Department of Ecology nor the regulated community have thought to examine or question the Dissolved Oxygen standards in the last 30 years. In this regard, we accept that we all bear some responsibility for this omission.

In accordance with RCW 34.05.330 we petition the Department of Ecology to undergo rulemaking to update the Dissolved Oxygen standards with the objective being to use new science to develop defensible Dissolved Oxygen standards which may be similar to EPA's dissolved oxygen criteria. Our petition is now timely because the state has listed numerous water bodies on the 303(d) list specifically for Dissolved Oxygen. The state is now expending much effort at developing TMDLs because of the Dissolved Oxygen listings. These endeavors are in turn imposing substantial costs on the regulated communities for compliance. Appendix I to the 1998 Section 303(d) List submittal to EPA identifies TMDL activities specific to Dissolved Oxygen for 89 waterbodies (see Attachment C for a listing of those specific waterbodies.) The list presented in Attachment C does not represent all of the waterbodies listed for Dissolved Oxygen. It only represents those for which there have been TMDL activities. There are other listed waterbodies for which Dissolved Oxygen TMDL activities are yet to begin.

Because of the high costs to Ecology to develop TMDLs and the much higher costs to the regulated (and unregulated) community for implementing TMDLs, it is appropriate to examine the standards to assure they are based on scientifically sound and up-to-date technical information. The present Dissolved Oxygen standards are more than 30 years old, lack any identified technical basis and obviously cannot represent current science.

We ask that Ecology halt all Dissolved Oxygen related TMDL developments and implementation until the state adopts scientifically defensible Dissolved Oxygen standard. At the moment, the state has no such standards. We propose that the state could rapidly adopt EPA's freshwater Dissolved Oxygen criteria for both freshwater and saltwater. Alternatively, for saltwater, the state could simply adopt a standard that "the dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials." This approach is what California uses, and is also in agreement with EPA's freshwater Dissolved Oxygen Criteria. We further ask that DOE immediately amend the 1998 303(d) List that was submitted to EPA to reflect the indefensibility of the present Dissolved Oxygen Standard and to later adjust the 303(d) List when Ecology completes the rulemaking.

The process we are requesting (both the standard revision, the TMDL moratorium and the 303(d) revision) must include a public education component to emphasize that this is needed to correct an old standard that is evidently without basis. The positive benefits should be emphasized. These benefits include 1) our waters are probably not as bad as had been previously indicated 2) both state and local resources may be more available to address other pressing needs instead and 3) a better standard will result.

The EPA Dissolved Oxygen criteria.

EPA published their criteria document in 1986 (see Attachment D), and also included a summary of the criteria in *Quality Criteria for Water, 1986* (also known as the "Goldbook") (see Attachment E). The criteria are specific to the protection of early life stages and other life stages for coldwater organisms and for warmwater organisms. The criteria (in mg/L) are:

Coldwater Criteria	Early Life Stages	Other Life Stages
30 day mean	NA	6.5
7 day mean	9.5(6.5)	NA
7 day mean minimum	NA	5.0
1 day minimum	8.0(5.0)	4.0
Warmwater Criteria		
30 day mean	NA	5.5
7 day mean	6.0	NA
7 day mean minimum	NA	4.0
1 day minimum	5.0	3.0

EPA's criteria include footnotes that explain that

- The early life stage values are water column concentrations recommended to achieve the required intergravel dissolved oxygen concentrations shown in the parentheses. For species that have early life stages exposed directly to the water column, the figures in parentheses apply.
- The 1 day minimum values should be considered as instantaneous concentrations to be achieved at all times.

The EPA criteria also discuss when natural conditions alone create dissolved oxygen concentrations less than 110 percent of the applicable criteria means or minima or both, the minimum acceptable concentration is 90 percent of the natural concentration. Note that this allows a much greater decrease than the State's 0.2 mg/L allowable drop from the natural. Also note that this is in agreement with the state of California's marine water Dissolved Oxygen standard.

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July 8, 1998

Mr. Lincoln Loehr
Environmental Analyst
Heller, Ehrman, White and McAuliffe
6100 Columbia Center\701 Fifth Avenue
Seattle, WA 98104-7098

Dear Mr. Loehr:

I am writing in response to your June 12 letter concerning our state standards for dissolved oxygen. As I discussed with you on the phone, we do not have supporting information on the technical basis for our existing criteria.

This last year I personally went through all of the files stored at Ecology and downtown in the state central archives. I examined these files with the intent to document the basis for our various water criteria. Little information exists in general regarding the water quality standards. This leaves me with the disappointing conclusion that the archive staff decided these records were not historically critical and had them destroyed. All I found in relation to dissolved oxygen was a comment letter sent by a pulp mill stating the need to allow some human degradation beyond natural levels in marine waters during periods of upwelling.

The existing dissolved oxygen criteria thresholds have existed in the state standards as far back as 1967 and is the oldest copy of the standards in my possession. The criteria has never been expressed other than an absolute threshold value, even though many other criteria have been and continue to include averaging periods. Let me know if you have any further questions or issues needing clarification (360) 407-6477.

Sincerely,

Mark Hicks

Mark Hicks
Water Quality Standards

MPh:mh

Shared.../section/wm/mark/loehr1.doc

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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September 16, 1998

Mr. Tad H. Shimazu
Heller Ehrman White & McAuliffe
6100 Columbia Center
701 Fifth Avenue
Seattle, WA 98104-7098

Dear Mr. Shimazu:

Thank you for your July 17, 1998 petition to revise our state's water quality standards for dissolved oxygen. Ecology is required by RCW 34.05.330 to respond to your petition within 60 days by either (1) denying the petition in writing or (2) initiating rule-making proceedings. We have reviewed your petition and find that we must deny your request at this time.

Our denial is based in part on our having already committed to undertake a review of our freshwater dissolved oxygen criteria as part of the current efforts investigating the potential conversion of the standards to a use-based approach. Following completion of these efforts, targeted for December 1999, we will evaluate whether state and agency priorities and the availability of resources allow us to initiate a similar review of our marine criteria.

We also find your request to be inconsistent with our understanding of procedural and technical issues associated with the standards, and the dissolved oxygen criteria in particular, as well as being inconsistent with our overall strategy for the surface water quality standards. For example, you suggest in the petition that our dissolved oxygen criteria are inappropriate due to their age and lack of administrative record. We disagree with your assumption that the age of the criteria and the lack of documentation in state archives indicates these standards lack scientific validity. We also find fault with the assumption that not having conducted a formal review of these criteria since their adoption is the result of an oversight. No basis has been provided to scientifically challenge our existing standards.

You also suggest that we should, and easily could, adopt the guidance values for freshwater dissolved oxygen from the U.S. Environmental Protection Agency's (EPA)

1986 Quality Criteria for Water and apply them to both fresh and marine waters. We disagree with this assumption for several reasons. First, EPA's guidance was developed specifically for fresh waters and did not consider or evaluate use impacts for marine waters. Second, EPA's guidance includes only limited evaluations of impacts to non-fish species and of sub-lethal or cumulative effects. Finally, any criteria change requires a review by the federal fisheries agencies as part of the Endangered Species Act consultative process. Based on the information provided to date by the resource agencies participating in the use-based criteria effort, we doubt whether EPA's 1986 dissolved oxygen criteria would be considered as adequately protective of the salmon species currently listed or proposed for listing as threatened or endangered in Washington waters.

Your petition includes a request that we suspend the development of Total Maximum Daily Loads (TMDLs) for dissolved oxygen until such time as we have adopted new dissolved oxygen criteria. Our existing state standards were developed and adopted in accordance with state rules and regulations and have been approved by EPA consistent with federal regulations and statutes. These regulations and statutes also require that we use them for setting permit limits, for establishing the 303(d) list, and for conducting TMDLs. We cannot legally or in good conscience waive the use of our current dissolved oxygen criteria. The enclosed letter from EPA Region 10 confirms that our current standards are legally binding and are to be used for TMDL development as well for other water pollution control efforts.

Ecology remains fully committed to maintaining accurate and defensible water quality criteria for all parameters, and dissolved oxygen is no exception. In fact, we have made many improvements to the Surface Water Quality Standards rule during the past twenty-five years in order to better protect Washington's waters. These improvements have incorporated new scientific information and advances in our understanding of aquatic systems as well as new state and national environmental policies. Recent improvements in the standards program have included the adoption of nutrient criteria for lakes and refinements to criteria for several metals and toxic chemicals. We are developing language to clarify how the state's antidegradation policy will be implemented and converting the standards to a use-based approach. The use-based approach will allow us to better customize the criteria for temperature, bacteria, dissolved oxygen, and fish habitat in order to protect the specific uses of a waterbody.

After these improvements to the standards are in place, we will need to switch our emphasis from rule development to implementing the nutrient criteria, antidegradation policy, and use-based criteria as part of the agency's watershed approach. We recognize that the standards program is very dynamic and there are many standards issues being discussed at the national level, including new requirements for nutrient criteria and biocriteria. We will, of course, continue to monitor developments on the national level with interest. It may make sense to adopt certain federal proposals in the future.

However, because we believe it is now our highest priority to implement the recent and pending changes to the standards, we do not anticipate initiating further changes to the standards in the foreseeable future.

We encourage you to remain involved with our current efforts to enhance the surface water quality standards, specifically development of an antidegradation implementation plan and conversion of the standards to a use-based approach. Mark Hicks, at (360) 407-6477 in our Water Quality Program, is leading this effort and can provide you with additional information regarding these activities.

Sincerely,

Tom

Tom Fitzsimmons
Director

TF:MH:kh
Enclosure

cc: Lincoln Loehr Heller Ehrman White & McAuliffe

SEP-15-98 TUE 03:34 PM FAX NO. 9121F^^63114 P.01/02

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

SEP 1 4 1998

REPLY TO
ATTN. OF: OW-134

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL	# of pages ► 2
To Steve Saunders	From Shirley
Dept./Agency DOE	Phone # 553-8512
Fax # 407-7162	Fax # -0165
NSN 7540-01-317-7368 5099-101	GENERAL SERVICES ADMINISTRATION

Mr. Steve Saunders
Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Re: Petition to Ecology submitted by Heller Ehrman White & McAuliffe to revise dissolved oxygen standards and to halt related TMDL development

Dear Mr. Saunders:

Thank you for forwarding a copy of the referenced July 17, 1998 petition. We have reviewed this document and find no basis for a favorable response. Washington's Surface Water Quality Standards (WQS) have been adopted by the state as Chapter 173-201A WAC and approved by the Environmental Protection Agency, Region 10 (EPA) in accordance with all applicable state and federal regulations and statutes. This approval includes Washington State's current standards for Dissolved Oxygen.

The petitioners are also requesting that Ecology replace the state's current Dissolved Oxygen criteria with those referenced in EPA's 1986 Quality Criteria for Water (Gold Book). Although we support the general use and adoption of the 1986 criteria, EPA policy as well as federal regulations and statutes encourage states to adopt criteria that are equal to or more protective of existing and designated uses. We believe Ecology's Dissolved Oxygen criteria provide better protection of the uses identified for each of the classifications in Washington's standards than would the single Dissolved Oxygen criteria set forth in the Gold Book. This is particularly true regarding the protection of marine uses in that the Gold Book criteria addresses only the protection of freshwater uses while Ecology has adopted separate criteria for both fresh and marine waters.

Federal Regulations and statutes also require that the approved standards be used as the basis for identifying water quality limited waters, establishing Total Maximum Daily Loads (TMDLs), and permitting decisions. Furthermore, approved standards must be used until such time that revised standards have been formally adopted by the state and approved by EPA. EPA's approval of new or revised standards also includes consultation with the federal resource agencies to ensure adequate protection for listed or threatened species under the federal Endangered Species Act. Therefore, we can not support the petitioner's request to suspend the application of approved standards during reviews of proposed revisions to the standards.

If you have any questions concerning this letter please contact Fletcher G. Shives of my staff at (206) 553-8512.

Sincerely,

[illegible] for TH

Timothy Hamlin
Manager, Water Quality Unit

Gordon Holtgrieve

Please see attached file.

SCHOOL OF AQUATIC AND FISHERY SCIENCES
UNIVERSITY of WASHINGTON

August 16, 2021

Eleanor Ott, PSNGP Permit Writer
Department of Ecology
Water Quality Program
PO Box 47600
Olympia, WA 98504-7600

Regarding: Puget Sound Nutrient General Permit

The Scientific Basis for Regulation is Flawed
The Washington State Department of Ecology (hereafter Ecology), intends to implement the Nutrient General Permit on the basis that the state's water quality standard for dissolved oxygen is not being met, due in part to nitrogen discharge from wastewater treatment plants (WWTP). Ecology has used its implementation of the Salish Sea Model (SSM) to determine: a) the dissolved oxygen water quality standard is not being met, and b) WWTP are contributing to this non-compliance. These two factors are the basis for the Nutrient General Permit and, as such, questions about the SSM and the compliance determination process are relevant to the Nutrient General Permit under consideration. As detailed in my letter regarding the Draft Nutrient Permit dated 15 March 2021, I and other independent scientists with relevant expertise have repeatedly and publicly challenged Ecology's assertion that the SSM is sufficiently precise and accurate to determine compliance with the standard. In short, we believe that model uncertainty when predicting current conditions is too large to say that the standard is likely not being met. The response to my letter, provided by Ecology in the General Nutrient Permit Fact Sheet, fails to adequately address the issue of model uncertainty in determining compliance to the standard. *This use of the SSM to determine compliance to the water quality standard needs independent review by qualified scientists without conflicts of interest.*

Public Messaging from Ecology on Puget Sound Water Quality is Misleading and Not Based on Facts
Ecology's recent public messaging campaign that describes "dead zones" in Puget Sound (either current or future) as a meaningful problem for the ecosystem necessitating action[i] is not based on any published study or report. Ecology representatives have been on the record stating that salmon are suffocating because of nutrients from WWTP[ii], yet there is no scientific evidence pointing to low oxygen from nutrients as a cause of salmon mortality in Puget Sound. *Simply put, this public messaging campaign is a dishonest misrepresentation of the impacts WWTP are having on Puget Sound and should be immediately retracted.*

Here are the facts: Between 0.25% and 1% of the volume of Puget Sound is hypoxic[iii] during part of the summer, of which 80% to 85% of this hypoxia is due to natural processes outside of

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human control (Ahmed et al. 2019, MacCready 2019). That means between 0.03% and 0.2% of the Puget Sound is becoming hypoxic due to humans, for part of the year, and actions to reduce nutrients from WWTP will not have a meaningful impact on hypoxia (MacCready 2019).

Effectiveness and Tradeoffs Must be Considered
The Puget Sound Ecosystem faces numerous challenges from myriad of stressors. This reality dictates that proposed solutions must be evaluated both on their likelihood of effecting change and the opportunity costs of actions that will not occur because the proposed policy. Ecology has never considered these critical factors in their decision-making around this issue! Given the high natural variability in dissolved oxygen in Puget Sound, it is a near certainty that there will be <u>no observable change</u> in dissolved oxygen as a result of this policy. Furthermore, because the SSM is a deterministic model, it is an absolute certainty it will indicate a water quality improvement, even if there is not an observable change, because it is written into the model. Will the public accept that the money they have spent on this action does not result in an observable change in dissolved oxygen even if the model says it should be there? *At a minimum, Ecology should detail how the effectiveness of this policy will be evaluated.*

Finally, the list of issues and potential actions to improve the health of Puget Sound is long – far longer than is possible, given available resources. Consideration of tradeoffs and optimization of actions is therefore a must. Recent research by King County suggests that actions to reduce stormwater runoff and improve habitat result in a far greater "bang for the buck" than nutrient reduction.[iv] Ecology must take seriously the reality that resources are limiting and restoration actions must be prioritized. Otherwise, there is the substantial risk that money will be spent on this issue in vain and, even worse, the public will pull their support for future environmental initiatives. *As environmental scientists, engineers and policy-makers, have a responsibility spend the public's money wisely.*

Recommendations

1. Delay implementation of the Nutrient General Permit until it is clear that: a) there is an ecologically meaningful problem as the result of nutrients from WWTP, b) the proposed action will provide ecological benefits to the Puget Sound, and c) critical funds are not better spent on alternative actions with higher likelihoods of success.

2. Revise Ahmed et al. (2019) to include the model uncertainties in a transparent and scientifically-defensible way that specifically includes the range of likely values (i.e., confidence intervals), not just a single number, for each model-generated result. When determining compliance to the dissolved oxygen standard, present the areas deemed to be out of compliance with an associated type I error probability.

3. Conduct a multi-model comparison of Puget Sound water quality, as is the current best practice. There are at least three existing models of water quality for Puget Sound that can easily be compared to one another as a means to assess model uncertainty.

4. Solicit an independent review of the science related to compliance standards and incorporate all relevant suggestions into a new presentation of results. The Washington State Academy of Sciences frequently conducts this type of scientific review for issues of high policy

importance such as this. It is therefore recommended that Ecology requests a full scientific review from the Academy.

5. Publicly retract all statements that suggest "dead zones" are a meaningful problem in Puget Sound that can be corrected by regulating nutrients from WWTP. Furthermore, Ecology should publicly retract all statements that suggest salmon are being impacted by "dead zones" in the Puget Sound (i.e., suffocating). Neither of these statements can be supported by data or modeling.

Sincerely,

Gordon W. Holtgrieve
Associate Professor
School of Aquatic & Fishery Sciences
University of Washington

References Cited

Ahmed, A., Figueroa-Kaminsky, C. Gala, J., Mohamedali, T., Pelletier, G., and McCarthy, S. 2019. Puget Sound Nutrient Source Reduction Project. Volume 1: Model Updates and Bounding Scenarios. Washington State Department of Ecology, Publication 19-03-001.

MacCready, P. 2019. External Review of the Bounding Scenarios Report by Ahmed et al. Obtained by public records request.

Diaz, RJ and R Rosenberg. 2008. Spreading Dead Zones and Consequences for Marine Ecosystems. *Science* 321(5891): 926-929. DOI: 10.1126/science.1156401

---

[i] https://ecology.wa.gov/Blog/Posts/June-2021/To-prevent-dead-zones-in-Puget-Sound,-communities

[ii] Puget Sound Partnership Leadership Council Meeting (open to the public) 18 February 2021.

[iii] The term "dead zone" is poorly defined, but at a minimum it implies lethal consequences for marine life due to low oxygen. "Hypoxia"—typically defined as dissolved oxygen less than or equal to 2 mg/L—is a term used to indicate low oxygen that can negatively impact marine life, while mass mortality events are expected to occur at dissolved oxygen values of 0.5 mg/L or less (Diaz and Rosenberg 2008).

[iv] Presentation by Dow Constantine, Abigail Hook, and colleagues at the Puget Sound Partnership Leadership Council Meeting (open to the public) 18 February 2021.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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July 8, 1998

Mr. Lincoln Loehr
Environmental Analyst
Heller, Ehrman, White and McAuliffe
6100 Columbia Center\701 Fifth Avenue
Seattle, WA 98104-7098

Dear Mr. Loehr:

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Sincerely,

Mark Hicks

Mark Hicks
Water Quality Standards

MPh:mh

Treatment Technology Review and Assessment

Association of Washington Business
Association of Washington Cities
Washington State Association of Counties

December 4, 2013

HDR

500 108th Avenue NE
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(425) 450-6200

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Acronyms

Acronym	Definition
AACE	Association for the Advancement of Cost Engineering
AOP	advanced oxidation processes
AWB	Association of Washington Businesses
BAC	biological activated carbon
BAP	benzo(a)pyrene
BOD	biochemical oxygen demand
BTU	British thermal unit
CEPT	Chemically-enhanced primary treatment
cf	cubic feet
CIP	clean in place
CRITFC	Columbia River Inter-Tribal Fish Commission
Ecology	Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
FCR	fish consumption rate
g/day	grams per day
GAC	granular activated carbon
gal	gallon
gfd	gallons per square foot per day
GHG	greenhouse gas
gpd	gallons per day
gpm	gallons per minute
GWh	giga watt hours
HDR	HDR Engineering, Inc.
HHWQC	human health water quality criteria
HRT	hydraulic residence time
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram
KWh/MG	kilowatt-hours per million gallons
lb	pound
MBR	membrane bioreactor
MCL	maximum contaminant level
MF	microfiltration
mgd	million gallons per day
mg/L	milligrams per liter
MMBTU	million British thermal units
MWh/d	megawatt-hours per day
NF	nanofiltration
ng/L	nanograms per liter
NPDES	National Pollutant Discharge Elimination System
NPV	net present value
O&M	operations and maintenance
ODEQ	Oregon Department of Environmental Quality
PAC	powdered activated carbon
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PE	population equivalents
PIX	potable ion exchange

Acronym	Definition
ppm	parts per million
RO	reverse osmosis
SDWA	Safe Drinking Water Act
sf	square feet
SGSP	salinity gradient solar pond
SRT	solids retention time
Study Partners	Association of Washington Businesses/Association of Washington Cities and Washington State Association of Counties consortium
TDS	total dissolved solids
TMDL	total maximum daily load
TSS	total suspended solids
UF	ultrafiltration
µg/L	micrograms per liter
USDA	U.S. Department of Agriculture
UV	ultraviolet
WAC	Washington Administrative Code
WAS	waste activated sludge
WLA	waste load allocation
WWTP	wastewater treatment plant
ZLD	zero liquid discharge

Executive Summary

This study evaluated treatment technologies potentially capable of meeting the State of Washington Department of Ecology's (Ecology) revised effluent discharge limits associated with revised human health water quality criteria (HHWQC). HDR Engineering, Inc. (HDR) completed a literature review of potential technologies and an engineering review of their capabilities to evaluate and screen treatment methods for meeting revised effluent limits for four constituents of concern: arsenic, benzo(a)pyrene (BAP), mercury, and polychlorinated biphenyls (PCBs). HDR selected two alternatives to compare against an assumed existing baseline secondary treatment system utilized by dischargers. These two alternatives included enhanced secondary treatment with membrane filtration/reverse osmosis (MF/RO) and enhanced secondary treatment with membrane filtration/granulated activated carbon (MF/GAC). HDR developed capital costs, operating costs, and a net present value (NPV) for each alternative, including the incremental cost to implement improvements for an existing secondary treatment facility.

Currently, there are no known facilities that treat to the HHWQC and anticipated effluent limits that are under consideration. Based on the literary review, research, and bench studies, the following conclusions can be made from this study:

- Revised HHWQC based on state of Oregon HHWQC (2001) and U.S. Environmental Protection Agency (EPA) "National Recommended Water Quality Criteria" will result in very low water quality criteria for toxic constituents.
- There are limited "proven" technologies available for dischargers to meet required effluent quality limits that would be derived from revised HHWQC.
    - Current secondary wastewater treatment facilities provide high degrees of removal for toxic constituents; however, they are not capable of compliance with water quality-based National Pollutant Discharge Elimination System (NPDES) permit effluent limits derived from the revised HHWQC.
    - Advanced treatment technologies have been investigated and candidate process trains have been conceptualized for toxics removal.
        - Advanced wastewater treatment technologies may enhance toxics removal rates; however, they will not be capable of compliance with HHWQC-based effluent limits for PCBs. The lowest levels achieved based on the literature review were between <0.00001 and 0.00004 micrograms per liter (µg/L), as compared to a HHWQC of 0.0000064 µg/L.
        - Based on very limited performance data for arsenic and mercury from advanced treatment information available in the technical literature, compliance with revised criteria may or may not be possible, depending upon site specific circumstances.
            - Compliance with a HHWQC for arsenic of 0.018 µg/L appears unlikely. Most treatment technology performance information available in the literature is based on drinking water treatment applications targeting a much higher Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) of 10 µg/L.
            - Compliance with a HHWQC for mercury of 0.005 µg/L appears to be potentially attainable on an average basis, but perhaps not if effluent limits are structured on a maximum monthly, maximum weekly or maximum daily basis. Some secondary treatment facilities attain average effluent mercury levels of 0.009 to 0.066 µg/L. Some treatment facilities with effluent filters attain average effluent mercury levels of 0.002 to 0.010 µg/L. Additional

advanced treatment processes are expected to enhance these removal rates, but little mercury performance data is available for a definitive assessment.

  - Little information is available to assess the potential for advanced technologies to comply with revised BAP criteria. A municipal wastewater treatment plant study reported both influent and effluent BAP concentrations less than the HHWQC of 0.0013 ug/L (Ecology, 2010).

- Some technologies may be effective at treating identified constituents of concern to meet revised limits while others may not. It is therefore even more challenging to identify a technology that can meet all constituent limits simultaneously.
- A HHWQC that is one order-of-magnitude less stringent could likely be met for mercury and BAP; however, it appears PCB and arsenic limits would not be met.

- Advanced treatment processes incur significant capital and operating costs.
  - Advanced treatment process to remove additional arsenic, BAP, mercury, and PCBs would combine enhancements to secondary treatment with microfiltration membranes and reverse osmosis or granular activated carbon and increase the estimated capital cost of treatment from $17 to $29 in dollars per gallon per day of capacity (based on a 5.0-million-gallon-per-day (mgd) facility).
  - The annual operation and maintenance costs for the advanced treatment process train will be substantially higher (approximately $5 million - $15 million increase for a 5.0 mgd capacity facility) than the current secondary treatment level.
- Implementation of additional treatment will result in additional collateral impacts.
  - High energy consumption.
  - Increased greenhouse gas emissions.
  - Increase in solids production from chemical addition to the primaries. Additionally, the membrane and GAC facilities will capture more solids that require handling.
  - Increased physical space requirements at treatment plant sites for advanced treatment facilities and residuals management including reverse osmosis reject brine processing.
- It appears advanced treatment technology alone cannot meet all revised water quality limits and implementation tools are necessary for discharger compliance.
  - Implementation flexibility will be necessary to reconcile the difference between the capabilities of treatment processes and the potential for HHWQC driven water quality based effluent limits to be lower than attainable with technology

Table ES-1 indicates that the unit NPV cost for baseline conventional secondary treatment ranges from $13 to $28 per gallon per day of treatment capacity. The unit cost for the advanced treatment alternatives increases the range from the low $20s to upper $70s on a per gallon per-day of treatment capacity. The resulting unit cost for improving from secondary treatment to advanced treatment ranges between $15 and $50 per gallon per day of treatment capacity. Unit costs were also evaluated for both a 0.5 and 25 mgd facility. The range of unit costs for improving a 0.5 mgd from secondary to advanced treatment is $60 to $162 per gallon per day of treatment capacity. The range of unit costs for improving a 25 mgd from secondary to advanced treatment is $10 to $35 per gallon per day of treatment capacity.

Table ES-1. Treatment Technology Costs in 2013 Dollars for a 5-mgd Facility

Alternative	Total Construction Cost, 2013 dollars ($ Million)	O&M Net Present Value, 2013 dollars ($ Million)***	Total Net Present Value, 2013 dollars ($ Million)	NPV Unit Cost, 2013 dollars ($/gpd)
Baseline (Conventional Secondary Treatment)*	59 - 127	5 - 11	65 - 138	13 - 28
Incremental Increase to Advanced Treatment - MF/RO	48 - 104	26 - 56	75 - 160	15 - 32
Advanced Treatment - MF/RO**	108 - 231	31 - 67	139 - 298	28 - 60
Incremental Increase to Advanced Treatment - MF/GAC	71 - 153	45 - 97	117 - 250	23 - 50
Advanced Treatment - MF/GAC	131 - 280	50 - 108	181 - 388	36 - 78

* Assumed existing treatment for dischargers. The additional cost to increase the SRT to upwards of 30-days is about $12 - 20 million additional dollars in total project cost for a 5 mgd design flow.

** Assumes zero liquid discharge for RO brine management, followed by evaporation ponds. Other options are available as listed in Section 4.4.2.

*** Does not include the cost for labor.

mgd=million gallons per day
MG=million gallons
MF/RO=membrane filtration/reverse osmosis
MF/GAC=membrane filtration/granulated activated carbon
O&M=operations and maintenance
Net Present Value = total financed cost assuming a 5% nominal discount rate over an assumed 25 year equipment life.

Costs presented above are based on a treatment capacity of 5.0 mgd, however, existing treatment facilities range dramatically across Washington in size and flow treated. The key differences in cost between the baseline and the advanced treatment MF/RO are as follows:

- Larger aeration basins than the baseline to account for the longer SRT (>8 days versus <8 days).
- Additional pumping stations to pass water through the membrane facilities and granulated activated carbon facilities. These are based on peak flows.
- Membrane facilities (equipment, tanks chemical feed facilities, pumping, etc.) and replacement membrane equipment.
- Granulated activated carbon facilities (equipment, contact tanks, pumping, granulated activated carbon media, etc.)
- Additional energy and chemical demand to operate the membrane and granulated activated carbon facilities
- Additional energy to feed and backwash the granulated activated carbon facilities.
- Zero liquid discharge facilities to further concentrate the brine reject.
    - Zero liquid discharge facilities are energy/chemically intensive and they require membrane replacement every few years due to the brine reject water quality.
- Membrane and granulated activated carbon media replacement represent a significant maintenance cost.

- Additional hauling and fees to regenerate granulated activated carbon off-site.

The mass of pollutant removal by implementing advanced treatment was calculated based on reducing current secondary effluent discharges to revised effluent limits for the four pollutants of concern. These results are provided in Table ES-2 as well as a median estimated unit cost basis for the mass of pollutants removed.

Table ES-2. Unit Cost by Contaminant for a 5-mgd Facility Implementing Advanced Treatment using Membrane Filtration/Reverse Osmosis

Component	PCBs	Mercury	Arsenic	BAPs
Required HHWQC based Effluent Quality (µg/L)	0.0000064	0.005	0.018	0.0013
Current Secondary Effluent Concentration (µg/L)	0.002	0.025	7.5	0.006
Total Mass Removed (lbs) over 25 year Period	0.76	7.6	2,800	1.8
Median Estimated Unit Cost (NPV per total mass removed in pounds over 25 years)	$290,000,000	$29,000,000	$77,000	$120,000,000

µg/L=micrograms per liter
lbs=pounds
NPV=net present value

Collateral adverse environmental impacts associated with implementing advanced treatment were evaluated. The key impacts from this evaluation include increased energy use, greenhouse gas production, land requirements and treatment residuals disposal. Operation of advanced treatment technologies could increase electrical energy by a factor of 2.3 to 4.1 over the baseline secondary treatment system. Direct and indirect greenhouse gas emission increases are related to the operation of advanced treatment technologies and electrical power sourcing, with increases of at least 50 to 100 percent above the baseline technology. The energy and air emission implications of advanced treatment employing granulated activated carbon construction of advanced treatment facilities will require additional land area. The availability and cost of land adjacent to existing treatment facilities has not been included in cost estimates, but could be very substantial. It is worthwhile noting residual materials from treatment may potentially be hazardous and their disposal may be challenging to permit. Costs assume zero liquid discharge from the facilities.

1.0 Introduction

Washington's Department of Ecology (Ecology) has an obligation to periodically review waterbody "designated uses" and to modify, as appropriate, water quality standards to ensure those uses are protected. Ecology initiated this regulatory process in 2009 for the human health-based water quality criteria (HHWQC) in Washington's *Surface Water Quality Standards* (Washington Administrative Code [WAC] 173-201A). HHWQC are also commonly referred to as "toxic pollutant water quality standards." Numerous factors will influence Ecology's development of HHWQC. The expectation is that the adopted HHWQC will be more stringent than current adopted criteria. National Pollutant Discharge Elimination System (NPDES) effluent limits for permitted dischargers to surface waters are based on U.S. Environmental Protection Agency (EPA) and state guidance. Effluent limits are determined primarily from reasonable potential analyses and waste load allocations (WLAs) from total maximum daily loads (TMDLs), although the permit writer may use other water quality data. Water quality-based effluent limits are set to be protective of factors, including human health, aquatic uses, and recreational uses. Therefore, HHWQC can serve as a basis for effluent limits. The presumption is that more stringent HHWQC will, in time, drive lower effluent limits. The lower effluent limits will require advanced treatment technologies and will have a consequent financial impact on NPDES permittees. Ecology anticipates that a proposed revision to the water quality standards regulation will be issued in first quarter 2014, with adoption in late 2014.

The Association of Washington Businesses (AWB) is recognized as the state's chamber of commerce, manufacturing and technology association. AWB members, along with the Association of Washington Cities and Washington State Association of Counties (collectively referred to as Study Partners), hold NPDES permits authorizing wastewater discharges. The prospect of more stringent HHWQC, and the resulting needs for advanced treatment technologies to achieve lower effluent discharge limits, has led this consortium to sponsor a study to assess technology availability and capability, capital and operations and maintenance (O&M) costs, pollutant removal effectiveness, and collateral environmental impacts of candidate technologies.

The "base case" for the study began with the identification of four nearly ubiquitous toxic pollutants present in many industrial and municipal wastewater discharges, and the specification of pollutant concentrations in well-treated secondary effluent. The pollutants are arsenic, benzo(a)pyrene (BAP), mercury and polychlorinated biphenyls (PCBs), which were selected for review based on available monitoring data and abundant presence in the environment. The purpose of this study is to review the potential water quality standards and associated treatment technologies able to meet those standards for four pollutants.

A general wastewater treatment process and wastewater characteristics were used as the common baseline for comparison with all of the potential future treatment technologies considered. An existing secondary treatment process with disinfection at a flow of 5 million gallons per day (mgd) was used to represent existing conditions. Typical effluent biochemical oxygen demand (BOD) and total suspended solids (TSS) were assumed between 10 and 30 milligrams per liter (mg/L) for such a facility and no designed nutrient or toxics removal was assumed for the baseline existing treatment process.

Following a literature review of technologies, two advanced treatment process options for toxics removal were selected for further evaluation based on the characterization of removal effectiveness from the technical literature review and Study Partners' preferences. The two tertiary treatment options are microfiltration membrane filtration (MF) followed by either reverse osmosis (RO) or granular activated carbon (GAC) as an addition to an existing secondary treatment facility.

The advanced treatment technologies are evaluated for their efficacy and cost to achieve the effluent limitations implied by the more stringent HHWQC. Various sensitivities are examined, including for less stringent adopted HHWQC, and for a size range of treatment systems. Collateral environmental impacts associated with the operation of advanced technologies are also qualitatively described.

2.0 Derivation of the Baseline Study Conditions and Rationale for Selection of Effluent Limitations

2.1 Summary of Water Quality Criteria

Surface water quality standards for toxics in the State of Washington are being updated based on revised human fish consumption rates (FCRs). The revised water quality standards could drive very low effluent limitations for industrial and municipal wastewater dischargers. Four pollutants were selected for study based on available monitoring data and abundant presence in the environment. The four toxic constituents are arsenic, BAP, mercury, and PCBs.

2.2 Background

Ecology is in the process of updating the HHWQC in the state water quality standards regulation. Toxics include metals, pesticides, and organic compounds. The human health criteria for toxics are intended to protect people who consume water, fish, and shellfish. FCRs are an important factor in the derivation of water quality criteria for toxics.

The AWB/City/County consortium (hereafter "Study Partners") has selected four pollutants for which more stringent HHWQC are expected to be promulgated. The Study Partners recognize that Ecology probably will not adopt more stringent arsenic HHWQC so the evaluation here is based on the current arsenic HHWQC imposed by the National Toxics Rule. Available monitoring information indicates these pollutants are ubiquitous in the environment and are expected to be present in many NPDES discharges. The four pollutants include the following:

- Arsenic
  - Elemental metalloid that occurs naturally and enters the environment through erosion processes. Also widely used in batteries, pesticides, wood preservatives, and semiconductors. Other current uses and legacy sources in fungicides/herbicides, copper smelting, paints/dyes, and personal care products.
- Benzo(a)pyrene (BAP)
  - Benzo(a)pyrene is a polycyclic aromatic hydrocarbon formed by a benzene ring fused to pyrene as the result of incomplete combustion. Its metabolites are highly carcinogenic. Sources include wood burning, coal tar, automobile exhaust, cigarette smoke, and char-broiled food.
- Mercury
  - Naturally occurring element with wide legacy uses in thermometers, electrical switches, fluorescent lamps, and dental amalgam. Also enters the environment through erosion processes, combustion (especially coal), and legacy industrial/commercial uses. Methylmercury is an organometallic that is a bioaccumulative toxic. In aquatic systems, an anaerobic methylation process converts inorganic mercury to methylmercury.
- Polychlorinated Biphenyls (PCBs)
  - Persistent organic compounds historically used as a dielectric and coolant in electrical equipment and banned from production in the U.S. in 1979. Available information indicates continued pollutant loadings to the environment as a byproduct from the use of some pigments, paints, caulking, motor oil, and coal combustion.

2.3 Assumptions Supporting Selected Ambient Water Quality Criteria and Effluent Limitations

Clean Water Act regulations require NPDES permittees to demonstrate their discharge will "not cause or contribute to a violation of water quality criteria." If a "reasonable potential analysis" reveals the possibility of a standards violation, the permitting authority is obliged to develop "water quality-based effluent limits" to ensure standards achievement. In addition, if ambient water quality monitoring or fish tissue assessments reveal toxic pollutant concentrations above HHWQC levels, Ecology is required to identify that impairment ("303(d) listing") and develop corrective action plans to force reduction in the toxic pollutant discharge or loading of the pollutant into the impaired water body segment. These plans, referred to as total maximum daily loads (TMDLs) or water cleanup plans, establish discharge allocations and are implemented for point discharge sources through NPDES permit effluent limits and other conditions.

The effect of more stringent HHWQC will intuitively result in more NPDES permittees "causing or contributing" to a water quality standards exceedance, and/or more waterbodies being determined to be impaired, thus requiring 303(d) listing, the development of TMDL/water cleanup plans, and more stringent effluent limitations to NPDES permittees whose treated wastewater contains the listed toxic pollutant.

The study design necessarily required certain assumptions to create a "baseline effluent scenario" against which the evaluation of advanced treatment technologies could occur. The Study Partners and HDR Engineering, Inc (HDR) developed the scenario. Details of the baseline effluent scenario are presented in Table 1. The essential assumptions and rationale for selection are presented below:

- Ecology has indicated proposed HHWQC revisions will be provided in first quarter 2014. A Study Partners objective was to gain an early view on the treatment technology and cost implications. Ecology typically allows 30 or 45 days for the submission of public comments on proposed regulations. To wait for the proposed HHWQC revisions would not allow sufficient time to complete a timely technology/cost evaluation and then to share the study results in the timeframe allowed for public involvement/public comments.
- Coincident with the issuance of the proposed regulation, Ecology has a statutory obligation to provide a Significant Legislative Rule evaluation, one element of which is a "determination whether the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented" (RCW 34.05.328(1)(d)). A statutory requirement also exists to assess the impact of the proposed regulation to small businesses. The implication is that Ecology will be conducting these economic evaluations in fourth quarter 2013 and early 2014. The Study Partners wanted to have a completed technology/cost study available to share with Ecology for their significant legislative rule/small business evaluations.
- The EPA, Indian tribes located in Washington, and various special interest groups have promoted the recently promulgated state of Oregon HHWQC (2011) as the "model" for Washington's revisions of HHWQC. The Oregon HHWQC are generally based on a increased FCR of 175 grams per day (g/day) and an excess cancer risk of 10^{-6}. While the Study Partners do not concede the wisdom or appropriateness of the Oregon criteria, or the selection of scientific/technical elements used to derive those criteria, the Study Partners nevertheless have selected the Oregon HHWQC as a viable "starting point" upon which this study could be based.

- The scenario assumes generally that Oregon's HHWQC for ambient waters will, for some parameters in fact, become effluent limitations for Washington NPDES permittees. The reasoning for this important assumption includes:
  - The state of Washington's NPDES permitting program is bound by the *Friends of Pinto Creek vs. EPA* decision in the United States Court of Appeals for the Ninth Circuit (October 4, 2007). This decision held that no NPDES permits authorizing new or expanded discharges of a pollutant into a waterbody identified as impaired; i.e., listed on CWA section 303(d), for that pollutant, may be issued until such time as "existing dischargers" into the waterbody are "subject to compliance schedules designed to bring the (waterbody) into compliance with applicable water quality standards." In essence, any new/expanded discharge of a pollutant causing impairment must achieve the HHWQC at the point of discharge into the waterbody.
  - If a waterbody segment is identified as "impaired" (i.e., not achieving a HHWQC), then Ecology will eventually need to produce a TMDL or water cleanup plan. For an existing NPDES permittee with a discharge of the pollutant for which the receiving water is impaired, the logical assumption is that any waste load allocation granted to the discharger will be at or lower than the numeric HHWQC (to facilitate recovery of the waterbody to HHWQC attainment). As a practical matter, this equates to an effluent limit established at the HHWQC.
  - Acceptance of Oregon HHWQC as the baseline for technology/cost review also means acceptance of practical implementation tools used by Oregon. The HHWQC for mercury is presented as a fish tissue methyl mercury concentration. For the purposes of NPDES permitting, however, Oregon has developed an implementation management directive which states that any confirmed detection of mercury is considered to represent a "reasonable potential" to cause or contribute to a water quality standards violation of the methyl mercury criteria. The minimum quantification level for total mercury is presented as 0.005 micrograms per liter (µg/L) (5.0 nanograms per liter (ng/L)).
  - The assumed effluent limit for arsenic is taken from EPA's *National Recommended Water Quality Criteria* (2012) (inorganic, water and organisms, 10^{-6} excess cancer risk). Oregon's 2011 criterion is actually based on a less protective excess cancer risk (10^{-4}). This, however, is the result of a state-specific risk management choice and it is unclear if Washington's Department of Ecology would mimic the Oregon approach.
  - The assumption is that no mixing zone is granted such that HHWQC will effectively serve as NPDES permit effluent limits. Prior discussion on the impact of the Pinto Creek decision, 303(d) impairment and TMDL Waste Load Allocations processes, all lend support to this "no mixing zone" condition for the parameters evaluated in this study.
- Consistent with Ecology practice in the evaluation of proposed regulations, the HHWQC are assumed to be in effect for a 20-year period. It is assumed that analytical measurement technology and capability will continue to improve over this time frame and this will result in the detection and lower quantification of additional HHWQC in ambient water and NPDES dischargers. This knowledge will trigger the Pinto Creek/303(d)/TMDL issues identified above and tend to pressure NPDES permittees to evaluate and install advanced treatment technologies. The costs and efficacy of treatment for these additional HHWQC is unknown at this time.

Other elements of the Study Partners work scope, as presented to HDR, must be noted:

- The selection of four toxic pollutants and development of a baseline effluent scenario is not meant to imply that each NPDES permittee wastewater discharge will include those pollutants at the assumed concentrations. Rather, the scenario was intended to represent a composite of many NPDES permittees and to facilitate evaluation of advanced treatment technologies relying on mechanical, biological, physical, chemical processes.
- The scalability of advanced treatment technologies to wastewater treatment systems with different flow capacities, and the resulting unit costs for capital and O&M, is evaluated.
- Similarly, a sensitivity analysis on the unit costs for capital and O&M was evaluated on the assumption the adopted HHWQC (and effectively, NPDES effluent limits) are one order-of-magnitude less stringent than the Table 1 values.

Table 1: Summary of Effluent Discharge Toxics Limits

Constituent	Human Health Criteria based Limits to be met with no Mixing Zone (µg/L)	Basis for Criteria	Typical Concentration in Municipal Secondary Effluent (µg/L)	Typical Concentration in Industrial Secondary Effluent (µg/L)	Existing Washington HHC (water + org.), NTR (µg/L)
PCBs	0.0000064	Oregon Table 40 Criterion (water + organisms) at FCR of 175 grams/day	0.0005 to 0.0025[b,c,d,e,f]	0.002 to 0.005[i]	0.0017
Mercury	0.005	DEQ IMD[a]	0.003 to 0.050[h]	0.010 to 0.050[h]	0.140
Arsenic	0.018	EPA National Toxics Rule (water + organisms)[k]	0.500 to 5.0[j]	10 to 40[j]	0.018
Benzo(a)Pyrene	0.0013	Oregon Table 40 Criterion (water + organisms) at FCR of 175 grams/day	0.00028 to 0.006[b,g]	0.006 to1.9	0.0028

[a] Oregon Department of Environmental Quality (ODEQ). Internal Management Directive: Implementation of Methylmercury Criterion in NPDES Permits. January 8, 2013.

[b] Control of Toxic Chemicals in Puget Sound, Summary Technical Report for Phase 3: Loadings from POTW Discharge of Treated Wastewater, Washington Department of Ecology, Publication Number 10-10-057, December 2010.

[c] Spokane River PCB Source Assessment 2003-2007, Washington Department of Ecology, Publication No. 11-03-013, April 2011.

[d] Lower Okanogan River Basin DDT and PCBs Total Maximum Daily Load, Submittal Report, Washington Department of Ecology, Publication Number 04-10-043, October 2004.

[e] Palouse River Watershed PCB and Dieldrin Monitoring, 2007-2008, Wastewater Treatment Plants and Abandoned Landfills, Washington Department of Ecology, Publication No. 09-03-004, January 2009

[f] A Total Maximum Daily Load Evaluation for Chlorinated Pesticides and PCBs in the Walla Walla River, Washington Department of Ecology, Publication No. 04-03-032, October 2004.

[g] Removal of Polycyclic Aromatic Hydrocarbons and Heterocyclic Nitrogenous Compounds by A POTW Receiving Industrial Discharges, Melcer, H., Steel, P. and Bedford, W.K., Water Environment Federation, 66th Annual Conference and Exposition, October 1993.

[h] Data provided by Lincoln Loehr's summary of WDOE Puget Sound Loading data in emails from July 19, 2013.

[i] NCASI memo from Larry Lefleur, NCASI, to Llewellyn Matthews, NWPPA, revised June 17, 2011, summarizing available PCB monitoring data results from various sources.

[j] Professional judgment, discussed in August 6, 2013 team call.

[k] The applicable Washington Human Health Criteria cross-reference the EPA National Toxics Rule, 40 CFR 131.36. The EPA arsenic HHC is 0.018 ug/L for water and organisms.

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3.0 Wastewater Characterization Description

This section describes the wastewater treatment discharge considered in this technology evaluation. Treated wastewater characteristics are described, including average and peak flow, effluent concentrations, and toxic compounds of concern.

3.1 Summary of Wastewater Characterization

A general wastewater treatment process and wastewater characteristics were developed as the common baseline to represent the existing conditions as a starting point for comparison with potential future advanced treatment technologies and improvements. A secondary treatment process with disinfection at a flow of 5 mgd as the current, baseline treatment system for existing dischargers was also developed. Typical effluent biochemical oxygen demand (BOD) and total suspended solids (TSS) were assumed between 10 to 30 mg/L from such a facility and no nutrient or toxics removal was assumed to be accomplished in the existing baseline treatment process.

3.2 Existing Wastewater Treatment Facility

The first step in the process is to characterize the existing wastewater treatment plant to be evaluated in this study. The goal is to identify the necessary technology that would need to be added to an existing treatment facility to comply with revised toxic pollutant effluent limits. Rather than evaluating the technologies and costs to upgrade multiple actual operating facilities, the Study Partners specified that a generalized municipal/industrial wastewater treatment facility would be characterized and used as the basis for developing toxic removal approaches. General characteristics of the facility's discharge are described in Table 2.

Table 2. General Wastewater Treatment Facility Characteristics

Average Annual Wastewater Flow, mgd	Maximum Month Wastewater Flow, mgd	Peak Hourly Wastewater Flow, mgd	Effluent BOD, mg/L	Effluent TSS, mg/L
5.0	6.25	15.0	10 to 30	10 to 30

mgd=million gallons per day
mg/L=milligrams per liter
BOD=biochemical oxygen demand
TSS=total suspended solids

In the development of the advanced treatment technologies presented below, the capacity of major treatment elements are generally sized to accommodate the maximum month average wastewater flow. Hydraulic elements, such as pumps and pipelines, were selected to accommodate the peak hourly wastewater flow.

The general treatment facility incorporates a baseline treatment processes including influent screening, grit removal, primary sedimentation, suspended growth biological treatment (activated sludge), secondary clarification, and disinfection using chlorine. Solids removed during primary treatment and secondary clarification are assumed to be thickened, stabilized, dewatered, and land applied to agricultural land. The biological treatment process is assumed to be activated sludge with a relatively short (less than 10-day) solids retention time. The baseline secondary treatment facility is assumed not to have processes dedicated to removing nutrients or toxics. However, some coincident removal of toxics will occur during conventional treatment.

3.3 Toxic Constituents

As described in Section 2.3, the expectation of more stringent HHWQC will eventually trigger regulatory demands for NPDES permittees to install advanced treatment technologies. The Study Group and HDR selected four specific toxic pollutants reflecting a range of toxic constituents as the basis for this study to limit the constituents and technologies to be evaluated to a manageable level.

The four toxic pollutants selected were PCBs, mercury, arsenic, and BAP, a polycyclic aromatic hydrocarbon (PAH). Mercury and arsenic are metals, and PCBs and PAHs are organic compounds. Technologies for removing metals and organic compounds are in some cases different. Key information on each of the compounds, including a description of the constituent, the significance of each constituent, proposed HHWQC, basis for the proposed criteria, typical concentration in both municipal and industrial secondary effluent, and current Washington state water quality criteria, are shown in Table 1. It is assumed that compliance with the proposed criteria in the table would need to be achieved at the “end of pipe” and Ecology would not permit a mixing zone for toxic constituents. This represents a “worst–case,” but a plausible assumption about discharge conditions.

4.0 Treatment Approaches and Costs

4.1 Summary of Treatment Approach and Costs

Two advanced treatment process options for toxics removal for further evaluation based on the characterization of removal effectiveness from the technical literature review and Study Group preferences. The two tertiary treatment options are microfiltration MF followed by either RO or GAC as an addition to an existing secondary treatment facility. Based on the literature review, it is not anticipated that any of the treatment options will be effective in reducing all of the selected pollutants to below the anticipated water quality criteria. A summary of the capital and operations and maintenance costs for tertiary treatment is provided, as well as a comparison of the adverse environmental impacts for each alternative.

4.2 Constituent Removal – Literature Review

The evaluation of treatment technologies relevant to the constituents of concern was initiated with a literature review. The literature review included a desktop search using typical web-based search engines, and search engines dedicated to technical and research journal databases. At the same time, HDR's experience with the performance of existing treatment technologies specifically related to the four constituents of concern, was used in evaluating candidate technologies. A summary of the constituents of concern and relevant treatment technologies is provided in the following literature review section.

4.2.1 Polychlorinated Biphenyls

PCBs are persistent organic pollutants that can be difficult to remove in treatment. PCB treatment in wastewater can be achieved using oxidation with peroxide, filtration, biological treatment or a combination of these technologies. There is limited information available about achieving ultra-low effluent PCB concentrations near the 0.0000064 µg/L range under consideration in the proposed rulemaking process. This review provides a summary of treatment technology options and anticipated effluent PCB concentrations.

Research on the effectiveness of ultraviolet (UV) light and peroxide on removing PCBs was tested in bench scale batch reactions (Yu, Macawile, Abella, & Gallardo 2011). The combination of UV and peroxide treatment achieved PCB removal greater than 89 percent, and in several cases exceeding 98 percent removal. The influent PCB concentration for the batch tests ranged from 50 to 100 micrograms per liter (µg/L). The final PCB concentration (for the one congener tested) was <10 µg/L (10,000 ng/L) for all tests and <5 µg/L (5,000 ng/L) for some tests. The lowest PCB concentrations in the effluent occurred at higher UV and peroxide doses.

Pilot testing was performed to determine the effectiveness of conventional activated sludge and a membrane bioreactor to remove PCBs (Bolzonella, Fatone, Pavan, & Cecchi 2010). EPA Method 1668 was used for the PCB analysis (detection limit of 0.01 ng/L per congener). Influent to the pilot system was a combination of municipal and industrial effluent. The detailed analysis was for several individual congeners. Limited testing using the Aroclor method (total PCBs) was used to compare the individual congeners and the total concentration of PCBs. Both conventional activated sludge and membrane bioreactor (MBR) systems removed PCBs. The effluent MBR concentrations ranged from <0.01 ng/L to 0.04 ng/L compared to <0.01 ng/L to 0.88 ng/L for conventional activated sludge. The pilot testing showed that increased solids retention time (SRT) and higher mixed liquor suspended solids concentrations in the MBR system led to increased removal in the liquid stream.

Bench scale studies were completed to test the effectiveness of GAC and biological activated carbon (BAC) for removing PCBs (Ghosh, Weber, Jensen, & Smith 1999). The effluent from the

GAC system was 800 ng/L. The biological film in the BAC system was presumed to support higher PCB removal with effluent concentrations of 200 ng/L. High suspended sediment in the GAC influent can affect performance. It is recommended that filtration be installed upstream of a GAC system to reduce solids and improve effectiveness.

Based on limited available data, it appears that existing municipal secondary treatment facilities in Washington state are able to reduce effluent PCBs to the range approximately 0.10 to 1.5 ng/L. It appears that the best performing existing municipal treatment facility in Washington state with a microfiltration membrane is able to reduce effluent PCBs to the range approximately 0.00019 to 0.00063 µg/L. This is based on a very limited data set and laboratory blanks covered a range that overlapped with the effluent results (blanks 0.000058 to 0.00061 µg/L).

Addition of advanced treatment processes would be expected to enhance PCB removal rates, but the technical literature does not appear to provide definitive information for guidance. A range of expected enhanced removal rates might be assumed to vary widely from level of the reference microfiltration facility of 0.19 to 0.63 ng/L.

Summary of PCB Technologies

The literature review revealed there are viable technologies available to reduce PCBs **but no research was identified with treatment technologies capable of meeting the anticipated human health criteria based limits for PCB removal**. Based on this review, a tertiary process was selected to biologically reduce PCBs and separate the solids using tertiary filtration. Alternately, GAC was investigated as an option to reduce PCBs, although it is not proven that it will meet revised effluent limits.

4.2.2 Mercury

Mercury removal from wastewater can be achieved using precipitation, adsorption, filtration, or a combination of these technologies. There is limited information available about achieving ultra-low effluent mercury concentrations near the 5 ng/L range under consideration in the proposed rulemaking process. This review provides a summary of treatment technology options and anticipated effluent mercury concentrations.

Precipitation (and co-precipitation) involves chemical addition to form a particulate and solids separation, using sedimentation or filtration. Precipitation includes the addition of a chemical precipitant and pH adjustment to optimize the precipitation reaction. Chemicals can include metal salts (ferric chloride, ferric sulfate, ferric hydroxide, or alum), pH adjustment, lime softening, or sulfide. A common precipitant for mercury removal is sulfide, with an optimal pH between 7 and 9. The dissolved mercury is precipitated with the sulfide to form an insoluble mercury sulfide that can be removed through clarification or filtration. One disadvantage of precipitation is the generation of a mercury-laden sludge that will require dewatering and disposal. The mercury sludge may be considered a hazardous waste and require additional treatment and disposal at a hazardous waste site. The presence of other compounds, such as other metals, may reduce the effectiveness of mercury precipitation/co-precipitation. For low-level mercury treatment requirements, several treatment steps will likely be required in pursuit of very low effluent targets.

EPA compiled a summary of facilities that are using precipitation/co-precipitation for mercury treatment (EPA 2007). Three of the full-scale facilities were pumping and treating groundwater and the remaining eight facilities were full-scale wastewater treatment plants. One of the pump and treat systems used precipitation, carbon adsorption, and pH adjustment to treat groundwater to effluent concentrations of 300 ng/L.

Adsorption treatment can be used to remove inorganic mercury from water. While adsorption can be used as a primary treatment step, it is frequently used for polishing after a preliminary treatment step (EPA 2007). One disadvantage of adsorption treatment is that when the adsorbent is saturated, it either needs to be regenerated or disposed of and replaced with new adsorbent. A common adsorbent is GAC. There are several patented and proprietary adsorbents on the market for mercury removal. Adsorption effectiveness can be affected by water quality characteristics, including high solids and bacterial growth, which can cause media blinding. A constant and low flow rate to the adsorption beds increases effectiveness (EPA 2007). The optimal pH for mercury adsorption on GAC is pH 4 to 5; therefore, pH adjustment may be required.

EPA compiled a summary of facilities that are using adsorption for mercury treatment (EPA 2007). Some of the facilities use precipitation and adsorption as described above. The six summarized facilities included two groundwater treatment and four wastewater treatment facilities. The reported effluent mercury concentrations were all less than 2,000 ng/L (EPA 2007).

Membrane filtration can be used in combination with a preceding treatment step. The upstream treatment is required to precipitate soluble mercury to a particulate form that can be removed through filtration. According to the EPA summary report, ultrafiltration is used to remove high-molecular weigh contaminants and solids (EPA 2007). The treatment effectiveness can depend on the source water quality since many constituents can cause membrane fouling, decreasing the effectiveness of the filters. One case study summarized in the EPA report showed that treatment of waste from a hazardous waste combustor treated with precipitation, sedimentation, and filtration achieved effluent mercury concentrations less than the detection limit of 200 ng/L.

Bench-scale research performed at the Oak Ridge Y-12 Plant in Tennessee evaluated the effectiveness of various adsorbents for removing mercury to below the NPDES limit of 12 ng/L and the potential revised limit of 51 ng/L (Hollerman et al. 1999). Several proprietary adsorbents were tested, including carbon, polyacrylate, polystyrene, and polymer adsorption materials. The adsorbents with thiol-based active sites were the most effective. Some of the adsorbents were able to achieve effluent concentrations less than 51 ng/L but none of the adsorbents achieved effluent concentrations less than 12 ng/L.

Bench-scale and pilot-scale testing performed on refinery wastewater was completed to determine treatment technology effectiveness for meeting very low mercury levels (Urgun-Demirtas, Benda, Gillenwater, Negri, Xiong & Snyder 2012) (Urgun-Demirtas, Negri, Gillenwater, Agwu Nnanna & Yu 2013). The Great Lakes Initiative water quality criterion for mercury is less than 1.3 ng/L for municipal and industrial wastewater plants in the Great Lakes region. This research included an initial bench scale test including membrane filtration, ultrafiltration, nanofiltration, and reverse osmosis to meet the mercury water quality criterion. The nanofiltration and reverse osmosis required increased pressures for filtration and resulted in increased mercury concentrations in the permeate. Based on this information and the cost difference between the filtration technologies, a pilot-scale test was performed. The 0.04 um PVDF GE ZeeWeed 500 series membranes were tested. The 1.3 ng/L water quality criterion was met under all pilot study operating conditions. The mercury in the refinery effluent was predominantly in particulate form which was well-suited for removal using membrane filtration.

Based on available data, it appears that existing municipal treatment facilities are capable of reducing effluent mercury to near the range of the proposed HHWQC on an average basis. Average effluent mercury in the range of 1.2 to 6.6 ng/L for existing facilities with secondary treatment and enhanced treatment with cloth filters and membranes. The Spokane County plant data range is an average of 1.2 ng/L to a maximum day of 3 ng/L. Addition of advanced treatment processes such as GAC or RO would be expected to enhance removal rates. Data from the West Basin treatment facility in California suggests that at a detection limit of 7.99 ng/L mercury is not detected in the effluent from this advanced process train. A range of expected enhanced removal rates from the advanced treatment process trains might be expected to ranged from meeting the proposed standard at 5 ng/L to lower concentrations represented by the Spokane County performance level (membrane filtration) in the range of 1 to 3 ng/L, to perhaps even lower levels with additional treatment. For municipal plants in Washington, this would suggest that effluent mercury values from the two advanced treatment process alternatives might range from 1 to 5 ng/L (0.001 to 0.005 µg/L) and perhaps substantially better, depending upon RO and GAC removals. It is important to note that industrial plants may have higher existing mercury levels and thus the effluent quality that is achievable at an industrial facility would be of lower quality.

Summary of Mercury Technologies

The literature search revealed limited research on mercury removal technologies at the revised effluent limit of 0.005 µg/L. Tertiary filtration with membrane filters or reverse osmosis showed the best ability to achieve effluent criteria less than 0.005 µg/L.

4.2.3 Arsenic

A variety of treatment technologies can be applied to capture arsenic (Table 3). Most of the information in the technical literature and from the treatment technology vendors is focused on potable water treatment for compliance with a Safe Drinking Water Act (SDWA) maximum contaminant level (MCL) of 10 µg/L. The most commonly used arsenic removal method for a wastewater application (tertiary treatment) is coagulation/ flocculation plus filtration. This method by itself could remove more than 90 to 95 percent of arsenic. Additional post-treatment through adsorption, ion exchange, or reverse osmosis is required for ultra-low arsenic limits in the 0.018 µg/L range under consideration in the proposed rulemaking process. In each case it is recommended to perform pilot-testing of each selected technology.

Table 3: Summary of Arsenic Removal Technologies[1]

Technology	Advantages	Disadvantages
Coagulation/filtration	• Simple, proven technology • Widely accepted • Moderate operator training	• pH sensitive • Potential disposal issues of backwash waste • As^{+3} and As^{+5} must be fully oxidized
Lime softening	• High level arsenic treatment • Simple operation change for existing lime softening facilities	• pH sensitive (requires post treatment adjustment) • Requires filtration • Significant sludge operation
Adsorptive media	• High As^{+5} selectivity • Effectively treats water with high total dissolved solids (TDS)	• Highly pH sensitive • Hazardous chemical use in media regeneration • High concentration SeO_4^{-2}, F^-, Cl^-, and SO_4^{-2} may limit arsenic removal

Table 3: Summary of Arsenic Removal Technologies[1]

Technology	Advantages	Disadvantages
Ion exchange	• Low contact times • Removal of multiple anions, including arsenic, chromium, and uranium	• Requires removal of iron, manganese, sulfides, etc. to prevent fouling • Brine waste disposal
Membrane filtration	• High arsenic removal efficiency • Removal of multiple contaminants	• Reject water disposal • Poor production efficiency • Requires pretreatment

[1]Adapted from WesTech

The removal of arsenic in activated sludge is minimal (less than 20 percent) (Andrianisa et al. 2006), but biological treatment can control arsenic speciation. During aerobic biological process As (III) is oxidized to As (V). Coagulation/flocculation/filtration removal, as well as adsorption removal methods, are more effective in removal of As(V) vs. As (III). A combination of activated sludge and post-activated sludge precipitation with ferric chloride (addition to MLSS and effluent) results in a removal efficiency of greater than 95 percent. This combination could decrease As levels from 200 µg/L to less than 5 µg/L (5,000 ng/L) (Andrianisa et al. 2008) compared to the 0.018 µg/L range under consideration in the proposed rulemaking process.

Data from the West Basin facility (using MF/RO/AOP) suggests effluent performance in the range of 0.1 to 0.2 µg/L, but it could also be lower since a detection limit used there of 0.15 µg/l is an order of magnitude higher than the proposed HHWQC. A range of expected enhanced removal rates might be assumed to equivalent to that achieved at West Basin in 0.1 to 0.2 µg/L range.

Review of Specific Technologies for Arsenic Removal

Coagulation plus Settling or Filtration

Coagulation may remove more than 95 percent of arsenic through the creation of particulate metal hydroxides. Ferric sulfite is typically more efficient and applicable to most wastewater sources compared to alum. The applicability and extent of removal should be pilot-tested, since removal efficiency is highly dependent on the water constituents and water characteristics (i.e., pH, temperature, solids).

Filtration can be added after or instead of settling to increase arsenic removal. Example treatment trains with filtration are shown in Figures 1 and 2, respectively.

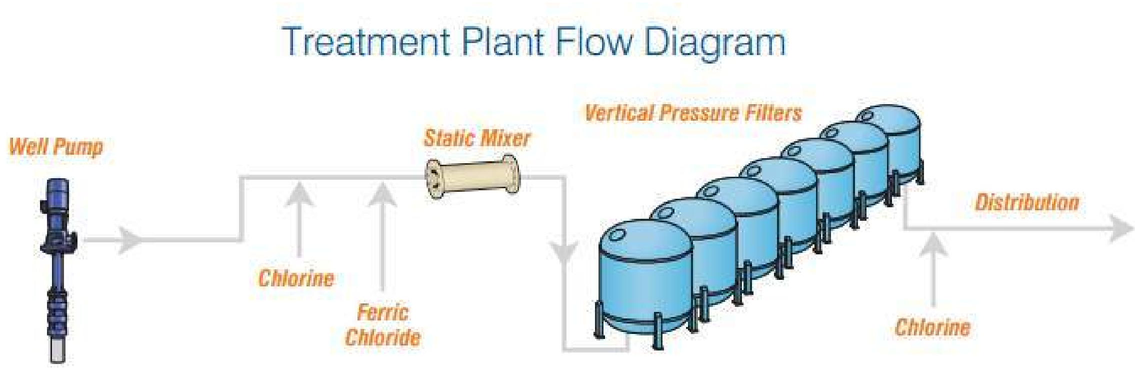

Figure 1. Water Treatment Configuration for Arsenic Removal (WesTech)

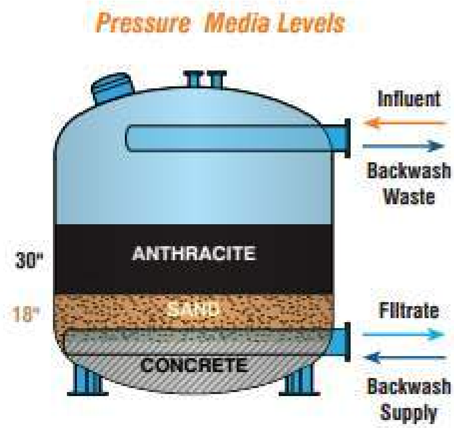

Figure 2. WesTech Pressure Filters for Arsenic Removal

One system for treatment of potable water with high levels of arsenic in Colorado (110 parts per million [ppm]) consists of enhanced coagulation followed by granular media pressure filters that include anthracite/silica sand/garnet media (WesTech). The arsenic levels were reduced to less than the drinking water MCL, which is 10 µg/L (10,000 ng/L). The plant achieves treatment by reducing the pH of the raw water to 6.8 using sulfuric acid, and then adding approximately 12 to 14 mg/L ferric sulfate. The water is filtered through 16 deep bed vertical pressure filters, the pH is elevated with hydrated lime and is subsequently chlorinated and fed into the distribution system. (http://www.westechinc.com/public/uploads/global/2011/3/Fallon%20NV%20Installation%20ReportPressureFilter.pdf).

Softening (with lime)

Removes up to 90 percent arsenic through co-precipitation, but requires pH to be higher than 10.2.

Adsorption processes

Activated alumina is considered an adsorptive media, although the chemical reaction is an exchange of arsenic ions with the surface hydroxides on the alumina. When all the surface hydroxides on the alumina have been exchanged, the media must be regenerated. Regeneration consists of backwashing, followed by sodium hydroxide, flushing with water and neutralization with a strong acid. Effective arsenic removal requires sufficient empty bed contact time. Removal efficiency can also be impacted by the water pH, with neutral or slightly acidic conditions being considered optimum. If As (III) is present, it is generally advisable to increase empty bed contact time, as As (III) is adsorbed more slowly than As (V). Alumina dissolves slowly over time due to contact with the chemicals used for regeneration. As a result, the media bed is likely to become compacted if it is not backwashed periodically.

Granular ferric hydroxide works by adsorption, but when the media is spent it cannot be regenerated and must be replaced. The life of the media depends upon pH of the raw water, the concentrations of arsenic and heavy metals, and the volume of water treated daily. Periodic backwashing is required to prevent the media bed from becoming compacted and pH may need to be adjusted if it is high, in order to extend media life. For maximum arsenic removal, filters operate in series. For less stringent removal, filters can operate in parallel.

One type of adsorption media has been developed for application to non-drinking water processes for arsenic, phosphate and for heavy metals removal by sorption (Severent Trent Bayoxide® E IN-20). This granular ferric oxide media has been used for arsenic removal from mining and industrial wastewaters, selenium removal from refinery wastes and for phosphate polishing of municipal wastewaters. Valley Vista drinking water treatment with Bayoxide® E IN-20 media achieves removal from 31-39 µg/L (31,000-39,000 ng/L) to below 10 µg/L MCL (http://www.severntrentservices.com/News/Successful_Drinking_Water_Treatment_in_an_Arsenic__Hot_Spot__nwMFT_452.aspx).

Another adsorptive filter media is greensand. Greensand is available in two forms: as glauconite with manganese dioxide bound ionically to the granules and as silica sand with manganese dioxide fused to the granules. Both forms operate in pressure filters and both are effective. Greensand with the silica sand core operates at higher water temperatures and higher differential pressures than does greensand with the glauconite core. Arsenic removal requires a minimum concentration of iron. If a sufficient concentration of iron is not present in the raw water, ferric chloride is added.

WesTech filters with greensand and permanganate addition for drinking water systems can reduce As from 15-25 µg/L to non-detect. Sodium hypochlorite and/or potassium permanganate are added to the raw water prior to the filters. Chemical addition may be done continuously or intermittently, depending on raw water characteristics. These chemicals oxidize the iron in the raw water and also maintain the active properties of the greensand itself. Arsenic removal is via co-precipitation with the iron.

Ion Exchange

Siemens offers a potable ion exchange (PIX) arsenic water filtration system. PIX uses ion exchange resin canisters for the removal of organic and inorganic contaminants, in surface and groundwater sources to meet drinking water standards.

Filtronics also uses ion exchange to treat arsenic. The technology allows removal for below the SWDA MCL for potable water of 10 µg/L (10,000 ng/L).

Reverse osmosis

Arsenic is effectively removed by RO when it is in oxidative state As(V) to approximately 1,000 ng/L or less (Ning 2002).

Summary of Arsenic Technologies

The current state of the technology for arsenic removal is at the point where all the processes target the SWDA MCL for arsenic in potable water. Current EPA maximum concentration level for drinking water is 10 ug/l; much higher than 0.0018 µg/L target for arsenic in this study. The majority of the methods discussed above are able to remove arsenic to either EPA maximum contaminant level or to the level of detection. The lowest detection limit of one of the EPA approved methods of arsenic measurements is 20 ng/l (0.020 µg/l) (Grosser, 2010), which is comparable to the 0.018 µg/L limit targeted in this study.

4.2.1 Polycyclic Aromatic Hydrocarbons

BAP During Biological Treatment

During wastewater treatment process, BAP tends to partition into sludge organic matter (Melcer et al. 1993). Primary and secondary processing could remove up to 60 percent of incoming PAHs and BAP in particular, mostly due to adsorption to sludge (Kindaichi et al., NA, Wayne et al. 2009). Biodegradation of BAP is expected to be very low since there are more than five benzene rings which are resistant to biological degradation. Biosurfactant addition to biological process could partially improve biodegradation, but only up to removal rates of 50 percent (Sponza et al. 2010). Existing data from municipal treatment facilities in Washington state have influent and effluent concentrations of BAP of approximately 0.30 ng/L indicating that current secondary treatment has limited effectiveness at BAP removal.

Methods to Enhance Biological Treatment of BAP

Ozonation prior to biological treatment could potentially improve biodegradability of BAP (Zeng et al. 2000). In the case of soil remediation, ozonation before biotreatment improved biodegradation by 70 percent (Russo et al. 2012). The overall removal of BAP increased from 23 to 91 percent after exposure of water to 0.5 mg/L ozone for 30 minutes during the simultaneous treatment process and further to 100 percent following exposure to 2.5 mg/L ozone for 60 minutes during the sequential treatment mode (Yerushalmi et al. 2006). In general, to improve biodegradability of BAP, long exposure to ozone might be required (Haapea et al. 2006).

Sonication pre-treatment or electronic beam irradiation before biological treatment might also make PAHs more bioavailable for biological degradation..

Recent studies reported that a MBR is capable of removing PAHs from wastewater (Rodrigue and Reilly 2009; Gonzaleza et al. 2012). None of the studies listed the specific PAHs constituents removed.

Removal of BAP from Drinking Water

Activated Carbon

Since BAP has an affinity to particulate matter, it is removed from the drinking water sources by means of adsorption, such as granular activated carbon (EPA). Similarly, Oleszczuk et al. (2012) showed that addition of 5 percent activated carbon could remove 90 percent of PAHs from the wastewater.

Reverse Osmosis

Light (1981) (referenced by Williams, 2003) studied dilute solutions of PAHs, aromatic amines, and nitrosamines and found rejections of these compounds in reverse osmosis to be over 99 percent for polyamide membranes. Bhattacharyya et al. (1987) (referenced by Williams, 2003) investigated rejection and flux characteristics of FT30 membranes for separating various pollutants (PAHs, chlorophenols, nitrophenols) and found membrane rejections were high (>98 percent) for the organics under ionized conditions.

Summary of BAP Technologies

Current technologies show that BAP removal may be 90 percent or greater. The lowest detection limit for BAP measurements is 0.006 µg/L, which is also the assumed secondary effluent BAP concentration assumed for this study. If this assumption is accurate, it appears technologies may exist to remove BAP to a level below the proposed criteria applied as an effluent limit of 0.0013 µg/L; however, detection limits exceed this value and it is impossible to know this for certain. A municipal wastewater treatment plant study reported both influent and effluent BAP concentrations less than the HHWQC of 0.0013 ug/L (Ecology, 2010).

4.3 Unit Processes Evaluated

Based on the results of the literature review, a wide range of technologies were evaluated for toxic constituent removal. A listing of the technologies is as follows:

- Chemically enhanced primary treatment (CEPT): this physical and chemical technology is based on the addition of a metal salt to precipitate particles prior to primary treatment, followed by sedimentation of particles in the primary clarifiers. This technology has been shown to effectively remove arsenic but there is little data supporting the claims. As a result, the chemical facilities are listed as optional.

- Activated sludge treatment (with a short SRT of approximately 8 days or less): this biological technology is commonly referred to as secondary treatment. It relies on converting dissolved organics into solids using biomass. Having a short SRT is effective at removing degradable organics referred to as BOD compounds for meeting existing discharge limits. Dissolved constituents with a high affinity to adsorb to biomass (e.g., metals, high molecular weight organics, and others) will be better removed compared to smaller molecular weight organics and recalcitrant compounds which will have minimal removal at a short SRT.
- Enhanced activated sludge treatment (with a long SRT of approximately 8 days or more): this technology builds on secondary treatment by providing a longer SRT, which enhances sorption and biodegradation. The improved performance is based on having more biomass coupled with a more diverse biomass community, especially nitrifiers, which have been shown to assist in removal of some of the more recalcitrant constituents not removed with a shorter SRT (e.g., lower molecular weight PAHs). There is little or no data available on the effectiveness of this treatment for removing BAP.

  Additional benefits associated with having a longer SRT are as follows:

  - Lower BOD/TSS discharge load to receiving water
  - Improved water quality and benefit to downstream users
  - Lower effluent nutrient concentrations which reduce algal growth potential in receiving waters
  - Reduced receiving water dissolved oxygen demand due to ammonia removal
  - Reduced ammonia discharge, which is toxic to aquatic species
  - Improved water quality for habitat, especially as it relates to biodiversity and eutrophication
  - Secondary clarifier effluent more conditioned for filtration and disinfection
  - Greater process stability from the anaerobic/anoxic zones serving as biological selectors
- Coagulation/Flocculation and Filtration: this two-stage chemical and physical process relies on the addition of a metal salt to precipitate particles in the first stage, followed by the physical removal of particles in filtration. This technology lends itself to constituents prone to precipitation (e.g., arsenic).
- Lime Softening: this chemical process relies on increasing the pH as a means to either volatilize dissolved constituents or inactivate pathogens. Given that none of the constituents being studied are expected to volatilize, this technology was not carried forward.
- Adsorptive Media: this physical and chemical process adsorbs constituents to a combination of media and/or biomass/chemicals on the media. There are several types of media, with the most proven and common being GAC. GAC can also serve as a coarse roughing filter.
- Ion Exchange: this chemical technology exchanges targeted constituents with a resin. This technology is common with water softeners where the hard divalent cations are

exchanged for monovalent cations to soften the water. Recently, resins that target arsenic and mercury removal include activated alumina and granular ferric hydroxides have been developed. The resin needs to be cleaned and regenerated, which produces a waste slurry that requires subsequent treatment and disposal. As a result, ion exchange was not considered for further.

- Membrane Filtration: This physical treatment relies on the removal of particles larger than the membranes pore size. There are several different membrane pore sizes as categorized below.
    - Microfiltration (MF): nominal pore size range of typically between 0.1 to 1 micron. This pore size targets particles, both inert and biological, and bacteria. If placed in series with coagulation/flocculation upstream, dissolved constituents precipitated out of solution and bacteria can be removed by the MF membrane.
    - Ultrafiltration (UF): nominal pore size range of typically between 0.01 to 0.1 micron. This pore size targets those solids removed with MF (particles and bacteria) plus viruses and some colloidal material. If placed in series with coagulation/flocculation upstream, dissolved constituents precipitated out of solution can be removed by the UF membrane.
    - Nanofiltration (NF): nominal pore size range of typically between 0.001 to 0.010 micron. This pore size targets those removed with UF (particles, bacteria, viruses) plus colloidal material. If placed in series with coagulation/flocculation upstream, dissolved constituents precipitated out of solution can be removed by the NF membrane.
- MBR (with a long SRT): this technology builds on secondary treatment whereby the membrane (microfiltration) replaces the secondary clarifier for solids separation. As a result, the footprint is smaller, the mixed liquor suspended solids concentration can be increased to about 5,000 – 10,000 mg/L, and the physical space required for the facility reduced when compared to conventional activated sludge. As with the activated sludge option operated at a longer SRT, the sorption and biodegradation of organic compounds are enhanced in the MBR process. The improved performance is based on having more biomass coupled with a more diverse biomass community, especially nitrifiers which have been shown to assist in removal of persistent dissolved compounds (e.g., some PAHs). There is little or no data available on effectiveness at removing BAP. Although a proven technology, MBRs were not carried further in this technology review since they are less likely to be selected as a retrofit for an existing activated sludge (with a short SRT) secondary treatment facility. The MBR was considered to represent a treatment process approach more likely to be selected for a new, greenfield treatment facility. Retrofits to existing secondary treatment facilities can accomplish similar process enhancement by extending the SRT in the activated sludge process followed by the addition of tertiary membrane filtration units.
- RO: This physical treatment method relies on the use of sufficient pressure to osmotically displace water across the membrane surface while simultaneously rejecting most salts. RO is very effective at removing material smaller than the size ranges for the membrane filtration list above, as well as salts and other organic compounds. As a result, it is expected to be more effective than filtration and MBR methods described above at removing dissolved constituents. Although effective, RO produces a brine reject water that must be managed and disposed.

- Advanced Oxidation Processes (AOPs): this broad term considers all chemical and physical technologies that create strong hydroxyl-radicals. Examples of AOPs include Fenton's oxidation, ozonation, ultraviolet/hydrogen peroxide (UV-H2O2), and others. The radicals produced are rapid and highly reactive at breaking down recalcitrant compounds. Although effective at removing many complex compounds such as those evaluated in this study, AOPs does not typically have as many installations as membranes and activated carbon technologies. As a result, AOPs were not carried forward.

Based on the technical literature review discussed above, a summary of estimated contaminant removal rated by unit treatment process is presented in Table 4.

Table 4. Contaminants Removal Breakdown by Unit Process

Unit Process	Arsenic	BAP	Mercury	Polychlorinated Biphenyls
Activated Sludge Short SRT	No removal	Partial Removal by partitioning		80% removal; effluent <0.88 ng/L
Activated Sludge Long SRT	No removal	Partial removal by partitioning and/or partially biodegradation; MBR could potentially remove most of BAP		>90% removal with a membrane bioreactor, <0.04 ng/L (includes membrane filtration)
Membrane Filtration (MF)	More than 90 % removal (rejection of bound arsenic)	No removal	<1.3 ng/L	>90% removal with a membrane bioreactor, <0.04 ng/L (includes membrane filtration)
Reverse Osmosis (RO)	More than 90% removal (rejection of bound arsenic and removal of soluble arsenic)	More than 98% removal		
Granular Activated Carbon (GAC)	No removal, removal only when carbon is impregnated with iron	90 % removal	<300 ng/L (precipitation and carbon adsorption) <51 ng/L (GAC)	<800 ng/L Likely requires upstream filtration
Disinfection	--	--	--	--

4.4 Unit Processes Selected

The key conclusion from the literature review was that there is limited, to no evidence, that existing treatment technologies are capable of simultaneously meeting all four of the revised discharge limits for the toxics under consideration. Advanced treatment using RO or GAC is expected to provide the best overall removal of the constituents of concern. It is unclear whether these advanced technologies are able to meet revised effluent limits, however these processes may achieve the best effluent quality of the technologies reviewed. This limitation in the findings is based on a lack of an extensive dataset on treatment removal effectiveness in the technical literature for the constituents of interest at the low levels relevant to the proposed criteria, which approach the limits of reliable removal performance for the technologies. As Table 4 highlights, certain unit processes are capable of removing a portion, or all, of the removal requirements for each technology. The removal performance for each constituent will vary from facility to facility and require a site-specific, detailed evaluation because the proposed criteria are such low concentrations. In some cases, a facility may only have elevated concentrations of a single constituent of concern identified in this study. In other cases, a discharger may have elevated concentrations of the four constituents identified in this study, as well as others not identified in this study but subject to revised water quality criteria. This effort is intended to describe a planning level concept of what treatment processes are required to comply with discharge limits for all four constituents. Based on the literature review of unit processes above, two different treatment trains were developed for the analysis that are compared against a baseline of secondary treatment as follows:

- Baseline: represents conventional secondary treatment that is most commonly employed nationwide at wastewater treatment plants. A distinguishing feature for this treatment is the short solids residence time (SRT) (<8 days) is intended for removal of BOD with minimal removal for the toxic constituents of concern.
- Advanced Treatment – MF/RO: builds on baseline with the implementation of a longer SRT (>8 days) and the addition of MF and RO. The longer SRT not only removes BOD, but it also has the capacity to remove nutrients and a portion of the constituents of concern. This alternative requires a RO brine management strategy which will be discussed in sub-sections below.
- Advanced Treatment – MF/GAC: this alternative provides a different approach to advanced treatment with MF/RO by using GAC and avoiding the RO reject brine water management concern. Similar to the MF/RO process, this alternative has the longer SRT (>8 days) with the capacity to remove BOD, nutrients, and a portion of the toxic constituents of concern. As a result, the decision was made to develop costs for both advanced treatment options.

A description of each alternative is provided in Table 5. The process flowsheets for each alternative are presented in Figure 3 to Figure 5.

4.4.1 Baseline Treatment Process

A flowsheet of the baseline treatment process is provided in Figure 3. The baseline treatment process assumes the current method of treatment commonly employed by dischargers. For this process, water enters the headworks and undergoes primary treatment, followed by conventional activated sludge (short SRT) and disinfection. The solids wasted in the activated sludge process are thickened, followed by mixing with primary solids prior to entering the anaerobic digestion process for solids stabilization. The digested biosolids are dewatered to produce a cake and hauled off-site. Since the exact process for each interested facility in Washington is unique, this baseline treatment process was used to establish the baseline capital and O&M costs. The baseline costs will be compared against the advanced treatment alternatives to illustrate the magnitude of the increased costs and environmental impacts.

Table 5. Unit Processes Description for Each Alternative

Unit Process	Baseline	Advanced Treatment – MF/RO	Advanced Treatment - GAC
Influent Flow	5 mgd	5 mgd	5 mgd
Chemically Enhanced Primary Treatment (CEPT); Optional	--	• Metal salt addition (alum) upstream of primaries	• Metal salt addition (alum) upstream of primaries
Activated Sludge	• Hydraulic Residence Time (HRT): 6 hrs • Short Solids Residence Time (SRT): <8 days	• Hydraulic Residence Time (HRT): 12 hrs (Requires more tankage than the Baseline) • Long Solids Residence Time (SRT): >8 days (Requires more tankage than the Baseline)	• Hydraulic Residence Time (HRT): 12 hrs (Requires more tankage than the Baseline) • Long Solids Residence Time (SRT): >8 days (Requires more tankage than the Baseline)
Secondary Clarifiers	Hydraulically Limited	Solids Loading Limited (Larger clarifiers than Baseline)	Solids Loading Limited (Larger clarifiers than Baseline)
Microfiltration (MF)	--	Membrane Filtration to Remove Particles and Bacteria	Membrane Filtration to Remove Particles and Bacteria
Reverse Osmosis (RO)	--	Treat 50% of the Flow by RO to Remove Metals and Dissolved Constituents. Sending a portion of flow through the RO and blending it with the balance of plant flows ensures a stable non-corrosive, non-toxic discharge.	--
Reverse Osmosis Brine Reject Mgmt	--	Several Options (All Energy or Land Intensive)	--
Granular Activated Carbon (GAC)	--	--	Removes Dissolved Constituents
Disinfection	Not shown to remove any of the constituents	Not shown to remove any of the constituents	Not shown to remove any of the constituents

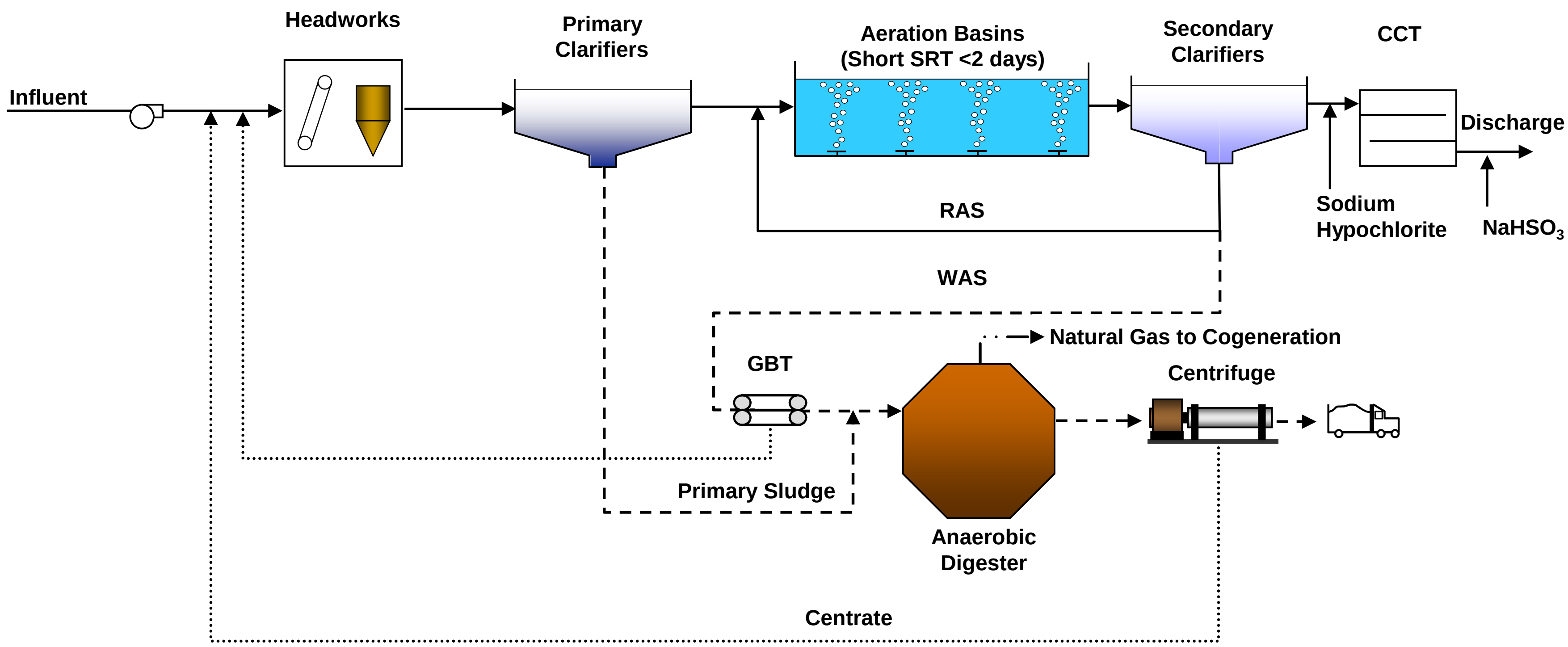

Figure 3. Baseline Flowsheet – Conventional Secondary Treatment

4.4.2 Advanced Treatment – MF/RO Alternative

A flowsheet of the advanced treatment – MF/RO alternative is provided in Figure 4. This alternative builds on the baseline secondary treatment facility, whereby the SRT is increased in the activated sludge process, and MF and RO are added prior to disinfection. The solids treatment train does not change with respect to the baseline. Additionally, a brine management strategy must be considered.

The RO process concentrates contaminants into a smaller volume reject stream. Disposing of the RO reject stream can be a problem because of the potentially large volume of water involved and the concentration of contaminants contained in the brine. For reference, a 5 mgd process wastewater flow might result in 1 mgd of brine reject requiring further management. The primary treatment/handling options for RO reject are as follows:

- Zero liquid discharge
- Surface water discharge
- Ocean discharge
- Haul and discharge to coastal location for ocean discharge
- Sewer discharge
- Deep well injection
- Evaporate in a pond
- Solar pond concentrator

Many of the RO brine reject management options above result in returning the dissolved solids to a “water of the state” such as surface water, groundwater, or marine waters. Past rulings in Washington State have indicated that once pollutants are removed from during treatment they are not to be re-introduced to a water of the state. As a result, technologies with this means for disposal were not considered viable options for management of RO reject water in Washington.

Zero Liquid Discharge

Zero liquid discharge (ZLD) is a treatment process that produces a little or no liquid brine discharge but rather a dried residual salt material. This process improves the water recovery of the RO system by reducing the volume of brine that must be treated and disposed of in some manner. ZLD options include intermediate treatment, thermal-based technologies, pressure driven membrane technologies, electric potential driven membrane technologies, and other alternative technologies.

Summary

There are many techniques which can be used to manage reject brine water associated with RO treatment. The appropriate alternative is primarily governed by geographic and local constraints. A comparison of the various brine management methods and potential costs are provided in Table 6.

Of the listed options, ZLD was considered for this analysis as the most viable approach to RO reject water management. An evaporation pond was used following ZLD. The strength in this combination is ZLD reduces the brine reject volume to treat, which in turn reduces the required evaporation pond footprint. The disadvantage is that evaporation ponds require a substantial amount of physical space which may not be available at existing treatment plant sites. It is also important to recognize that the greenhouse gas (GHG) emissions vary widely for the eight brine management options listed above based on energy and chemical intensity.

Table 6. Brine Disposal Method Relative Cost Comparison

Disposal Method	Description	Relative Capital Cost	Relative O&M Cost	Comments
Zero Liquid Discharge (ZLD)	Further concentrates brine reject for further downstream processing	High	High	This option is preferred as an intermediate step. This rationale is based on the reduction in volume to handle following ZLD. For example, RO reject stream volume is reduced on the order of 50-90%.
Surface Water Discharge	Brine discharge directly to surface water. Requires an NPDES permit.	Lowest	Lowest	Both capital and O&M costs heavily dependent on the distance from brine generation point to discharge. Not an option for nutrient removal.
Ocean Discharge	Discharge through a deep ocean outfall.	Medium	Low	Capital cost depends on location and availability of existing deep water outfall.
Sewer Discharge	Discharge to an existing sewer pipeline for treatment at a wastewater treatment plant.	Low	Low	Both capital and O&M costs heavily dependent on the brine generation point to discharge distance. Higher cost than surface water discharge due to ongoing sewer connection charge. Not an option for wastewater treatment.
Deep Well Injection	Brine is pumped underground to an area that is isolated from drinking water aquifers.	Medium	Medium	Technically sophisticated discharge and monitoring wells required. O&M cost highly variable based on injection pumping energy.
Evaporation Ponds	Large, lined ponds are filled with brine. The water evaporates and a concentrated salt remains.	Low – High	Low	Capital cost highly dependent on the amount and cost of land.
Salinity Gradient Solar Ponds (SGSP)	SGSPs harness solar power from pond to power an evaporative unit.	Low – High	Lowest	Same as evaporation ponds plus added cost of heat exchanger and pumps. Lower O&M cost due to electricity production.
Advanced Thermal Evaporation	Requires a two-step process consisting of a brine concentrator followed by crystallizer	High	Highest	Extremely small footprint, but the energy from H_2O removal is by far the most energy intensive unless waste heat is used.

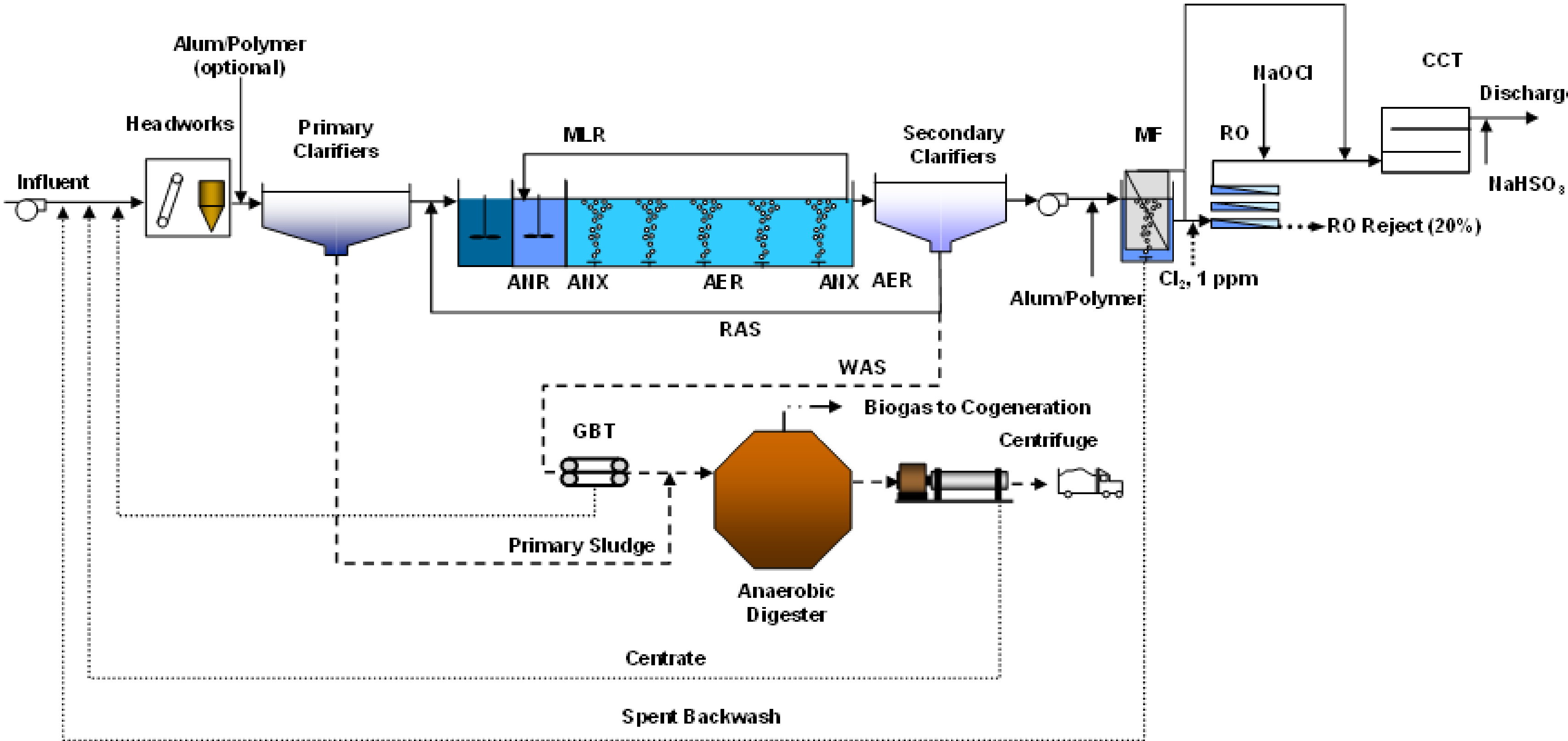

Figure 4. Advanced Treatment Flowsheet – Tertiary Microfiltration and Reverse Osmosis

4.4.3 Advanced Treatment – MF/GAC Alternative

A flowsheet of the advanced treatment – MF/GAC alternative is provided in Figure 5. Following the MF technology, a GAC contactor and media are required.

This alternative was developed as an option that does not require a brine management technology (e.g., ZLD) for comparison to the MF/RO advanced treatment alternative. However, this treatment alternative does require that the GAC be regenerated. A baseline secondary treatment facility can be retrofitted for MF/GAC. If an existing treatment facility has an extended aeration lagoon, the secondary effluent can be fed to the MF/GAC. The longer SRT in the extended aeration lagoon provides all the benefits associated with the long SRT in an activated sludge plant as previously stated:

- Lower BOD/TSS discharge load
- Higher removal of recalcitrant constituents and heavy metals
- Improved water quality and benefit to downstream users
- Less downstream algal growth
- Reduced receiving water dissolved oxygen demand due to ammonia removal
- Reduced ammonia discharge loads, which is toxic to several aquatic species
- Improved water quality for habitat, especially as it relates to biodiversity and eutrophication
- Secondary clarifier effluent more conditioned for filtration and disinfection
- Greater process stability from the anaerobic/anoxic zones serving as a selector

If an existing treatment facility employs a high rate activated sludge process (short SRT) similar to the baseline, it is recommended that the activated sludge process SRT be increased prior to the MF/GAC unit processes. The longer SRT upstream of the MF is preferred to enhance the membrane flux rate, reduce membrane biofouling, increase membrane life, and reduce the chemicals needed for membrane cleaning.

The key technical and operational challenges associated with the tertiary add-on membrane filtration units are as follows:

- The membrane filtration technology is a proven and reliable technology. With over 30 years of experience, it has made the transition in recent years from an emerging technology to a proven and reliable technology.
- Membrane durability dependent on feed water quality. The water quality is individual facility specific.
- Membranes are sensitive to particles, so upstream screening is critical. The newer generations of membranes have technical specifications that require a particular screen size.
- Membrane area requirements based on peak flows as water must pass through the membrane pores. Additionally, membranes struggle with variable hydraulic loading. Flow equalization upstream can greatly reduce the required membrane surface area and provide uniform membrane loading.

- Membrane tanks can exacerbate any foam related issues from the upstream biological process. Foam entrapment in the membrane tank from the upstream process can reduce membrane filtration capacity and in turn result in a plant-wide foam problem.
- Reliable access to the membrane modules is key to operation and maintenance. Once PLC is functionary properly, overall maintenance requirements for sustained operation of the system are relatively modest.
- The membranes go through frequent membrane relaxing or back pulse and a periodic deep chemical clean in place (CIP) process.
- Sizing of membrane filtration facilities governed by hydraulic flux. Municipal wastewaters have flux values that range from about 20 to 40 gallons per square foot per day (gfd) under average annual conditions. The flux associated with industrial applications is wastewater specific.

Following the MF is the activated carbon facilities. There are two kinds of activated carbon used in treating water: powdered activated carbon (PAC) and GAC. PAC is finely-ground, loose carbon that is added to water, mixed for a short period of time, and removed. GAC is larger than PAC, is generally used in beds or tanks that permit higher adsorption and easier process control than PAC allows, and is replaced periodically. PAC is not selective, and therefore, will adsorb all active organic substances making it an impractical solution for a wastewater treatment plant. As a result, GAC was considered for this analysis. The type of GAC (e.g., bituminous and subbituminous coal, wood, walnut shells, lignite or peat), gradation, and adsorption capacity are determined by the size of the largest molecule/ contaminant that is being filtered (AWWA, 1990).

As water flows through the carbon bed, contaminants are captured by the surfaces of the pores until the carbon is no longer able to adsorb new molecules. The concentration of the contaminant in the treated effluent starts to increase. Once the contaminant concentration in the treated water reaches an unacceptable level (called the breakthrough concentration), the carbon is considered "spent" and must be replaced by virgin or reactivated GAC.

The capacity of spent GAC can be restored by thermal reactivation. Some systems have the ability to regenerate GAC on-site, but in general, small systems haul away the spent GAC for off-site regeneration (EPA 1993). For this study, off-site regeneration was assumed.

The basic facilities and their potential unit processes included in this chapter are as follows:

- GAC supply and delivery
- Influent pumping
    - Low head feed pumping
    - High head feed pumping (assumed for this study as we have low limits so require high beds)
- Contactors and backwash facilities
    - Custom gravity GAC contactor
    - Pre-engineered pressure GAC contactor (Used for this study)
    - Backwash pumping
- GAC transport facilities
    - Slurry pumps
    - Eductors (Used for this study)

- Storage facilities
  - Steel tanks
  - Concrete tanks (Used for this study; larger plants would typically select concrete tanks)
- Spent carbon regeneration
  - On-site GAC regeneration
  - Off-Site GAC regeneration

Following the MF is the GAC facility. The GAC contactor provides about a 12-min hydraulic residence time for average annual conditions. The GAC media must be regenerated about twice per year in a furnace. The constituents sorbed to the GAC media are removed during the regeneration process. A typical design has full redundancy and additional storage tankage for spent and virgin GAC. Facilities that use GAC need to decide whether they will regenerate GAC on-site or off-site. Due to challenges associated with receiving air emission permits for new furnaces, it was assumed that off-site regeneration would be evaluated.

The key technical and operational challenges associated with the tertiary add-on GAC units are as follows:

- Nearest vendor to acquire virgin GAC – How frequently can they deliver virgin GAC and what are the hauling costs?
- Contactor selection is typically based on unit cost and flow variation. The concrete contactor is typically more cost effective at higher flows so it was used for this evaluation. The pre-engineered pressure contactor can handle a wider range of flows than a concrete contactor. Additionally, a pressure system requires little maintenance as they are essentially automated
- Periodical contactor backwashing is critical for maintaining the desired hydraulics and control biological growth
- Eductors are preferred over slurry pumps because they have fewer mechanical components. Additionally, the pump with eductors is not in contact with the carbon, which reduces wear.
- Off-site GAC regeneration seems more likely due to the challenges with obtaining an air emissions permit.

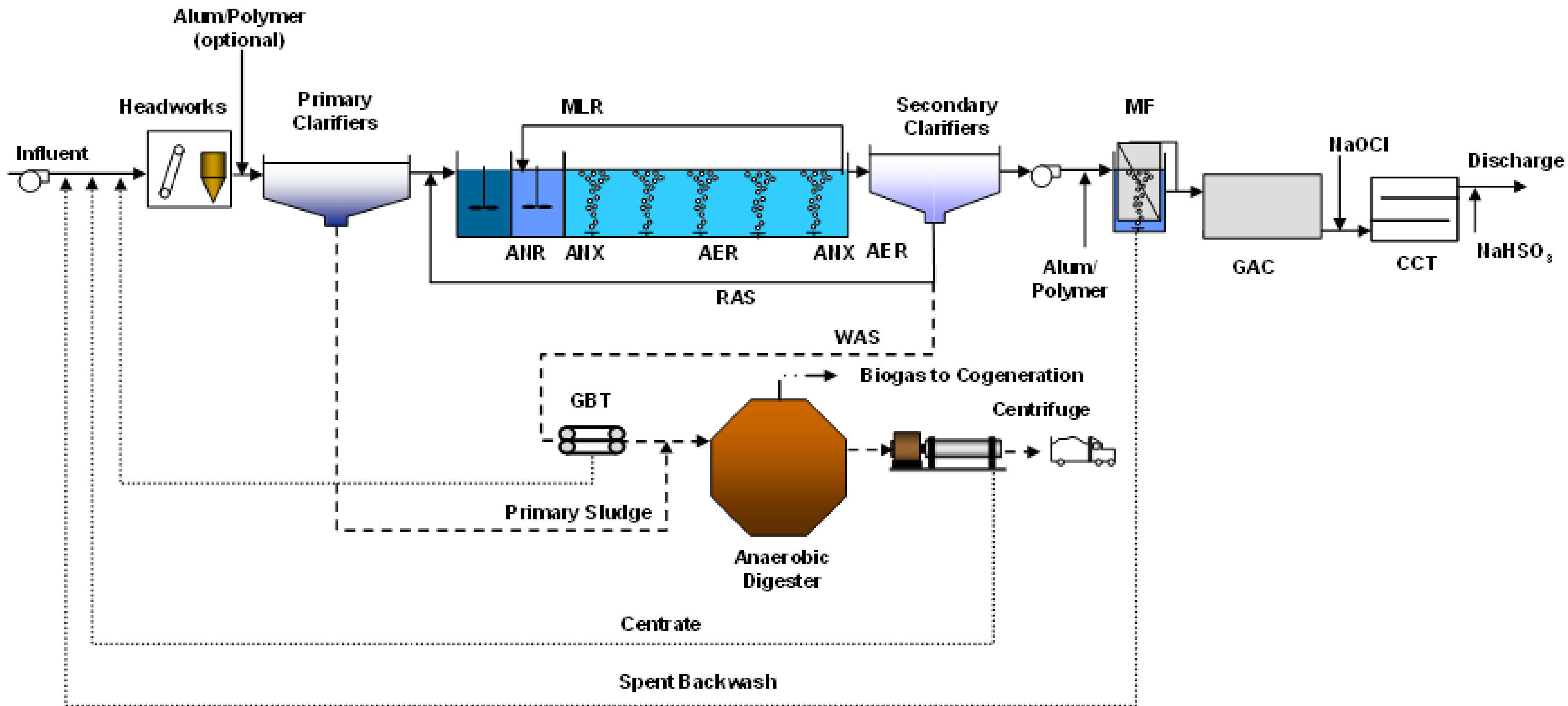

Figure 5. Advanced Treatment Flowsheet – Tertiary Microfiltration and Granular Activated Carbon

4.5 Steady-State Mass Balance

HDR used its steady-state mass balance program to calculate the flows and loads within the candidate advanced treatment processes as a means to size facilities. The design of wastewater treatment facilities are generally governed by steady-state mass balances. For a steady-state mass balance, the conservation of mass is calculated throughout the entire wastewater treatment facility for defined inputs. Dynamic mass balance programs exist for designing wastewater facilities, but for a planning level study such as this, a steady state mass balance program is adequate. A dynamic program is generally used for detailed design and is site-specific with associated requirements for more detailed wastewater characterization.

The set of model equations used to perform a steady-state mass balance are referred to as the model. The model equations provide a mathematical description of various wastewater treatment processes, such as an activated sludge process, that can be used to predict unit performance. The program relies on equations for each unit process to determine the flow, load, and concentration entering and leaving each unit process.

An example of how the model calculates the flow, load, and concentration for primary clarifiers is provided below. The steady-state mass balance equation for primary clarifiers has a single input and two outputs as shown in the simplified Figure 6. The primary clarifier feed can exit the primary clarifiers as either effluent or sludge. Solids not removed across the primaries leave as primary effluent, whereas solids captured leave as primary sludge. Scum is not accounted for.

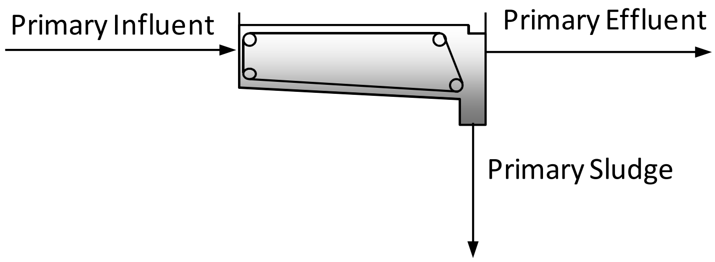

Figure 6. Primary Clarifier Inputs/Outputs

The mass balance calculation requires the following input:

- Solids removal percentage across the primaries (based on average industry accepted performance)
- Primary solids thickness (i.e., percent solids) (based on average industry accepted performance)

The steady-state mass balance program provides a reasonable first estimate for the process performance, and an accurate measure of the flows and mass balances at various points throughout the plant. The mass balance results were used for sizing the facility needs for each alternative. A listing of the unit process sizing criterion for each unit process is provided in Appendix A. By listing the unit process sizing criteria, a third-party user could redo the analysis and end up with comparable results. The key sizing criteria that differ between the baseline and treatment alternatives are as follows:

- Aeration basin mixed liquor is greater for the advanced treatment alternatives which in turn requires a larger volume
- The secondary clarifiers are sized based on hydraulic loading for the baseline versus solids loading for the advanced treatment alternatives

- The MF/GAC and MF/RO sizing is only required for the respective advanced treatment alternatives.

4.6 Adverse Environmental Impacts Associated with Advanced Treatment Technologies

The transition from the baseline (conventional secondary treatment) to either advanced treatment alternatives has some environmental impacts that merit consideration, including the following:

- Land area for additional system components (which for constrained facility sites, may necessitate land acquisition and encroachment into neighboring properties with associated issues and challenges, etc.).
- Increased energy use and atmospheric emissions of greenhouse gases and criteria air contaminants associated with power generation to meet new pumping requirements across the membrane filter systems (MF and RO) and GAC.
- Increased chemical demand associated with membrane filters (MF and RO).
- Energy and atmospheric emissions associated with granulated charcoal regeneration.
- RO brine reject disposal. The zero liquid discharge systems are energy intensive energy and increase atmospheric emissions as a consequence of the electrical power generation required for removing water content from brine reject.
- Increase in sludge generation while transitioning from the baseline to the advanced treatment alternatives. There will be additional sludge captured with the chemical addition to the primaries and membrane filters (MF and RO). Additionally, the GAC units will capture more solids.
- Benefits to receiving water quality by transitioning from a short SRT (<2 days) in the baseline to a long SRT (>8 days) for the advanced treatment alternatives (as previously stated):
    - Lower BOD/TSS discharge load
    - Higher removal of recalcitrant constituents and heavy metals
    - Improved water quality and benefit to downstream users
    - Reduced nutrient loadings to receiving waters and lower algal growth potential
    - Reduced receiving water dissolved oxygen demand due to ammonia removal
    - Reduced ammonia discharge loads, which is toxic to aquatic species
    - Improved water quality for habitat, especially as it relates to biodiversity and eutrophication
    - Secondary clarifier effluent better conditioned for subsequent filtration and disinfection
    - Greater process stability from the anaerobic/anoxic zones serving as a biological selectors

HDR calculated GHG emissions for the baseline and advanced treatment alternatives. The use of GHG emissions is a tool to normalize the role of energy, chemicals, biosolids hauling, and fugitive emissions (e.g., methane) in a single unit. The mass balance results were used to quantify energy demand and the corresponding GHG emissions for each alterative. Energy demand was estimated from preliminary process calculations. A listing of the energy demand for each process stream, the daily energy demand, and the unit energy demand is provided in Table 7. The advanced treatment options range from 2.3 to 4.1 times greater than the baseline. This large increase in energy demand is attributed to the energy required to pass water through the membrane barriers and/or the granular activated carbon. Additionally, there is energy required to handle the constituents removed as either regenerating the GAC or handling the RO brine reject water. This additional energy required to treat the removed constituents is presented in Table 7.

Table 7. Energy Breakdown for Each Alternative (5 mgd design flow)

Parameter	Units	Baseline	Advanced Treatment – MF/GAC	Advanced Treatment – MF/RO
Daily Liquid Stream Energy Demand	MWh/d	11.6	23.8	40.8
Daily Solids Stream Energy Demand	MWh/d	-1.6	-1.1	-1.1
Daily Energy Demand	MWh/d	10.0	22.7	39.7
Unit Energy Demand	kWh/MG Treated	2,000	4,500	7,900

MWh/d = megawatt hours per day
kWh/MG = kilowatt hours per million gallons

Details on the assumptions used to convert between energy demand, chemical demand and production, as well as biologically-mediated gases (i.e., CH4 and N2O) and GHG emissions are provided in Appendix B.

A plot of the GHG emissions for each alternative is shown in Figure 7. The GHG emissions increase from the baseline to the two advanced treatment alternatives. The GHG emissions increase about 50 percent with respect to baseline when MF/GAC is used and the GHG emissions increase over 100 percent with respect to baseline with the MF/RO advanced treatment alternative.

The MF/GAC energy demand would be larger if GAC regeneration was performed on-site. The GHG emissions do not include the energy or air emissions that result from off-site GAC regeneration. Only the hauling associated with moving spent GAC is included. The energy associated with operating the furnace would exceed the GHG emissions from hauling spent GAC.

The zero liquid discharge in the MF/RO alternative alone is comparable to the Baseline. This contribution to increased GHG emissions by zero liquid discharge brine system highlights the importance of the challenges associated with managing brine reject.

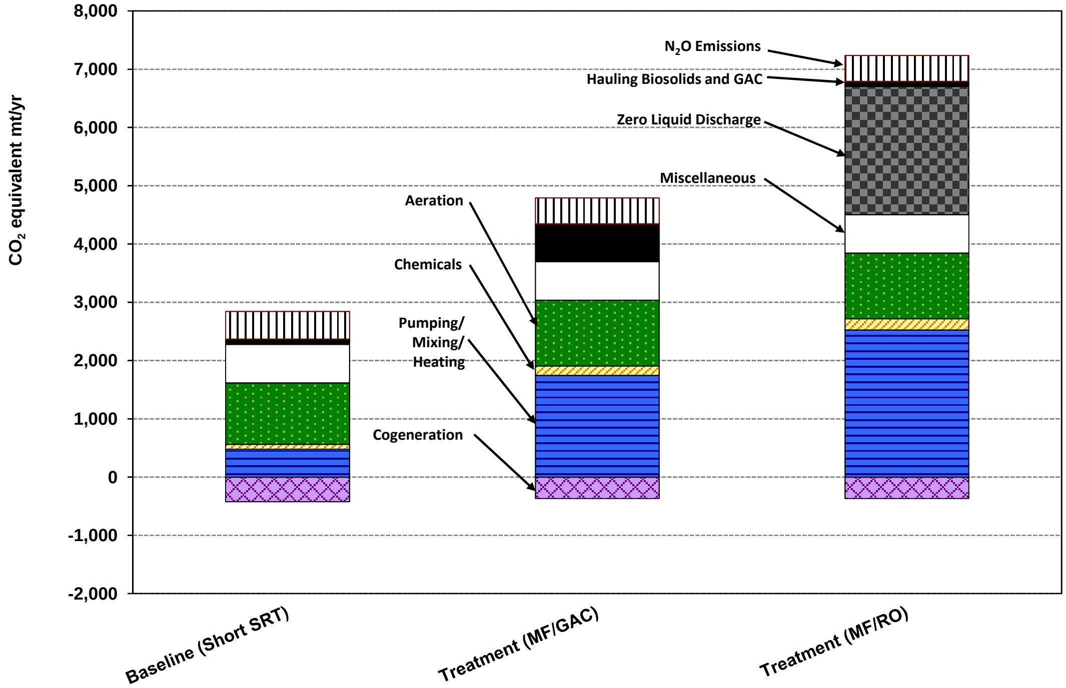

Figure 7. Greenhouse Gas Emissions for Each Alternative

The use of GHG emissions as a measure of sustainability does not constitute a complete comparison between the baseline and advanced treatment alternatives. Rather, it is one metric that captures the impacts of energy, chemical demand and production, as well as biologically-mediated gases (i.e., CH_4 and N_2O). The other environmental impacts of advanced treatment summarized in the list above should also be considered in decision making beyond cost analysis.

4.7 Costs

Total project costs along with the operations and maintenance costs were developed for each advanced treatment alternative for a comparison with baseline secondary treatment.

4.7.1 Approach

The cost estimates presented in this report are planning level opinions of probable construction costs for a nominal 5 mgd treatment plant design flow representing a typical facility without site specific details about local wastewater characteristics, physical site constraints, existing infrastructure, etc. The cost estimates are based on wastewater industry cost references, technical studies, actual project cost histories, and professional experience. The costs presented in this report are considered planning level estimates. A more detailed development of the advanced treatment process alternatives and site specific information would be required to further refine the cost estimates. Commonly this is accomplished in the preliminary design phase of project development for specific facilities following planning.

The cost opinion includes a range of costs associated with the level of detail used in this analysis. Cost opinions based on preliminary engineering can be expected to follow the Association for the Advancement of Cost Engineering (AACE International) Recommended Practice No. 17R-97 Cost Estimate Classification System estimate Class 4. A Class 4 estimate is based upon a 5 to 10 percent project definition and has an expected accuracy range of -30 to +50 percent and typical end usage of budget authorization and cost control. It is considered an "order-of-magnitude estimate." The life-cycle costs were prepared using the net present value (NPV) method.

The cost associated for each new unit process is based on a unit variable, such as required footprint, volume, demand (e.g., lb O_2/hr), and others. This approach is consistent with the approach developed for the EPA document titled "Estimating Water Treatment Costs: Volume 2-Cost Curves Applicable to 1 to 200 mgd Treatment Plants" dated August 1979. The approach has been updated since 1979 to account for inflation and competition, but the philosophy for estimating costs for unit processes has not changed. For example, the aeration system sizing/cost is governed by the maximum month airflow demand. Additionally, the cost associated constructing an aeration basin is based on the volume. The cost considers economies of scale.

The O&M cost estimates were calculated from preliminary process calculations. The operations cost includes energy and chemical demand. For example, a chemical dose was assumed based on industry accepted dosing rates and the corresponding annual chemical cost for that particular chemical was accounted for. The maintenance values only considered replacement equipment, specifically membrane replacement for the Advanced Treatment Alternatives.

4.7.2 Unit Cost Values

The life-cycle cost evaluation was based on using the economic assumptions shown in Table 8. The chemical costs were based on actual values from other projects. To perform detailed cost evaluations per industry, each selected technology would need to be laid out on their respective site plan based on the location of the existing piping, channels, and other necessary facilities.

Table 8. Economic Evaluation Variables

Item	Value
Nominal Discount Rate	5%
Inflation Rate:	
General	3.5%
Labor	3.5%
Energy	3.5%
Chemical	3.5%
Base Year	2013
Project Life	25 years
Energy	$0.06/kWh
Natural Gas	$0.60/therm
Chemicals:	
Alum	$1.1/gal
Polymer	$1.5/gal
Hypochlorite	$1.5/gal
Salt	$0.125/lb
Antiscalant	$12.5/lb
Acid	$0.35/lb
Deionized Water	$3.75/1,000 gal
Hauling:	

Table 8. Economic Evaluation Variables

Item	Value
Biosolids Hauling Distance	100 miles (one way)
Biosolids Truck Volume	6,000 gal/truck
Biosolids Truck Hauling	$250/truck trip
GAC Regeneration Hauling Distance	250 miles (round trip)
GAC Regeneration Truck Volume	$20,000 lb GAC/truck
GAC Regeneration Truck Hauling	Included in cost of Virgin GAC

kWh= kilowatt hours; lbs=pounds; GAC=granulated activated carbon; gal=gallon

4.7.3 Net Present Value of Total Project Costs and Operations and Maintenance Cost in 2013 Dollars

An estimate of the net present value for the baseline treatment process and the incremental cost to implement the advanced treatment alternatives is shown in Table 9. The cost for the existing baseline treatment process was estimated based on new construction for the entire conventional secondary treatment process (Figure 3). The incremental cost to expand from existing baseline secondary treatment to advanced treatment was calculated by taking the difference between the baseline and the advanced treatment alternatives. These values serve as a benchmark for understanding the prospective cost for constructing advanced treatment at the planning level of process development.

Table 9. Treatment Technology Total Project Costs in 2013 Dollars for a 5 mgd Facility

Alternative	Total Construction Cost, 2013 dollars ($ Million)	O&M Net Present Value, 2013 dollars ($ Million)*	Total Net Present Value, 2013 dollars ($ Million)	NPV Unit Cost, 2013 dollars ($/gpd)
Baseline (Conventional Secondary Treatment)*	59 - 127	5 - 11	65 – 138	13 - 28
Advanced Treatment – MF/RO**	108 - 231	31 - 67	139 - 298	28 - 60
Advanced Treatment – MF/GAC	131 - 280	50 - 108	181 - 388	36 - 78
Incremental Increase to Advanced Treatment MF/RO	48 - 104	26 - 56	75 - 160	15 - 32
Incremental Increase to Advanced Treatment MF/GAC	71 - 153	45 - 97	117 - 250	23 - 50

* The additional cost to increase the SRT to upwards of 30-days is about $12 - 20 million additional dollars in total project cost for a 5 mgd design flow

** Assumes zero liquid discharge for RO brine management, followed by evaporation ponds. Other options are available as listed in Section 4.4.2.

O&M=operations and maintenance; MF/RO=membrane filtration/reverse osmosis; MF/GAC=membrane filtration/granulated activated carbon; gpd=gallons per day

4.7.4 Unit Cost Assessment

Costs presented above are based on a treatment capacity of 5.0 mgd, however, existing treatment facilities range dramatically across Washington in size and flow treated. Table 9 indicates that the unit capital cost for baseline conventional secondary treatment for 5.0 mgd ranges between $13 to 28 per gallon per day of treatment capacity. The unit cost for the advanced treatment alternatives increases the range from the low $20s to upper $70s on a per-gallon per-day of capacity. The increase in cost for the advanced treatment alternatives is discussed in the sub-sections below.

Advanced Treatment MF/RO

The advanced treatment MF/RO alternative has a total present worth unit cost range of $28 to $60 million in per gallon per day of capacity. This translates to an incremental cost increase with respect to the baseline of $15 to $32 million dollars in per gallon per day treatment capacity. The key differences in cost between the baseline and the advanced treatment MF/RO are as follows:

- Larger aeration basins than the baseline to account for the longer SRT (<8 days versus >8 days).
- Additional pumping stations to pass water through the membrane facilities (MF and RO). These are based on peak flows.
- Membrane facilities (MF and RO; equipment, tanks chemical feed facilities, pumping, etc.) and replacement membrane equipment.
- Additional energy and chemical demand to operate the membrane facilities (MF and RO) and GAC.
- Zero liquid discharge facilities to further concentrate the brine reject.
- Zero liquid discharge facilities are energy/chemically intensive and they require membrane replacement every few years due to the brine reject water quality.
- An evaporation pond to handle the brine reject that has undergone further concentration by zero liquid discharge.

The advanced treatment MF/RO assumes that 100 percent of the flow is treated by MF, followed by 50 percent of the flow treated with RO. Sending a portion of flow through the RO and blending it with the balance of plant flows ensures a stable water to discharge. The RO brine reject (about 1.0 mgd) undergoes ZLD pre-treatment that further concentrates the brine reject to about 0.1-0.5 mgd. The recovery for both RO and ZLD processes is highly dependent on water quality (e.g., silicate levels).

ZLD technologies are effective at concentrating brine reject, but it comes at a substantial cost ($17.5 per gallon per day of ZLD treatment capacity of brine reject). The zero liquid discharge estimate was similar in approach to the demonstration study by Burbano and Brandhuber (2012) for La Junta, Colorado. The ability to further concentrate brine reject was critical from a management standpoint. Although 8 different options were presented for managing brine reject in Section 4.4.2, none of them is an attractive approach for handling brine reject. ZLD provides a viable pre-treatment step that requires subsequent downstream treatment. Evaporation ponds following ZLD were used for this study. Without ZLD, the footprint would be 3-5 times greater.

Roughly 30 acres of evaporation ponds, or more, may be required to handle the ZLD concentrate, depending upon concentrator effectiveness, local climate conditions, residuals accumulation, residual removal, etc. Precipitation throughout Washington is highly variable which can greatly influence evaporation pond footprint. The approach for costing the evaporation pond was in accordance with Mickley et al. (2006) and the cost was about $2.6 million.

Recent discussions with an industry installing evaporation ponds revealed that they will use mechanical evaporators to enhance evaporation rates. The use of mechanical evaporators was not included in this study, but merits consideration if a facility is performing a preliminary design that involves evaporation ponds. The mechanical evaporators have both a capital costs and annual energy costs.

Advanced Treatment MF/GAC

The advanced treatment MF/GAC alternative has a total present worth unit cost range of $36 to $78 million in per gallon per day capacity. This translates to an incremental cost increase with respect to the baseline of $23 to $50 million dollars on a per gallon per day of treatment capacity basis. The key differences in cost between the baseline and the advanced treatment MF/GAC are as follows:

- Larger aeration basins than the baseline to account for the longer SRT (<8 days versus >8 days).
- Additional pumping stations to pass water through the MF membrane and GAC facilities. These are based on peak flows.
- GAC facilities (equipment, contact tanks, pumping, GAC media, etc.)
- Additional energy to feed and backwash the GAC facilities.
- GAC media replacement was the largest contributor of any of the costs.
- Additional hauling and fees to regenerate GAC off-site.

The advanced treatment MF/GAC assumes that 100 percent of the flow is treated by MF, followed by 100 percent of the flow treated with GAC. The GAC technology is an established technology. The costing approach was in accordance with EPA guidelines developed in 1998.

The critical issue while costing the GAC technology is whether a GAC vendor/regeneration facility is located within the region. On-site regeneration is an established technology with a furnace.

However, there are several concerns as listed in Section 4.4.3:

- Ability to obtain an air emissions permit
- Additional equipment to operate and maintain
- Energy and air emissions to operate a furnace on-site
- Operational planning to ensure that furnace is operating 90-95 percent of the time. Otherwise, operations is constantly starting/stopping the furnace which is energy intensive and deleterious to equipment
- If not operated properly, the facility has the potential to create hazardous/toxic waste to be disposed

If located within a couple hundred miles, off-site regeneration is preferred. For this study, off-site regeneration was assumed with a 250-mile (one-way) distance to the nearest vendor that can provide virgin GAC and a regeneration facility.

Incremental Treatment Cost

The difference in costs between the baseline and the advanced treatment alternatives is listed in Table 10. The incremental cost to retrofit the baseline facility to the advanced treatment was calculated by taking the difference between the two alternatives. These values should serve as a planning level benchmark for understanding the potential cost for retrofitting a particular facility. The incremental cost is unique to a particular facility. Several reasons for the wide range in cost in retrofitting a baseline facility to advanced treatment are summarized as follows:

- Physical plant site constraints. A particular treatment technology may or may not fit within the constrained particular plant site. A more expensive technology solution that is more compact may be required. Alternately, land acquisition may be necessary to enlarge a plant site to allow the addition of advanced treatment facilities. An example of the former is stacking treatment processes vertically to account for footprint constraints. This is an additional financial burden that would not be captured in the incremental costs presented in Table 10.
- Yard piping. Site specific conditions may prevent the most efficient layout and piping arrangement for an individual facility. This could lead to additional piping and pumping to convey the wastewater through the plant. This is an additional financial burden that would not be captured in the incremental costs presented in Table 10.
- Pumping stations. Each facility has unique hydraulic challenges that might require additional pumping stations not captured in this planning level analysis. This is an additional financial burden that would not be captured in the incremental costs presented in Table 10.

A cursory unit cost assessment was completed to evaluate how costs would compare for facilities with lower (0.5 mgd) and higher capacity (25 mgd), as presented in Table 10. Capital costs were also evaluated for a 0.5 mgd and 25 mgd facility using non-linear scaling equations with scaling exponents. The unit capital cost for baseline conventional secondary treatment for 0.5 mgd and 25 mgd is approximately $44 and $10 per gallon per day of treatment capacity, respectively. The incremental unit costs to implement an advanced treatment retrofit for 0.5 mgd would range between $30 to $96 per gallon per day of treatment capacity and would be site and discharger specific. The incremental unit costs to implement an advanced treatment retrofit for 25 mgd would range between $10 to 35 per gallon per day of treatment capacity and would be site and discharger specific. The larger flow, 25 mgd, is not as expensive on a per gallon per day of treatment capacity. This discrepancy for the 0.5 and 25 mgd cost per gallon per day of treatment capacity is attributed to economies of scale. Cost curve comparisons (potential total construction cost and total net present value) for the baseline and the two tertiary treatment options (MF/RO and MF/GAC) are shown in Figure 8 and Figure 9 between the flows of 0.5 and 25 mgd. It is important to note that while the economies of scale suggest lower incremental costs for the larger size facilities, some aspects of the advanced treatment processes may become infeasible at larger capacities due to factors such as physical space limitations and the large size requirements for components such as RO reject brine management.

Table 10. Treatment Technology Total Project Costs in 2013 Dollars for a 0.5 mgd Facility and a 25 mgd Facility

Alternative	Total Construction Cost, 2013 dollars ($ Million)	O&M Net Present Value, 2013 dollars ($ Million)*	Total Net Present Value, 2013 dollars ($ Million)	NPV Unit Cost, 2013 dollars ($/gpd)
0.5 mgd:				
Baseline (Conventional Secondary Treatment)	15 - 32	0.5 - 1.1	15 - 33	31 - 66
Advanced Treatment – MF/RO**	27 - 58	3.2 - 6.8	30 - 65	60 - 130
Advanced Treatment – MF/GAC	33 - 70	5 - 10.8	38 - 81	76 - 162
Incremental Increase to Advanced Treatment MF/RO	12 - 26	2.7 - 5.7	15 - 32	30 - 64
Incremental Increase to Advanced Treatment MF/GAC	18 - 38	4.6 - 9.8	22 - 48	45 - 96
25 mgd:				
Baseline (Conventional Secondary Treatment)	156 - 335	25 - 54	182 - 389	7 - 16
Advanced Treatment – MF/RO**	283 - 606	157 - 336	440 - 942	18 - 38
Advanced Treatment – MF/GAC	343 - 735	252 - 541	595 - 1276	24 - 51
Incremental Increase to Advanced Treatment MF/RO	127 - 272	131 - 281	258 - 553	10 - 22
Incremental Increase to Advanced Treatment MF/GAC	187 - 401	226.9 - 486	414 - 887	17 - 35

* Does not include the cost for labor.
** Assumes zero liquid discharge for RO brine management, followed by evaporation ponds. Other options are available as listed in Section 4.4.2.
MF/RO=membrane filtration/reverse osmosis
MF/GAC=membrane filtration/granulated activated carbon
O&M=operations and maintenance
gpd=gallons per day

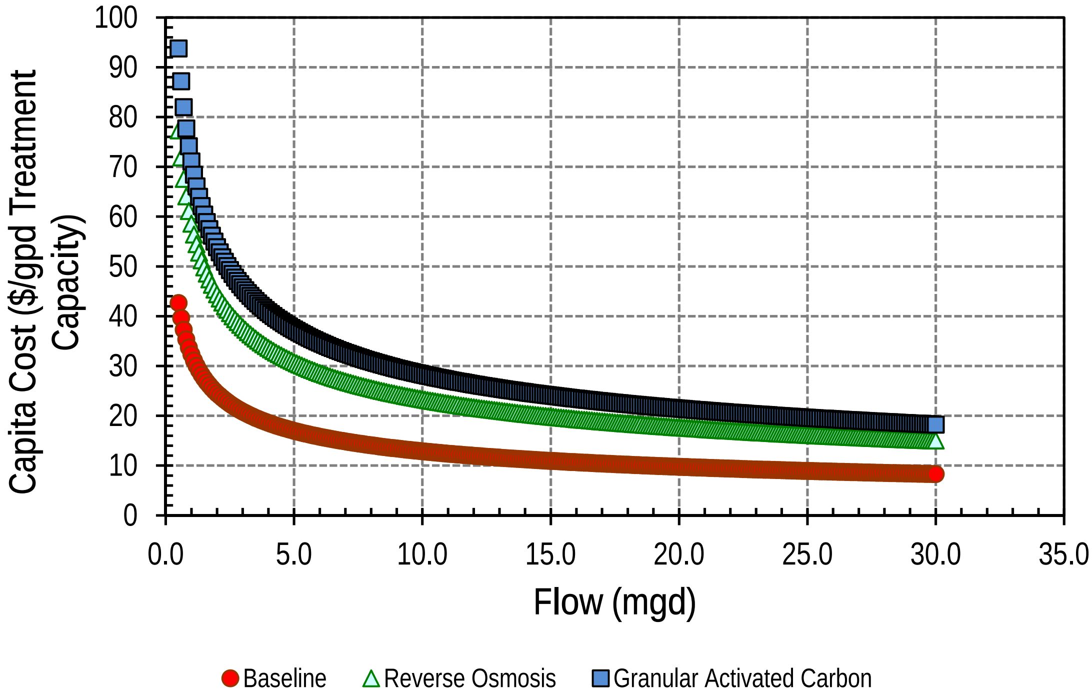

Figure 8: Capital Cost Curve Comparison for Baseline Treatment, MF/RO, and MF/GAC

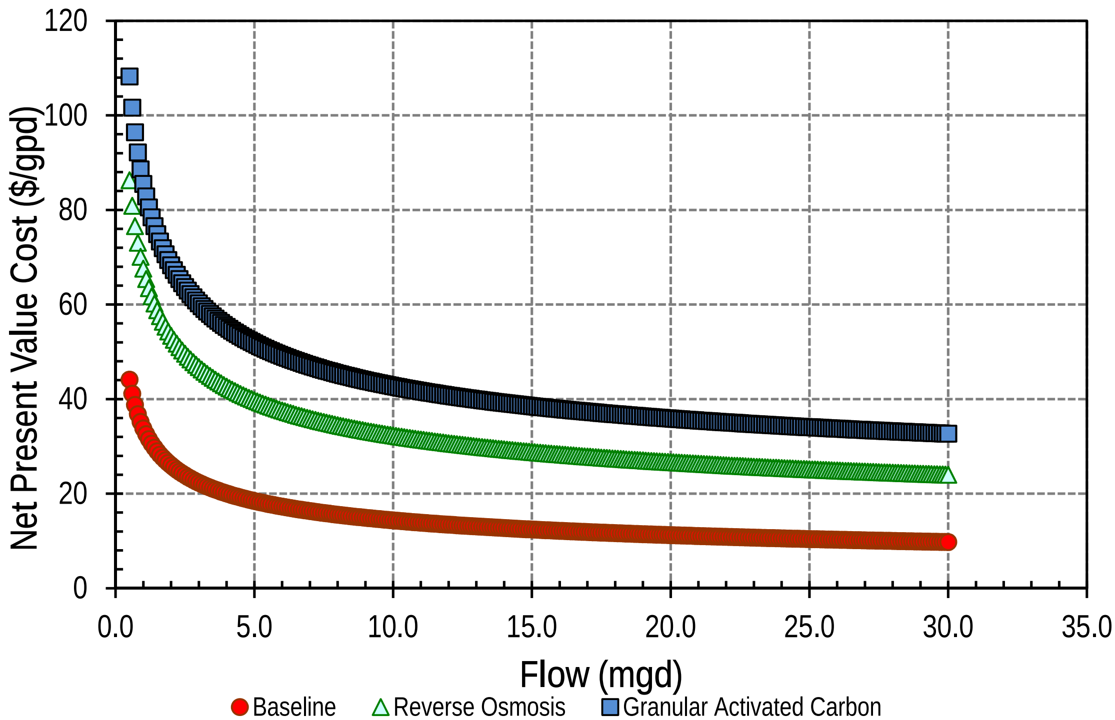

Figure 9: NPV Cost Curve Comparison for Baseline Treatment, MF/RO, and MF/GAC

4.8 Pollutant Mass Removal

An estimate of the projected load removal for the four constituents of concern was developed and is presented in Table 11. The current secondary effluent and advanced treatment effluent data is based on the only available data to HDR and is from municipal treatment plant facilities. Data is not available for advanced treatment facilities such as MF/RO or MF/GAC. Due to this lack of data, advanced treatment using MF/RO or MF/GAC was assumed to remove an additional zero to 90 percent of the constituents presented resulting in the range presented in Table 11. It is critical to note these estimates are based on limited data and are presented here simply for calculating mass removals. Current secondary effluent for industrial facilities would likely be greater than the data presented here and as a result, the projected effluent quality for industrial facilities would likely be higher as well. Based on the limited actual data from municipal treatment facilities, Table 11 indicates that mercury and BAP effluent limits may potentially be met using advanced treatment at facilities with similar existing secondary effluent quality.

Table 11. Pollutant Mass Removal by Contaminant for a 5 mgd Facility

Component	PCBs	Mercury	Arsenic	BAP
Required HHWQC based Effluent Quality (µg/L)	0.0000064	0.005	0.018	0.0013
Current Secondary Effluent Concentration (µg/L)*	0.0015	0.025	7.5	0.00031
Projected Effluent Quality (µg/L) from Advanced Treatment (MF/RO or MF/GAC)*	0.000041 – 0.00041	0.00012 – 0.0012	0.38 – 3.8	0.000029 - 0.00029
Mass Removed (mg/d)**	21 - 28	451 - 471	71,000 – 135,000	0.4 – 5.0
Mass Removed (lb/d)**	0.000045 – 0.000061	0.00099 – 0.0010	0.16 – 0.30	0.0000010 – 0.0000012

* Based on or estimated for actual treatment plant data from municipal facilities. Data sets are limited and current secondary effluent for industrial facilities would likely be greater than the data presented here.
** 1 lb = 454,000 mg
HHWQC=human health-based water quality criteria
MF/RO=membrane filtration/reverse osmosis
MF/GAC=membrane filtration/granulated activated carbon
µg/L=micrograms per liter
mg/d=milligrams per day
lb/d=pounds per day

Unit costs were developed based on required mass removal from a 5 mgd facility for each of the four constituents of concern to reduce discharges from current secondary effluent quality to the assumed required effluent quality (HHWQC). It important to note that this study concludes it is unclear if existing technology can meet the required effluent quality, however, the information presented in Table 12 assumes HHWQC would be met for developing unit costs. The unit costs are expressed as dollars in NPV (over a 25 year period) per pound of constituent removed over the same 25 year period using advanced treatment with MF/RO. The current secondary effluent quality data presented are based on typical secondary effluent quality expected for a municipal/industrial discharger. Table 12 suggests unit costs are most significant in meeting the PCB, mercury, and PAH required effluent quality.

Table 12. Unit Cost by Contaminant for a 5 mgd Facility Implementing Advanced Treatment using MF/RO

Component	PCBs	Mercury	Arsenic	PAHs
Required HHWQC based Effluent Quality (µg/L)	0.0000064	0.005	0.018	0.0013
Current Secondary Effluent Concentration (µg/L)*	0.002	0.025	7.5	0.006
Total Mass Removed (lbs) over 25-year Period	0.76	7.6	2,800	1.8
Unit Cost (NPV per total mass removed in pounds over 25 years)	$290,000,000	$29,000,000	$77,000	$120,000,000

*Derived from data presented in Table 3.
**Based on assumed 25-year NPV of $219,000,000 (average of the range presented in Table 10) and advanced treatment using MF/RO.
NPV=net present value
HHWQC=human health-based water quality criteria
µg/l=micrograms per liter

4.9 Sensitivity Analysis

The ability of dischargers to meet a HHWQC one order of magnitude less stringent (than HHWQC presented in Table 3 and used in this report) was considered. The same advanced treatment technologies using MF/RO or MF/GAC would still be applied to meet revised effluent quality one order-of-magnitude less stringent despite still not being able to meet less stringent effluent limits. As a result, this less stringent effluent quality would not impact costs. Based on available data, it appears the mercury and BAP limits would be met at a less stringent HHWQC. PCB effluent quality could potentially be met if advanced treatment with RO or GAC performed at the upper range of their projected treatment efficiency. It does not appear the less stringent arsenic HHWQC would be met with advanced treatment. It is important to note that a discharger's ability to meet these less stringent limits depends on existing secondary effluent characteristics and is facility specific. Facilities with higher secondary effluent constituent concentrations will have greater difficulty meeting HHWQC.

5.0 Summary and Conclusions

This study evaluated treatment technologies potentially capable of meeting revised effluent discharge limits associated with revised HHWQC. HDR completed a literature review of potential technologies and engineering review of their capabilities to evaluate and screen treatment methods for meeting revised effluent limits for four constituents of concern: arsenic, BAP, mercury, and PCBs. HDR selected two alternatives to compare against a baseline, including enhanced secondary treatment, enhanced secondary treatment with MF/RO, and enhanced secondary treatment with MF/GAC. HDR developed capital costs, operating costs, and a NPV for each alternative, including the incremental cost to implement from an existing secondary treatment facility.

The following conclusions can be made from this study.

- Revised HHWQC based on state of Oregon HHWQC (2001) and EPA "National Recommended Water Quality Criteria" will result in very low water quality criteria for toxic constituents.
- There are limited "proven" technologies available for dischargers to meet required effluent quality limits that would be derived from revised HHWQC.
    - Current secondary wastewater treatment facilities provide high degrees of removal for toxic constituents; however, they will not be capable of compliance with water quality-based NPDES permit effluent limits derived from revised HHWQC.
    - Advanced treatment technologies have been investigated and candidate process trains have been conceptualized for toxics removal.
        - Advanced wastewater treatment technologies may enhance toxics removal rates, however they will not be capable of compliance with HHWQC based effluent limits for PCBs. The lowest levels achieved based on the literature review were between <0.00001 and 0.00004 µg/L, as compared to a HHWQC of 0.0000064 µg/L.
        - Based on very limited performance data for arsenic and mercury from advanced treatment information available in the technical literature, compliance with revised criteria may or may not be possible, depending upon site specific circumstances.
            - Compliance with a HHWQC for arsenic of 0.018 µg/L appears unlikely. Most treatment technology performance information available in the literature is based on drinking water treatment applications targeting a much higher SDWA MCL of 10 µg/L.
            - Compliance with a HHWQC for mercury of 0.005 µg/L appears to be potentially attainable on an average basis but perhaps not if effluent limits are structured on a maximum monthly, weekly or daily basis. Some secondary treatment facilities attain average effluent mercury levels of 0.009 to 0.066 µg/L. Some treatment facilities with effluent filters attain average effluent mercury levels of 0.002 to 0.010 µg/L. Additional advanced treatment processes are expected to enhance these removal rates, but little mercury performance data is available for a definitive assessment.
        - Little information is available to assess the potential for advanced technologies to comply with revised benzo(a)pyrene criteria. A municipal wastewater treatment plant study reported both influent and effluent BAP concentrations less than the HHWQC of 0.0013 ug/L (Ecology, 2010).

  - Some technologies may be effective at treating identified constituents of concern to meet revised limits while others may not. It is therefore even more challenging to identify a technology that can meet all constituent limits simultaneously.
  - A HHWQC that is one order-of-magnitude less stringent could likely be met for mercury and PAHs however it appears PCB and arsenic limits would not be met.
- Advanced treatment processes incur significant capital and operating costs.
  - Advanced treatment process to remove additional arsenic, benzo(a)pyrene, mercury, and PCBs would combine enhancements to secondary treatment with microfiltration membranes, reverse osmosis, and granular activated carbon and increase the estimated capital cost of treatment from $17 to $29 in dollars per gallon per day of capacity (based on a 5.0 mgd facility).
  - The annual operation and maintenance costs for the advanced treatment process train will be substantially higher (approximately $5 million - $15 million increase for a 5.0 mgd capacity facility) than the current secondary treatment level.
- Implementation of additional treatment will result in additional collateral impacts.
  - High energy consumption.
  - Increased greenhouse gas emissions.
  - Increase in solids production from chemical addition to the primaries. Additionally, the membrane and GAC facilities will capture more solids that require handling.
  - Increased physical space requirements at treatment plant sites for advanced treatment facilities and residuals management including reverse osmosis reject brine processing.
- It appears advanced treatment technology alone cannot meet all revised water quality limits and implementation tools are necessary for discharger compliance.
  - Implementation flexibility will be necessary to reconcile the difference between the capabilities of treatment processes and the potential for HHWQC driven water quality based effluent limits to be lower than attainable with technology

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7.0 Appendices

- Appendix A - Unit Process Sizing Criteria
- Appendix B - Greenhouse Gas Emissions Calculation Assumptions

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APPENDIX A - UNIT PROCESS SIZING CRITERIA

Table A-1. Unit Processes Sizing Criteria for Each Alternative

Unit Process	Units	Baseline Treatment	Advanced Treatment	Comment
Influent Pumping Station	unitless	3 Times Ave Flow	3 Times Ave Flow	This is peaking factor used to size the pumps (peak flow:average flow)
Alum Dose for CEPT (optional)	mg/L	20	20	This is the metal salt upstream of the primaries
Primary Clarifiers	gpd/sf	1000	1000	This is for average annual flows
Primary Solids Pumping Station	unitless	1.25 Times Ave Flow	1.25 Times Ave Flow	This is peaking factor used to size the pumps (maximum month flow:average flow)
Aeration System Oxygen Uptake Rate (OUR)	mg/L/hr	25	25	Average annual OUR is used in tandem with mixed liquor to determine the required aeration basin volume (the limiting parameter governs the activated sludge basin volume)
Aeration Basin Mixed Liquor	mg/L	1250	2500	Average annual mixed liquor is used in tandem with OUR (see next row) to determine the required aeration basin volume (the limiting parameter governs the activated sludge basin volume)
Secondary Clarifiers Hydraulic Loading	gpd/sf	650	--	Only use for Baseline as clarifiers governed hydraulically with short SRT (<2 days)
Secondary Clarifiers Solids Loading	lb/d/sf	--	24	Only use for Advanced Treatment as clarifiers governed by solids with long SRT (>8 days)
Return Activated Sludge (RAS) Pumping Station	unitless	1.25 Times Ave Flow	1.25 Times Ave Flow	RAS must have capacity to meet 100% influent max month Flow. The influent flow is multiplied by this peaking factor to determine RAS pumping station capacity.
Waste Activated Sludge (WAS) Pumping Station	gpm	1.25 Times Ave Flow	1.25 Times Ave Flow	WAS must have capacity to meet max month WAS flows. The average annual WAS flow is multiplied by this peaking factor to determine WAS pumping station capacity.
Microfiltration (MF) Flux	gfd	--	25	Based on average annual pilot experience in Coeur D'Alene, ID
MF Backwash Storage Tank	unitless	--	1.25	Storage tanks must have capacity to meet maximum month MF backwash flows. The average annual MF backwash volume is multiplied by this peaking factor to determine required volume.

Table A-1. Unit Processes Sizing Criteria for Each Alternative

Unit Process	Units	Baseline Treatment	Advanced Treatment	Comment
MF Backwash Pumps	unitless	--	1.25	Backwash pumps must have capacity to meet maximum month MF backwash flows. The average annual MF backwash flow is multiplied by this peaking factor to determine required flows.
Reverse Osmosis (RO)	gallon per square foot per day (gfd)	--	10	
RO Reject	%	--	20	This represents the percentage of feed flow that is rejected as brine
Chlorination Dose	mg/L	15	15	
Chlorination Storage Capacity	days	14	14	
Chlorine Contact Tank	min	30	30	This is for average annual conditions.
Dechlorination Dose	mg/L	15	15	
Dechlorination Storage Capacity	days	14	14	
Gravity Belt Thickener	gpm/m	200	200	This is for maximum month conditions using the 1.25 peaking factor from average annual to maximum month
Anaerobic Digestion	Hydraulic residence time (HRT)	18	18	This is for average annual conditions
Dewatering Centrifuge	gpm	120	120	This is for maximum month conditions using the 1.25 peaking factor from average annual to maximum month

gpd=gallons per day; sf=square feet; gpm=gallons per minute

Appendix B – Greenhouse Gas Emissions Calculation Assumptions

The steady state mass balance results were used to calculate GHG emissions. The assumptions used to convert between energy demand, chemical demand and production, as well as biologically-mediated gases (i.e., CH4 and N2O) and GHG emissions are provided in Table B-1. The assumptions are based on EPA (2007) values for energy production, an adaptation of the database provided in Ahn et al. (2010) for N2O emissions contribution, Intergovernmental Panel on Climate Change (IPCC) (2006) for fugitive CH4 emissions, and various resources for chemical production and hauling from production to the wastewater treatment plant (WWTP). Additionally, the biogas produced during anaerobic digestion that is used as a fuel source is converted to energy with MOP8 (2009) recommended waste-to-energy values.

Table B-1. Greenhouse Gas Emissions Assumptions

Parameters	Units	Value	Source
N_2O to CO_2 Conversion	lb CO_2/lb N_2O	296	IPCC, 2006
CH_4 to CO_2 Conversion	lb CO_2/lb CH_4	23	IPCC, 2006
Energy Production			
CO_2	lb CO_2/MWh	1,329	USEPA (2007)
N_2O	lb N_2O/GWh	20.6	USEPA (2007)
CH_4	lb CO_2/GWh	27.3	USEPA (2007)
Sum Energy Production	lb CO_2/MWh	1336	USEPA (2007)
GHGs per BTU Natural Gas			
CO_2	lb CO_2/MMBTU Natural Gas	52.9	CA Climate Action Registry Reporting Tool
N_2O	lb N_2O/MMBTU Natural Gas	0.0001	CA Climate Action Registry Reporting Tool
CH_4	lb CO_2/MMBTU Natural Gas	0.0059	CA Climate Action Registry Reporting Tool
Sum Natural Gas		53.1	CA Climate Action Registry Reporting Tool
Non-BNR N_2O Emissions	g N_2O/PE/yr	32	Ahn et al. (2010)
BNR N_2O Emissions	g N_2O/PE/yr	30	Ahn et al. (2010)
Biogas Purity	% Methane	65	WEF, 2009
Biogas to Energy	BTU/cf CH4	550	WEF, 2009
Digester Gas to Electrical Energy Transfer Efficiency	%	32	HDR Data

Table B-1. Greenhouse Gas Emissions Assumptions

Parameters	Units	Value	Source
Chemical Production			
Alum	lb CO_2/lb Alum	0.28	SimaPro 6.0 - BUWAL250, Eco-indicator 95
Polymer	lb CO_2/lb Polymer	1.18	Owen (1982)
Sodium Hypochlorite	lb CO_2/lb Sodium Hypochlorite	1.07	Owen (1982)
Building Energy Efficiency	kBTU/sf/yr	60	Calif. Commercial End-Use Survey (2006)
Hauling Distance		-	
Local	miles	100	-
Hauling Emissions			
Fuel Efficiency	miles per gallon	8	
CO_2	kg CO_2/gal diesel	10.2	CA Climate Action Registry Reporting Tool
N_2O	kg N_2O/gal diesel	0.0001	CA Climate Action Registry Reporting Tool
CH_4	kg CH_4/gal diesel	0.003	CA Climate Action Registry Reporting Tool
Sum Hauling Fuel	kg CO_2/gal diesel	10.2	CA Climate Action Registry Reporting Tool

GWh = Giga Watt Hours
MWh = Mega Watt Hours
MMBTU = Million British Thermal Units
BTU = British Thermal Unit
PE = Population Equivalents
kBTU/sf/yr = 1,000 British Thermal Units per Square Foot per Year
cf = cubic feet
lb = pound
kg = kilogram
gal = gallon

City of Tacoma
Environmental Services Department

August 16, 2021

Eleanor Ott, PSNGP Permit Writer
Department of Ecology, Water Quality Program
PO Box 47600
Olympia, WA 98504-7600

Dear Ms. Ott:

City of Tacoma, Environmental Services Department (Environmental Services) appreciates the opportunity to comment on the Department of Ecology's (Ecology) draft Puget Sound Nutrient General Permit (Permit) and draft Fact Sheet. Environmental Services operates two wastewater treatment facilities: the North End Treatment Plant No. 3, a 7.2 MGD, facility, and the Central Treatment Plant, a 60 MGD facility. Both facilities discharge secondary effluent to Commencement Bay.

The City of Tacoma is an advocate for clean water and Environmental Services is committed to the protection of Puget Sound and making meaningful progress towards water quality goals. This commitment has been demonstrated through our voluntary acceptance of our responsibility to clean up the Thea Foss waterway and the over 50 million dollars the City has put towards this effort. Environmental Services recognizes that it is important to address the growing challenge of nutrient over-enrichment in Puget Sound to ensure that science-based and effective controls are put in place to address all sources of pollution. Environmental Services has demonstrated its support of a scientific approach to protecting Puget Sound by, among other things, providing the funding for the establishment of the Salish Sea Modeling Center. Environmental Services is also a founding member of the Puget Sound Clean Water Alliance; an organization dedicated to analyzing peer-reviewed, scientific, environmental, and economic data and using it to develop regional strategies aimed at both protecting and enhancing Puget Sound.

Environmental Services provides the following comments and questions regarding the draft Permit and Fact Sheet:

COMMENT NO. 1: THE GENERAL PERMIT IS NOT THE RIGHT TOOL

Ecology's process of developing the Permit has revealed several facts that do not support issuance of nutrient controls in a general permit.

A general permit is available as an alternative to an individual permit when Ecology determines that the dischargers are more appropriately controlled under a general permit. This determination must be made in accordance with the governing regulations. As discussed more fully below, a general permit is appropriate only when a defined category of dischargers have the same or substantially similar types of operations, wastes, effluent limits or operating conditions, and require similar monitoring. The Fact Sheet states, "A general permit is designed to provide coverage for a group of related facilities or operations of a specific industry type or group of industries.

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It is appropriate when the discharge characteristics are sufficiently similar, and a standard set of permit requirements can effectively provide environmental protection and comply with ***water quality standards*** for discharges." See Fact Sheet, Page 12. Likewise, the NPDES Permit Writers' Manual explains that, "a facility that otherwise qualifies for a general permit may opt to apply for an individual permit." NPDES Permit Writers' Manual, Section 4.4, at 4-12. Ecology has not explained when and how it made the determination that a general permit was appropriate, what process it followed, what criteria, facts and information were taken into consideration when it made this determination and how each of the criteria were met.

Ecology's NPDES permit regulations provide in pertinent part as follows:

> (2) The director may issue general permits to cover categories of dischargers for geographic areas as described under subsection (3) of this section. The area shall correspond to existing geographic or political boundaries . .....
> (3) General permits may be written to cover the following within a described area:
> (a) Stormwater sources; or
> (b) Categories of dischargers that meet all of the following requirements:
> (i) Involve the same or substantially similar types of operations;
> (ii) Discharge the same or substantially similar types of wastes;
> (iii) Require the same or substantially similar effluent limitations or operating conditions, and require similar monitoring; and
> (iv) In the opinion of the director are more appropriately controlled under a general permit than under individual permits.

WAC 173-226-050(2) & (3); See also, 40 C.F.R. § 122.28(a)(1). Requirements (b)(i) – (iv) are written in the conjunctive, meaning that each requirement must be met for the category of dischargers subject to the Permit. The NPDES Permit Writers' Manual explains that,

> In deciding whether to develop a general permit, permitting authorities consider whether
>
> - A large number of facilities will be covered.
> - The facilities have similar production processes or activities.
> - The facilities generate similar pollutants.
> - Whether uniform WQBELs (where necessary) will appropriately implement water quality standards.

The above requirements appropriately limit the use of a general permit to those circumstances in which the selected category of dischargers are engaged in substantially similar operations and types of discharges. As noted in the NPDES Permit Writers' Manual, ". . . using a general permit ensures consistent permit conditions for comparable facilities." See, NPDES Permit Writers' Manual, Section 3.1.2, Page 3-2. Clearly, as explained below and as acknowledged by Ecology, the facilities are not comparable and the Permit conditions are not consistent.

First, several of the dischargers proposed to be covered under this Permit are not marine dischargers. The Permit itself recognizes this. Ecology has not explained how or why it is appropriate to include some non-marine dischargers in the Permit.

Second, a category of dischargers governed by a general permit must be within a designated geographical area. See, WAC 173-226-020(13).[1] The federal regulations (made applicable to Ecology pursuant to 40 C.F.R § 123.25 and 122.1(a)(2)) provide further clarification regarding what should be considered a geographic area for coverage,

> (a) Coverage. The Director may issue a general permit in accordance with the following:
>
> (1) . . . The area should correspond to existing geographic or political boundaries such as:
>
> (i) Designated planning areas under sections 208 and 303 of CWA;
>
> (ii) Sewer districts or sewer authorities;
>
> (iii) City, county, or State political boundaries;
>
> (iv) State highway systems;
>
> (v) Standard metropolitan statistical areas as defined by the Office of Management and Budget;
>
> (vi) Urbanized areas as designated by the Bureau of the Census according to criteria in 30 FR 15202 (May 1, 1974); or
>
> (vii) Any other appropriate division or combination of boundaries.

40 CFR §§ 122.28(a)(1) & 123.25.

The included non-marine discharges are not located in the same geographic area as the marine dischargers. Ecology has not explained why or how the geographic area for the non-marine dischargers is rationally or appropriately included in the same geographic area as the marine dischargers.

Third, because the dischargers do not have similar production processes or activities, the requirements of the Permit are not uniform in application. The Permit has been constructed to recognize that larger facilities have a different impact than smaller facilities and therefore are subject to different requirements. For example, larger facilities are required to update their planning documents annually, monitor more frequently and implement “optimization”, while smaller facilities are only required to create optimization plans. Additionally, the Total Inorganic Nitrogen (TIN) Action Levels are effluent limits individualized for each plant. As noted in the NPDES Permit Writers’ Manual, the general permit is not intended to be applied where “*uniform”* water quality based effluent limitations (WQBELs) will not appropriately implement water quality standards. See, NPDES Permit Writers’ Manual, Section 3.1.2, Page 3-2.

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[1] (13) "General permit" means a permit that covers multiple dischargers of a point source category within a designated geographical area, in lieu of individual permits being issued to each discharger.

Likewise, the planning requirements in the Permit recognize that each facility is unique in its process and its discharge and cannot be subject to the same general requirements. There is no one size fits all solution and each plant must create their own planning and engineering documents to address the operating conditions of that plant. The wastewater treatment plants (WWTPs) have different technologies and processes for treatment that should be addressed under individual permits, not a general permit. A general permit is not a suitable or appropriate regulatory control when the dischargers, as they are here, are substantively dissimilar.

The Fact Sheet likewise recognizes the lack of similarity among the dischargers in its description of Ecology's "evolving" all known available and reasonable treatment technology (AKART) concept. The Fact Sheet states:

> The prevalence of 303(d) listings related to depleted dissolved oxygen levels from increased levels of nitrogen and phosphorus requires Ecology to reconsider the basis of AKART for domestic WWTPs. It is apparent that the agency must start to consider refining what constitutes AKART for this treatment category. The AKART provision needs evaluation on a case-by-case basis given its direct ties to economic impact. What constitutes AKART at one facility may be different at the next. This is especially true when considering the size differences between WWTPs, available space for expansion at the existing location, costs of additional treatment processes, the rate payer base and any identified hardship that may exist due to the median household income in the community.

See Fact Sheet, at 18. Ecology thus acknowledges that each facility is unique and requires an individualized evaluation to determine the appropriate nutrient controls. It stands to reason that these controls should be in individual permits. Indeed, in recognition of the lack of similarity among the plants included in the Permit, Ecology exempts one facility from the substantive requirements of the Permit. Ecology does not explain how or why inclusion of dischargers that are not the same or substantively the same satisfies the requirements of Ecology's own regulations and the federal regulations applicable to general permits.

Fourth, for the WWTP operators the major advantage of a general permit is that it might better facilitate a collaborative approach to nutrient management through effluent trading. However, Ecology's statement in the Fact Sheet that an effluent trading program would require waste load allocations for each individual facility negates any benefit that a general permit might provide in establishing such a program since there are no waste load allocations or final WQBELs in the Permit. Ecology does not explain how an effluent trading program would be feasible without waste load allocations of a final WQBEL in the Permit.

Finally, the prevalence of 303(d) listings related to depleted dissolved oxygen levels from increased levels of nitrogen and phosphorus requires Ecology to reconsider the basis of AKART for domestic WWTPs. It is apparent that the agency must start to consider refining what constitutes AKART for this treatment category. The AKART provision needs evaluation on a case-by-case basis given its direct ties to economic impact to each of the operators.

Recently, the Court of Appeals reiterated that the term 'reasonable' in the AKART standard limits Ecology to require a treatment system that is both technically and economically feasible.

Nw. Envtl. Advocates v Dep't of Ecology, 2021 Wash. App. LEXIS 1558, 2021 WL 2556573; citing to, *Puget Soundkeeper All. v Dep't of Ecology*, 102 Wn. App. 783, 793 (2000). What constitutes AKART at one facility will necessarily be different at the next. This is especially true when considering the size differences between WWTPs, available space for expansion at the existing location, costs of additional treatment processes, the rate payer base and any identified hardship that may exist due to the median household income in the community. Ecology has not explained how use of the general permit to regulate nutrients rather than the use of individual permits will ensure compliance with AKART.

COMMENT NO. 2: THE GENERAL PERMIT IS AN UNAUTHORIZED SECOND PERMIT FOR A SINGLE DISCHARGE

Ecology is proposing two mandatory permits, an individual permit and a general permit, to regulate a single discharge. The general permit coverage requirement proposed by Ecology conflicts with state and federal law regarding concurrency of a general and individual permits and constitutes an unlawful modification of the Tacoma's expired but administratively continued individual permits.

Ecology states that the Permit "supersedes effluent requirements related to total inorganic nitrogen in the individual NPDES permits with the exception of ammonia effluent limitations developed for control of ammonia toxicity." Fact Sheet, at 13. Ecology also states that the "permit supplements the individual NDPES permits held by the dischargers proposed for coverage." Fact Sheet, at 34.

These statements indicate that Nitrogen limits in individual permits still apply but are superseded by the Permit except under certain circumstances and that the Permit adds conditions not contained in the individual permits. This is not only confusing but in direct conflict with the Clean Water Act (CWA) which does not allow more than one permit for a single discharge, does not allow an individual permit to be amended through a general permit, and does not allow enforcement actions to be taken under the CWA when an operator is in compliance with an individual permit. Additionally, for dischargers operating under an administratively extended individual permit like Tacoma, coverage under the Permit will, by operation of law, extinguish the individual permit.

State NPDES permit programs authorized under the CWA are required to conform to the provisions of 33 USC § 1342 and guidelines for establishing state NPDES programs. 33 USC § 1342(c)(2). All state programs must be administered in accordance with the program requirements enumerated at 40 CFR § 123.25. 40 CFR §§ 122.1(a)(2) & 123.5. The program requirements made applicable to state programs include EPA regulations for general permits under 40 CFR § 122.28. Finally, the 2018 Memorandum of Agreement between the EPA and Ecology (2018 MOA) provides that Ecology will issue and administer general permits in accordance with State regulations and requirements consistent with 40 CFR § 122.28 (hereafter referred to as the "General Permit Regulations"). Ecology's' decision to require dischargers identified in the Permit to apply for coverage under the Permit conflicts with the provisions of 40 CFR § 122.28, the 2018 MOA and the CWA.

The EPA general permit regulations provide that general permits shall be written to cover one or more categories or subcategories of discharges or facilities not covered by individual permits. See, 40 CFR §122.28(a)(1). This provision does not contemplate or allow a general permit to operate concurrently with an individual permit. This is made clear in the same regulations which provide that, if a discharger is excluded from coverage under a general permit because the discharger already has an individual permit, the discharger may request that the individual permit be revoked in order to be covered under the general permit. 40 CFR § 122.28(a)(3)(G)(4)(v). Thus, to be covered by a general permit, the individual permit must be revoked.

Likewise, the application requirements for individual permits provide that any person discharging pollutants is required to apply for an individual permit unless that discharger is covered by a general permit. 40 CFR 122.21(a). And, if an individual NPDES permit is issued to a discharger already covered by a general permit, the general permit will be automatically terminated on the effective date of the individual permit. 40 CFR § 122.28(a)(3)(G)(4)(iv). The applicable EPA regulations do not provide for or allow concurrent coverage under both a general and individual permit. The same is true for Ecology's regulations.

Ecology's general permit program, at chapter 173-226 WAC, defines the term general permit as a permit that covers multiple dischargers of a point source category within a designated geographic area, in lieu of individual permits being issued to each discharger. WAC 173-226-020. Like the EPA regulations that Ecology's program must conform to, a general permit is an alternative to coverage under an individual permit. Ecology's regulations mirror the EPA regulations by providing that when an individual permit is issued to a discharger, the applicability of the general permit to that discharger is automatically terminated. In other words, there cannot be concurrent coverage. Further, a precondition to issuance of a general permit is a finding by Ecology that the category of dischargers to be covered are more appropriately controlled under a general permit than under individual permits. WAC 173-226-050(3)(b)(iv).[2] Again, the regulations establish that coverage must be under a general permit or an individual permit, but not both. Ecology has not explained its authority to require the operators to be subject to the Permit to be contemporaneously subject to the conditions of their individual permits and the Permit. Nor has Ecology explained why the individual permits for those operators subject to administratively extended permits will not terminate by operation of law upon coverage under the Permit, or why the Permit will not terminate by operation of law for those operators covered under an individual permit.

The Permit coverage requirement is also unenforceable. The permit shield contained in the CWA, 33 U.S.C. § 1342(k)) provides that compliance with the terms and conditions of a permit is deemed to be compliance with the CWA. The permit shield is also embodied in the Federal NPDES regulations.

> . . . [C]ompliance with a permit during its term constitutes compliance, for purposes of enforcement, with sections 301,302,306,307, 318, 403 and 405 (a)-(b) of CWA.

40 CFR § 122.5.

Accordingly, compliance with the terms of an individual permit is deemed to be compliance with the CWA. Ecology has not identified a provision in the CWA and its implementing regulations, or the State Water Pollution Control Act and its implementing regulations, that authorize Ecology to require coverage under a general permit for a discharger already covered by an individual

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[2] See also WAC 173-226-070(2)(a)(i) providing that where water quality-based effluent limitations shall be incorporated into a general permit if, among other things, Ecology determines that the use of a general permit rather than individual permits is appropriate.

permit. In the absence of such authority, Ecology cannot require any of the covered dischargers to apply for coverage under the Permit or take enforcement action if they fail to do so.

The Permit will also operate to modify the conditions of the individual permit in violation of the procedures set forth in the CWA and its implementing regulations for a permit modification. As noted above, Ecology has stated that the Permit will supersede effluent requirements related to TIN in the individual NPDES permits and that the Permit will supplement the individual NPDES permits. Fact Sheet, at 13, 34. In effect, the Permit will operate as a modification of the individual permit because it purports to modify the discharger's obligations under the individual permit. In other words, certain actions which were deemed to be compliance with the CWA under the terms and conditions of the individual permit, will no longer be deemed compliance with the CWA under the Permit. Ecology has not explained its authority to modify the terms and conditions of an individual permit through coverage under a concurrent general permit and has not explained its authority to impose conditions through a general permit that would vitiate the permit shield of the individual permit.

Modifications of permits are governed by 40 CFR §§ 122.62 & 124.5, made applicable to Ecology pursuant to 40 CFR § 123.25. A permit modification requires that Ecology find that cause exists for a modification. 40 CFR § 122.62. Assuming cause exists, permit modifications (other than minor modifications) must conform to the process set forth at 40 CFR § 124. 40 CFR § 122.63. Ecology has not followed this process for modification of Tacoma's obligations under its individual NPDES permits. Accordingly, issuance of the Permit cannot operate to modify any of the terms and conditions of the individual permits issued to Tacoma. Nor can issuance of the Permit alter the provisions under the CWA, and implementing regulations, establishing that compliance by Tacoma with the terms and conditions of its existing permits constitutes compliance with the CWA.

Finally, even if Ecology has such authority, issuance of the Permit would by operation of law result in termination of the Tacoma individual permits pursuant to WAC 173-226-200(5) and for some jurisdictions, would result in immediate termination of the general permit pursuant to WAC 173-226-080(3); WAC 173-226-200(7). Termination of the individual permit as required under WAC 173-226-200(5), would violate the anti-backsliding provisions of 33 USC 1342(0) and 40 CFR 122.44(I) because the effluent limits in the individual permits would not be included in the Permit. The absence of those limits would constitute permit conditions and effluent limits that are less stringent than the terminated individual permits. Ecology's action to require coverage under the Permit would therefore violate the state NPDES permit program, the CWA and the 2018 MOA. Ecology has not explained how or why these provisions would be inoperative with respect to the Permit.

Questions:

- In response to comments, can Ecology explain how EPA and Ecology regulations precluding coverage under an individual and a general permit for the same discharge do not apply to the proposed permit?

- In response to comments, can Ecology also explain for individual permits that are currently under administrative extension, whether the administrative extension will expire as provided in WAC 173-226-300(5) ("…continuation of an expired individual permit, pursuant to WAC 173-220-180(5), shall terminate upon coverage by the general permit.")?

- In response to comments, can Ecology explain whether coverage under the general permit will be mandatory or voluntary?

COMMENT NO. 3: THE SSM DOES NOT HAVE THE PRECISION TO PREDICT WATER QUALITY (DO) IMPAIRMENTS

Ecology is misusing the Salish Sea Model (SSM) to drive an ineffective general permit. Using models to calculate wasteload allocations is entirely different from using models to predict the impact of nitrogen discharges on dissolved oxygen (DO) levels. Ecology's own guidance on water quality assessments requires the use of actual data to establish a water quality impairment for DO. Water Quality Policy 1-11 Chapter 1, at 50 (Ecology 2020)(Pub. No. 18-10-035). The SSM would be extremely useful in designing strategies for reducing impacts for various sources of Nitrogen. It is completely inappropriate for assessing water quality. Models have been used to predict DO in a waterbody and even to help calculate wasteload allocations. In these cases they have been compared against water quality samples not as Ecology has done here, by simply comparing the results of two hypothetical model runs. No model, not the SSM or the Chesapeake Bay or the San Francisco Bay model, has the precision to estimate 0.2 mg/L difference between two model runs. Indeed, the 2019 bounding scenarios report includes an assessment of the Mean Square Error (MSE) of the SSM. The MSE indicates that DO levels can be predicted within an error of 0.8 mg/L, an error rate that is nearly an order of magnitude greater than 0.2mg/L standard. Thus the SSM cannot determine if the water quality standard is being met. Ecology has presented no evidence of near field, or localized, impacts. If Ecology believes the model is capable of predicting far field impacts, that information should be used in constructing individual permits.

The Fact Sheet, at 31, states that following review, "Ecology will use the draft Puget Sound Nutrient Reduction Plan (NRP) to assign the applicable allocations, possibly at the basin level." If the ultimate outcome of the SSM is to derive waste load allocations, Ecology should use the TMDL process, not a general permit to regulate individual permit strategies. Ecology incorrectly claims that the "benefits of this alternative restoration plan approach include achieving cleaner water more quickly than a traditional TMDL and improved opportunities for stakeholder input throughout the document development." *Id.* This is clearly not the case. Assuming there is an impairment, Ecology's process does nothing to address the problem for at least five years when WQBELs are supposed to be established. A TMDL approach would more precisely (and probably more accurately) identify where the impairments are so that a more targeted strategy including effluent limits and non-point source reductions could be employed sooner.

The proposed process takes a sledge hammer approach that will have a minor, if any, effect everywhere and a major impact nowhere.

Ecology cites the 2019 Bounding Scenarios Report to support a conclusion that Puget Sound is impaired due to low DO. Ecology has not explained its reasoning or process for how it determined that there is a reasonable potential to exceed water quality standards. EPA guidance refers to the model selection decision tool (MSDT) available in the Nutrient Management Toolbox (NMT), a process which requires the permit writer to go through a series of steps to determine which modeling approach is best to use in a reasonable potential analysis. Neither the Fact Sheet nor the Permit give any indication that Ecology has gone through the proper steps to select the correct model and used the correct procedures to perform a reasonable potential analysis. A conclusion of reasonable potential to exceed a water quality (nutrient) standard requires Ecology to link nutrient loads to ecological response indicators for purposes of developing nutrient criteria or setting allowable load based response. This requires Ecology to identify the dominant habitat and ecological responder. Ecology has not done this and in fact has used a blanket approach that evaluates all of Puget Sound including shallow embayments and depths greater than 30 meters and lumps them together. Ecology has failed to identify the ecological responder as wells as the dominant habitat of the ecological responder.

COMMENT NO. 4: ECOLOGY HAS NOT PROVIDED ADEQUATE INFORMATION FOR A MEANINGFUL COMMENT ON THE REASONABLE POTENTIAL ANALYSIS THAT FORMS THE BASIS FOR THE GENERAL PERMIT

EPA and Ecology regulations require sufficient information to evaluate and comment on the basis for a NPDES permit. This information must be set forth in a draft Fact Sheet that is available for public review at the time a draft NPDES permit is issued for public comment. In the case of the Permit, Ecology has relied entirely on the 2019 Bounding Scenarios Report and the SSM model runs described therein. The Fact Sheet and report lack sufficient information for Tacoma to comment on the reasonable potential determination.

Tacoma made several requests to Ecology to obtain documentation on the assumptions and values that were used in the Bounding Scenarios Report SSM. Despite receiving thousands of pages of documents there is no documentation by Ecology of the values that were inputted to the SSM. Tacoma cannot determine, for example, how the inputs assigned its plants or any other plants were calculated. There is no document that can be identified that explains this information. Likewise, and again despite repeated requests, there is no documentation of how the model results were processed. The Bounding Scenarios Report provides a single set of figures that depict models cells that apparently fall below the applicable DO standard. It is impossible to determine from this generalized information what exact cells fall into this category, which layers of the cell were deemed impaired, and the duration of such impairment.

It appears from Ecology presentations that many, if not most, of the cells that Ecology deems to be impaired in the Bounding Scenarios Report and for the purposes of the reasonable potential analysis for the Permit were from modeled results in the deepest of ten layers for each cell in the SSM. This is contrary to the DO water quality standard under WAC 173-201A-210(d)(iii) where the standard must be applied to the “dominant aquatic habitat.” Since the standards are based on salmon habitat, there is no basis for finding an impairment or interpreting the model results from deep layers in the model cells to make a reasonable potential determination.

Likewise, Ecology’s WQP 1-11 is clear that data, or in this case model results, should not be used “if a water column meets the criterion except at depths close to the sediment interface.” WQP 1-11, Ch. 1, Page 50. Ecology’s own policy states that it is not appropriate to attribute a criterion exceedance to the data since “DO levels near the sediment interface are naturally depleted in certain waters.” WQP 1-11, Ch. 1, Page 51.

Tacoma has been attempting to reverse engineer the SSM runs done by Ecology for the bounding scenarios report. This effort is compounded by the fact that Ecology did the modelling internally, with no documentation, and without any external peer review. Tacoma cannot provide meaningful comments on the reasonable potential analysis forming the basis for the Permit without completing this work.

Questions:

- In response to comments, can Ecology disclose how it processed it the results from the SSM modeling to make impairment determinations used in its reasonable potential analysis?

- In response to comments, can Ecology explain the extent of cells deemed out of compliance with DO standards based solely on model results in the deepest layer of a cell?

- In response to comments, can Ecology explain if WQP 1-11 represents the current interpretation and application of the marine DO water quality standard?

- In response to comments, can Ecology explain if it has adopted a new DO standard in the manner in which it has processed and applied the results from the SSM described in the Bounding Scenario Report?

COMMENT NO. 5: A TMDL WOULD BE THE MORE EFFECTIVE APPROACH TO MAINTAINING AND IMPROVING WATER QUALITY

Assuming there is an impairment, Ecology's proposed process does nothing to address the problem for at least five years when WQBELs may be established. A TMDL approach would more precisely and probably more accurately identify where the impairments are so that a targeted strategy including WQBELs and non-point source reductions could be employed. In addition a TMDL approach would more likely result in waste load allocations that would provide reasonable assurance that water quality standards will be achieved. The proposed process takes a sledge hammer approach that will have a minor, if any, effect everywhere and a major effect nowhere.

COMMENT NO. 6: THE DRAFT NARRATIVE WATER QUALITY-BASED EFFLUENT LIMITS (WQBELS) DO NOT CONTROL DISCHARGES AS NECESSARY TO MEET APPLICABLE WATER QUALITY STANDARDS FOR DO

As Ecology admits it does not have the data to determine if this Permit will control discharges in a manner that will result in meeting water quality standards. Ecology has further determined that current levels of TIN in WWTP effluent are causing or contributing to violations of the DO standards in Puget Sound. See Fact Sheet, Page 30. Ecology has not proposed a monitoring program that adequately measures DO in the “impaired” water bodies. Without this data there is no way to tell whether the proposed actions in the Permit have any impact on DO.

Questions:

- In response to comments, can Ecology explain whether discharges from a facility at or below the total inorganic nitrogen action levels in Condition S4.B will cause or contribute to a violation of water quality standards?

- In response to comments, can Ecology explain how the proposed permit narrative effluent limits will meet water quality standards for DO?

- In response to comments, can Ecology explain whether a facility in full compliance with the permit and discharging total inorganic nitrogen at or below

action levels in Condition S4.B will be meeting water quality standards for dissolved oxygen? Can Ecology explain the basis for its answer to this question?

COMMENT NO. 7: THE ACTION LEVEL CALCULATION DATA SET IS TOO SMALL

Ecology recognizes that most facilities did not have adequate data sets to represent the Nitrogen discharge from the facilities covered under the Permit. Ecology developed a calculation tool for ALo that uses a nonparametric method called "bootstrapping" to calculate the annual load from facility data.

Bootstrapping disregards the underlying problem that Ecology does not have a data set that accurately represents nitrogen discharges from the covered operators. In addition, some operators had only quarterly data which Ecology extrapolated in an illogical attempt to represent the variability. Using extrapolated data in the bootstrapping calculation destroys what little statistical validity existed in the bootstrapping analysis. The action level that Ecology is using is an annual total load of TIN. The bootstrapping analysis is based on monthly averages. The confidence interval calculated, that is the basis for the action levels, is based on the estimated monthly mean not the annual load. This greatly exaggerates the precision of this estimate and could result in a high probability of immediate exceedances of the action level. Tacoma estimates that it has a one in five chance of exceeding the action level in the first year of the Permit.

There is no way that meaningful confidence intervals for annual loads can be calculated from monthly data, particularly if the extrapolation and bootstrapping have been used to artificially increase the sample size. Ecology should design and require a sampling program for each plant to more precisely estimate current nitrogen discharges before setting effluent limits or action levels. Ecology should defer setting action levels until more data is collected.

Additionally, Ecology's reference for Bootstrapping in the bibliography is not reliable.

Bootstrapping (statistics). (2021, May 7). In *Wikipedia.*
https://en.wikipedia.org/w/index.php?title=Bootstrapping_(statistics)&oldid=1021858475) [11]

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COMMENT NO. 8: ALTERNATIVE RATE STRUCTURES ARE NOT LEGAL UNDER STATE LAW OR THE WASHINGTON STATE CONSTITUTION

Ecology has recognized that the financial impact of the costs of treatment can create an unreasonable burden upon communities served by wastewater treatment plants. See, *Northwest Environmental Advocates v State*, 2021 Wash. App. LEXIS 1558 (2021). Overburdened communities will bear a significant and disproportionate burden of the cost of compliance with the Permit.

While the City appreciates Ecology's effort to address environmental justice by requiring an affordability assessment, the assessment will do nothing to address the disparate impact of the cost burden of the Permit upon communities of color, Tribes, indigenous communities, and low income populations. State law does not allow dischargers to create rate classifications based upon ability to pay, except as authorized pursuant to RCW 74.38.070 for low-income citizens. See, RCW Chapters 35.67 and 35.92. Tacoma already has a program for rate reductions under this statute. All other rate classifications must be based upon the cost of service and must be allocated equitably based upon service received. See generally, *King County Water Dist. No. 75 v Seattle*, 89 Wn. 2d 890, 903 (1978). A utility has a duty to fix rates that are just and reasonable and not unduly discriminatory. *Faxe v Grandview*, 48 Wn. 2d 342, 347 (1956).

Rates must comply with Article 1 § 12 of the State Constitution which requires that rates be non-discriminatory, meaning that rates apply alike to all persons within a class, and that there must be a reasonable ground for creation of different rate classifications. *Faxe*, 89 Wn. 2d at 348. Rate classifications under state law are based upon such factors as cost of service, the character of the service furnished, or the quantity or amount received. *Faxe*, 89 Wn. 2d at 349-350. State law sets for the criteria in Chapter 35.67 and 35.92 RCW. Neither state law nor the state constitution allow rate classifications based upon an affordability assessment with the exception of low income rate reductions authorized under state law and which are already being implemented. Accordingly, the concept of a study and proposal for rate alternatives only serves to create false hope that the enormous impact of funding the cost of treatment can be more equitably distributed. Further, it will not address the reasonableness of the overall costs of compliance to be borne by all of the rate payers.

Question:

- In response to comments, can Ecology explain what assessment Ecology has made to address environmental justice impacts from the proposed permit?

- **In response to comments, can Ecology explain how the requested report will be used to regulate NPDES permits for publically owned WWTPs?**

<u>COMMENT NO. 9: ADAPTIVE MANAGEMENT</u>

Tacoma supports an adaptive management approach, however the Permit does not include the basic tenet of adaptive management. Adaptive management is based off of the Deming Cycle of plan, do, study, act.

Determine Management Objectives:

Ecology's stated management objective for the first Permit is to "prevent the dissolved oxygen problem in Puget Sound from getting any worse." To that end, Ecology's key desired outcome would be to prevent DO levels from declining throughout Puget Sound. The key performance indicator would be DO.

The problem is that there is no provision in the Permit that requires DO to be measured or to use that data in determining the success or failure of any actions taken. The performance provisions in the Permit are limited to the total nitrogen loading from the WWTPs. Presumably this data will be used to do additional model runs that will tell us that DO conditions have improved. But without actual measurements of DO all we will know is that we have successfully manipulated the model. A robust monitoring program designed to detect improvements in DO levels is absolutely essential to a successful adaptive management program.

The ultimate management objective of the Permit is to improve DO conditions in Puget Sound. Assuming that limiting TIN loads from marine dischargers will actually have a meaningful impact on DO impairment, Ecology should use the first Permit cycle to collect the data necessary to inform the strategies for accomplishing the ultimate objective. Rather than write plans that may never be implemented or implement strategies that will, at best, maintain the status quo, Ecology should use the first Permit cycle to develop strategies and actions that most efficiently and effectively achieve target DO levels.

Implement Strategies and Actions to Achieve Objectives:

Ecology's timeframes for implementation are far too short. Once a strategy has been selected and appropriate metrics determined, baseline data must be collected to determine the nominal state before implementation of the strategy. If we don't know where we began, how will we know how far we have travelled or if there has been any meaningful benefit from reduction of nutrient loads from marine dischargers? Measurement of the effectiveness of a strategy is the basis of adaptive management. Collecting baseline data can take months. Actually implementing the strategy can take months to years depending on the amount of construction involved and the difficulty in optimizing the process change. Finally the action must proceed for a long enough period of time that any differences can be reliably measured.

Evaluate Management Effectiveness:

The time required for data collection, strategy development and implementation suggest long term objectives rather than short term, first Permit cycle, objectives should be the focus of adaptive management.

COMMENT NO. 10: CONDITION S3 – COMPLIANCE WITH STANDARDS

The Permit provides as follows:

> A. Discharges must not cause or contribute to a violation of surface water quality standards (Chapter 173-201A WAC), sediment management standards (Chapter 173-204 WAC), and human health-based criteria in the Federal water quality criteria applicable to Washington (40 CFR Part 135.45). This Permit does not authorize discharge in violation of water quality standards.

Permit, Condition S3.A

Ecology has determined that WWTPs discharges are causing or contributing to violations of the DO standards in Puget Sound. Fact Sheet, at 30. Indeed Ecology has determined that excess nutrients discharged from WWTPs in one location cumulatively contribute to DO impairments in other locations due to the water exchange that occurs between basins. *Id.* Based on these determinations compliance with the conditions of Permit will not result in meeting water quality standards putting dischargers in immediate violation of Condition S3.A of the Permit. Accordingly, the Permit will not meet the requirements of the CWA because compliance with the permit will not result in meeting water quality standards.

Questions:

- In response to comments, can Ecology explain the scope of the prohibition in Condition S3 in the permit? Does the prohibition only apply to TIN?

- In response to comments, can Ecology explain the basis for its presumption that compliance with permit conditions will result in compliance with water quality standards?

- In response to comments, can Ecology explain whether discharges from a facility at or below the total inorganic nitrogen action levels in Condition S4.B will cause or contribute to a violation of water quality standards?

- In response to comments, can Ecology explain the basis for its presumption in Condition S3 that compliance with permit conditions will result in compliance with water quality standards?

- In response to comments, can Ecology explain whether discharges from a facility at or below the total inorganic nitrogen action levels in Condition S4.B will cause or contribute to a violation of water quality standards?

- In response to comments, can Ecology explain whether the reasonable potential determination in the Draft Fact Sheet, at 30, constitutes site specific information for each facility covered under the permit that the facility has a discharge that is causing or contributing to a violation of water quality standards?

COMMENT NO. 11: S4.A APPLICABILITY OF NARRATIVE EFFLUENT LIMITS

Condition S4 does not meet the requirements under 40 CFR §§ 122.44(d) and (k) for establishing narrative effluent limits. Effluent limits means any restriction, prohibition, or specification established by the Ecology in a permit on:

> . . . (a) Quantities, rates, percent removals, and/or concentrations of physical, chemical, or biological characteristics of wastes which are discharged into waters of the state; and (b) Management practices relevant to the prevention or control of such waste discharges.

WAC 173-221-030.

When Ecology has determined that there exists a reasonable potential for a discharger to cause, or contribute to an excursion above any water quality standard for a particular pollutant, the Permit must contain effluent limits for that pollutant. See, 40 CFR § 112.4(d). Best management practices may be used in lieu of a numeric effluent limit when numeric effluent limitations are infeasible. 40 CFR § 122.44(k)(3). Best management practices (BMPs) means,

> . . . schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of ''waters of the United States.'' BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

See, 40 CFR § 122.2

Ecology acknowledges in the Fact Sheet that under 40 CFR § 122.44 the Permit must contain effluent limits to control pollutants which have the reasonable potential to cause an excursion above water qualities standards. Fact Sheet, at 33. As noted above, Ecology has stated in the Fact Sheet that it has determined that domestic wastewater discharges may cause or contribute to a violation of water quality standards for DO. See, Fact Sheet, at 34. If Ecology stands by this determination, numeric WQBELs are required to be included in the Permit. See, 40 CFR § 122.44(d). The Permit does not meet the requirements of 40 CFR § 122.44(d) for the following reasons.

As noted above, narrative effluent limits may be used in lieu of a numeric effluent limit when numeric effluent limits are infeasible. 40 CFR § 122.4(k)(3). However, Ecology has acknowledged that not only is it feasible to establish numeric water quality limits, it plans to do so in the second iteration of the Permit. Fact Sheet, at 33.[3] The fact that it will take more time to perform additional model runs to establish numeric effluent limits does not mean that it is infeasible to do so. Accordingly, the Permit does not meet the requirements of 40 CFR § 122.44(k)(3). The Permit also fails to comply with NPDES permit regulations because it does not require actions that will result in meeting water quality standards. 40 § CFR 122.44(k)(4). At best the Permit will require compliance with actions levels that Ecology has determined are causing violations of the DO water quality standard throughout Puget Sound.

Table 4 (Condition S4) sets forth what are labeled “Narrative Effluent Limitations for Dominant TIN Loaders” that include three items: (1) monitoring and reporting, (2) nitrogen optimization plan, and (3) a nutrient reduction evaluation. The Permit and Fact Sheet do not explain how these narrative effluent limitations will result in compliance with water quality standards as required under EPA and Ecology regulations.

In *Washington Dairy Federation v. Department of Ecology*, 2021 WL 2660024, *13, __ Wn. App. ____ (Div. II June 29, 2021) (citing WAC 173-226-100(1)(j)(ii)), the court ruled that with NPDES Ecology must “issue a fact sheet that includes an explanation of how the permits meet groundwater and surface water quality standards.”

<u>Questions:</u>

- In response to comments, can Ecology explain how these narrative effluent limitations will result in compliance with DO water quality standards?

- In response to comments, can Ecology explain whether a facility in full compliance with the permit and discharging total inorganic nitrogen at or below action levels in Condition S4.B will be meeting water quality standards for dissolved oxygen? Can Ecology explain the basis for its answer to this question?

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[3] “Ecology continues to review model results from the first year of optimization scenarios and scope future model runs through the Puget Sound Nutrient Forum. Additional model runs will be defined in 2021 to further quantify far and near field effects of wastewater discharges to marine waters along with the anthropogenic nutrient loads from Puget Sound watershed. Once Ecology can establish a nutrient loading capacity that meets DO criteria in the marine waters of Puget Sound, allocations that will lead to numeric WQBELs can be established. The NRP will include draft allocations for point sources and watershed inflows. After internal and external review, the allocations will be finalized and numeric WQBELs will no longer be infeasible. It is anticipated that for the second iteration of this permit the approach will shift to working towards compliance with those numeric limits.” Fact Sheet, at 33.

COMMENT NO. 12: TIN ACTION LEVELS

Table 5 in the Permit includes “action levels” for TIN applicable to some WWTPs.

Questions:

- In response to comments, can Ecology explain how the actions levels were calculated?

- In response to comments, can Ecology explain the basis and information that were used to derive the action levels?

- In response to comments, can Ecology explain if the actions levels were calculated at a level to achieve compliance with DO water quality standards?

COMMENT NO. 13: CONDITION S4.A NITROGEN OPTMIZATION PLAN AND REPORT

Condition S4.A requires a permittee to develop and implement a Nitrogen Optimization Plan and apply an adaptive management approach at the WWTP. Ecology has not adequately defined what optimization means and how an operator can determine if it has optimized or how Ecology or a third party will determine if the operator has optimized. The Permit defines “optimization” as a BMP resulting in the refinement of WWTP operations that lead to improved effluent water quality and/or treatment efficiencies. By Ecology’s own admission, optimization does not have a large impact on the perceived DO impairment. A more effective measure would be to put effort into determining WQBELs and begin planning design and construction of facilities that would actually have a significant impact on DO impairment, assuming there is an impairment.

Nitrogen Optimization Plan and Report. If a plant initially optimizes for maximum Nitrogen removal and then exceeds the Action Level, the Permit does not explain what adaptive management strategies are available since the WWTPs have presumably already optimized for maximum nitrogen removal.

Ecology’s requirement that optimization strategies be planned and implemented in under a year is unrealistic. The facility must select a strategy, define metrics, measure the baseline data, and implement the strategy and then using the selected metrics determine if the strategy works. It is not feasible to complete this work within one year.

Question:

- In response to comments, can Ecology explain if a plant initially optimizes for maximum nitrogen removal but exceeds the action level, then what adaptive management strategies are left since they have presumably already optimized for maximum nitrogen removal?

COMMENT NO. 14: CONDITION S4.C NITROGEN OPTIMIZATION PLAN AND REPORT

Condition S4.C.1.b requires that the nitrogen optimization plan determine the optimization goal(s) for the WWTP. It is not clear from this language what goal or goals should be considered other than maximizing nitrogen removal. In the same section of the Permit Ecology allows the plan to exclude any strategy that would exceed a one year timeframe. There are no strategies for optimizing nitrogen removal at Tacoma facilities that can be developed, tested, modelled, and implemented in under a year.

In Condition S4.C.2.a.iv requires documentation of any impacts to the overall treatment performance as a result of process changes. Ecology does not explain how a facility, or how Ecology, will address potential negative impacts from optimization to overall treatment performance. It is not clear if a facility may violate its individual permit if negative impacts result from implementing optimization efforts, or whether negative impacts from optimization will be addressed in modified or reissued individual permits. It is not clear if optimization strategies that will have negative impacts to overall treatment performance must be considered.

Condition A4.C.2.b.i requires a load evaluation by March 31 each year to determine the facility's annual average TIN concentration and load from the reporting period. Since there will only be one year of data in year two of the Permit, it is impossible to calculate an annual loading average.

Condition S4.C.3.b requires identification of strategies for reducing TIN from new multi-family/dense residential developments and commercial buildings. The Fact Sheet does not explain or provide any guidance on what strategies should be considered under this condition of the Permit.

Condition S4.D.1.c requires, when a facility exceeds its action level, it must include in its next Annual Report a proposed approach to reduce the annual effluent nitrogen level by 10 percent. The Permit does not explain how a facility can be capable of obtaining an additional 10 percent reduction in loading if it has already reduced nitrogen loading to the maximum extent under the Permit.

The Fact Sheet, at 44, cites two EPA Case Studies on Implementing Low-Cost Modifications to Improve Nutrient Reduction at Wastewater Treatment Plants (2015) as a resource for evaluating alternatives for optimizing nitrogen reductions at activated sludge plants. The EPA study concluded that most opportunities for optimization were only found in facilities with existing BNR capabilities. The EPA document does not apply to the Tacoma facilities and Ecology has cited no other guidance for optimization alternatives.

The Fact Sheet, at 47, suggests that facilities evaluate strategies for reducing nitrogen loading including increasing production volumes of reclaimed water (if applicable to the facility), implementing side stream treatment for a portion of return flows from solids treatment, reducing influent nitrogen loads, alternative effluent disposal options and any other intermediate treatment alternative which results in decreased nitrogen loads into Puget Sound prior to major facility upgrades. All of these alternatives require substantial capital investment or growth moratoria. This is contrary to the previous statement that substantial capital investment would not be part of the optimization program.

Questions:

- In response to comments, can Ecology explain how a facility can document the exclusion of optimization strategies under this section?

- In response to comments, can Ecology explain whether Condition S4.C.1.b applies to consideration of an additional 10 percent reduction – namely, that a

facility does not need to consider optimization strategies that exceed a reasonable implementation cost or timeframe that exceeds one year?

- In response to comments, can Ecology explain the consequence to a facility if there are no optimization strategies that can reasonably be implemented to reduce nitrogen loading by an additional 10 percent within five years?

- In response to comments, can Ecology explain whether a facility will be in violation of the permit where there are no reasonably available optimization strategies to achieve a 10 percent reduction in annual nitrogen loading?

COMMENT NO. 15: CONDITION S4.E NUTRIENT REDUCTION EVALUATION

Condition S4.E.2 states that a facility must submit an "approvable" nutrient reduction evaluation report. There is no regulatory standard for nutrient reduction evaluation report and no basis for a permittee to know what might constitute an approvable or unapprovable evaluation. The Permit states that the nutrient reduction evaluation must include an AKART analysis. Since Ecology has determined, and the state courts have affirmed, that BNR and other tertiary treatment technology are not AKART for Puget Sound WWTPs, it is assumed that these technologies do not have to be considered in the evaluation. The Permit and Fact Sheet do not provide any explanation or basis for considering these types of treatment technologies as AKART.

Condition S4.E.3 of the Permit requires consideration of treatment technologies to achieve an effluent concentration of 3 mg/L. The Permit and fact sheet do not explain the basis for this requirement and how this requirement applies in the context of the Condition S4.E.2 AKART evaluation. It is assumed that a facility does not need to include an evaluation of any technology that would not constitute AKART.

Question:

- In response to comments, can Ecology explain what specifically constitutes an "approvable" Nutrient Reduction Evaluation?

- In response to comments, can Ecology explain the basis for inclusion of a requirement to evaluate treatment technologies to achieve TIN effluent concentrations of 3 mg/L?

COMMENT NO. 16: CONDITION S4.E.5.C IS VAGUE

Condition S4.E.5.c requires an environmental justice review and affordability assessment for what "overburdened communities" can afford to pay for the wastewater utility. There is no explanation as to what constitutes an overburdened community or how to determine what a member of an overburdened community can afford to pay for the wastewater utility. It is not clear the basis on which Ecology is asking for this information. There are no regulatory standards under Ecology regulations for the assessment and there is no basis for a facility under the state constitution or state statutes to vary the utility rates of its customers based on environmental justice. This is an assessment that Ecology should undertake on its own initiative prior to issuance of the Permit.

COMMENT NO. 17: CONDITION G25 BYPASS PROHIBITED

General Condition G25 imposes a bypass prohibition that directly modifies the administratively extended individual permits for the Tacoma facilities. This is a clear violation of federal and state regulations and case law that prohibit the modification of expired and administratively extended permits. This condition cannot lawfully be included in a general permit applicable to the Tacoma facilities.

COMMENT NO. 18: SEPA COMPLIANCE

Ecology should withdraw its SEPA determination for the Permit and prepare an environmental impact statement. Ecology acknowledges that a "modification of permit coverage for physical alterations, modifications, or additions to the wastewater treatment process that are substantially different from the original design and/or expands the existing treatment footprint requires State Environmental Policy Act (SEPA) compliance." Ecology is incorrect, however, in concluding that optimization does not require additional SEPA review. The draft Fact Sheet, at 47, suggests that facilities evaluate strategies for reducing nitrogen loading including increasing production volumes of reclaimed water, if applicable to the facility, implementing side stream treatment for a portion of return flows from solids treatment, reducing influent nitrogen loads, alternative effluent disposal options and any other intermediate treatment alternative which results in decreased nitrogen loads into Puget Sound prior to major facility upgrades." All of these alternatives will require substantial capital investment or some sort of growth moratoria by Tacoma.

The Tacoma facilities were not designed for de-nitrification and the optimization alternatives proposed by Ecology will require modifications that subject the Permit to SEPA review under an environmental impact statement.

Additionally, condition S4.C.3.b requires identification of strategies for reducing TIN from new multi-family/dense residential developments and commercial buildings. This condition requires Tacoma to propose development regulations that would trigger SEPA review. See, WAC 365-196-620 (Adoption of comprehensive plans and development regulations are "actions" as defined under SEPA. Counties and cities must comply with SEPA when adopting new or amended comprehensive plans and development regulations.)

Regardless of the applicability of any SEPA exemption, Ecology is also required to assess the potential climate impacts from the optimization requirements and the evaluation of treatment technologies, particularly treatment technologies that can achieve an effluent concentration of TIN at 3 mg/L. These alternatives will have a profound impact on energy consumption at the Tacoma facilities. *See Washington Dairy Federation v. Department of Ecology,* 2021 WL 2660024, *23 ___ Wn. App. ____ (Div. II June 29, 2021) (Ecology must consider climate change impacts in issuing a NPDES permit).

COMMENT NO. 19: PERMIT LIMITS BASED ON CURRENT TIN LOADING CONFLICT WITH TACOMA'S OBLIGATION TO PROVIDE WASTEWATER SERVICES WITH THE SERVICE AREAS OF ITS FACILITIES

Ecology has improperly based numeric effluent action levels on calculated levels of TIN loading from flow data and nitrogen concentration data in recent years. Tacoma is obligated under the Growth Management Act to accept and facilitate growth within the applicable urban growth boundaries. Associated with this obligation is the parallel requirement under its NPDES permits to maintain sufficient capacity to provide wastewater treatment within the service areas of its two facilities. This is a permit condition in both of the individual NPDES permits issued by Ecology and a requirement that is reflected in the general facility plans and engineering documents generated by Tacoma under WAC 173-240-050 and WAC 173-240-060. By adopting an effluent limit based on current loading and concentrations Ecology will be denying Tacoma any ability to provide for anticipated growth or leave the City in violation of its individual permits. Moreover, Ecology is locking in effluent limitations that fail to consider the permitted design flows for its facilities and that may be irrevocable under state and federal water quality anti-backsliding regulations. This is a critical issue that should compel Ecology to abandon the Permit until it has completed a DO TMDL for Puget Sound and is able to address nitrogen issues in individual NPDES permits.

Questions:

- In response to comments, can Ecology explain why it has not considered design flows and the need to maintain treatment capacity in setting effluent limitations in the permit?

- In response to comments, can Ecology explain whether the general permit will supersede and modify the obligations in the individual Tacoma permits to maintain treatment capacity within the service areas of the facilities?

- In response to comments, can Ecology explain whether, based on the general permit, the department will now consider void those portions of Tacoma's general sewer plan and engineering reports that are based on providing and maintaining wastewater treatment capacity within the respective service areas of its two facilities?

- In response to comments, can Ecology explain how it has evaluated the likelihood that Tacoma will have to put building moratoria in place to meet the proposed effluent limitations?

- In response to comments, can Ecology explain how it has evaluated the impact of the effluent limitations on the ability to develop low and moderate income housing?

- In response to comments, can Ecology explain how it has evaluated the potential environmental justice concerns that will result from reduced access to affordable housing?

- In response to comments, can Ecology explain how it has evaluated the applicability of anti-backsliding regulations to the proposed effluent limitations?

Thank you for this opportunity to comment on the Puget Sound Nutrient General Permit. We trust our comments are useful. If you have any questions or would like additional information please contact Daniel C. Thompson, Ph.D at 253 502-2191 dthompso@cityoftacoma.org.

Sincerely

Michael P. Slevin III, P.E.

Michael P. Slevin III, P.E.
Environmental Services Director

POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON

KING COUNTY, Appellant, v. WASHINGTON STATE DEPARTMENT OF ECOLOGY, Respondent.	Case No. 21-083 **DECLARATION OF CHRISTIE TRUE**

1. My name is Christie True. I make this Declaration in support of the County's Motion to Stay.

2. I am over the age of eighteen (18) and declare the following facts are true to the best of my recollection, and that I have personal knowledge of the same.

3. I am the Director of King County's Department of Natural Resources and Parks. In that capacity, I oversee, and am responsible for the County's operation of its wastewater treatment plants ("WWTPs" or "Plants"), including King County's Brightwater Plant, its South Plant, its Vashon Plant, and its West Point Plant. The WWTPs and their operations, including the costs of compliance with regulatory requirements and permit, are funded by fees that the County charges to users of the WWTPs.

4. Each of these Plants is currently regulated by an individual National Pollutant Discharge Elimination System ("NPDES") permit issued by the Department of Ecology

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("Ecology") as follows: Brightwater is covered by #WA0032247, which expires on February 28, 2023; South is covered by #WA00295810, which expired on July 31, 2020 but which has been administratively extended; West Point is covered by #WA00029181, which expired on January 31, 2020 but which has been administratively extended; and Vashon is covered by #WA022527, which expires on February 28, 2022 but which I anticipate will be administratively extended. Copies of these individual permits are attached to the County's Motion to Stay.

5. Ecology issued the Puget Sound Nutrient General Permit ("PSNGP" or "Permit") on December 1, 2021, which becomes effective on January 1, 2022. Although the County's four WWTPs are already covered by existing individual NPDES permits, the PSNGP requires the County to apply for coverage for these four WWTPs under the PSNGP by March 1, 2022. The PSNGP applies to discharges of nutrients from the WWTPs and will simultaneously regulate the WWTPs along with their existing individual NPDES permits. King County has appealed the PSNGP and now moves to stay its effectiveness as to the County's four WWTPs.

6. The PSNGP requires the County to immediately begin complying with a number of onerous requirements, including (i) additional sampling, monitoring, and reporting requirements for each of the County's WWTP's dischargers, including monitoring for Total Inorganic Nitrogen ("TIN"); (ii) developing and implementing for each of the WWTPs a Nitrogen Optimization Plan to maximize nitrogen removal; (iii) compliance with assigned TIN discharge "action levels" established under Condition S4.D of the Permit for each of the County's individual WWTPs, or alternatively, compliance with the cumulative or "bubbled" action level assigned to the County's three Plants classified by the Permit as "dominant dischargers"; and (iv) compliance with the PSNGP's generic prohibitions on causing or contributing to a violation of surface water quality standards, sediment management standards, and human health-based water quality criteria. These immediate obligations will require a significant amount of staff and outside consultant time and effort and will cost the County *tens of*

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millions of dollars in the next two years, in addition to continuing to comply with all the requirements of the WWTPs' individual NPDES permits, which will remain fully in effect.

7. More specifically, the PSNGP now requires the County to begin enhanced monitoring of the influent and effluent at each of its four WWTPs as well as monthly permit required DMR reporting. Conditions S7.A, S7.C. That will involve additional sampling and sample transport, analytical testing and associated lab practices, documentation and reporting, and the need to purchase additional equipment. This will also require the County to hire two new staffers. The total cost of this additional sampling, monitoring, and recording will be about $350,000 annually.

8. In addition to the enhanced monitoring, reporting and record keeping required under Conditions S7.A and S7.C described in ¶ 7 of this declaration, the PSNGP immediately requires the County to begin developing, preparing, and implementing a "Nitrogen Optimization Plan and Report" for each of the WWTPs pursuant to Conditions S4.C. and S6.B of the Permit. Because domestic wastewater treatment plants are not currently designed to remove nitrogen, the purposes of these optimization requirements are to "maximiz[e] nitrogen removal from the existing treatment plant[s] to stay below the calculated action level[s] "applicable to the three "dominant" WWTPs (South Plant, Brightwater, and West Point) and to "maximiz[e] nitrogen removal from" the "small" WWTP (Vashon). Conditions S4.C, S6.B. The Permit emphasizes that **"the Permittee must begin the actions described in this section immediately upon permit coverage."** *Id*. (emphasis in original). Condition S4.C.1.c requires the County to identify viable optimization strategies for each "dominant" WWTP owned and operated by the County, and to select **by July 1, 2022** at least one optimization strategy for implementation. Condition S6.B.1.b requires the County to identify the optimization strategy selected for implementation at the "small" WWTP by **December 31, 2022.**

9. To comply with Conditions S4.C. and S6.B the County must 1) select optimization strategies by July 1, 2022, and December 31, 2022, respectively, and 2) implement

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the selected optimization strategies and submit annual reports beginning in March 2023. The County will have to dedicate 7 of its current staff to this effort on a full-time basis. To backfill these staff, the County will have to hire new employees. The labor costs associated with this requirement alone are estimated to be $700,000 for the first two years for optimization planning and $1,200,000 for optimization implementation in the same two years. The County will also have to hire outside consultants to assist with these optimization planning efforts at an expense of approximately $500,000 for the first two years. The County will have increased operating and maintenance costs associated with optimization, which are estimated to be $950,000 annually. The capital cost to implement the selected optimization strategies (e.g., install new equipment) is estimated at $5,000,000 a year per plant. Because the WWTPs and their operations are funded by fees charged to the users of the WWTPs, the County's ratepayers will ultimately bear the costs of complying with the PSNGP.

10. The County is also required to immediately *implement* the selected optimization strategy identified under Condition S4.C.1. and then document the implementation of the selected optimization strategy for each Plant by March 3, 2023. Condition S4.C.2. The immediate implementation of the PSNGP optimization requirement will adversely affect the ability of the County to complete other major capital project upgrades currently scheduled. More specifically, the immediate optimization requirements imposed by the PSNGP will have a cascading negative effect across the County's capital program resulting in the reassignment of project managers, engineers, operations staff, and construction managers. It will result in the delay of capital projects are needed to increase system reliability, maintain system capacity, reduce overflows, and maintain permit compliance. As an example of a critically impacted program, King County's West Point Capital Improvement Program ("the Program") has over $600,000,000 of active and planned projects to improve the reliability of the West Point Treatment Plant. Staff currently assigned to the Program will now need to be reassigned to comply with the PSNGP. This will result in the deferral of projects that are badly needed at

West Point to improve reliability. This increases the risk of equipment failures and may result in an increase in plant bypasses, secondary treatment bypasses, increased risks to worker safety, and ultimately, to harm to the environment.

11. Additionally, immediate implementation of nitrogen optimization strategies at each WWTP has the real potential to create externalities that are not intended, including causing the Plant to violate a provision of its individual NPDES permit. For example, South Plant operates under NPDES Waste Discharge Permit No. WA0029581 which includes a pH limit and a prohibition on the bypass of sewage around the secondary treatment process. Operating South Plant to biologically remove nitrogen will likely result in a violation of both these requirements due to reduced flow capacity and the existing configuration of the treatment plant. Condition S1.A of the NPDES Waste Discharge Permit No. WA0029581.

12. If, as a result of compliance with Condition S4.C, the County determines that the Plant's annual TIN load exceeds its assigned action load (or, if applicable, the County's cumulative or "bubbled" load for all three dominant discharging Plants), then the County must proceed to take the corrective actions identified in Condition S4.D. Based on the County's data -- used by Ecology for development of the PSNGP-- the current discharge of total inorganic nitrogen (TIN) in effluent from any of the three dominant County dischargers demonstrate that the action levels, or bubbled action level, are likely to be exceeded within the first permit cycle.

13. Condition S4.D requires the County, if it exceeds its action level, to document why that happened and to identify what corrective actions will be needed to get the Plants below the action level. It must also, with the next annual report, submit a strategy to reduce the annual effluent load by *at least 10% below the action level* assigned to the individual plants or the bubbled action level for the three "dominant" plants. Condition S4.D.2. This "strategy" must be in the form of an engineering report that includes a summary of treatment alternatives considered, basic design information and influent characterization, a description of the proposed treatment approach and anticipated results from implementing that approach and have the

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signature and certification of a licensed professional engineer. An engineering report sufficient to comply with the permit is estimated to cost $5,000,000 for each plant. As indicated in paragraph 10 of this Declaration, this will result in a cascading effect, delaying critical capital improvements already in the planning phase.

14. The County's election of the type of coverage must be made in the Notice of Application (NOI) process by or before March 1, 2022, before any substantive planning information can be developed to assist making an informed decision on the optimal path to Permit compliance. If the County elects Permit coverage under individual action levels for the three WWTPs, it estimates that it likely will trigger the S4.D.2. corrective action obligation to develop an abbreviated engineering report to document the actions necessary to reduce nitrogen by 10% of the action level. This Condition of the Permit is expected to be triggered on or before July 1, 2022 at its West Point Plant (even if that Plant discharges at or below its assigned action level), because the County currently knows of no "viable optimization strategies" for that Plant. *See* Condition S4.C.1.b. This could result in an extensive and stranded planning and design effort.

15. If the County exceeds an action level two years in a row, or for a third year during the permit term, the County must implement the strategy proposed in the abbreviated engineering report under a schedule negotiated with Ecology. Condition S4.D.2.a. If the County elects Permit coverage with the bubbled action level, the relatively lower optimization capacity at the West Point WWTP described above would contribute to a probability of exceeding the bubbled action level. Consequently, the County would need to identify a strategy to reduce nitrogen to 10% below the total bubbled action level which would likely require actions be implemented at two or three of the County's regional WWTPs. Should that happen, whether at any of the County's individual WWTPs, or to the 3 County WWTPs classified as "dominant dischargers" cumulatively (if the County choses to approach compliance on the basis of the "bubbled action level"), the County will be forced to prepare a combined engineering report at a cost of

$9,000,000, and spend up to $88,000,000 for an individual treatment plant or $176,000,000 for the bubbled action level in implementing capital improvements to meet the draconian corrective action required by Condition S4.D.2.a. As explained more fully in ¶ 17 below, the investments in corrective actions could result in extensive stranded assets.

16. The County must immediately begin implementation of Condition S4.C.3 that includes, but is not limited to, "…investigate opportunities to reduce influent TIN loads from septage handling practices, commercial, dense residential and industrial sources and submit documentation with the annual report." While the County has limited institutional control over these matters, it accepts septage at the South Plant facility, has delegated authority for industrial waste pretreatment permits for all three regional plant customers, and has some land-use regulation role for unincorporated areas of the service area. Thus, the County must devote resources to work with stakeholders with direct roles in these matters, and develop and ensure compliance with the condition, including, but not limited to, 34 local sewer agencies, community engagement, local limit development, and permit writing. The County estimates that it will cost it a minimum of approximately $600,000 annually to provide the staffg needed to meet this requirement of the PSNGP.

17. The County will be irreparably harmed if the PSNGP is not stayed because the efforts outlined above that are required of the County to comply with the PSNGP will be for naught. Although Ecology is requiring the County to spend tens of millions of dollars to immediately evaluate, optimize, and modify its existing treatment systems, it is also requiring permittees to determine how each of their WWTPs will comply with a 3 mg/l TIN discharge limit as part of the required "Nutrient Reduction Evaluation" required under Condition S4.E.3. Through this requirement, Ecology is signaling that it intends to impose a 3 mg/L TIN discharge limit in the future, or perhaps an even more stringent limit, once it determines what constitutes all known and reasonable methods of treatment technology ("AKART") for domestic wastewater treatment plants that discharge nutrients to the Salish Sea, and once it determines what numeric

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water quality-based effluent limits are necessary for the County's four WWTPs to meet applicable dissolved oxygen water quality standards.

18. To meet TIN discharge limits as low as 3 mg/L at the County's four WWTPs, the County will have to employ tertiary treatment processes. For that to happen, the County will have to build new WWTPs because its existing plants were not built to remove TIN and cannot be retrofitted to accommodate tertiary treatment.

19. This means that if the PSNGP is not stayed, the County will be forced to take all the measures described in ¶¶ 6-16 herein and spend tens of millions of ratepayer dollars in the process, only to have that significant expenditure wasted when the County is forced to build new WWTPs that employ aggressive tertiary treatment methods.

20. In addition to the above, the County runs the risk of having to face an Ecology enforcement action or citizen suit filed under section 505 of the Clean Water Act ("CWA") and potential liability as a result of internally inconsistent provisions under Condition S3 of the PSNGP that render the County susceptible to being charged with discharging amounts of TIN that violate the CWA. On the one hand, Condition S3.A prohibits permittees from violating water quality standards ("WQS"), including the dissolved oxygen ("DO") standard at issue in this Appeal. On the other hand, Condition S3.B presumes that the very discharges that Ecology has authorized elsewhere in the PSNGP comply with the DO WQS. The inconsistencies between these two provisions put the County's four WWTPs at risk of immediate legal jeopardy.

21. More specifically, the Permit presumes that permittees are in compliance with the Permit and with applicable WQS so long as the permittee strictly complies with the Permit. The PSNGP establishes "TIN action levels" (Condition S3.B) for each dominant WWTP discharger that Ecology claims were established at current discharge levels. As described above, the PSNGP requires the dominant dischargers to discharge at or below those TIN action levels. *See generally*, Conditions S3, S4, and if those action levels are exceeded, to take appropriate corrective action.

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22. Yet, at the same time, Ecology decided to issue the PSNGP and to make it immediately applicable to the County's four WWTPs, because Ecology has concluded that the current TIN discharges from the 58 covered WWTPs are causing or contributing to potential violations of the DO WQS. *See* Fact Sheet at 32-33 (explaining that modeling demonstrates that TIN collectively discharged from domestic wastewater treatment plants contributes to low dissolved oxygen concentrations in Puget Sound that do not meet water quality criteria). In other words, Ecology has concluded that "all wastewater discharges to the greater Puget Sound area containing nitrogen cumulatively contribute to existing DO impairments meeting the threshold for reasonable potential under 40 C.F.R. 122.44(d)(1)(iii)" Fact Sheet at 32.

23. In short, under Condition S3, Ecology has both authorized and prohibited the same discharge, rendering the County, and for that matter, all dischargers covered under the Permit, susceptible to potential liability for discharging nitrogen in amounts that the County has concluded violate the DO WQS.

24. Although the County firmly disagrees with and has appealed Ecology's conclusion that each of its four Plants are currently causing or contributing to a violation of the DO WQS (*see* Notice of Appeal at section I), Ecology's foundational premise for issuing the PSNGP and the inconsistent provisions of Condition S3 expose the County to the *immediate* prospect of potential liability under the Permit. Not only do Ecology's "reasonable potential" findings conflict with Condition S3.B and raise concerns that the Permit does not ensure compliance with WQS, they also expose the County to potential citizen suits under the CWA, 33 U.S.C. § 1365. This includes potential penalties up to $56,460 per day for allegedly discharging nutrients in a manner that violates WQS, even if the County strictly complies with the optimization planning requirements and its assigned action levels.

25. For all these reasons, together with those explained more fully in the County's stay motion, the County is being irreparably harmed by having to immediately comply with the

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PSNGP. The Board should stay the Permit's effect while it considers—and until it resolves—the County's Appeal.

I declare under penalty of perjury that the foregoing is true and correct.

12/27/2021

Executed on December __, 2021 in Seattle, Washington

DocuSigned by:

1BD15B1B73AE4A0...

Christie True
Director, King County Dept. of Natural Resources

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CERTIFICATE OF SERVICE

I, Lynn A. Stevens, certify and declare:

I am over the age of 18 years, make this Declaration based upon personal knowledge, and am competent to testify regarding the facts contained herein.

On December 28, 2021, I served true and correct copies of the document to which this certificate is attached on the following persons in the manner listed below:

The Department of Ecology
Appeals Coordinator
300 Desmond Drive SE
Lacey, WA 98503
[ ] Via Facsimile
[■] Via U.S. Mail
[■] Via Legal Messenger
[ ] Via Federal Express

Bob Ferguson
Washington State Attorney General
Office of the Attorney General
Ecology Division
1125 Washington Street, SE
Olympia, WA 98501
[ ] Via Facsimile
[■] Via U.S. Mail
[■] Via Legal Messenger
[ ] Via Federal Express

The Pollution Control Hearings Board
1111 Israel Rd. SW, Ste 301
Tumwater, WA 98501
eluho@eluho.wa.gov
[ ] Via Facsimile
[■] Via U.S. Mail
[■] Via Email
[ ] Via Federal Express

I certify under penalty of perjury pursuant to the laws of the State of Washington that the foregoing is true and correct.

SIGNED on December 28, 2021 at Seattle, Washington.

Lynn A. Stevens

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POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON

KING COUNTY, Appellant, v. WASHINGTON STATE DEPARTMENT OF ECOLOGY, Respondent.	Case No. 21-083 **KING COUNTY'S MOTION FOR STAY**

I. INTRODUCTION

King County ("County") moves the Pollution Control Hearings Board ("Board") for a stay of the effect of the Department of Ecology's ("Ecology") issuance of the Puget Sound Nutrient General Permit ("PSNGP" or "Permit") as it applies to the County. The Permit regulates the discharge of nutrients, including total inorganic nitrogen ("TIN"), from publicly owned domestic wastewater treatment plants ("WWTPs") to the Washington waters of the Salish Sea. Fact Sheet for the Puget Sound Nutrient General Permit ("Fact Sheet") at 2. The PSNGP requires the County, by March 1, 2022, to apply for coverage under the PSNGP for its four WWTPs that discharge to Puget Sound: the Brightwater, South, Vashon, and West Point WWTPs.

The Board should grant the stay because the County is likely to succeed on the merits of the appeal and because the PSNGP will cause the County irreparable harm if the stay is not granted. The County is likely to succeed on the merits for the reasons set forth in the County's

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Notice of Appeal. These reasons include but are not limited to the PSNGP's inconsistency with the federal Clean Water Act ("CWA"), 33 U.S.C. §§ 1251-1387, and state law by requiring the County to apply for and obtain coverage under the PSNGP when the County's WWTP discharges are already authorized and regulated under individual National Pollutant Discharge Elimination System ("NPDES") permits; by simultaneously regulating these discharges under both the PSNGP and the WWTPs' individual permits; and by effectively modifying the County's four individual NPDES permits without complying with permit modification procedures and requirements.

In addition, the County is likely to succeed on the merits of its challenge to PSNGP Condition S3, which is arbitrary, internally inconsistent, and contrary to the CWA. PSNGP Condition S3.A prohibits permittees from causing or contributing to violations of water quality standards, and Ecology has concluded that the current nutrient discharges from all 58 WWTPs that are subject to the PSNGP are contributing to violations of the water quality standards for dissolved oxygen in Puget Sound. Fact Sheet at 32-33. Condition S3.B, however, authorizes permittees to continue discharging at their current levels as long as they comply with the other provisions of the PSNGP. Obviously, the permittees' current nutrient discharges cannot be both compliant and non-compliant with the PSNGP at the same time. Moreover, there is no legal basis for this internally inconsistent provision because it is neither an effluent limit nor any other NPDES permit condition authorized by the CWA or state law. The only effect of Condition S3 is to immediately subject the County and other PSNGP permittees to potential liability, including CWA penalties as high as $56,460 per day per violation. *See* 33 U.S.C. § 1319(d); 40 C.F.R. § 19.4.

The County will also suffer irreparable harm if the Board does not stay the PSNGP. The PSNGP requires the County to immediately devote thousands of hours of employee time, vast amounts of County resources, and tens of millions of ratepayers' dollars to immediately begin complying with the PSNGP's treatment system "optimization" and other requirements.

Compliance with these requirements will also cause the County to forgo or delay upgrades to existing WWTPs that are needed to maintain system reliability, prevent wastewater from bypassing treatment systems, and improve treatment performance. In addition, the treatment system optimization measures required by the PSNGP are likely to cause the County to violate the conditions of its WWTPs' individual NPDES permit conditions.

Furthermore, the requirements of the PSNGP are likely to be for naught. PSNGP Condition S4.E requires all WWTPs designated as "dominant," including three of the four County WWTPs, to prepare an evaluation report to demonstrate how the County will achieve a seasonal TIN effluent limit of 3 milligrams per liter ("mg/L"), based on Ecology's belief that dischargers subject to the PSNGP will ultimately need to meet that or an even more stringent TIN effluent limit. To achieve a limit that low, the County will be required to employ tertiary treatment, which none of its existing WWTPs can be retrofitted to employ. This means that the County would have to build new WWTPs, thereby wasting the tens of millions of dollars that the PSNGP will require it to invest in "optimizing" its current WWTPs.

This Motion is supported by the accompanying Declaration of Christie True, King County's Director of Natural Resources. A copy of the PSNGP and its accompanying Fact Sheet were filed in support of the County's Notice of Appeal, which has been filed contemporaneously with this Motion.

II. FACTS

A. The PSNGP

Ecology issued the PSNGP on December 1, 2021. The Permit becomes effective on January 1, 2022, and expires on December 31, 2026. The Permit, which is a general NPDES permit issued pursuant to the CWA and RCW 90.48, applies to discharges of nutrients from the 58 WWTPs identified in the Permit that discharge directly to the Washington waters of the Salish Sea, including Puget Sound. *See* PSNGP Cover Page, Condition S1.A.

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The Permit *requires* the County to apply for coverage under the Permit by March 1, 2022, for each of its four WWTPs that discharge to Puget Sound. Condition S2.A. But each of these WWTPs is already fully authorized to discharge treated wastewater to Puget Sound, including the nutrients contained in the wastewater, by individual NPDES permits issued by Ecology. Specifically, the County's Brightwater WWTP is authorized to discharge "treated domestic wastewater to Puget Sound" by individual NPDES permit number WA0032247 (attached as Ex. A), its South WWTP is authorized to discharge "treated municipal wastewater to the Puget Sound" by individual NPDES permit number WA0029581 (attached as Ex. B), its West Point WWTP is authorized to discharge "treated municipal wastewater" to Puget Sound by individual NPDES permit number WA0029181 (attached as Ex. C), and its Vashon WWTP is authorized to discharge "treated domestic wastewater to the Puget Sound" by individual NPDES permit number WA022527 (attached as Ex. D).[1]

Because the County cannot "opt out" of coverage under the PSNGP, discharges from each of the four County WWTPs will be simultaneously regulated by both the PSNGP and the WWTP's individual NPDES permit.

B. PSNGP Requirements

The PSNGP requires the County to immediately begin complying with a number of onerous requirements, including but not limited to the following: Conditions S7 and S9 require additional sampling, monitoring, and reporting requirements for each of the County's WWTPs, including monitoring for TIN. Conditions S4.C and S6.B require developing and implementing for each of the WWTPs a Nitrogen Optimization Plan to maximize nitrogen removal. Condition S4.B establishes annual TIN discharge "action levels" for the three County WWTPs

[1] The individual NPDES permit for the Brightwater WWTP expires on February 28, 2023. The individual NPDES permits for the South WWTP and West Point WWTP expired on July 31, 2020, and January 31, 2020, respectively, but they remain in effect pending Ecology's final action on the County's timely and pending permit renewal applications. *See* WAC 173-220-180(5). The individual NPDES permit for the Vashon WWTP expires on February 28, 2022, but will remain in effect thereafter until Ecology takes final action on the County's timely and pending permit renewal application. *See id.*

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designated by the PSNGP as "dominant" TIN dischargers, which Ecology asserts are based on their current TIN discharge levels. Condition S4.D requires the County to take various corrective actions if these action levels are not met. Condition S4.E requires a Nutrient Reduction Evaluation for the County's three dominant WWTPs to identify treatment technologies that provide "all known, available, and reasonable methods of prevention, control, and treatment" ("AKART") for nitrogen on an annual basis and to achieve a TIN discharge concentration of 3 mg/L on a seasonal (April through October) basis. Condition S6.C requires an AKART analysis for nitrogen removal for the County's Vashon WWTP. In addition, Condition S3.A prohibits causing or contributing to a violation of surface water quality standards.

C. Effects on the County

As detailed in the accompanying Declaration of Christie True, the PSNGP imposes immediate and substantial obligations on the County. Satisfying these obligations will require a significant amount of staff and outside consultant time and effort and will cost the County *tens of millions of dollars in the next two years*, in addition to continuing to comply with all the requirements of its WWTPs' individual NPDES permits, which will remain fully in effect. True Decl. ¶ 6.

Compliance with the PSNGP's enhanced monitoring and reporting requirements will immediately require the County to hire two new staffers and incur other costs of about $350,000 annually. True Decl. ¶ 7.

Compliance with the PSNGP's Nitrogen Optimization Plan requirements will require the County to immediately begin developing, preparing, and implementing the plans for each of its WWTPs. PSNGP Condition S4.C.1.c requires the County to identify and select viable optimization strategies for each of its three "dominant" WWTPs by July 1, 2022, and Condition S6.B.1.b requires the County to identify the optimization strategy selected for its Vashon WWTP by December 31, 2022. True Decl. ¶ 8. The County estimates that developing and implementing

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these plans will result in labor and outside consulting costs totaling $2.4 million for the first two years. *See* True Decl. ¶ 9. In addition, the County will have increased operating and maintenance costs associated with optimization, which are estimated to be $950,000 annually, and it estimates that the capital cost to implement the selected optimization strategies (*e.g.,* installing new equipment) to be $5 million a year per plant. *Id.*

The immediate implementation of the PSNGP optimization requirement will adversely affect the ability of the County to complete other major capital project upgrades currently scheduled. True Decl. ¶ 10. This will have a cascading negative effect across the County's capital program, including the reassignment of project managers, engineers, operations staff, and construction managers, which will delay ongoing capital projects that are needed to increase system reliability, maintain system capacity, reduce overflows, and maintain compliance with the County's individual NPDES permits. *Id.* This increases the risk of equipment failures and may result in an increase in plant bypasses, secondary treatment bypasses, increased risks to worker safety, and, ultimately, harm to the environment. *Id.* Furthermore, the immediate implementation of nitrogen optimization strategies at each WWTP has the potential to cause other changes in the quality of the wastewater discharged from the WWTPs, and violations of the discharge limits in the WWTPs individual NPDES permits. True Decl. ¶ 11.

These efforts and expenses are ultimately also likely to be for naught. PSNGP Condition S4.E requires the County to determine how each of the three dominant WWTPs will achieve a seasonal TIN discharge concentration of 3 mg/l because Ecology expects that future iterations of the PSNGP will include equally or even more stringent TIN discharge limits. True Decl. ¶ 17. Achieving TIN discharge limits as low as 3 mg/L will require tertiary treatment processes. True Decl. ¶ 18. For that to happen, the County will have to build new WWTPs because its existing plants were not built to remove TIN and cannot be retrofitted to accommodate tertiary treatment. *Id.* This means that if the PSNGP is not stayed, the County will be forced to take all the measures described above, and spend tens of millions of ratepayers'

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dollars in the process, only to have that significant expenditure wasted when the County is forced to build new WWTPs that employ aggressive tertiary treatment methods. True Decl. ¶ 19.

III. ARGUMENT

A. Standard for Stay

Pursuant to WAC 371-08-415, the Board may stay the effect of the PSNGP. The County makes a *prima facie* case for a stay if it "demonstrates *either* a likelihood of success on the merits of the appeal *or* irreparable harm." WAC 371-08-415(4) (emphasis added). Upon such a demonstration, the Board must grant the stay unless Ecology demonstrates either (i) "[a] substantial probability of success on the merits" or (ii) a "[l]ikelihood of success and an overriding public interest which justifies denial of the stay." WAC 371-08-415(4)(a)-(b). Likelihood of success on the merits "does not require the moving party to demonstrate that it will conclusively win on the merits, but only that there are questions 'so serious … as to make them fair ground for litigation and thus for more deliberative investigation.'" *Airport Communities Coal. v. Ecology*, PCHB No. 01-160 (Order Granting Motion to Stay Effectiveness of Section 401 Certification) (Dec. 17, 2001) (ellipsis in original; citation omitted). "The evaluation of the likely outcome on the merits is based on a sliding scale that balances the comparative injuries that the parties and non-parties may suffer if a stay is granted or denied." *Id.* The moving party's showing of likelihood of success on the merits need not be as strong where the non-moving party would suffer little or no harm. *Id.* The Board, after granting or denying a stay request, shall "expedite the hearing and decision on the merits," unless otherwise stipulated by the parties. WAC 371-08-415(5).

B. The County Has a Likelihood of Success on the Merits

The Board reviews the terms of an NPDES permit to determine if it is "invalid in any respect," and whether it is consistent with applicable legal requirements. WAC 371-08-540(2); *Puget Soundkeeper All. v. Ecology*, PCHB No. 15-050 (Order Granting Respondents' Motion for Summary Judgment, Jan. 6, 2016).

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As described in detail below, the PSNGP is invalid in multiple respects and is not consistent with either state or federal regulations. Accordingly, the County is likely to succeed on the merits, and the PSNGP must be stayed.

1. *Federal and State NPDES Permit Regulations Prohibit Ecology from Requiring Coverage Under a General NPDES Permit*

Each of the County's four WWTPs have coverage under individual NPDES permits. Exhibit A-D. Yet, PSNGP Condition S2 *requires* the County to apply for and obtain coverage under the PSNGP for each of its four WWTPs. For the 58 WWTPs listed in the PSNGP, including the County's four WWTPs, coverage under the PSNGP is *mandatory*. This *mandatory* general permit coverage is contrary to both the federal regulations implementing the CWA and Ecology's own regulations.

The federal regulations explicitly prohibit Ecology from developing general permits that cover the same discharges that are authorized by individual permits. 40 C.F.R. § 122.28(a)(1) ("The general permit shall be written to cover one or more categories or subcategories of discharges … *except those covered by individual permits*…." (emphasis added)). If Ecology assigns general NPDES permit coverage to a discharger that does not have permit coverage, the discharger must be allowed to request an individual permit. *See id.* § 122.28(b)(2)(vi). And even a discharger that has obtained coverage under a general permit may request to be excluded from coverage under the general permit by applying for and obtaining an individual NPDES permit. *Id.* § 122.28(b)(3)(iii) ("Any owner or operator authorized by a general permit may request to be excluded from the coverage of the general permit by applying for an individual permit."); *id.* § 122.28(b)(3)(iv).

The federal regulations are permissive in that they allow, but do not require, a discharger covered by an individual permit to apply for coverage under a general permit. *Id.* § 122.28(b)(3)(v) ("A source excluded from a general permit solely because it already has an individual permit *may* request that the individual permit be revoked, and that it be covered by the

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general permit." (emphasis added)). But the regulations do not allow Ecology to mandate coverage under a general permit. Instead, as the U.S. Environmental Protection Agency ("EPA") explained in the final rule promulgating the general permit regulations, "individual permittees can request to be covered by [a] general permit, and vice versa." Final Rule, National Pollutant Discharge Elimination System; Revision of Regulations, 44 Fed. Reg. 32,854, 32,874 (June 7, 1979).

Ecology's own regulations allow dischargers to choose to be regulated under a general permit. WAC 173-226-200(1) ("[A]ll dischargers *who desire to be covered* under the general permit shall notify the department of that fact…." (emphasis added)). Where a discharger has chosen to be covered under a general permit, the regulations specifically allow that discharger to subsequently "request to be excluded from coverage under the general permit by applying for and being issued an individual permit." WAC 173-226-080(3). If the discharger requests to be excluded from the general permit, "[t]he director *shall* either issue an individual permit or deny the request with a statement explaining the reason for denial." *Id.* (emphasis added); *see also* WAC 173-226-240(4) (same). "When an individual permit is issued to a discharger otherwise subject to a general permit, the applicability of the general permit to that permittee is automatically terminated on the effective date of the individual permit." WAC 173-226-080(4).

In direct contravention of the regulations, which allow dischargers discretion whether to apply for coverage under a general permit or apply for individual permit coverage, and which expressly prohibit requiring coverage under a general permit for a discharger already covered by an individual permit, the PSNGP *mandates* that the 58 listed WWTPs apply for and obtain coverage under the PSNGP for the same discharges that are already covered by their individual NPDES permits. Condition S2.A; Fact Sheet at 13 (listing "[d]ischargers that must apply for coverage under this … general permit"). Each of the four County WWTPs has an individual NPDES permit that authorizes discharges of treated wastewater subject to the conditions of those permits, including discharges of the nutrients that would be authorized by the PSNGP. Because

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the PSNGP violates these regulations, it is invalid insofar as it requires the listed facilities, including the County's four WWTPs, to apply for and obtain coverage under it.

2. *Federal and State NPDES Permit Regulations Prohibit Ecology from Regulating the Same Discharge Under Both a General and an Individual NPDES Permit*

The PSNGP is similarly unlawful because the nutrient discharges that it would authorize and regulate would simultaneously be authorized and regulated by the 58 facilities' individual NPDES permits, including those for the four County WWTPs. Ecology's Fact Sheet explains that

> Ecology currently issues individual NPDES permits to municipal wastewater treatment plants. The PSNGP addresses the discharge of nutrient pollution from POTWs that hold an existing, individual NPDES permit.

Fact Sheet at 2. The individual NPDES permits for the County's four WWTPs comprehensively regulate the discharge of effluent from the County's WWTPs by setting effluent limitations along with requirements related to monitoring, recordkeeping, reporting, design, operations, and maintenance, among others. The PSNGP imposes additional monitoring, recordkeeping, and reporting requirements on the County while purporting to authorize discharges of nutrients—something that is *already authorized* by the individual permit for each of the County's WWTPs. Yet, the PSNGP does not fully authorize discharges from the County's WWTPs; it only purports to authorize nutrient discharges, so the County cannot terminate the individual NPDES permits upon obtaining coverage under the PSNGP, as required by the regulations. Instead, the County must maintain its individual NPDES permits even after obtaining coverage under the PSNGP. This mandatory dual permit coverage is contrary to both EPA's and Ecology's regulations.

Both EPA and Ecology's regulations prescribe a binary system where discharges are covered either by an individual permit or by a general permit. WAC 173-226-020 ("No pollutants shall be discharged to waters of the state from any point source, except as authorized by an individual permit … *or* as authorized through coverage under a general permit…."

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(emphasis added)). The federal regulations explicitly prohibit writing a general permit for dischargers covered by an individual permit. 40 C.F.R. § 122.28(a)(1) ("The general permit shall be written to cover one or more categories of discharges … except those covered by individual permits….").

The regulations provide that "[w]hen an individual NPDES permit is issued to an owner or operator otherwise subject to a general NPDES permit, the applicability of the general permit to the individual NPDES permittee *is automatically terminated* on the effective date of the individual permit." 40 C.F.R. § 122.28(b)(3)(iv) (emphasis added); *see also* WAC 173-226-080(4) (same), -200(7) (same). The federal regulations further specify that "[a] source excluded from a general permit solely because it already has an individual permit may request that the individual permit be revoked, and that it be covered by the general permit." 40 C.F.R. § 122.28(b)(3)(v). These regulations specifically prevent a discharger from obtaining coverage under both a general and individual permit for the same discharge at the same time. Instead, the regulation requires that coverage under a general permit automatically terminates when a general permit is issued. Likewise, general permit coverage may only be obtained when an individual permit is fully revoked.

Ecology's own regulations recognize this distinction by defining "General Permit" as "a permit that covers multiple dischargers of a point source category within a designated geographical area, *in lieu of individual permits being issued to each discharger*." WAC 173-226-030(13) (emphasis added). Yet, the PSNGP is not in lieu of individual permits, but is in addition to individual permits contrary to both EPA's and Ecology's regulations.

Because discharges from the four County WWTPs that are required to obtain coverage under the PSNGP are already fully authorized by their individual NPDES permits, Ecology cannot require coverage for and regulate the same discharges under the PSNGP. The PSNGP is therefore unlawful and invalid as it applies to the County's WWTPs and all other WWTPs whose discharges are fully authorized by individual NPDES permits.

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3. *The PSNGP Impermissibly Modifies the County's Individual NPDES Permits*

The individual NPDES permits for the four County WWTPs that are subject to the PSNGP authorize discharges to Puget Sound of treated wastewater, which includes nutrients, subject only to the conditions of those permits. The PSNGP imposes substantial additional requirements on these authorized discharges. This impermissibly modifies the requirements of the individual permits without adhering to the NPDES permit modification procedures mandated by the applicable federal and state NPDES permitting regulations.

As the Board explained in *Citizens Against SeaTac Expansion v. Ecology*, "an entity that already has an effective permit does not need to apply for an NPDES permit" when the entity, Ecology, or an interested person seeks a modification of the permit. PCHB No. 01-090 (Order Denying Stay, Aug. 29, 2001) (internal quotation marks omitted) (citing 40 C.F.R. § 122.21(a)(1)). Rather, if an entity, Ecology, or an interested person wishes to modify an existing permit, they must comply with 40 C.F.R. § 124.5, applicable to modification, revocation, reissuance, and termination of an existing NPDES permit. *Citizens Against SeaTac Expansion v. Ecology*, PCHB No. 01-090 (Order Granting Summary Judgment, Jan. 4, 2002). Permits may only be modified for the reasons specified in 40 C.F.R. § 122.62, unless they are minor modifications. *Id.*

The PSNGP purports to authorize permittees who obtain coverage under the PSNGP to "discharge nutrients." But the County's WWTPs are already fully authorized to discharge wastewater, which necessarily contains nutrients, as the PSNGP recognizes. *See* Fact Sheet at 12. Functionally, the PSNGP does not authorize the discharge of anything. The only legal effect of the PSNGP is to modify the effluent limits, monitoring requirements, reporting requirements, and other conditions of the individual NPDES permits that the County already holds.

Individual permits can only be modified for one of the 18 enumerated causes specified in 40 C.F.R. § 122.62. *Puget Soundkeeper All. v. Ecology*, PCHB No. 15-050 (Order Granting Respondents' Motion for Summary Judgment, Jan. 6, 2016); *see also* WAC 173-220-

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150(1)(d), -190(1). Ecology has not identified any of the causes listed in 40 C.F.R. § 122.62 as a facility-specific reason for modifying the individual NPDES permits for the County's four WWTPs. Moreover, the individual NPDES permits for two of the WWTPs, South and West Point, have expired and therefore cannot be modified, only renewed. *See* 40 C.F.R. § 122.46(b); 49 Fed. Reg. 37,998, 38,045 (Sept. 26, 1984) ("Permits which have 'expired' cannot be modified. While expired permits may be continued in effect beyond the permit terms [pending final action on a permit renewal application], ... these permits may only be changed by reissuance.").

Even if Ecology had cause to modify the individual NPDES permits and the ability to do so, the regulations required Ecology to prepare draft permits addressing the individual permit modifications and to provide public notice and an opportunity for comment on each of the individual proposed permit modifications for the County's four WWTPs. *See* 40 C.F.R. §§ 124.5(c)(1), 124.6(d), 124.10(a)(1)(ii), (b)(1), (d)(1); WAC 173-220-190(3). Ecology did not do so.

The PSNGP modifies the requirements of the individual NPDES permits for the 58 facilities subject to the PSNGP, including the County's four WWTPs, by imposing additional NPDES permit requirements on the discharges from those facilities. Ecology has not identified a facility-specific cause for modifying the individual permits, and does not have the legal authority to modify the permits for two of the County's WWTPs. Even if Ecology did have cause and authority to modify the individual NPDES permits, it failed to comply with the permit modification procedures established by EPA's and Ecology's NPDES permit regulations. Therefore, the PSNGP is invalid as to the County's WWTPs and the other WWTPs subject to the Permit. Ecology cannot evade permit modification requirements and procedures by imposing a general permit on individually authorized discharges.

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4. *PSNGP Condition S3 Is Unreasonable and Unlawful Because It Has No Legal Basis and Is Inconsistent with Other PSNGP Provisions*

Condition S3.A prohibits discharges that cause or contribute to violations of water quality standards. The animating factor that led Ecology to issue the PSNGP and require the 58 dischargers subject to the Permit to obtain coverage under it is Ecology's determination that each of those individual WWTPs is causing or contributing to violations of the dissolved oxygen water quality standards by discharging TIN *at its current levels*. More specifically, the Fact Sheet states that

> nutrients, particularly inorganic nitrogen, discharged from domestic wastewater treatment plants contribute to low dissolved oxygen concentrations in Puget Sound that do not meet state water quality criteria.... The [modeled] circulation patterns showed how discharges in one basin can affect the water quality in other basins. Thus, all wastewater discharges to the greater Puget Sound area containing nitrogen currently contribute to existing DO [dissolved oxygen] impairments meeting the threshold for reasonable potential under 40 C.F.R. 122.44(d)(1)(iii).

Fact Sheet at 32-33.

Notwithstanding this assertion, the PSNGP authorizes each discharger subject to the PSNGP to continue discharging at what the PSNGP purports to be its current levels of TIN, subject to future evaluations that may result in unspecified reductions in TIN discharges. For example, Condition S4.B sets forth TIN action levels for each of the WWTPs classified by Ecology as "dominant dischargers" based on Ecology's calculation of the WWTP's *current* TIN discharges.[2] Similarly, although small WWTPs are not subject to action levels, Condition S6 allows them to continue discharging at their current TIN levels.

Furthermore, Condition S3.B includes a presumption that compliance with the monitoring, evaluation, optimization, corrective action, and other PSNGP requirements will result in compliance with water quality standards:

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[2] Ecology has concluded that a facility subject to these action levels has a one percent chance of exceeding the action level, based on its current operations, in any given year.

> Ecology presumes that a Permittee complies with water quality standards unless discharge monitoring data or other site-specific information demonstrates that a discharge causes or contributes to a violation of water quality standards, when the Permittee complies with the following conditions. The Permittee must fully comply with all permit conditions, including planning, optimization, corrective actions (as necessary), sampling, monitoring, reporting, waste management, and recordkeeping conditions.

Id. This means that, so long as an individual WWTP does not exceed its TIN action level (or if it does exceed that level, it undertakes the measures required in Condition S4.D), that individual WWTP is presumed by Ecology to be in compliance with the PSNGP. This is so even though Ecology has determined that each WWTP's current discharge is causing or contributing to a water quality standards violation, and even though Condition S3.A explicitly prohibits discharges that cause water quality standards violations.

Thus, the PSNGP is unreasonable and internally inconsistent. It purports to allow discharges in Conditions S4.B, S5.B, and S6 that Ecology believes contribute to water quality standard violations and that are expressly disallowed in Condition S3.A. In other words, the PSNGP presumes compliance with water quality standards only if the permittee complies with water quality standards.

In addition to being unreasonable and internally inconsistent, Condition S3 is unlawful because it has no legal basis. Having determined that discharges of nutrients from the WWTPs have a reasonable potential to cause or contribute to a water quality standards violation, Ecology is required to establish permit effluent limits for nutrients. *See* 40 C.F.R. § 122.44(d)(1)(i); *Nat. Res. Def. Council v. U.S. Env't Prot. Agency* ("*NRDC*"), 808 F.3d 556, 577 (2d Cir. 2015). If numeric effluent limits for nutrients are "infeasible," "[b]est management practices" may be used instead. 40 C.F.R. § 122.44(k)(3); *see NRDC*, 808 F.3d at 577. But Condition S3.A is neither a numeric effluent limit nor a best management practice.

The condition is not a numeric effluent limit because it does not tell the permittee, Ecology, or the public what discharge quality the WWTP must achieve. The court in *NRDC*

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rejected a general NPDES permit condition nearly identical to Condition S3.A for precisely that reason.

> This narrative standard is insufficient to give ... [the permittee] guidance as to what is expected or to allow any permitting authority to determine whether ... [the permittee] is violating water quality standards. By requiring ... [permittees] to control discharges "as necessary to meet applicable water quality standards" without giving specific guidance on the discharge limits, EPA fails to fulfill its duty to "regulat[e] in fact, not only in principle." ... [This condition], although found by EPA to be required ... in fact add[s] nothing.

808 F.3d at 578 (fourth brackets in original; citation omitted).

Condition S3.A is also not a "best management practice" that may be used in lieu of a numeric effluent limit. "Best management practices" are "schedules of *activities*, prohibitions of *practices*, maintenance *procedures*, and other *management practices* to prevent or reduce the pollution of 'waters of the United States.'" 40 C.F.R. § 122.2 (emphasis added). Condition S3.A, however, does not require or prohibit any activities, practices, or procedures. Therefore, it cannot serve as a narrative substitute for numeric effluent limits, even if numeric limits are "infeasible." *See NRDC*, 808 F.3d at 579 (holding that a general NPDES permit nearly identical to Condition S3 did not qualify as a best management practice); *see also Wash. State Dairy Fed'n v. State*, 18 Wn. App. 2d 259, 297, 490 P.3d 290 (2021) (holding that a general permit prohibition on violating water quality standards is "not an adequate effluent limitation").

Condition S3.A cannot be justified as a numeric or narrative effluent limit, nor does it have any other legal basis. Rather, the condition simply exposes each of the permittees to liability, including penalties of up to $56,460 per day per violation, *see* 33 U.S.C. § 1319(d); 40 C.F.R. § 19.4, if an after-the-fact determination is made that the permittee's discharges caused or contributed to a violation of water quality standards. Determinations of the discharge levels needed to meet water quality standards, however, must be made before the permit is issued and used to establish effluent limits so that the permittee can take the steps needed to comply with standards. *See NRDC*, 808 F.3d at 579-80 (rejecting argument that a permit condition requiring

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compliance with water quality standards is a sufficient water quality-based effluent limit because it allows standards to be met through enforcement or other corrective actions).

Because Condition S3 is unreasonable, inconsistent with other PSNGP conditions, and without any legal basis, it is unlawful and invalid.

C. The County Will Be Irreparably Harmed in the Absence of a Stay

In addition to the County's likelihood of success on the merits, a stay is warranted because the County and its ratepayers will be irreparably harmed by the PSNGP. Compliance with the PSNGP will require the County to immediately begin spending millions of dollars on monitoring, evaluation, and treatment system optimization. These efforts will divert funds and personnel from ongoing capital projects and other measures to ensure compliance with existing NPDES permits, improve reliability, and increase system capacity. In addition, the treatment system optimization measures required by the PSNGP could result in violations of the County's individual NPDES permit, and those potential violations and PSNGP Condition S3.A's immediate prohibition on contributing to violations of water quality standards could expose the County to substantial liability from an agency enforcement action or CWA citizen suit. And, ultimately, the measures required by the PSNGP may be for naught because they will not enable the County to achieve the 3 mg/L or less TIN discharge limit that Ecology expects to impose in future iterations of the PSNGP.[3]

The County must immediately begin to implement Condition S4.C.3, which requires the County to investigate ways to reduce TIN loads in its influent. The County has limited control

---

[3] As detailed in the True Declaration, the County will be required to spend at least $350,000 annually to comply with the enhanced influent and effluent monitoring requirements, $700,000 in the first two years to develop a Nitrogen Optimization Plan and Report for each of its WWTPs and $1.2 million to begin optimization implementation, $500,000 for outside consultants to assist with the optimization planning efforts in the first two years, and $950,000 annually in increased operation and maintenance costs. True Decl. ¶ 7. The County will have to divert at least seven staff members, and then eventually backfill their positions. *Id.* The County is also required to *immediately* implement the selected optimization strategy identified under Condition S4.C.1 and then document the implementation of the selected optimization strategy for each plant by March 2023, which will cost $5 million a year per plant. *Id.* ¶ 10.

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over the TIN load in its influent stream and will need to conduct extensive stakeholder engagement to even determine what options are feasible. True Decl. ¶ 16. The County estimates this will cost a minimum of $600,000 annually, simply to satisfy the staffing required for this effort. *Id.*

The County recognizes that expenditure of funds alone does not constitute irreparable harm under the stay regulations. *Martig Eng'g & Seashore Villa Mobile Home Park v. Ecology*, PCHB No. 03-013 (Order Denying Stay, Mar. 28, 2003). While these are significant costs that will directly impact King County ratepayers and citizens, the irreparable harm also arises from the enormous diversion of resources that will be required to immediately begin complying with the PSNGP. The immediate optimization requirements imposed by the PSNGP will have a cascading negative effect across the County's capital program, resulting in the reassignment of project managers, engineers, operations staff, and construction managers. True Decl. ¶ 10. It will result in the delay of capital projects that are needed to increase system reliability, maintain system capacity, reduce overflows, and maintain permit compliance. *Id.* As an example of a critically impacted program, the County's West Point Capital Improvement Program ("Program") has over $600 million of active and planned projects to improve the reliability of the West Point Treatment Plant. Staff currently assigned to the Program will now need to be reassigned to comply with the PSNGP. *Id.* This will result in the deferral of projects that are badly needed at West Point to improve reliability. *Id.* This increases the risk of equipment failures and may result in an increase in plant bypasses, secondary treatment bypasses, increased risks to worker safety, and, ultimately, harm to the environment.

Additionally, immediate implementation of nitrogen optimization strategies at each WWTP has the real potential to cause violations of individual NPDES permits. True Decl. ¶ 11. For example, the South Plant operates under NPDES Waste Discharge Permit No. WA0029581, which includes a pH limit and a prohibition on the bypass of sewage around the secondary treatment process. *Id.* Operating South Plant to biologically remove nitrogen will likely result in

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a violation of both these requirements due to reduced flow capacity and the existing configuration of the treatment plant. Condition S1.A of the NPDES Waste Discharge Permit No. WA0029581.

Further, if the County determines that a plant's annual TIN load exceeds its assigned action load (or, if applicable, the County's cumulative or "bubbled" load for all three dominant discharging plants), then the County must proceed to take the corrective actions identified in Condition S4.D. Based on the County's data, the current discharge of TIN in effluent from any of the three dominant County dischargers demonstrates that the action levels, or bubbled action level, are expected to be exceeded within the first permit cycle. True Decl. ¶ 12. When the County exceeds the action level, Condition S4.D requires the County to prepare a strategy, in the form of an engineering report, that identifies treatment options and design alternatives to reduce the annual effluent load by at least 10% below the action level. An engineering report sufficient to comply with the permit is estimated to cost $5 million for each plant. True Decl. ¶ 13. This will add to the cascading effect, further delaying critical capital improvements already in the planning phase.

Yet this enormous outlay of resources will likely be for naught. Although Ecology is requiring the County to spend tens of millions of dollars to immediately evaluate, optimize, and modify its existing treatment systems, it is simultaneously requiring permittees to determine how each of their WWTPs will comply with a 3 mg/l TIN discharge limit as part of the required "Nutrient Reduction Evaluation" required under Condition S4.E.3. Accordingly, Ecology is signaling that compliance with a 3 mg/L, or stricter, limit is what the agency is going to require in the future once it actually establishes AKART for domestic WWTPs that discharge nutrients to the Salish Sea, and once it determines what numeric water quality-based effluent limits are necessary for the County's four WWTPs to meet applicable dissolved oxygen water quality standards.

To meet TIN discharge limits as low as 3 mg/L at the County's four WWTPs, the County will have to employ tertiary treatment processes. To achieve tertiary treatment, the County will have to build new WWTPs because its existing plants were not built to remove TIN and cannot be retrofitted to accommodate tertiary treatment. True Decl. ¶ 18.

This means that if the PSNGP is not stayed, the County will be forced to (1) immediately plan for and begin to optimize its four treatment plants; (ii) take the onerous corrective action dictated under the PSNGP (which may cause it to violate its individual permits); (iii) forgo or delay necessary improvements that it was otherwise planning at its four WWTPs; and (iv) spend tens of millions of ratepayer dollars in the process, only to have that expenditure wasted when the County is forced to employ tertiary treatment to meet aggressive treatment goals that will require the County to build new WWTPs altogether. True Decl. ¶ 19.

The Board has repeatedly held that, when an activity authorized or required under a permit is certain to have an irreparable impact, the appellant can demonstrate irreparable injury, even when the exact contours of the impact are not certain. *See Raymond A. Clough, Jr., v. Ecology*, PCHB No. 12-064 (Order Granting Partial Stay, Aug. 31, 2014) (finding irreparable harm to wetland from construction activities even though boundaries of wetland had not been delineated and actual harm was uncertain); *Carl & Dana Strode v. Ecology*, PCHB Nos. 11-085, 11-086, 11-089 (Order on Stay, Aug. 4, 2011) (finding irreparable harm from aquatic herbicide application even though exact location of herbicide application was not known).

Here, the County has demonstrated certain irreparable harm from the massive diversion of resources required to comply with the PSNGP when those compliance measures are likely to prove to have been wasted. This massive waste of resources will irreparably harm the County and its ratepayers.

The County will also be irreparably harmed because the internally inconsistent provisions of the PSNGP—on the one hand finding that the County's current TIN discharges are violating water quality standards, while on the other hand explicitly permitting the County to discharge

TIN at current levels—will place the County at an immediate risk of an Ecology enforcement action or citizen suit under section 505 of the CWA and liability for violating the Act.

More specifically, the Permit presumes that permittees are in compliance with applicable water quality standards so long as the permittee strictly complies with the Permit. The PSNGP establishes "TIN action levels" (Condition S4.B) for each dominant WWTP discharger that Ecology asserts were established at current discharge levels. The PSNGP requires the dominant dischargers to discharge at or below those TIN action levels, and, if those action levels are exceeded, to take appropriate corrective action. *See generally* Condition S4.

Yet, at the same time, Ecology decided to issue the PSNGP and to make it immediately applicable to the County's four WWTPs, because Ecology has concluded that the current TIN discharges from the 58 covered WWTPs are causing or contributing to violations of the DO water quality standards. *See* Fact Sheet at 32-33 (explaining that modeling demonstrates that TIN collectively discharged from domestic wastewater treatment plants contributes to low dissolved oxygen concentrations in Puget Sound that do not meet water quality criteria).

In short, under Condition S3, Ecology has both authorized and prohibited the same discharge, rendering the County, and for that matter all dischargers covered under the Permit, susceptible to liability for discharging nutrients in amounts that Ecology has concluded violate the DO water quality standards. The inconsistent provisions of the Permit irreparably harm the County by subjecting it to legal liability as soon as the PSNGP takes effect.

Accordingly, the Board must stay the permit to preserve the status quo and prevent the irreparable loss of rights and waste of resources that will occur if the PSNGP is allowed to take effect before the Board is able to determine if the PSNGP is valid. *Raymond A. Clough, Jr. v. Ecology*, PCHB No. 12-064 (Order Granting Partial Stay, Aug. 31, 2012).

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DATED: December 28, 2021

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Attorneys for Appellant
King County

CERTIFICATE OF SERVICE

I, Lynn A. Stevens, certify and declare:

I am over the age of 18 years, make this Declaration based upon personal knowledge, and am competent to testify regarding the facts contained herein.

On December 28, 2021, I served true and correct copies of the document to which this certificate is attached on the following persons in the manner listed below:

The Department of Ecology
Appeals Coordinator/Processing Desk
300 Desmond Drive SE
Lacey, WA 98503
[ ] Via Facsimile
[■] Via U.S. Mail
[■] Via Legal Messenger
[ ] Via Federal Express

Bob Ferguson
Washington State Attorney General
Office of the Attorney General
Ecology Division
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Olympia, WA 98501
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The Pollution Control Hearings Board
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[■] Via Email
[ ] Via Federal Express

I certify under penalty of perjury pursuant to the laws of the State of Washington that the foregoing is true and correct.

SIGNED on December 28, 2021, at Seattle, Washington.

Lynn A. Stevens

EXHIBIT A

Issuance Date:	February 26, 2018
Effective Date:	March 01, 2018
Expiration Date:	February 28, 2023

National Pollutant Discharge Elimination System
Waste Discharge Permit No. WA0032247

State of Washington
DEPARTMENT OF ECOLOGY
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1342 et seq.

King County Department of Natural Resources and Parks,
Wastewater Treatment Division
King Street Center, KSC-NR-700
201 South Jackson Street
Seattle, Washington 98104-3855

is authorized to discharge in accordance with the Special and General Conditions that follow.

Plant Name: Brightwater Wastewater Treatment Plant (WWTP)	Receiving Water: Puget Sound
Plant Location: 22505 SR 9 SE, Woodinville, WA 98072	Discharge Locations: Outfall 001 *Diffuser 1* Latitude: 47.777138360 Longitude: -122.416948716 *Diffuser 2* Latitude: 47.776987265 Longitude: -122.417957020
Plant Type: Activated Sludge with Hollow Fiber Membranes; Chemically Enhanced Primary Treatment for Peak Wet Weather Flows	

Rachel McCrea

Rachel McCrea
Water Quality Section Manager
Northwest Regional Office
Washington State Department of Ecology

Exhibit A

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Summary of Permit Report Submittals

This list is intended as a summary of submittal requirements in the permit and may not include all submittals required by the permit. The Permittee must refer to the Special and General Conditions of this permit for additional submittal requirements and submit reports according to their instructions.

Permit Section	Submittal	Frequency	First Submittal Date
S3.A	Discharge Monitoring Report (DMR)	Monthly	04/15/2018
S3.A	Discharge Monitoring Report (DMR)	Quarterly	07/15/2018
S3.A	Discharge Monitoring Report (DMR)	Semiannual	01/15/2019
S3.A	Discharge Monitoring Report (DMR)	Annual	03/15/2019
S4.E	Wasteload Assessment	1/permit cycle	12/31/2022
S5.G.a.1	Operations and Maintenance Manual	1/permit cycle	07/31/2018
S5.G.a.3	Operations and Maintenance Manual Updates	1/permit cycle	09/01/2022
S6.A.4	Pretreatment Report	1/year	04/30/2018
S9.B	Wet Weather Bypass Annual Report	1/year	07/01/2018
S9.C	Utility Analysis Report	1/permit cycle	09/01/2022
S9.E	MBR Pilot Testing Report	1/permit cycle	07/31/2018
S10	Outfall Evaluation	1/permit cycle	12/01/2021
S11.A	Acute Toxicity Effluent Test Results for Permit Renewal	2/permit cycle	See condition for specific due dates
S12.A	Chronic Toxicity Effluent Test Results for Permit Renewal	2/permit cycle	See condition for specific due dates
S13	Application for Permit Renewal	1/permit cycle	09/01/2022

Special Conditions

S1. Discharge limits

S1.A. Effluent limits

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit violates the terms and conditions of this permit.

Beginning on the effective date of this permit, the Permittee may discharge treated domestic wastewater to Puget Sound at the permitted location subject to compliance with the following limits:

Effluent Limits: Outfall 001 See discharge coordinates on cover sheet		
Parameter	**Average Monthly [a]**	**Average Weekly [b]**
Biochemical Oxygen Demand (5-day) (BOD_5)	30 milligrams/liter (mg/L) 10,233 pounds/day (lbs/day) 85% removal of influent BOD_5	45 mg/L 15,350 lbs/day
Total Suspended Solids (TSS)	30 mg/L 10,233 lbs/day 85% removal of influent TSS	45 mg/L 15,350 lbs/day
Total Residual Chlorine	0.5 mg/L	0.75mg/L
Parameter	**Minimum**	**Maximum**
pH	6.0 standard units	9.0 standard units
Parameter	**Monthly Geometric Mean**	**Weekly Geometric Mean**
Fecal Coliform Bacteria [c]	200/100 milliliter (mL)	400/100 mL

a	Average monthly effluent limit means the highest allowable average of daily discharges over a calendar month. To calculate the discharge value to compare to the limit, you add the value of each daily discharge measured during a calendar month and divide this sum by the total number of daily discharges measured. See footnote c for fecal coliform calculations.
b	Average weekly discharge limit means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges' measured during that week. See footnote c for fecal coliform calculations.
c	Ecology provides directions to calculate the monthly and the weekly geometric mean in publication No. 04-10-020, Information Manual for Treatment Plant Operators.

S1.B. Mixing zone authorization

Mixing zone for Outfall 001

The following paragraphs define the maximum boundaries of the mixing zones:

Chronic mixing zone

The mixing zone is a series of overlapping circles with radius of 794 feet measured from the center of each discharge port. The aggregate region of the mixing zone encompasses an oblong circular area measuring 2,088 feet long and 1,588 feet wide, centered around the 500-foot long diffuser. The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the chronic zone must meet chronic aquatic life criteria and human health criteria.

Acute mixing zone

The acute mixing zone is a series of overlapping circles with radius of 79.4 feet measured from the center of each discharge port. The aggregate region of the mixing zone encompasses an oblong circular area measuring 658 feet long and 158.8 feet wide, centered around the 500-foot long diffuser. The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the acute zone must meet acute aquatic life criteria.

Available Dilution (dilution factor)	
Acute Aquatic Life Criteria	115
Chronic Aquatic Life Criteria	238
Human Health Criteria - Carcinogen	511
Human Health Criteria - Non-carcinogen	415

S2. Monitoring requirements

S2.A. Monitoring schedule

The Permittee must monitor in accordance with the following schedule and the requirements specified in Appendix A.

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
(1) Wastewater influent, monitored at Headworks			
Wastewater Influent means the raw sewage flow from the collection system into the treatment facility. Sample the wastewater entering the headworks of the treatment plant excluding any side-stream returns from inside the plant.			
Flow	MGD	Continuous [a]	Metered/Recorded
BOD_5	mg/L	5/week	24-hr Composite [b]
BOD_5	lbs/day	5/week	Calculation [c]
TSS	mg/L	5/week	24-hr Composite
TSS	lbs/day	5/week	Calculation

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
(2) Final wastewater effluent, monitored at the Influent Pump Station (IPS)			
Final Wastewater Effluent means wastewater exiting the last treatment process or operation. Typically, this is after or at the exit from the chlorine contact chamber or other disinfection process. The Permittee may take effluent samples for the BOD_5 analysis before or after the disinfection process. If taken after, the Permittee must dechlorinate and reseed the sample.			
Flow	MGD	Continuous	Metered/recorded
BOD_5	mg/L	5/week	24-hr Composite
BOD_5	lbs/day	5/week	Calculation
BOD_5	% removal	1/month	Calculation [d]
TSS	mg/L	5/week	24-hr Composite
TSS	lbs/day	5/week	Calculation
TSS	% removal	1/month	Calculation [d]
Total Residual Chlorine	mg/L	Continuous	Metered/recorded [e]
pH [f]	Standard Units	Continuous	Metered/recorded
Fecal Coliform [g]	# /100 ml	5/week	Grab
Total Phosphorus	mg/L as P	1/Month	24-hr Composite
Soluble Reactive Phosphorus	mg/L as P	1/Month	24-hr Composite
Total Ammonia	mg/L as N	1/Month	24-hr Composite
Nitrate plus Nitrite Nitrogen	mg/L as N	1/Month	24-hr Composite
Total Kjeldahl Nitrogen (TKN)	mg/L as N	1/Month	24-hr Composite
(3) Wet weather bypass, monitored at the Chemically-Enhanced Primary Clarifier Effluent Channel			
The Permittee must monitor and report the following parameters for each split stream flow event in which the Permittee diverts a portion of the plant's influent to chemically enhanced primary treatment and bypasses the MBR treatment system. All parameters are monitored at the effluent channel of the active chemically enhanced primary clarifier(s), unless otherwise noted. See Special Condition S9 for additional requirements for wet weather bypasses.			
Calculated Membrane Flow Capacity	MGD	1/day [h]	Calculation [i]
Maximum Membrane TMP [j]	Pounds per square inch (psi)	1/day [h]	Measurement
Headworks Flow Rate [k]	MGD	1/day [h]	Measurement
Total Volume	Million Gallons (MG)	1/day [h]	Calculation
Total Duration of Bypass	Hours	1/day [h]	Measurement
Total Storm Duration [L]	Hours	1/day [h]	Measurement
Total Precipitation [m]	Inches	1/day [h]	Measurement or Calculation
BOD_5	mg/L	1/day [h]	Composite [n]
BOD_5	% removal	1/day [h]	Calculation [d]
TSS	mg/L	1/day [h]	Composite [n]
TSS	% removal	1/day [h]	Calculation [d]
pH	Standard Units	1/day [h]	Measurement
Priority Pollutants (PP) – Total Metals	µg/L; nanograms(ng/L) for mercury	2/year [o]	Composite [n] Grab for mercury [p]

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
(4) Priority pollutant testing, monitored in influent at Headworks, effluent at IPS, and in biosolids			
The Permittee must monitor the following parameters in the influent at the headworks, and biosolids in accordance with the Pretreatment requirements in Special Condition S6.B. The Permittee must also monitor effluent at the IPS in accordance with the Pretreatment requirements in Special Conditions S6.B and as required by the NPDES permit application. The schedule for pH below applies only to influent and biosolids since the effluent monitoring schedule above requires more frequent effluent monitoring for that parameter. Oil and grease monitoring applies only to influent and effluent.			
pH (influent and biosolids)	Standard units	1/quarter	Grab
Oil and Grease (influent and effluent)	mg/L	1/quarter	Grab
Cyanide	micrograms/liter (µg/L)	1/quarter	Grab
Total Phenolic Compounds	µg/L	1/quarter	Grab
PP – Total Metals	µg/L; nanograms (ng/L) for mercury	1/quarter	24-Hour composite Grab for mercury [p]
PP – Volatile Organic Compounds	µg/L	1/year	Manual Composite [q]
PP – Acid-extractable Compounds	µg/L	1/year	24-Hour composite
PP – Base-neutral Compounds	µg/L	1/year	24-Hour composite
PP – Pesticides/PCB Compounds	µg/L	1/year	24-Hour composite
(5) Permit renewal application requirements – final effluent monitored at IPS			
This section includes parameters required by the application that are not otherwise required by routine monitoring. The Permittee must report results with quarterly monitoring listed above			
Temperature	Degrees Celsius	1/quarter	Grab
Dissolved Oxygen	mg/L	1/quarter	Grab
Total Dissolved Solids	mg/L	1/quarter	Grab
Total Hardness	mg/L	1/quarter	Grab
(6) Whole effluent toxicity testing – final wastewater effluent			
Acute Toxicity Testing	See condition S11 for testing requirements	2/permit cycle during months specified in condition S11	24-hr composite
Chronic Toxicity Testing	See condition S12 for testing requirements	2/permit cycle during months specified in condition S12	24-hr composite

Monitoring schedule notes	
a	Continuous means uninterrupted except for brief lengths of time for calibration, power failure, or unanticipated equipment repair or maintenance. The Permittee must sample every 6 hours when continuous monitoring is not possible.
b	24-hour composite means a series of individual samples collected over a 24-hour period into a single container, and analyzed as one sample.
c	Calculate mass concurrently with the respective concentration of a sample, using the following formula: Concentration (in mg/L) X Flow (in MGD) X Conversion Factor (8.34) = lbs/day

d	Calculate the monthly average percent removal using the following formula: $$\% \text{ removal} = \frac{\text{Influent concentration (mg/L)} - \text{Effluent concentration (mg/L)}}{\text{Influent concentration (mg/L)}} \times 100$$ where influent and effluent concentrations are the monthly average concentrations of BOD_5 and TSS.
e	The Permittee must continuously record effluent total residual chlorine concentration using inline analyzers. Report the highest concentration from instantaneous data averaged over a maximum interval of 10 minutes as the daily maximum concentration.
f	The Permittee must continuously record effluent pH using inline analyzers. Report the daily maximum and minimum pH values from instantaneous data averaged over a maximum interval of 5 minutes. Do not report daily average pH values.
g	Report a numerical value for fecal coliforms following the procedures in Ecology's *Information Manual for Wastewater Treatment Plant Operators*, Publication Number 04-10-020. Do not report a result as too numerous to count (TNTC).
h	The Permittee must monitor and report all parameters in section 3 of this monitoring schedule, except metals, each day in which wet weather bypassing occurs. Report individual sample results on the monthly DMR in which bypassing occurred and summarize the results in the annual bypass report (S9.B). Report "No Discharge" for the CEPC monitoring point on the monthly DMR when no bypassing occurs during the month.
i	Membrane Flow Capacity to be calculated based on daily peak flow tests conducted on the day of a wet weather bypass event.
j	The maximum membrane TMP is the highest measured transmembrane pressure recorded at the initiation of a wet weather bypass event.
k	The Permittee must record and report the influent flow rate to the WWTP at the time of initiating a wet weather bypass. The Permittee must also calculate and report the average flow rate to the WWTP over the duration of the wet weather bypass event.
L	Storm duration is the amount of total time when precipitation that contributed to a wet weather bypass event occurred.
m	The Permittee must report precipitation for each storm event that led to a wet weather bypass. It may report precipitation using a single rain gauge that most represents precipitation over the drainage area tributary to the treatment plant or it may report precipitation based on an aggregate of multiple rain gauges in the drainage basin.
n	The Permittee must limit composite sampling of CEPC effluent to the duration of each wet weather bypass event. It may use automated composite sampling equipment or manually composite a series of grab samples over the duration of the bypass.
o	The Permittee must monitor metals in the CEPC effluent during a wet weather bypass event. Report individual results on the semiannual DMR corresponding to the months in which metals testing occurred. The semiannual monitoring periods are January through June and July through December.
p	Mercury monitoring requires clean sampling using EPA Method 1669 and low-level analysis using EPA Method 1631E. The Permittee will report mercury results with all other priority pollutant metals testing.
q	Manual composite refers to the collection of multiple discrete grab samples that are mixed and analyzed as a single sample. See Special Condition S6.B.1 for further details.

S2.B. Sampling and analytical procedures

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters. The Permittee must conduct representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions that may affect effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 (or as applicable in 40 CFR subchapters N [Parts 400–471] or O [Parts 501-503]) unless otherwise specified in this permit . Ecology may only specify alternative methods for parameters without permit limits and for those parameters without an EPA approved test method in 40 CFR Part 136.

S2.C. Flow measurement and continuous monitoring devices

The Permittee must:

1. Select and use appropriate flow measurement and continuous monitoring devices and methods consistent with accepted scientific practices.
2. Install, calibrate, and maintain these devices to ensure the accuracy of the measurements is consistent with the accepted industry standard, the manufacturer’s recommendation, and approved O&M manual procedures for the device and the wastestream.
3. Calibrate continuous monitoring instruments weekly unless it can demonstrate a longer period is sufficient based on monitoring records. The Permittee:
    a. May calibrate apparatus for continuous monitoring of dissolved oxygen by air calibration.
    b. Must calibrate continuous pH measurement instruments using a grab sample analyzed in the lab with a pH meter calibrated with standard buffers and analyzed within 15 minutes of sampling.
    c. Must calibrate continuous chlorine measurement instruments using a grab sample analyzed in the laboratory within 15 minutes of sampling.
4. Calibrate flow-monitoring devices at a minimum frequency of at least one calibration per year.
5. Maintain calibration records for at least three years.

S2.D. Laboratory accreditation

The Permittee must ensure that all monitoring data required by Ecology for permit specified parameters is prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. Flow, temperature, settleable solids, conductivity, pH, and internal process control parameters are exempt from this requirement. The Permittee must obtain accreditation for conductivity and pH if it must receive accreditation or registration for other parameters.

S3. Reporting and recording requirements

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

S3.A. Discharge monitoring reports

The first monitoring period begins on the effective date of the permit (unless otherwise specified). The Permittee must:

1. Summarize, report, and submit monitoring data obtained during each monitoring period on the electronic discharge monitoring report (DMR) form provided by Ecology within the Water Quality Permitting Portal. Include data for each of the parameters tabulated in Special Condition S2 and as required by the form. Report a value for each day sampling occurred (unless specifically exempted in the permit) and for the summary values (when applicable) included on the electronic form.
2. Ensure that DMRs are electronically submitted no later than the dates specified below, unless otherwise specified in this permit.
3. The Permittee must also submit an electronic copy of the laboratory report as an attachment using WQWebDMR. The contract laboratory reports must also include information on the chain of custody, QA/QC results, and documentation of accreditation for the parameter.
4. Submit DMRs for parameters with the monitoring frequencies specified in S2 (monthly, quarterly, annual, etc.) at the reporting schedule identified below. The Permittee must:
    a. Submit **monthly** DMRs by the 15th day of the following month.
    b. Submit **quarterly DMRs**, unless otherwise specified in the permit, by the 15th day of the month following the monitoring period. Quarterly sampling periods are January through March, April through June, July through September, and October through December. The Permittee must submit the first quarterly DMR on July 15, 2018 for the quarter beginning on April 1, 2018.
    c. Submit **semiannual DMRs** to report metals testing of the CEPC effluent by July 15 and January 15 of each year. Semiannual sampling periods are January through June, and July through December. The first sampling period begins July 1, 2018 and the first DMR is due January 15, 2019. If there are no qualifying wet weather bypass events during a semiannual monitoring period, the Permittee must report “No Discharge” on the DMR for that period.

d. Submit **annual DMRs** by March 15th of each year for monitoring completed the previous year. The first monitoring period begins on the effective date of the permit and lasts 12 calendar months. The first annual DMR is due March 15, 2019.

e. Submit permit renewal application monitoring data in WQWebDMR on quarterly DMRs as required by S3.A.4.b.

5. Enter the "No Discharge" reporting code for an entire DMR, for a specific monitoring point, or for a specific parameter as appropriate, if the Permittee did not discharge wastewater or a specific pollutant during a given monitoring period.

6. Report single analytical values below detection as "less than the detection level (DL)" by entering < followed by the numeric value of the detection level (e.g. < 2.0) on the DMR. If the method used did not meet the minimum DL and quantitation level (QL) identified in the permit, report the actual QL and DL in the comments or in the location provided.

7. Report single analytical values between the detection level (DL) and the quantitation level (QL) by entering the estimated value, the code for estimated value/below quantitation limit (j) and any additional information in the comments. Submit a copy of the laboratory report as an attachment using WQWebDMR.

8. **Not** report zero for bacteria monitoring. Report as required by the laboratory method.

9. Calculate and report an arithmetic average value for each day for bacteria if multiple samples were taken in one day.

10. Calculate the geometric mean values for bacteria (unless otherwise specified in the permit) using:

    a. The reported numeric value for all bacteria samples measured above the detection value except when it took multiple samples in one day. If the Permittee takes multiple samples in one day it must use the arithmetic average for the day in the geometric mean calculation.

    b. The detection value for those samples measured below detection.

11. Report the test method used for analysis in the comments if the laboratory used an alternative method not specified in the permit and as allowed in Appendix A.

12. Calculate average values and calculated total values (unless otherwise specified in the permit) using:

    a. The reported numeric value for all parameters measured between the detection value and the quantitation value for the sample analysis.

    b. One-half the detection value (for values reported below detection) if the lab detected the parameter in another sample from the same monitoring point for the reporting period.

c. Zero (for values reported below detection) if the lab did not detect the parameter in another sample for the reporting period.

13. Report single-sample grouped parameters (for example: priority pollutants, PAHs, pulp and paper chlorophenolics, TTOs) on the WQWebDMR form and include: sample date, concentration detected, detection limit (DL) (as necessary), and laboratory quantitation level (QL) (as necessary).

S3.B. Permit submittals and schedules

The Permittee must use the Water Quality Permitting Portal – Permit Submittals application (unless otherwise specified in the permit) to submit all other written permit-required reports by the date specified in the permit.

When another permit condition requires submittal of a paper (hard-copy) report, the Permittee must ensure that it is postmarked or received by Ecology no later than the dates specified by this permit. Send these paper reports to Ecology at:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

S3.C. Records retention

The Permittee must retain records of all monitoring information for a minimum of three (3) years. Such information must include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

S3.D. Recording of results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, method, and time of sampling or measurement.
2. The individual who performed the sampling or measurement.
3. The dates the analyses were performed.
4. The individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

S3.E. Additional monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Special Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR unless otherwise specified by Special Condition S2.

S3.F. Reporting permit violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

1. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance and correct the problem.
2. If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within thirty (30) days of sampling.

a. Immediate reporting

The Permittee must immediately report to Ecology and the Snohomish County Health District or Public Health of Seattle-King County (depending on location impacted by the incident) at the numbers listed below all:

- Failures of the disinfection system.
- Collection system overflows.
- Plant bypasses discharging to marine surface waters.
- Any other failures of the sewage system (pipe breaks, etc.)

Northwest Regional Office	425-649-7000
Snohomish County Health District	425-339-5200
Public Health of Seattle-King County	(206) 477-8050

If the reportable incident impacts marine waters, the Permittee must also contact the Department of Health, Shellfish Program:

Department of Health,	360-236-3330 (business hours)
Shellfish Program	360-789-8962 (after business hours)

Additionally, for any sanitary sewer overflow (SSO) that discharges to a municipal separate storm sewer system (MS4), the Permittee must notify the appropriate MS4 owner or operator.

b. Twenty-four-hour reporting

The Permittee must report the following occurrences of noncompliance by telephone, to Ecology at the telephone numbers listed above, within 24 hours from the time the Permittee becomes aware of any of the following circumstances:

1. Any noncompliance that may endanger health or the environment, unless previously reported under immediate reporting requirements.

2. Any unanticipated bypass that causes an exceedance of an effluent limit in the permit (See Part S5.F, “Bypass Procedures”).
3. Any upset that causes an exceedance of an effluent limit in the permit (See G.15, “Upset”).
4. Any violation of a maximum daily or instantaneous maximum discharge limit for any of the pollutants in Section S1.A of this permit.
5. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limit in the permit.

c. Report within five days

The Permittee must also submit a written report within five business days of the time that the Permittee becomes aware of any reportable event under S3.F.2.a or S3.F.2.b, above. Submit the written report electronically using the *Water Quality Permitting Portal – Permit Submittals* application under the “As Needed, 5-day Written Follow-up” submittal schedule. Include the ERTS number in the name of the file uploaded for this submittal. If the letter covers multiple ERTS reports, include the incident date in the file name (example file names: “ERTS XXXXXX follow-up” or “follow-up-MMDDYYYY incidents”). The report must contain:

1. A description of the noncompliance and its cause.
2. The period of noncompliance, including exact dates and times.
3. The estimated time the Permittee expects the noncompliance to continue if not yet corrected.
4. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
5. If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

d. Waiver of written reports

Ecology may waive the written report required in subpart c, above, on a case-by-case basis upon request if the Permittee has submitted a timely oral report.

e. All other permit violation reporting

The Permittee must report all permit violations, which do not require immediate or within 24 hours reporting, when it submits monitoring reports for S3.A ("Reporting"). The reports must contain the information listed in subpart c, above. Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

S3.G. Other reporting

a. Spills of oil or hazardous materials

The Permittee must report a spill of oil or hazardous materials in accordance with the requirements of RCW 90.56.280 and chapter 173-303-145. You can obtain further instructions at the following website: https://ecology.wa.gov/About-us/Get-involved/Report-an-environmental-issue/Report-a-spill.

b. Failure to submit relevant or correct facts

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it must submit such facts or information promptly.

S3.H. Maintaining a copy of this permit

The Permittee must keep a copy of this permit at the facility and make it available upon request to Ecology inspectors.

S4. Facility loading

S4.A. Design criteria

The flows or waste loads for the permitted facility must not exceed the following design criteria:

Maximum Month Design Flow (MMDF)	40.9 MGD
BOD_5 Influent Loading for Maximum Month	66,063 lbs/day
TSS Influent Loading for Maximum Month	61,400 lbs/day

S4.B. Plans for maintaining adequate capacity

a. Conditions triggering plan submittal

The Permittee must submit a plan and a schedule for continuing to maintain capacity to Ecology when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months.
2. The projected plant flow or loading would reach design capacity within five years.

b. Plan and schedule content

The plan and schedule must identify the actions necessary to maintain adequate capacity for the expected population growth and to meet the limits and requirements of the permit. The Permittee must consider the following topics and actions in its plan.

1. Analysis of the present design and proposed process modifications.

2. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.
3. Limits on future sewer extensions or connections or additional waste loads.
4. Modification or expansion of facilities.
5. Reduction of industrial or commercial flows or waste loads.

Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by Ecology prior to any construction.

S4.C. Duty to mitigate

The Permittee must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

S4.D. Notification of new or altered sources

1. The Permittee must submit written notice to Ecology whenever any new discharge or a substantial change in volume or character of an existing discharge into the wastewater treatment plant is proposed which:
   a. Would interfere with the operation of, or exceed the design capacity of, any portion of the wastewater treatment plant.
   b. Is not part of an approved general sewer plan or approved plans and specifications.
   c. Is subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act.
2. This notice must include an evaluation of the wastewater treatment plant’s ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the treatment plant, and the anticipated impact on the Permittee’s effluent [40 CFR 122.42(b)].

S4.E. Wasteload assessment

The Permittee must conduct an assessment of its influent flow and waste load and submit a report to Ecology by December 31, 2022. The report must contain:

1. A description of compliance or noncompliance with the permit effluent limits.
2. A comparison between the existing and design:
   a. Monthly average dry weather and wet weather flows.
   b. Maximum month flows.
   c. Peak flows.
   d. BOD_5 loadings.
   e. Total suspended solids loadings.
3. The percent change in the above parameters since the previous report.

4. The present and design population or population equivalent.
5. The projected population growth rate.
6. The estimated date upon which the Permittee expects the wastewater treatment plant to reach design capacity, according to the most restrictive of the parameters above.
7. An Infiltration and Inflow (I/I) update that describes:
   a. For the collection system owned and operated by the County:
      i. The results of recent I/I monitoring
      ii. A summary of recent I/I improvement projects.
      iii. Projects planned to improve I/I.
   b. For the collection systems owned and operated by component agencies:
      i. Measures taken to encourage component agencies to control I/I.
      ii. Any known I/I concerns.
      iii. Steps planned to further encourage I/I reduction projects.

S5. Operation and maintenance

The Permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances), which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes keeping a daily operation logbook (paper or electronic), adequate laboratory controls, and appropriate quality assurance procedures. This provision of the permit requires the Permittee to operate backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

S5.A. Certified operator

This permitted facility must be operated by an operator certified by the state of Washington for at least a Class IV plant. This operator must be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class III plant must be in charge during all regularly scheduled shifts.

S5.B. Operation and maintenance program

The Permittee must:

1. Institute an adequate operation and maintenance program for the entire sewage system.
2. Keep maintenance records on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records must clearly specify the frequency and type of maintenance recommended by the manufacturer and must show the frequency and type of maintenance performed.
3. Make maintenance records available for inspection at all times.

S5.C. Short-term reduction

The Permittee must schedule any facility maintenance, which might require interruption of wastewater treatment and degrade effluent quality, during non-critical water quality periods and carry this maintenance out according to the approved O&M manual or as otherwise approved by Ecology.

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limits on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee must:

1. Give written notification to Ecology, if possible, thirty (30) days prior to such activities.
2. Detail the reasons for, length of time of, and the potential effects of the reduced level of treatment.

This notification does not relieve the Permittee of its obligations under this permit.

S5.D. Electrical power failure

The Permittee must ensure that adequate safeguards prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations. Adequate safeguards include, but are not limited to, alternate power sources, standby generator(s), or retention of inadequately treated wastes.

The Permittee must maintain Reliability Class II (EPA 430-99-74-001) at the wastewater treatment plant. Reliability Class II requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions. Vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but must be sufficient to maintain the biota.

S5.E. Prevent connection of inflow

The Permittee must strictly enforce its sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system.

S5.F. Bypass procedures

A bypass is the intentional diversion of waste streams from any portion of a treatment facility. This permit prohibits all bypasses except when the bypass is for essential maintenance, as authorized in special condition S5.F.1, or is approved by Ecology as an anticipated bypass following the procedures in S5.F.2. Special Condition S9 authorizes anticipated wet weather bypasses of the MBR treatment system under specific conditions and limits.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   This permit allows bypasses for essential maintenance of the treatment system when necessary to ensure efficient operation of the system. The Permittee may bypass the treatment system for essential maintenance only if doing so does not cause violations of effluent limits. The Permittee is not required to notify Ecology when bypassing for essential maintenance. However the Permittee must comply with the monitoring requirements specified in special condition S2.B.

2. Anticipated bypasses for non-essential maintenance

   Ecology may approve an anticipated bypass under the conditions listed below. This permit prohibits any anticipated bypass that is not approved through the following process.

   a. If a bypass is for non-essential maintenance, the Permittee must notify Ecology, if possible, at least ten (10) days before the planned date of bypass. The notice must contain:

      - A description of the bypass and the reason the bypass is necessary.
      - An analysis of all known alternatives which would eliminate, reduce, or mitigate the potential impacts from the proposed bypass.
      - A cost-effectiveness analysis of alternatives.
      - The minimum and maximum duration of bypass under each alternative.
      - A recommendation as to the preferred alternative for conducting the bypass.
      - The projected date of bypass initiation.
      - A statement of compliance with SEPA.
      - A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.
      - Details of the steps taken or planned to reduce, eliminate, and prevent recurrence of the bypass.

   b. For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during the project planning and design process. The project-specific engineering report as well as the plans and specifications must include details of probable construction bypasses to the extent practical. In cases where the Permittee determines the probable need to bypass early, the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.

c. Ecology will determine if the Permittee has met the conditions of special condition S5.F.2 a and b and consider the following prior to issuing a determination letter, an administrative order, or a permit modification as appropriate for an anticipated bypass:

- If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.
- If the bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.
- If feasible alternatives to the bypass exist, such as:
    - The use of auxiliary treatment facilities.
    - Retention of untreated wastes.
    - Stopping production.
    - Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance.
    - Transport of untreated wastes to another treatment facility.

S5.G. Operations and maintenance (O&M) manual

a. O&M manual submittal and requirements

The Permittee must:

1. Submit an electronic copy of the current Operations and Maintenance (O&M) Manual for the permitted facility that meets the requirements of 173-240-080 WAC by July 31, 2018. Due to the large size and complexity of the manual, the Permittee must submit the electronic files on a portable digital storage device, (flash drive, DVD or CD); do not submit files through the Water Quality Permitting Portal – Permit Submittals application.
2. Review the O&M Manual at least annually.
3. Submit to Ecology for review all substantial changes or updates to the O&M Manual whenever it incorporates them into the manual. Submit electronic copies of all updated sections by September 1, 2022.
4. Keep the approved O&M Manual at the permitted facility.
5. Follow the instructions and procedures of this manual.

b. **O&M manual components**

In addition to the requirements of WAC 173-240-080(1) through (5), the O&M Manual must be consistent with the guidance in Table G1-3 in the *Criteria for Sewage Works Design* (Orange Book), 2008. The O&M Manual must include:

1. Emergency procedures for cleanup in the event of wastewater system upset or failure.
2. A review of system components which if failed could pollute surface water or could impact human health. Provide a procedure for a routine schedule of checking the function of these components.
3. Wastewater system maintenance procedures that contribute to the generation of process wastewater.
4. Reporting protocols for submitting reports to Ecology to comply with the reporting requirements in the discharge permit.
5. Any directions to maintenance staff when cleaning or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine).
6. The treatment plant process control monitoring schedule.
7. Minimum staffing adequate to operate and maintain the treatment processes and carry out compliance monitoring required by the permit.

S6. Pretreatment

S6.A. General requirements

1. The Permittee must implement the Industrial Pretreatment Program in accordance with King County Code 28.84.060 as amended by King County Ordinance No. 11963 on January 1, 1996, legal authorities, policies, procedures, and financial provisions described in the Permittee's approved pretreatment program submittal entitled "Industrial Pretreatment Program" and dated April 27, 1981; any approved revisions thereto; and the General Pretreatment Regulations (40 CFR Part 403). At a minimum, the Permittee must undertake the following pretreatment implementation activities:

   a. Enforce categorical pretreatment standards under Section 307(b) and (c) of the Federal Clean Water Act (hereinafter, the Act), prohibited discharge standards as set forth in 40 CFR 403.5, local limits, or state standards, which ever are most stringent or apply at the time of issuance or modification of a local industrial waste discharge permit. Locally derived limits are defined as pretreatment standards under Section 307(d) of the Act and are not limited to categorical industrial facilities.

b. Issue industrial waste discharge permits to all significant industrial users [SIUs, as defined in 40 CFR 403.3(v)(i)(ii)] contributing to the treatment system, including those from other jurisdictions. Industrial waste discharge permits must contain as a minimum, all the requirements of 40 CFR 403.8 (f)(l)(iii). The Permittee must coordinate the permitting process with Ecology regarding any industrial facility which may possess a state waste discharge permit issued by Ecology.

c. Maintain and update, as necessary, records identifying the nature, character, and volume of pollutants contributed by industrial users to the treatment works. The Permittee must maintain records for at least a three-year period.

d. Perform inspections, surveillance, and monitoring activities on industrial users to determine or confirm compliance with pretreatment standards and requirements. The Permittee must conduct a thorough inspection of SIUs annually, except Middle-Tier Categorical Industrial Users, as defined by 40 CFR 403.8(f)(2)(v)(B)&(C), need only be inspected once every two years. The Permittee must conduct regular local monitoring of SIU wastewaters commensurate with the character and volume of the wastewater but not less than once per year except for Middle-Tier Categorical Industrial Users which may be sampled once every two years. The Permittee must collect and analyze samples in accordance with 40 CFR Part 403.12(b)(5)(ii)-(v) and 40 CFR Part 136.

e. Enforce and obtain remedies for non-compliance by any industrial users with applicable pretreatment standards and requirements. Once violations have been identified, the Permittee must take timely and appropriate enforcement action to address the non-compliance. The Permittee's action must follow its enforcement response procedures and any amendments, thereof.

f. Publish, at least annually in a newspaper of general circulation within the Permittee's service area, a list of all non-domestic users which, at any time in the previous 12 months, were in significant non-compliance as defined in 40 CFR 403.8(f)(2)(vii).

g. If the Permittee elects to conduct sampling of an SIU's discharge in lieu of requiring user self-monitoring, it must satisfy all requirements of 40 CFR Part 403.12. This includes monitoring and record keeping requirements of sections 403.12(g) and (o). For SIU's subject to categorical standards (i.e., CIUs), the Permittee may either complete baseline and initial compliance reports for the CIU (when required by 403.12(b) and (d)) or require these of the CIU. The Permittee must ensure SIUs are provided the results of sampling in a timely manner, inform SIUs of their right to sample, their obligations to report any sampling they do, to respond to non-compliance, and to submit other notifications. These include a slug load report (403.12(f)), notice of changed discharge (403.12(j)), and hazardous waste notifications (403.12(p)). If sampling for the SIU, the Permittee must not sample less than once in every six month period unless the Permittee's approved program includes procedures for reduction of monitoring for Middle-Tier or Non-Significant Categorical Users per 403.12(e)(2) and (3) and those procedures have been followed.

h. Develop and maintain a data management system designed to track the status of the Permittee's industrial user inventory, industrial user discharge characteristics, and compliance status.

i. Maintain adequate staff, funds, and equipment to implement its pretreatment program.

j. Establish, where necessary, contracts or legally binding agreements with contributing jurisdictions to ensure compliance with applicable pretreatment requirements by commercial or industrial users within these jurisdictions. These contracts or agreements must identify the agency responsible for the various implementation and enforcement activities to be performed in the contributing jurisdiction.

2. Per 40 CFR 403.8(f)(2)(vii), the Permittee must evaluate each Significant Industrial User to determine if a Slug Control Plan is needed to prevent slug discharges which may cause interference, pass-through, or in any other way result in violations of the Permittee’s regulations, local limits or permit conditions. The Slug Control Plan evaluation shall occur within one year of a user’s designation as a SIU. In accordance with 40 CFR 403.8(f)(1)(iii)(B)(6) the Permittee shall include slug discharge control requirements in an SIU’s permit if the Permittee determines that they are necessary.

3. Whenever Ecology determines that any waste source contributes pollutants to the Permittee's treatment works in violation of Subsection (b), (c), or (d) of Section 307 of the Act, and the Permittee has not taken adequate corrective action, Ecology will notify the Permittee of this determination. If the Permittee fails to take appropriate enforcement action within 30 days of this notification, Ecology may take appropriate enforcement action against the source or the Permittee.

4. Pretreatment Report

   The Permittee must submit the annual report according to the instructions in Special Condition S3.B, Permit Submittals and Schedules. Submit one electronic copy of the annual report using the Water Quality Permitting Portal – Permit Submittals application by April 30th of each year.

   The report must include the following information:

   a. An updated listing of non-domestic industrial dischargers.

   b. Summarized Results of wastewater sampling at the treatment plant as specified in Subsection S6.B below. The Permittee must submit complete results of each sampling event on the appropriate quarterly or annual DMR through Ecology’s WQWebDMR system, as described in Special Condition S3.A. The Permittee must calculate removal rates for each pollutant and evaluate the adequacy of the existing local limits in prevention of treatment plant interference, pass through of pollutants that could affect receiving water quality and biosolids contamination.

c. Status of program implementation, including:

- Any substantial modifications to the pretreatment program as originally approved by Ecology, including staffing and funding levels.
- Any interferences, upsets, or permit violations experienced at the WWTP that are directly attributable to wastes from industrial users.
- Listing of industrial users inspected and/or monitored, and a summary of the results.
- Listing of industrial users scheduled for inspection and/or monitoring for the next year, and expected frequencies.
- Listing of industrial users notified of promulgated pretreatment standards and/or local standards as required in 40 CFR 403.8(f)(2)(iii). The list must indicate which industrial users are on compliance schedules and the final date of compliance for each.
- Listing of industrial users issued industrial waste discharge permits.
- Planned changes in the pretreatment program implementation plan.

d. Status of compliance activities, including:

- Listing of industrial users that failed to submit baseline monitoring reports or any other reports required under 40 CFR 403.12 and in the Permittee's pretreatment program, dated April 27, 1981.
- Listing of industrial users that were at any time during the reporting period not complying with federal, state, or local pretreatment standards or with applicable compliance schedules for achieving those standards, and the duration of such non-compliance.
- Summary of enforcement activities and other corrective actions taken or planned against non-complying industrial users. The Permittee must supply to Ecology a copy of the public notice of facilities that were in significant non-compliance.

5. The Permittee must request and obtain approval from Ecology before making any significant changes to the approved local pretreatment program. The Permittee must follow the procedure in 40 CFR 403.18 (b) and (c).

S6.B. Monitoring requirements

The Permittee must monitor its influent, effluent, and biosolids at the Brightwater WWTP for the priority pollutants identified in Tables II and III of Appendix D of 40 CFR Part 122 as amended, any compounds identified as a result of Condition S6.B.4, and any other pollutants expected from nondomestic sources using U.S. EPA-approved procedures for collection, preservation, storage, and analysis. The Permittee must test influent, effluent, and biosolids samples for the priority pollutant metals (Table III, 40 CFR 122, Appendix D) on a quarterly basis throughout the term of this permit. The Permittee must test influent, effluent, and biosolids samples for the organic priority pollutants (Table II, 40 CFR 122, Appendix D) on an annual basis.

1. The Permittee must sample Brightwater WWTP influent and effluent on a day when industrial discharges are occurring at normal to maximum levels. The Permittee must obtain 24-hour composite samples for the analysis of acid and base/neutral extractable compounds and metals. The Permittee must collect samples for the analysis of volatile organic compounds and samples must be collected using grab sampling techniques at equal intervals for a total of four grab samples per day.

   The laboratory may run a single analysis for volatile pollutants (using GC/MS procedures approved by 40 CFR 136) for each monitoring day by compositing equal volumes of each grab sample directly in the GC purge and trap apparatus in the laboratory, with no less than 1 ml of each grab included in the composite.

   Unless otherwise indicated, all reported test data for metals must represent the total amount of the constituent present in all phases, whether solid, suspended, or dissolved, elemental or combined including all oxidation states.

   The Permittee must handle, prepare, and analyze all wastewater samples taken for GC/MS analysis using procedures approved by 40 CFR 136.

2. The Permittee must collect a biosolids sample concurrently with a wastewater sample as a single grab sample of residual biosolids. Sampling and analysis must be performed using procedures approved by 40 CFR 136 unless the Permittee requests an alternate method and Ecology has approved.

3. The Permittee must take cyanide, phenols, and oils as grab samples. Oils must be hexane soluble or equivalent, and should be measured in the influent and effluent only.

4. In addition to quantifying pH, oil and grease, and all priority pollutants, the Permittee must make a reasonable attempt to identify all other substances and quantify all pollutants shown to be present by gas chromatograph/mass spectrometer (GC/MS) analysis using procedures approved by 40 CFR 136. The Permittee should attempt to make determinations of pollutants for each fraction, which produces identifiable spectra on total ion plots (reconstructed gas chromatograms). The Permittee should attempt to make determinations from all peaks with responses 5% or greater than the nearest internal standard. The 5% value is based on internal standard concentrations of 30 μg/l, and must be adjusted downward if higher internal standard concentrations are used or adjusted upward if lower internal standard concentrations are used. The Permittee may express results for non-substituted aliphatic compounds as total hydrocarbon content. The Permittee must use a laboratory whose computer data processing programs are capable of comparing sample mass spectra to a computerized library of mass spectra, with visual confirmation by an

experienced analyst. For all detected substances which are determined to be pollutants, the Permittee must conduct additional sampling and appropriate testing to determine concentration and variability, and to evaluate trends.

S6.C. Reporting of monitoring results

The Permittee must submit data from each sampling event electronically on quarterly and annual DMRs through the WQWebDMR system, as outlined in Special Condition S3.A. The Permittee must also include a summary of monitoring results in the Annual Pretreatment Report.

S6.D. Local limit development

As sufficient data become available, the Permittee must, in consultation with Ecology, reevaluate their local limits in order to prevent pass through or interference. If Ecology determines that any pollutant present causes pass through or interference, or exceeds established biosolids standards, the Permittee must establish new local limits or revise existing local limits as required by 40 CFR 403.5. Ecology may also require the Permittee to revise or establish local limits for any pollutant discharged from the treatment works that has a reasonable potential to exceed the water quality standards, sediment standards, or established effluent limits, or causes whole effluent toxicity. Ecology makes this determination in the form of an Administrative Order.

Ecology may modify this permit to incorporate additional requirements relating to the establishment and enforcement of local limits for pollutants of concern. Any permit modification is subject to formal due process procedures under state and federal law and regulation.

S7. Solid wastes

S7.A. Solid waste handling

The Permittee must handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

S7.B. Leachate

The Permittee must not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment, nor allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality Standards, Chapter 173-200 WAC. The Permittee must apply for a permit or permit modification as may be required for such discharges to state ground or surface waters.

S8. Spill control plan

S8.A Spill control plan submittals and requirements

The Permittee must:

1. Review the existing spill control plan for the permitted facility at least annually and update the plan as needed.

2. Send changes to the plan to Ecology.
3. Follow the plan and any supplements throughout the term of the permit.

S.B. Spill control plan components

The spill control plan must include the following:

1. A list of all oil and petroleum products and other materials used and/or stored on-site, which when spilled, or otherwise released into the environment, designate as dangerous waste (DW) or extremely hazardous waste (EHW) by the procedures set forth in WAC 173-303-070. Include other materials used and/or stored on-site which may become pollutants or cause pollution upon reaching state's waters.
2. A description of preventive measures and facilities (including an overall facility plot showing drainage patterns) which prevent, contain, or treat spills of these materials.
3. A description of the reporting system the Permittee will use to alert responsible managers and legal authorities in the event of a spill.
4. A description of operator training to implement the plan.

The Permittee may submit plans and manuals required by 40 CFR Part 112, contingency plans required by Chapter 173-303 WAC, or other plans required by other agencies, which meet the intent of this section.

S9. Wet weather operations

S9.A. Flow blending approval

The Permittee may initiate a bypass of the membrane bioreactor (MBR) treatment components at the permitted facility when the flows entering the facility are within 10% of exceeding the calculated available daily Membrane Flow Capacity. The following conditions apply to each wet weather bypass event.

1. The membrane control system must be operating in “TMP Control Mode”.
2. The Permittee must determine available Membrane Flow Capacity using an automated peak flow test performed simultaneously on two MBR trains for a one-hour period each day. The available Membrane Flow Capacity for the facility is the average individual train flow rate measured during the two-train peak flow test multiplied by the maximum number of installed MBR trains.
3. The Permittee must minimize the release of pollutants to the environment by taking the following actions:
    - Maximize flow through the MBR treatment system,
    - Maximize the use of storage capacity in the influent system, and
    - Divert flow to the West Point and/or South WWTPs, if conveyance and treatment capacity for those facilities is available.

4. When bypassing the MBR treatment components, the Permittee must ensure all bypass flows receive treatment through screening, grit removal, chemically enhanced primary clarification, and disinfection. The final discharge must meet the effluent limits listed in special condition S1.
5. The bypass event must result from increased flows caused by wet weather. The Permittee must document the duration and amount of rainfall for each storm event that causes a wet weather bypass.

Bypasses that do meet the above conditions are subject to the bypass provisions of special condition S5.F.

S9.B. Records and reporting

The Permittee must maintain records of all bypasses at the treatment plant. These records must document the date, duration, and volume of each bypass event, and the magnitude of the associated precipitation event. The records must also indicate the influent flow rate at the time when bypassing is initiated and the average influent flow rate during the split flow event.

The Permittee must report on the facility's monthly DMR all data from bypass monitoring listed in table S2A(3) of this permit. In addition, the Permittee must submit an annual bypass report by July 1st each year that summarizes all bypass occurrences for the previous year.

The annual report must document that each bypass complied with the authorizing conditions in part A above. It must also include a net environmental benefit (NEB) analysis. The NEB section must calculate the actual mass of BOD_5 and TSS discharged through the marine outfall on a monthly and annual basis and compare the results to a theoretical mass loading for a conventional, non-blending plant with the following assumed effluent quality:

Annual Average BOD_5 and TSS Concentrations:	15 mg/L
Maximum Monthly BOD_5 and TSS Concentrations:	25 mg/L

S9.C. Utility analysis report

The Permittee must submit an updated Utility Analysis Report by September 1, 2022.

S9.D. Net environmental benefit (NEB) performance standard

A performance standard applies to the Net Environmental Benefit achieved by the Brightwater WWTP. Achievement of the NEB is required in accordance with the standards in the table below which were approved by Ecology as part of the facility plan approval. If the Brightwater WWTP does not meet the required NEB, the Permittee must submit an explanation in the annual report(s) explaining the cause of non-compliance of the NEB and measures that will be taken to ensure achievement of the NEB.

Net Environmental Benefit Required[1]

Parameter	Net Environmental Benefit (percent reduction in BOD/TSS) [a, b]
Phase 1 – Revised (2012-2030) [c]	
BOD_5	
Maximum year [d]	51 percent
Maximum month [d]	16 percent
TSS	
Maximum year [d]	66 percent
Maximum month [d]	47 percent
a	Net environmental benefit is the reduction in a pollutant from the actual discharge compared to the theoretical discharge from a Conventional Activated Sludge (CAS) process.
b	Assumes CAS = 15 mg/L BOD_5/TSS for yearly conditions and 25 mg/L BOD_5/TSS for maximum-month condition.
c	Based on flow projections for 2030 and utilization of 0.8 million gallons of inline storage upstream of Hollywood Pump Station
d	20-year maximum flow based on 60 years of simulation.

S9.E. MBR pilot testing report

The Permittee must submit by July 31, 2018, a report that presents the findings of MBR pilot testing conducted at the Brightwater WWTP beginning in December 2014. The report must identify the variables testing revealed as potential causes of seasonal decreases in membrane performance. The report must also describe operational changes the Permittee may make to improve seasonal performance.

S10. Outfall evaluation

The Permittee must inspect the submerged portion of the outfall line and diffuser to document its integrity and continued function. If conditions allow for a photographic verification, the Permittee must include such verification in the report. By December 1, 2021, the Permittee must submit the inspection report to Ecology through the Water Quality Permitting Portal – Permit Submittals application. The Permittee must submit hard-copies of any video files to Ecology as required by Permit Condition S3.B. The Portal does not support submittal of video files.

[1] King County Wastewater Treatment Division, Brightwater Regional Wastewater Treatment System, Facilities Plan, May 2005, p 4-35 and King County Wastewater Treatment Division, Brightwater Regional Wastewater Treatment System, Facilities Plan Amendment No. 3, October 2016, p 15-17.

The inspector must at a minimum:

- Assess the physical condition of the outfall pipe, diffuser, and associated couplings and pipe anchors.
- Evaluate whether alignment issues reported in the 2012 Brightwater Marine Outfall Inspection and Commissioning report have worsened. Issues included the suspension of pipeline sections over depressions in the seabed and a slight rotation of one pipe as it sank into place during construction.
- Determine the extent of sediment accumulation in the vicinity of the diffuser.
- Ensure diffuser ports are free of obstructions and are allowing uniform flow.
- Confirm physical location (latitude/longitude) and depth (at MLLW) of the diffuser section of the outfall.

S11. Acute toxicity

S11.A. Testing when there is no permit limit for acute toxicity

The Permittee must:

1. Conduct acute toxicity testing on final effluent during the year prior to applying for permit renewal. Testing must occur once during the third quarter of 2021, no later than September 30, 2021, and once during the first quarter of 2022, no later than March 31, 2022.
2. Conduct acute toxicity testing on a series of at least five concentrations of effluent, including 100% effluent and a control.
3. Use each of the following species and protocols for each acute toxicity test:

Acute Toxicity Tests	Species	Method
Fathead minnow 96-hour static-renewal test	*Pimephales promelas*	EPA-821-R-02-012
Daphnid 48-hour static test	*Ceriodaphnia dubia, Daphnia pulex,* or *Daphnia magna*	EPA-821-R-02-012

4. Submit the results to Ecology electronically through the Water Quality Permitting Portal – Permit Submittals application by November 15, 2021 (for third quarter 2021 testing) and May 15, 2022 (for first quarter 2022 testing). The Permittee must also summarize the results in the next application for permit renewal.

S11.B. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain toxicity data, bench sheets, and reference toxicant results for test methods. In addition, the Permittee must submit toxicity test data in electronic format (CETIS export file preferred) for entry into Ecology's database.

2. The Permittee must collect 24-hour composite samples of effluent at the IPS for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Subsection C and the Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.
5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Section A or pristine natural water of sufficient quality for good control performance.
6. The Permittee must conduct whole effluent toxicity tests on an unmodified sample of final effluent.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the acute critical effluent concentration (ACEC). The ACEC equals 0.87% effluent.
8. All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing must comply with the acute statistical power standard of 29% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S12. Chronic toxicity

S12.A. Testing when there is no permit limit for chronic toxicity

The Permittee must:

1. Conduct chronic toxicity testing on final effluent during the year prior to applying for permit renewal. Testing must occur once during the fourth quarter of 2021, no later than December 31, 2021, and once during the second quarter of 2022, no later than June 30, 2022.
2. Conduct chronic toxicity testing on a series of at least five concentrations of effluent and a control. This series of dilutions must include the acute critical effluent concentration (ACEC). The ACEC equals 0.87% effluent. The series of dilutions should also contain the CCEC of 0.42% effluent.

3. Compare the ACEC to the control using hypothesis testing at the 0.05 level of significance as described in Appendix H, EPA/600/4-89/001.
4. Submit the results to Ecology electronically through the Water Quality Permitting Portal – Permit Submittals application by February 15, 2022 (for fourth quarter 2021 testing) and August 15, 2022 (for second quarter 2022 testing). The Permittee must also summarize the results in the next application for permit renewal.
5. Perform chronic toxicity tests with all of the following species and the most recent version of the following protocols:

Saltwater Chronic Test	Species	Method
Topsmelt survival and growth	*Atherinops affinis*	EPA/600/R-95/136
Mysid shrimp survival and growth	*Americamysis bahia* (formerly *Mysidopsis bahia*)	EPA-821-R-02-014

S12.B. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain toxicity data, bench sheets, and reference toxicant results for test methods. In addition, the Permittee must submit toxicity test data in electronic format (CETIS export file preferred) for entry into Ecology's database.
2. The Permittee must collect 24-hour composite samples of effluent at the IPS for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Section C and the Ecology Publication no. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.
5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Subsection C or pristine natural water of sufficient quality for good control performance.
6. The Permittee must conduct whole effluent toxicity tests on an unmodified sample of final effluent.

7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the CCEC and the ACEC. The CCEC and the ACEC may either substitute for the effluent concentrations that are closest to them in the dilution series or be extra effluent concentrations. The CCEC equals 0.42% effluent. The ACEC equals 0.87% effluent.
8. All whole effluent toxicity tests that involve hypothesis testing must comply with the chronic statistical power standard of 39% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S13. Application for permit renewal or modification for facility changes

The Permittee must submit an application for renewal of this permit by September 1, 2022.

The Permittee must also submit a new application or addendum at least one hundred eighty (180) days prior to commencement of discharges, resulting from the activities listed below, which may result in permit violations. These activities include any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility.

General Conditions

G1. Signatory requirements

1. All applications submitted to Ecology must be signed and certified.
   a. In the case of corporations, by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
      - 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, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
   b. In the case of a partnership, by a general partner.
   c. In the case of sole proprietorship, by the proprietor.
   d. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

   Applications for permits for domestic wastewater facilities that are either owned or operated by, or under contract to, a public entity shall be submitted by the public entity.
2. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
   a. The authorization is made in writing by a person described above and submitted to Ecology.
   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)
3. Changes to authorization. If an authorization under paragraph G1.2, above, is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph G1.2, above, must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section must make the following certification:

   "I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G2. Right of inspection and entry

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

1. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.
2. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.
3. To inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.
4. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. Permit actions

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the Permittee) or upon Ecology's initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 40 CFR 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

1. The following are causes for terminating this permit during its term, or for denying a permit renewal application:
   a. Violation of any permit term or condition.
   b. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.
   c. A material change in quantity or type of waste disposal.
   d. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination.

e. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or sludge use or disposal practice controlled by the permit.

f. Nonpayment of fees assessed pursuant to RCW 90.48.465.

g. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

2. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:

   a. A material change in the condition of the waters of the state.

   b. New information not available at the time of permit issuance that would have justified the application of different permit conditions.

   c. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.

   d. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.

   e. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.

   f. Ecology has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.

   g. Incorporation of an approved local pretreatment program into a municipality's permit.

3. The following are causes for modification or alternatively revocation and reissuance:

   a. When cause exists for termination for reasons listed in 1.a through 1.g of this section, and Ecology determines that modification or revocation and reissuance is appropriate.

   b. When Ecology has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G7) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. Reporting planned changes

The Permittee must, as soon as possible, but no later than one hundred eighty (180) days prior to the proposed changes, give notice to Ecology of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in:

1. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b).
2. A significant change in the nature or an increase in quantity of pollutants discharged.

3. A significant change in the Permittee's sludge use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G5. Plan review required

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications must be submitted to Ecology for approval in accordance with chapter 173-240 WAC. Engineering reports, plans, and specifications must be submitted at least one hundred eighty (180) days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities must be constructed and operated in accordance with the approved plans.

G6. Compliance with other laws and statutes

Nothing in this permit excuses the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. Transfer of this permit

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee must notify the succeeding owner or controller of the existence of this permit by letter, a copy of which must be forwarded to Ecology.

1. Transfers by Modification

   Except as provided in paragraph (2) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

2. Automatic Transfers

   This permit may be automatically transferred to a new Permittee if:

   a. The Permittee notifies Ecology at least thirty (30) days in advance of the proposed transfer date.

   b. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.

   c. Ecology does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G8. Reduced production for compliance

The Permittee, in order to maintain compliance with its permit, must control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G9. Removed substances

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G10. Duty to provide information

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology upon request, copies of records required to be kept by this permit.

G11. Other requirements of 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. Additional monitoring

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. Payment of fees

The Permittee must submit payment of fees associated with this permit as assessed by Ecology.

G14. Penalties for violating permit conditions

Any person who is found guilty of willfully violating the terms and conditions of this permit is deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit may incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is deemed to be a separate and distinct violation.

G15. Upset

Definition – "Upset" means 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, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limits if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the Permittee can identify the cause(s) of the upset.
2. The permitted facility was being properly operated at the time of the upset.
3. The Permittee submitted notice of the upset as required in Special Condition S3.F.
4. The Permittee complied with any remedial measures required under S3.F of this permit.

In any enforcement action the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. Property rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. Duty to comply

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. Toxic pollutants

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. Penalties for tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment shall be a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or by both.

G20. Compliance schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than fourteen (14) days following each schedule date.

G21. Service agreement review

The Permittee must submit to Ecology any proposed service agreements and proposed revisions or updates to existing agreements for the operation of any wastewater treatment facility covered by this permit. The review is to ensure consistency with chapters 90.46 and 90.48 RCW as required by RCW 70.150.040(9). In the event that Ecology does not comment within a thirty-day (30) period, the Permittee may assume consistency and proceed with the service agreement or the revised/updated service agreement.

Appendix A

LIST OF POLLUTANTS WITH ANALYTICAL METHODS, DETECTION LIMITS AND QUANTITATION LEVELS

The Permittee must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table for permit and application required monitoring unless:

- Another permit condition specifies other methods, detection levels, or quantitation levels.
- The method used produces measurable results in the sample and EPA has listed it as an EPA-approved method in 40 CFR Part 136.

If the Permittee uses an alternative method, not specified in the permit and as allowed above, it must report the test method, DL, and QL on the discharge monitoring report or in the required report.

If the Permittee is unable to obtain the required DL and QL in its effluent due to matrix effects, the Permittee must submit a matrix-specific detection limit (MDL) and a quantitation limit (QL) to Ecology with appropriate laboratory documentation.

When the permit requires the Permittee to measure the base neutral compounds in the list of priority pollutants, it must measure all of the base neutral pollutants listed in the table below. The list includes EPA required base neutral priority pollutants and several additional polynuclear aromatic hydrocarbons (PAHs). The Water Quality Program added several PAHs to the list of base neutrals below from Ecology's Persistent Bioaccumulative Toxics (PBT) List. It only added those PBT parameters of interest to Appendix A that did not increase the overall cost of analysis unreasonably.

Ecology added this appendix to the permit in order to reduce the number of analytical "non-detects" in permit-required monitoring and to measure effluent concentrations near or below criteria values where possible at a reasonable cost.

The lists below include conventional pollutants (as defined in CWA section 502(6) and 40 CFR Part 122.), toxic or priority pollutants as defined in CWA section 307(a)(1) and listed in 40 CFR Part 122 Appendix D, 40 CFR Part 401.15 and 40 CFR Part 423 Appendix A), and nonconventionals. 40 CFR Part 122 Appendix D (Table V) also identifies toxic pollutants and hazardous substances which are required to be reported by dischargers if expected to be present. This permit Appendix A list does not include those parameters.

CONVENTIONAL POLLUTANTS

Pollutant	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
Biochemical Oxygen Demand		SM5210-B		2 mg/L
Biochemical Oxygen Demand, Soluble		SM5210-B [3]		2 mg/L
Fecal Coliform		SM 9221E,9222	N/A	Specified in method - sample aliquot dependent
Oil and Grease (HEM) (Hexane Extractable Material)		1664 A or B	1,400	5,000
pH		SM4500-H^+ B	N/A	N/A
Total Suspended Solids		SM2540-D		5 mg/L

NONCONVENTIONAL POLLUTANTS

Pollutant & CAS No. (if available)	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] µg/L unless specified	Quantitation Level (QL)[2] µg/L unless specified
Alkalinity, Total		SM2320-B		5 mg/L as CaCO3
Aluminum, Total	7429-90-5	200.8	2.0	10
Ammonia, Total (as N)		SM4500-NH3-B and C/D/E/G/H		20
Barium Total	7440-39-3	200.8	0.5	2.0
BTEX (benzene +toluene + ethylbenzene + m,o,p xylenes)		EPA SW 846 8021/8260	1	2
Boron, Total	7440-42-8	200.8	2.0	10.0
Chemical Oxygen Demand		SM5220-D		10 mg/L
Chloride		SM4500-Cl B/C/D/E and SM4110 B		Sample and limit dependent
Chlorine, Total Residual		SM4500 Cl G		50.0
Cobalt, Total	7440-48-4	200.8	0.05	0.25
Color		SM2120 B/C/E		10 color units
Dissolved oxygen		SM4500-OC/OG		0.2 mg/L
Flow		Calibrated device		
Fluoride	16984-48-8	SM4500-F E	25	100
Hardness, Total		SM2340B		200 as CaCO3
Iron, Total	7439-89-6	200.7	12.5	50
Magnesium, Total	7439-95-4	200.7	10	50
Manganese, Total	7439-96-5	200.8	0.1	0.5
Molybdenum, Total	7439-98-7	200.8	0.1	0.5
Nitrate + Nitrite Nitrogen (as N)		SM4500-NO3- E/F/H		100
Nitrogen, Total Kjeldahl (as N)		SM4500-N_{org}B/C and SM4500NH_3-B/C/D/EF/G/H		300
NWTPH Dx [4]		Ecology NWTPH Dx	250	250
NWTPH Gx [5]		Ecology NWTPH Gx	250	250
Phosphorus, Total (as P)		SM 4500 PB followed by SM4500-PE/PF	3	10
Salinity		SM2520-B		3 practical salinity units or scale (PSU or PSS)

Exhibit A

NONCONVENTIONAL POLLUTANTS

Pollutant & CAS No. (if available)	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] µg/L unless specified	Quantitation Level (QL)[2] µg/L unless specified
Settleable Solids		SM2540 -F		Sample and limit dependent
Soluble Reactive Phosphorus (as P)		SM4500-P E/F/G	3	10
Sulfate (as mg/L SO_4)		SM4110-B		0.2 mg/L
Sulfide (as mg/L S)		SM4500-S^2F/D/E/G		0.2 mg/L
Sulfite (as mg/L SO_3)		SM4500-SO3B		2 mg/L
Temperature (max. 7-day avg.)		Analog recorder or use micro-recording devices known as thermistors		0.2º C
Tin, Total	7440-31-5	200.8	0.3	1.5
Titanium, Total	7440-32-6	200.8	0.5	2.5
Total Coliform		SM 9221B, 9222B, 9223B	N/A	Specified in method - sample aliquot dependent
Total Organic Carbon		SM5310-B/C/D		1 mg/L
Total dissolved solids		SM2540 C		20 mg/L

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
METALS, CYANIDE & TOTAL PHENOLS					
Antimony, Total	114	7440-36-0	200.8	0.3	1.0
Arsenic, Total	115	7440-38-2	200.8	0.1	0.5
Beryllium, Total	117	7440-41-7	200.8	0.1	0.5
Cadmium, Total	118	7440-43-9	200.8	0.05	0.25
Chromium (hex) dissolved	119	18540-29-9	SM3500-Cr C	0.3	1.2
Chromium, Total	119	7440-47-3	200.8	0.2	1.0
Copper, Total	120	7440-50-8	200.8	0.4	2.0
Lead, Total	122	7439-92-1	200.8	0.1	0.5
Mercury, Total	123	7439-97-6	1631E	0.0002	0.0005
Nickel, Total	124	7440-02-0	200.8	0.1	0.5
Selenium, Total	125	7782-49-2	200.8	1.0	1.0
Silver, Total	126	7440-22-4	200.8	0.04	0.2
Thallium, Total	127	7440-28-0	200.8	0.09	0.36
Zinc, Total	128	7440-66-6	200.8	0.5	2.5
Cyanide, Total	121	57-12-5	335.4	5	10
Cyanide, Weak Acid Dissociable	121		SM4500-CN I	5	10
Cyanide, Free Amenable to Chlorination (Available Cyanide)	121		SM4500-CN G	5	10
Phenols, Total	65		EPA 420.1		50

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
ACID COMPOUNDS					
2-Chlorophenol	24	95-57-8	625.1	3.3	9.9
2,4-Dichlorophenol	31	120-83-2	625.1	2.7	8.1
2,4-Dimethylphenol	34	105-67-9	625.1	2.7	8.1
4,6-dinitro-o-cresol (2-methyl-4,6,-dinitrophenol)	60	534-52-1	625.1/1625B	24	72
2,4 dinitrophenol	59	51-28-5	625.1	42	126
2-Nitrophenol	57	88-75-5	625.1	3.6	10.8
4-Nitrophenol	58	100-02-7	625.1	2.4	7.2
Parachlorometa cresol (4-chloro-3-methylphenol)	22	59-50-7	625.1	3.0	9.0
Pentachlorophenol	64	87-86-5	625.1	3.6	10.8
Phenol	65	108-95-2	625.1	1.5	4.5
2,4,6-Trichlorophenol	21	88-06-2	625.1	2.7	8.1

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
VOLATILE COMPOUNDS					
Acrolein	2	107-02-8	624.1	5	10
Acrylonitrile	3	107-13-1	624.1	1.0	2.0
Benzene	4	71-43-2	624.1	4.4	13.2
Bromoform	47	75-25-2	624.1	4.7	14.1
Carbon tetrachloride	6	56-23-5	624.1/601 or SM6230B	2.8	8.4
Chlorobenzene	7	108-90-7	624.1	6.0	18.0
Chloroethane	16	75-00-3	624.1 or 601	1.0	2.0
2-Chloroethylvinyl Ether	19	110-75-8	624.1	1.0	2.0
Chloroform	23	67-66-3	624.1 or SM6210B	1.6	4.8
Dibromochloromethane (chlordibromomethane)	51	124-48-1	624.1	3.1	9.3
1,2-Dichlorobenzene	25	95-50-1	624.1	1.9	7.6
1,3-Dichlorobenzene	26	541-73-1	624.1	1.9	7.6
1,4-Dichlorobenzene	27	106-46-7	624.1	4.4	17.6
Dichlorobromomethane	48	75-27-4	624.1	2.2	6.6
1,1-Dichloroethane	13	75-34-3	624.1	4.7	14.1
1,2-Dichloroethane	10	107-06-2	624.1	2.8	8.4
1,1-Dichloroethylene	29	75-35-4	624.1	2.8	8.4
1,2-Dichloropropane	32	78-87-5	624.1	6.0	18.0
1,3-dichloropropene (mixed isomers) (1,2-dichloropropylene) [6]	33	542-75-6	624.1	5.0	15.0
Ethylbenzene	38	100-41-4	624.1	7.2	21.6
Methyl bromide (Bromomethane)	46	74-83-9	624.1 or 601	5.0	10.0
Methyl chloride (Chloromethane)	45	74-87-3	624.1	1.0	2.0
Methylene chloride	44	75-09-2	624.1	2.8	8.4
1,1,2,2-Tetrachloroethane	15	79-34-5	624.1	6.9	20.7
Tetrachloroethylene	85	127-18-4	624.1	4.1	12.3
Toluene	86	108-88-3	624.1	6.0	18.0
1,2-Trans-Dichloroethylene (Ethylene dichloride)	30	156-60-5	624.1	1.6	4.8
1,1,1-Trichloroethane	11	71-55-6	624.1	3.8	11.4

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL) [2] *µg/L unless specified***
VOLATILE COMPOUNDS					
1,1,2-Trichloroethane	14	79-00-5	624.1	5.0	15.0
Trichloroethylene	87	79-01-6	624.1	1.9	5.7
Vinyl chloride	88	75-01-4	624.1 or SM6200B	1.0	2.0

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL) [2] *µg/L unless specified***
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)					
Acenaphthene	1	83-32-9	625.1	1.9	5.7
Acenaphthylene	77	208-96-8	625.1	3.5	10.5
Anthracene	78	120-12-7	625.1	1.9	5.7
Benzidine	5	92-87-5	625.1	44	132
Benzyl butyl phthalate	67	85-68-7	625.1	2.5	7.5
Benzo(*a*)anthracene	72	56-55-3	625.1	7.8	23.4
Benzo(b)fluoranthene (3,4-benzofluoranthene) [7]	74	205-99-2	610/625.1	4.8	14.4
Benzo(j)fluoranthene [7]		**205-82-3**	625.1	0.5	1.0
Benzo(k)fluoranthene (11,12-benzofluoranthene) [7]	75	207-08-9	610/625.1	2.5	7.5
Benzo(b,j,k)fluoranthene (combined according to footnote 7) [7]			625.1	7.8	22.9
Benzo(r,s,t)pentaphene		**189-55-9**	625.1	1.3	5.0
Benzo(*a*)pyrene	73	50-32-8	610/625.1	2.5	7.5
Benzo(*ghi*)Perylene	79	191-24-2	610/625.1	4.1	12.3
Bis(*2-chloroethoxy)*methane	43	111-91-1	625.1	5.3	15.9
Bis(*2-chloroethyl*)ether	18	111-44-4	611/625.1	5.7	17.1
Bis(*2-chloroisopropyl*)ether	42	39638-32-9	625.1	0.5	1.0
Bis(*2-ethylhexyl*)phthalate	66	117-81-7	625.1	2.5	7.5
4-Bromophenyl phenyl ether	41	101-55-3	625.1	1.9	5.7
2-Chloronaphthalene	20	91-58-7	625.1	1.9	5.7
4-Chlorophenyl phenyl ether	40	7005-72-3	625.1	4.2	12.6
Chrysene	76	218-01-9	610/625.1	2.5	7.5
Dibenzo (a,h)acridine		**226-36-8**	610M/625M	2.5	10.0
Dibenzo (a,j)acridine		**224-42-0**	610M/625M	2.5	10.0
Dibenzo(a-*h*)anthracene (1,2,5,6-dibenzanthracene)	82	53-70-3	625.1	2.5	7.5
Dibenzo(a,e)pyrene		192-65-4	610M/625M	2.5	10.0
Dibenzo(a,h)pyrene		189-64-0	625M	2.5	10.0
3,3-Dichlorobenzidine	28	91-94-1	605/625.1	16.5	49.5
Diethyl phthalate	70	84-66-2	625.1	1.9	5.7
Dimethyl phthalate	71	131-11-3	625.1	1.6	4.8
Di-n-butyl phthalate	68	84-74-2	625.1	2.5	7.5
2,4-dinitrotoluene	35	121-14-2	609/625.1	5.7	17.1
2,6-dinitrotoluene	36	606-20-2	609/625.1	1.9	5.7
Di-n-octyl phthalate	69	117-84-0	625.1	2.5	7.5
1,2-Diphenylhydrazine (*as Azobenzene*)	37	122-66-7	1625B	5.0	20
Fluoranthene	39	206-44-0	625.1	2.2	6.6
Fluorene	80	86-73-7	625.1	1.9	5.7
Hexachlorobenzene	9	118-74-1	612/625.1	1.9	5.7
Hexachlorobutadiene	52	87-68-3	625.1	0.9	2.7

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)					
Hexachlorocyclopentadiene	53	77-47-4	1625B/625	2.0	4.0
Hexachloroethane	12	67-72-1	625.1	1.6	4.8
Indeno(*1,2,3-cd*)Pyrene	83	193-39-5	610/625.1	3.7	11.1
Isophorone	54	78-59-1	625.1	2.2	6.6
3-Methyl cholanthrene		**56-49-5**	625.1	2.0	8.0
Naphthalene	55	91-20-3	625.1	1.6	4.8
Nitrobenzene	56	98-95-3	625.1	1.9	5.7
N-Nitrosodimethylamine	61	62-75-9	607/625.1	2.0	4.0
N-Nitrosodi-n-propylamine	63	621-64-7	607/625.1	0.5	1.0
N-Nitrosodiphenylamine	62	86-30-6	625.1	1.0	2.0
Perylene		**198-55-0**	625.1	1.9	7.6
Phenanthrene	81	85-01-8	625.1	5.4	16.2
Pyrene	84	129-00-0	625.1	1.9	5.7
1,2,4-Trichlorobenzene	8	120-82-1	625.1	1.9	5.7

PRIORITY POLLUTANT	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
DIOXIN					
2,3,7,8-Tetra-Chlorodibenzo-P-Dioxin (2,3,7,8 TCDD)	129	1746-01-6	1613B	1.3 pg/L	5 pg/L

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
PESTICIDES/PCBs					
Aldrin	89	309-00-2	608.3	4.0 ng/L	12 ng/L
alpha-BHC	102	319-84-6	608.3	3.0 ng/L	9.0 ng/L
beta-BHC	103	319-85-7	608.3	6.0 ng/L	18 ng/L
gamma-BHC (Lindane)	104	58-89-9	608.3	4.0 ng/L	12 ng/L
delta-BHC	105	319-86-8	608.3	9.0 ng/L	27 ng/L
Chlordane [8]	91	57-74-9	608.3	14 ng/L	42 ng/L
4,4'-DDT	92	50-29-3	608.3	12 ng/L	36 ng/L
4,4'-DDE	93	72-55-9	608.3	4.0 ng/L	12 ng/L
4,4' DDD	94	72-54-8	608.3	11ng/L	33 ng/L
Dieldrin	90	60-57-1	608.3	2.0 ng/L	6.0 ng/L
alpha-Endosulfan	95	959-98-8	608.3	14 ng/L	42 ng/L
beta-Endosulfan	96	33213-65-9	608.3	4.0 ng/L	12 ng/L
Endosulfan Sulfate	97	1031-07-8	608.3	66 ng/L	198 ng/L
Endrin	98	72-20-8	608.3	6.0 ng/L	18 ng/L
Endrin Aldehyde	99	7421-93-4	608.3	23 ng/L	70 ng/L
Heptachlor	100	76-44-8	608.3	3.0 ng/L	9.0 ng/L
Heptachlor Epoxide	101	1024-57-3	608.3	83 ng/L	249 ng/L
PCB-1242 [9]	106	53469-21-9	608.3	0.065	0.095
PCB-1254	107	11097-69-1	608.3	0.065	0.095
PCB-1221	108	11104-28-2	608.3	0.065	0.095
PCB-1232	109	11141-16-5	608.3	0.065	0.095
PCB-1248	110	12672-29-6	608.3	0.065	0.095
PCB-1260	111	11096-82-5	608.3	0.065	0.095
PCB-1016 [9]	112	12674-11-2	608.3	0.065	0.095
Toxaphene	113	8001-35-2	608.3	240 ng/L	720 ng/L

1. Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR part 136, Appendix B.

2. Quantitation Level (QL) also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard or a multiple of the method detection limit. The Permittee must ensure that the analytical lab derives QLs for each analyte according to the procedures documented in the specific analytical method used by the lab.
ALSO GIVEN AS:
The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency, December 2007).

3. Soluble Biochemical Oxygen Demand method note: First, filter the sample through a Millipore Nylon filter (or equivalent) - pore size of 0.45-0.50 um (prep all filters by filtering 250 ml of laboratory grade deionized water through the filter and discard). Then, analyze sample as per method 5210-B.

4. NWTPH Dx - Northwest Total Petroleum Hydrocarbons Diesel Extended Range – see http://www.ecy.wa.gov/biblio/97602.html

5. NWTPH Gx - Northwest Total Petroleum Hydrocarbons Gasoline Extended Range – see http://www.ecy.wa.gov/biblio/97602.html

6. 1, 3-dichloroproylene (mixed isomers) - You may report this parameter as two separate parameters: cis-1, 3-dichlorpropropene (10061-01-5) and trans-1, 3-dichloropropene (10061-02-6).

7. Total Benzofluoranthenes - Because Benzo(b)fluoranthene, Benzo(j)fluoranthene and Benzo(k)fluoranthene co-elute you may report these three isomers as total benzofluoranthenes.

8. Chlordane – You may report alpha-chlordane (5103-71-9) and gamma-chlordane (5103-74-2) in place of chlordane (57-74-9). If you report alpha and gamma-chlordane, the DL/PQLs that apply are 14/42 ng/L.

9. PCB 1016 & PCB 1242 – You may report these two PCB compounds as one parameter called PCB 1016/1242.

EXHIBIT B

Issuance Date:	July 1, 2015
Effective Date:	August 1,2015
Expiration Date:	July 31, 2020

National Pollutant Discharge Elimination System
Waste Discharge Permit No. WA0029581

State of Washington
DEPARTMENT OF ECOLOGY
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1342 et seq.

King County Wastewater Treatment Division
King Street Center, KSC-NR-0512
Seattle, Washington 98104-3855

is authorized to discharge in accordance with the Special and General Conditions that follow.

Plant Location:
King County South Wastewater Treatment Plant
1200 Monster Road SW
Renton, WA 98057

Receiving Water:
Puget Sound – Central

Treatment Type:
Activated Sludge with chlorine disinfection

Kevin C. Fitzpatrick
Water Quality Section Manager
Northwest Regional Office
Washington State Department of Ecology

Exhibit B

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Appendix A 40

Summary of Permit Report Submittals

Refer to the Special and General Conditions of this permit for additional submittal requirements.

Permit Section	Submittal	Frequency	First Submittal Date
S3.A	Discharge Monitoring Report (DMR)	Monthly	September 15, 2015
S3.A	Permit application and priority pollutant data in WQWebDMR	Annually	July 31, 2016
S3.F	Reporting Permit Violations	As necessary	
S4.B	Plans for Maintaining Adequate Capacity	As necessary	
S4.D	Notification of New or Altered Sources	As necessary	
S4.E	Wasteload Assessment	1/permit cycle	October 31, 2018
S5.F	Bypass Notification	As necessary	
S5.G	Operations and Maintenance Manual Update	As necessary	
S6.A.4	Pretreatment Report	1/year	April 30, 2016
S8	Spill Control Plan Update	As necessary	
S9.A	Sediment Sampling and Analysis Plan	1/permit cycle	December 1, 2016
S9.B	Sediment Data Report	1/permit cycle	December 1, 2018
S10.A	Acute Toxicity Effluent Test Results - Submit with Permit Renewal Application	2 tests/permit cycle, 1 submittal/permit cycle	Tests: 2018, 1st and 3rd quarters. Submittal: July 31, 2019
S11.A	Chronic Toxicity Effluent Test Results with Permit Renewal Application	2 tests/permit cycle, 1 submittal/permit cycle	Tests: 2018, 2nd and 4th quarters. Submittal: July 31, 2019
S13	Application for Permit Renewal	1/permit cycle	July 31, 2019
G4	Reporting Planned Changes	As necessary	
G5	Engineering Report for Construction or Modification Activities	As necessary	

Special Conditions

S1. Discharge limits

S1.A. Effluent limits

Puget Sound (Marine) Outfall No. 001

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit violates the terms and conditions of this permit.

Beginning on the effective date of this permit, the Permittee may discharge treated municipal wastewater to the Puget Sound at the permitted locations subject to compliance with the following limits:

Effluent Limits: Outfall 001 (Puget Sound) *North Diffuser Lat/Long:* 47.602778˚, -122.429000˚ *South Diffuser Lat/Long:* 47.599722˚, -122.429028˚		
Parameter	**Average Monthly** [a]	**Average Weekly** [b]
Carbonaceous Biochemical Oxygen Demand (5-day) ($CBOD_5$)	25 milligrams/liter (mg/L) 30,000 pounds/day (lbs/day) 85% removal of influent $CBOD_5$	40 mg/L 48,000 lbs/day
Total Suspended Solids (TSS)	30 mg/L 36,000 lbs/day 85% removal of influent TSS	45 mg/L 54,000 lbs/day
	Average Monthly	**Maximum Daily** [c]
Total Residual Chlorine	500 µg/L	750 µg/L
	Instantaneous Minimum	**Instantaneous Maximum**
pH [d]	6.0 standard units	9.0 standard units
	Monthly Geometric Mean	**Weekly Geometric Mean**
Fecal Coliform Bacteria [e]	200/100 milliliter (mL)	400/100 mL

[a] Average monthly effluent limit is the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

[b] Average weekly discharge limit is the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

[c] Maximum daily effluent limit is the highest allowable daily discharge. The daily discharge is the average discharge of a pollutant measured during a calendar day. This does not apply to pH.

[d] Report the instantaneous maximum and minimum pH monthly. Do not average pH values.

[e] Ecology provides directions to calculate the monthly and the weekly geometric mean in publication No. 04-10-020, *Information Manual for Treatment Plant Operators* available at: http://www.ecy.wa.gov/pubs/0410020.pdf

Green River (Freshwater) - Outfall No. 002

Beginning on the effective date of this permit and lasting through the expiration date, the Permittee is authorized to discharge treated municipal wastewater at the Green River outfall for maintenance purposes only under the following conditions:

1. The Permittee must obtain approval from Ecology at least five (5) working days in advance of the discharging to the Green River for maintenance purposes.
2. The duration of the discharge must not exceed four (4) hours.
3. The discharge must comply with the limits specified below.

Effluent Limits: Outfall 002A (Green River) *Lat/Long:* 47.467500˚, -122.244167˚	
Parameter	**Maximum Daily** [1]
Effluent Flow, MGD [2]	Must be less than or equal to: 0.25 * Green River Flow (MGD) / 5
$CBOD_5$	20 mg/L
Total Suspended Solids	20 mg/L
Total Residual Chlorine	95 µg/L
pH	Shall not be outside the range 6.0 to 9.0
	Maximum Geometric Mean
Fecal Coliform	200/100 mL

[1] Maximum daily effluent limit is the highest allowable daily discharge. In this case, the daily discharge is the average measurement over the discharge duration.

[2] Effluent flow limit is based on a dilution factor of 5, which is required to assure compliance with water quality criteria.

4. The Permittee may only discharge when the Green River flow is greater than 500 cfs.
5. The Permittee must treat any maintenance discharges to the Green River using secondary treatment, disinfection, and dechlorination.
6. The Permittee must monitor the discharge as required in S2.A to ensure that effluent limits are met.
7. The Permittee must sample receiving water turbidity as detailed in S2.A.
8. Any discharge from the treatment plant that results in water quality violations or contributes significantly to a fish kill is a violation of this permit.
9. The Permittee may only discharge, as a result of maintenance activities, during the out-going tide (after a high tide and before the subsequent low tide).
10. The Permittee should consider fish migration patterns when scheduling maintenance discharges.

S1.B. Mixing zone authorization

Outfall 001 – Puget Sound (marine)

The following paragraphs define the maximum boundaries of the mixing zones:

Chronic mixing zone

The chronic mixing zone consists of circles surrounding each discharge port with radii of 825 feet measured from the center of each port. The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the chronic zone must meet chronic aquatic life criteria and human health criteria.

Acute mixing zone

The extended acute mixing zone consists of circles surrounding each discharge port with radii of 82 feet measured from the center of each port. The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the acute zone must meet acute aquatic life criteria.

Outfall 001 - Available Dilution (dilution factor)	
Acute Aquatic Life Criteria	186
Chronic Aquatic Life Criteria	225
Human Health Criteria - Carcinogen	428
Human Health Criteria - Non-carcinogen	428

Outfall 002 – Green River (freshwater)

The Green River outfall is used as an emergency/backup outfall and is permitted for maintenance purposes only; emergency discharges from this outfall are permitted under S5.F. No chronic mixing zone is granted because maintenance discharges are permitted for durations of 4 hours or less.

Acute mixing zone

The acute mixing zone encompasses 25% of the river flow in accordance with WAC 173-201A-400(12). The resulting dilution factor is 5.0. The mixing zone extends 100 feet upstream, 300 feet downstream, and from the bottom to the top of the water column. The concentration of pollutants at the edge of the acute zone must meet acute aquatic life criteria.

Outfall 002 - Available Dilution (dilution factor)	
Chronic Dilution Ratio*	Not Applicable
Acute Dilution Ratio	5.0:1

* Maintenance discharges are permitted for durations of 4 hours or less and therefore a chronic dilution factor is not applicable.

S2. Monitoring requirements

S2.A. Monitoring schedules

The Permittee must monitor in accordance with the following schedules and must use the laboratory method, detection level (DL), and quantitation level (QL) specified in Appendix A or corresponding Sampling Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) documents. Alternative methods from 40 CFR Part 136 are acceptable for those parameters without limits, and if the DL and QL are equivalent to those specified in Appendix A, corresponding SAP/QAPP documents, or sufficient to produce a measurable quantity.

Monitoring Requirements for Outfall 001 – Puget Sound

Parameter	Units	Minimum Sampling Frequency	Sample Type
(1) Wastewater influent (raw sewage from the collection system into the treatment facility)			
BOD_5	mg/L	1/week	24-hour composite [a]
	lbs/day [b]	1/week	Calculation
$CBOD_5$	mg/L	4/week	24-hour composite
	lbs/day [b]	4/week	Calculation
TSS	mg/L	4/week	24-hour composite
	lbs/day [b]	4/week	Calculation
(2) Final wastewater effluent (wastewater exiting the last treatment process or operation)			
Flow	MGD	Continuous [c]	Metered/recorded
$CBOD_5$ [d]	mg/L	4/week	24-hour composite
	lbs/day [b]	4/week	Calculation
	% removal [e]	Monthly	Calculation
TSS	mg/L	4/week	24-hour composite
	lbs/day [b]	4/week	Calculation
	% removal [e]	Monthly	Calculation
Chlorine (Total Residual)	µg/L	Continuous	Metered/recorded
Fecal Coliform [f]	# /100 ml	5/week	Grab [g]
pH [h]	Standard Units	Continuous	Metered/recorded
Total Ammonia	mg/L as N	Monthly	24-hour composite
	lbs/day [b]	Monthly	Calculation
Nitrate plus Nitrite Nitrogen	mg/L as N	Monthly	24-hour composite
Total Kjeldahl Nitrogen (TKN)	mg/L as N	Monthly	24-hour composite
Total Phosphorus	mg/L as P	Monthly	24-hour composite
Soluble Reactive Phosphorus	mg/L as P	Monthly	24-hour composite
Cyanide	micrograms/liter (µg/L)	2/year: Aug & Jan	Grab

Parameter	Units	Minimum Sampling Frequency	Sample Type
Total Phenolic Compounds	µg/L	2/year: Aug & Jan	Grab
Priority Pollutants (PP) – Total Metals [i]	µg/L ng/L for mercury	2/year: Aug & Jan	24-hour composite Grab for mercury
PP – Volatile Organic Compounds [i]	µg/L	2/year: Aug & Jan	Grab
PP – Acid-extractable Compounds [i]	µg/L	2/year: Aug & Jan	24-hour composite
PP – Base-neutral Compounds [i]	µg/L	2/year: Aug & Jan	24-hour composite
PP – PCBs [i]	µg/L	2/year: Aug & Jan	24-hour composite
(3) Whole effluent toxicity testing – As specified in Permit Conditions S10 & S11			
Acute Toxicity Testing		2/permit cycle	24-hour composite
Chronic Toxicity Testing		2/permit cycle	24-hour composite
(4) Pretreatment - As specified in Permit Condition S6			
(5) Permit Application Requirements – Final Wastewater Effluent			
Dissolved Oxygen	mg/L	1/year in Aug	Grab
Oil and Grease (HEM)	mg/L	1/year in Aug	Grab
Total Dissolved Solids	mg/L	1/year in Aug	24-hour composite
Total Hardness	mg/L	1/year in Aug	24-hour composite
Alkalinity	mg/L as $CaCO_3$	1/year in Aug	Grab
Temperature	˚C	1/year in Aug	Grab
(6) Sediment - As specified in Permit Condition S9			

[a] 24-hour composite means a series of individual samples collected over a 24-hour period into a single container, and analyzed as one sample.

[b] lbs/day = Concentration (in mg/L) x Flow (in MGD) x Conversion Factor (8.34). Calculate using the average flow measured during the sample collection period.

[c] "Continuous" means uninterrupted except for brief lengths of time for calibration, power failure, or unanticipated equipment repair or maintenance. The time interval for the associated data logger must be no greater than 30 minutes. The Permittee must sample every six hours when continuous monitoring is not possible.

[d] Effluent samples for $CBOD_5$ analysis may be taken before or after the disinfection process. If taken after, dechlorinate and reseed the sample.

[e] $$\% \text{ removal} = \frac{\text{Influent monthly average conc. (mg/L)} - \text{Effluent monthly average conc. (mg/L)}}{\text{Influent monthly average concentration (mg/L)}} \times 100$$

[f] Report a numerical value for fecal coliforms following the procedures in Ecology's *Information Manual for Wastewater Treatment Plant Operators*, Publication Number 04-10-020 available at: http://www.ecy.wa.gov/programs/wq/permits/guidance.html. Do not report a result as too numerous to count (TNTC).

[g] Grab means an individual sample collected over a fifteen (15) minute, or less, period.

[h] Report the instantaneous maximum and minimum pH daily. Do not average pH values.

[i] Record and report the effluent flow discharged on the day of the priority pollutant samples.
See Appendix A or corresponding SAP/QAPP for the required detection (DL) or quantitation (QL) levels.
Report single analytical values below detection as "less than (detection level)" where (detection level) is the numeric value specified in Appendix A.
Report single analytical values between the detection and quantitation levels with qualifier code of 'j' following the value. If unable to obtain the required DL and QL due to matrix effects, the Permittee must submit a matrix specific MDL and a QL with appropriate laboratory documentation.

Monitoring Requirements for Outfall 002A – Green River

Parameter	Units	Minimum Sampling Frequency	Sample Type
(1) Wastewater Final Effluent (wastewater exiting the last treatment process or operation)			
Effluent Flow - maximum	MGD	Continuous	Metered/recorded
Duration	Hours	Once per event	Measurement
$CBOD_5$	mg/L	Once per event	Composite of equal volume grab samples during event
TSS	mg/L	Once per event	Composite of equal volume grab samples during event
pH	s.u.	Continuous	Metered/recorded
Fecal Coliform	# /100 ml	Once per event	Grab
Total Residual Chlorine	µg/L	Continuous	Metered/recorded
Dilution Factor *	None	Once per event	Calculated
(2) Downstream of Discharge - 300 feet			
River Flow	cfs	Once per event	Measurement
Turbidity	NTU	Once per event	Grab
(3) Upstream of Discharge			
Turbidity	NTU	Once per event	Grab

* Dilution Factor = [0.25 * River Flow, MGD] / [Effluent Flow, MGD], report as comment on DMR

S2.B. *Sampling and analytical procedures*

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters. The Permittee must conduct representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions that may affect effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 (or as applicable in 40 CFR subchapters N [Parts 400–471] or O [Parts 501-503]) unless otherwise specified in this permit . Ecology may only specify alternative methods for parameters without permit limits and for those parameters without an EPA approved test method in 40 CFR Part 136.

S2.C. *Flow measurement and continuous monitoring devices*

The Permittee must:

1. Select and use appropriate flow measurement and continuous monitoring devices and methods consistent with accepted scientific practices.

2. Install, calibrate, and maintain these devices to ensure the accuracy of the measurements is consistent with the accepted industry standard, the manufacturer's recommendation, and approved O&M manual procedures for the device and the wastestream.
3. Calibrate continuous monitoring instruments consistent with the manufacturer's recommendation.
4. Maintain calibration records for at least three years.

S2.D. Laboratory accreditation

The Permittee must ensure that all monitoring data required by Ecology for permit specified parameters is prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. Flow and internal process control parameters are exempt from this requirement.

S3. Reporting and recording requirements

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

S3.A. Discharge monitoring reports

The first monitoring period begins on the effective date of the permit. Permittee must:

1. Summarize, report, and submit monitoring data obtained during each monitoring period on the electronic discharge monitoring report (DMR) form provided by Ecology within the Water Quality Permitting Portal. Include data for each of the parameters tabulated in Special Condition S2 and as required by the form. Report a value for each day sampling occurred and for the summary values (when applicable) included on the electronic form.

   To find out more information and to sign up for the Water Quality Permitting Portal go to: http://www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html
2. Enter the "No Discharge" reporting code for an entire DMR, for a specific monitoring point, or for a specific parameter as appropriate, if the Permittee did not discharge wastewater or a specific pollutant during a given monitoring period.
3. Report single analytical values below detection as "less than the detection level (DL)" by entering < followed by the numeric value of the detection level (e.g. < 2.0) on the DMR. If the method used did not meet the minimum DL and quantitation level (QL) identified in the permit, report the actual QL and DL in the comments or in the location provided.
4. **Not** report zero for bacteria monitoring. Report as required by the laboratory method.
5. Calculate the geometric mean values for bacteria using:

a. The reported numeric value for all bacteria samples measured above the detection value except when it took multiple samples in one day. If the Permittee takes multiple samples in one day it must use the arithmetic average for that day in the geometric mean calculation.

b. The detection value for those samples measured below detection.

6. Report the test method used for analysis in the comments if the laboratory used an alternative method not specified in the permit and as allowed in Appendix A.

7. Calculate average values and total values (unless otherwise specified in the permit) using:

   a. The reported numeric value for all parameters measured between the agency-required detection value and the agency-required quantitation value.

   b. One-half the detection value (for values reported below detection) if the lab detected the parameter in another sample from the same monitoring point for the reporting period.

   c. Zero (for values reported below detection) if the lab did not detect the parameter in another sample for the reporting period.

8. Report single-sample grouped parameters (for example: priority pollutants) on the WQWebDMR form and include sample date, concentration detected, detection limit (DL) (as necessary), laboratory quantitation level (QL) (as necessary), and CAS number. The Permittee must also submit an electronic copy of the laboratory report as an attachment using WQWebDMR. The contract laboratory reports must also include information on the chain of custody, QA/QC results, and documentation of accreditation for the parameter.

9. Ensure that DMRs are electronically submitted no later than the dates specified below, unless otherwise specified in this permit.

10. Submit DMRs in WQWebDMR for parameters with the monitoring frequencies specified in S2 (monthly, annually, etc.) at the reporting schedule identified below. The Permittee must:

    a. Submit **monthly** DMRs by the 15th day of the following month.

    b. Submit **annual** DMRs by July 31th for the previous calendar year. These submittals must include the permit renewal application monitoring data, priority pollutant, cyanide, and phenolic compound data as required in Special Condition S2.A. The annual sampling period is the calendar year.

S3.B. Permit submittals and schedules

The Permittee must use the *Water Quality Permitting Portal – Permit Submittals* application to submit all other written permit-required reports by the date specified in the permit.

When another permit condition requires submittal of a paper (hard-copy) report, the Permittee must ensure that it is postmarked or received by Ecology no later than the dates specified by this permit. Send these paper reports to Ecology at:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

S3.C. Records retention

The Permittee must retain records of all monitoring information for a minimum of three (3) years. Such information must include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

S3.D. Recording of results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, method, and time of sampling or measurement.
2. The individual who performed the sampling or measurement.
3. The dates the analyses were performed.
4. The individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

S3.E. Additional monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Special Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR unless otherwise specified by Special Condition S2.

S3.F. Reporting permit violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

1. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance and correct the problem.
2. If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within thirty (30) days of sampling.

a. *Immediate reporting*

The Permittee must **immediately** report to Ecology and the Department of Health, Shellfish Program, and Public Health of Seattle-King County (phone numbers listed below), all:

- Failures of the disinfection system
- Collection system overflows
- Plant bypasses discharging to marine surface waters
- Any other failures of the sewage system (pipe breaks, etc.)

The Permittee must also *immediately* report any collection system overflows discharging to a waterbody used as a source of drinking water to Ecology, the Department of Health Drinking Water Program, and Public Health of Seattle-King County.

Ecology - Northwest Regional Office	425-649-7000
Department of Health - Shellfish Program	360-236-3330 (business hours) 360-789-8962 (after business hours)
Public Health of Seattle-King County	206-477-8177
Department of Health, Drinking Water Program	800-521-0323 (business hours) 877-481-4901 (after business hours)

Additionally, for any sanitary sewer overflow (SSO) that discharges to a municipal separate storm sewer system (MS4), the Permittee must notify the appropriate MS4 owner or operator.

b. *Twenty-four-hour reporting*

The Permittee must report the following occurrences of noncompliance by telephone, to Ecology at the telephone number listed above, within 24 hours from the time the Permittee becomes aware of any of the following circumstances:

i. Any noncompliance that may endanger health or the environment, unless previously reported under immediate reporting requirements.

ii. Any unanticipated bypass that causes an exceedance of an effluent limit in the permit (See Part S5.F, “Bypass Procedures”).

iii. Any upset that causes an exceedance of an effluent limit in the permit (see G15, “Upset”).

iv. Any violation of a maximum daily or instantaneous maximum discharge limit for any of the pollutants in Section S1.A of this permit.

v. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limit in the permit.

c. *Report within five days*

The Permittee must also submit a written report within five business days of the time that the Permittee becomes aware of any reportable event under subparts a or b, above. The report must contain:

i. A description of the noncompliance and its cause.

ii. The period of noncompliance, including exact dates and times.

iii. The estimated time the Permittee expects the noncompliance to continue if not yet corrected.

iv. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

v. If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

d. *Waiver of written reports*

Ecology may waive the written report required in subpart c, above, on a case-by-case basis upon request if the Permittee has submitted a timely oral report.

e. *All other permit violation reporting*

The Permittee must report all permit violations, which do not require immediate or within 24 hours reporting, when it submits monitoring reports for S3.A ("Reporting"). The reports must contain the information listed in subpart c, above. Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

S3.G. Other reporting

1. Spills of oil or hazardous materials

   The Permittee must report a spill of oil or hazardous materials in accordance with the requirements of RCW 90.56.280 and chapter 173-303-145. You can obtain further instructions at the following website: http://www.ecy.wa.gov/programs/spills/other/reportaspill.htm .

2. Failure to submit relevant or correct facts

   Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it must submit such facts or information promptly.

S3.H. Maintaining a copy of this permit

The Permittee must keep a copy of this permit at the facility and make it available upon request to Ecology inspectors.

S4. Facility loading

S4.A. Design criteria

The flows or waste loads for the permitted facility must not exceed the following design criteria:

Maximum Month Design Flow (MMDF)	144 MGD
BOD_5 Influent Loading for Maximum Month	251,000 lbs/day
TSS Influent Loading for Maximum Month	235,000 lbs/day

S4.B. Plans for maintaining adequate capacity

1. Conditions triggering plan submittal

   The Permittee must submit a plan and a schedule for continuing to maintain capacity to Ecology when:

   a. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months.

   b. The projected plant flow or loading would reach design capacity within five years.

2. Plan and schedule content

   The plan and schedule must identify the actions necessary to maintain adequate capacity for the expected population growth and to meet the limits and requirements of the permit. The Permittee must consider the following topics and actions in its plan.

   a. Analysis of the present design and proposed process modifications.

   b. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.

   c. Limits on future sewer extensions or connections or additional waste loads.

   d. Modification or expansion of facilities.

   e. Reduction of industrial or commercial flows or waste loads

   Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by Ecology prior to any construction.

S4.C. Duty to mitigate

The Permittee must take all reasonable steps to minimize or prevent any discharge or biosolids use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

S4.D. Notification of new or altered sources

1. The Permittee must submit written notice to Ecology whenever any new discharge or a substantial change in volume or character of an existing discharge into the wastewater treatment plant is proposed which:
   a. Would interfere with the operation of, or exceed the design capacity of, any portion of the wastewater treatment plant.
   b. Is not part of an approved general sewer plan or approved plans and specifications.
   c. Is subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act.
2. This notice must include an evaluation of the wastewater treatment plant's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the treatment plant, and the anticipated impact on the Permittee's effluent [40 CFR 122.42(b)].

S4.E. Wasteload assessment

The Permittee must conduct an assessment of its influent flow and waste load and submit a report to Ecology by October 31, 2018. The report must contain:

1. A description of compliance or noncompliance with the permit effluent limits.
2. A comparison between the existing and design:
   a. Monthly average dry weather and wet weather flows.
   b. Maximum month flows.
   c. Peak flows.
   d. BOD_5 loadings.
   e. Total suspended solids loadings.
3. The percent change in the above parameters since the previous report.
4. The present and design population or population equivalent.
5. The projected population growth rate.
6. The estimated date upon which the Permittee expects the wastewater treatment plant to reach design capacity, according to the most restrictive of the parameters above.
7. An Infiltration and Inflow (I/I) update that describes:
   a. For the collection system owned and operated by the County:
      i. The results of recent I/I monitoring
      ii. A summary of recent I/I improvement projects.
      iii. Projects planned to improve I/I.

b. For the collection systems owned and operated by component agencies:
   i. Measures taken to encourage component agencies to control I/I.
   ii. Any known I/I concerns.
   iii. Steps planned to further encourage I/I reduction projects.

S5. Operation and maintenance

The Permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances), which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes keeping a daily operation logbook (paper or electronic), adequate laboratory controls, and appropriate quality assurance procedures. This provision of the permit requires the Permittee to operate backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

S5.A. Certified operator

This permitted facility must be operated by an operator certified by the state of Washington for at least a Class IV plant. This operator must be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class III plant must be in charge during all regularly scheduled shifts.

S5.B. Operation and maintenance program

The Permittee must:

1. Institute an adequate operation and maintenance program for the entire sewage system.
2. Keep maintenance records on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records must clearly specify the frequency and type of maintenance recommended by the manufacturer and must show the frequency and type of maintenance performed.
3. Make maintenance records available for inspection at all times.

S5.C. Short-term reduction

The Permittee must schedule any facility maintenance, which might require interruption of wastewater treatment and degrade effluent quality, during non-critical water quality periods and carry this maintenance out according to the approved O&M manual or as otherwise approved by Ecology.

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limits on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee must:

1. Give written notification to Ecology, if possible, thirty (30) days prior to such activities.
2. Detail the reasons for, length of time of, and the potential effects of the reduced level of treatment.

This notification does not relieve the Permittee of its obligations under this permit.

S5.D. Electrical power failure

The Permittee must ensure that adequate safeguards prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations. Adequate safeguards include, but are not limited to, alternate power sources, standby generator(s), or retention of inadequately treated wastes.

The Permittee must maintain Reliability Class II (EPA 430-99-74-001) at the wastewater treatment plant. Reliability Class II requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions. Vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but must be sufficient to maintain the biota.

S5.E. Prevent connection of inflow

The Permittee must strictly enforce its sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system within King County control.

S5.F. Bypass procedures

This permit prohibits a bypass, which is the intentional diversion of waste streams from any portion of a treatment facility. Ecology may take enforcement action against a Permittee for a bypass unless one of the following circumstances (1, 2, or 3) applies.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   This permit authorizes a bypass if it allows for essential maintenance and does not have the potential to cause violations of limits or other conditions of this permit, or adversely impact public health as determined by Ecology prior to the bypass. The Permittee must submit prior notice, if possible, at least ten (10) days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated, and results in noncompliance of this permit.

   This permit authorizes such a bypass only if:

a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

b. No feasible alternatives to the bypass exist, such as:

- The use of auxiliary treatment facilities.
- Retention of untreated wastes.
- Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass.
- Transport of untreated wastes to another treatment facility.

c. Ecology is properly notified of the bypass as required in Special Condition S3.F of this permit.

3. If bypass is anticipated and has the potential to result in noncompliance of this permit.

a. The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:

- A description of the bypass and its cause.
- An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.
- A cost-effectiveness analysis of alternatives including comparative resource damage assessment.
- The minimum and maximum duration of bypass under each alternative.
- A recommendation as to the preferred alternative for conducting the bypass.
- The projected date of bypass initiation.
- A statement of compliance with SEPA.
- A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.
- Details of the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

b. For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during the project planning and design process. The project-specific engineering report or facilities plan as well as the plans and specifications must include details of probable construction bypasses to the extent practical. In cases where the Permittee determines the probable need to bypass early, the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.

c. Ecology will consider the following prior to issuing an administrative order for this type of bypass:

- If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.
- If feasible alternatives to bypass exist, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.
- If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve or deny the request. Ecology will give the public an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Ecology will approve a request to bypass by issuing an administrative order under RCW 90.48.120.

S5.G. Operations and maintenance (O&M) manuals

1. O&M manual submittal and requirements

   The Permittee must:

   a. Review the O&M Manuals at least annually.

   b. Submit to Ecology for review and approval substantial changes or updates to the O&M Manuals.

   c. Keep the approved O&M Manuals at the permitted facility.

   d. Follow the instructions and procedures of the manuals.

2. O&M manual components

   In addition to the requirements of WAC 173-240-080 (1) through (5), the O&M manuals must include:

   a. Emergency procedures for cleanup in the event of wastewater system upset or failure.

   b. A review of system components which if failed could pollute surface water or could impact human health. Provide a procedure for a routine schedule of checking the function of these components.

   c. Wastewater system maintenance procedures that contribute to the generation of process wastewater.

d. Reporting protocols for submitting reports to Ecology to comply with the reporting requirements in the discharge permit.

e. Any directions to maintenance staff when cleaning or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine).

f. The treatment plant process control monitoring schedule.

S6. Pretreatment

S6.A. General requirements

1. The Permittee must implement the Industrial Pretreatment Program in accordance with King County Code 28.84.060 as amended by King County Ordinance No. 11963 on January 1, 1996, legal authorities, policies, procedures, and financial provisions described in the Permittee's approved pretreatment program submittal entitled "Industrial Pretreatment Program" and dated April 27, 1981; any approved revisions thereto; and the General Pretreatment Regulations (40 CFR Part 403). At a minimum, the Permittee must undertake the following pretreatment implementation activities:

   a. Enforce categorical pretreatment standards under Section 307(b) and (c) of the Federal Clean Water Act (hereinafter, the Act), prohibited discharge standards as set forth in 40 CFR 403.5, local limits, or state standards, which ever are most stringent or apply at the time of issuance or modification of a local industrial waste discharge permit. Locally derived limits are defined as pretreatment standards under Section 307(d) of the Act and are not limited to categorical industrial facilities.

   b. Issue industrial waste discharge permits to all significant industrial users [SIUs, as defined in 40 CFR 403.3(v)(i)(ii)] contributing to the treatment system, including those from other jurisdictions. Industrial waste discharge permits must contain as a minimum, all the requirements of 40 CFR 403.8 (f)(l)(iii). The Permittee must coordinate the permitting process with Ecology regarding any industrial facility which may possess a state waste discharge permit issued by Ecology.

   c. Maintain and update, as necessary, records identifying the nature, character, and volume of pollutants contributed by industrial users to the treatment works. The Permittee must maintain records for at least a three-year period.

   d. Perform inspections, surveillance, and monitoring activities on industrial users to determine or confirm compliance with pretreatment standards and requirements. The Permittee must conduct a thorough inspection of SIUs annually, except Middle-Tier Categorical Industrial Users, as defined by 40 CFR 403.8(f)(2)(v)(B)&(C), need only be inspected once every two years. The Permittee must conduct regular local monitoring of SIU wastewaters commensurate with the character and volume of the wastewater but not less than once per year except for Middle-Tier Categorical Industrial Users which may be sampled once every two years. The Permittee must collect and analyze samples in accordance with 40 CFR Part 403.12(b)(5)(ii)-(v) and 40 CFR Part 136.

e. Enforce and obtain remedies for non-compliance by any industrial users with applicable pretreatment standards and requirements. Once violations have been identified, the Permittee must take timely and appropriate enforcement action to address the non-compliance. The Permittee's action must follow its enforcement response procedures and any amendments, thereof.

f. Publish, at least annually in a newspaper of general circulation within the Permittee's service area, a list of all non-domestic users which, at any time in the previous 12 months, were in significant non-compliance as defined in 40 CFR 403.8(f)(2)(vii).

g. If the Permittee elects to conduct sampling of an SIU's discharge in lieu of requiring user self-monitoring, it must satisfy all requirements of 40 CFR Part 403.12. This includes monitoring and record keeping requirements of sections 403.12(g) and (o). For SIU's subject to categorical standards (i.e., CIUs), the Permittee may either complete baseline and initial compliance reports for the CIU (when required by 403.12(b) and (d)) or require these of the CIU. The Permittee must ensure SIUs are provided the results of sampling in a timely manner, inform SIUs of their right to sample, their obligations to report any sampling they do, to respond to non-compliance, and to submit other notifications. These include a slug load report (403.12(f)), notice of changed discharge (403.12(j)), and hazardous waste notifications (403.12(p)). If sampling for the SIU, the Permittee must not sample less than once in every six month period unless the Permittee's approved program includes procedures for reduction of monitoring for Middle-Tier or Non-Significant Categorical Users per 403.12(e)(2) and (3) and those procedures have been followed.

h. Develop and maintain a data management system designed to track the status of the Permittee's industrial user inventory, industrial user discharge characteristics, and compliance status.

i. Maintain adequate staff, funds, and equipment to implement its pretreatment program.

j. Establish, where necessary, contracts or legally binding agreements with contributing jurisdictions to ensure compliance with applicable pretreatment requirements by commercial or industrial users within these jurisdictions. These contracts or agreements must identify the agency responsible for the various implementation and enforcement activities to be performed in the contributing jurisdiction.

2. Per 40 CFR 403.8(f)(2)(vii), the Permittee must evaluate each Significant Industrial User to determine if a Slug Control Plan is needed to prevent slug discharges which may cause interference, pass-through, or in any other way result in violations of the Permittee's regulations, local limits or permit conditions. The Slug Control Plan evaluation shall occur within one year of a user's designation as a SIU. In accordance with 40 CFR 403.8(f)(1)(iii)(B)(6) the Permittee shall include slug discharge control requirements in an SIU's permit if the Permittee determines that they are necessary.

3. Whenever Ecology determines that any waste source contributes pollutants to the Permittee's treatment works in violation of Subsection (b), (c), or (d) of Section 307 of the Act, and the Permittee has not taken adequate corrective action, Ecology will notify the Permittee of this determination. If the Permittee fails to take appropriate enforcement action within 30 days of this notification, Ecology may take appropriate enforcement action against the source or the Permittee.

4. Pretreatment Report

   The Permittee must provide to Ecology an annual report that briefly describes its program activities during the previous calendar year. By April 30th, the Permittee must send the annual report to Ecology at:

   Water Quality Permit Coordinator
   Department of Ecology
   Northwest Regional Office
   3190 160th Avenue SE
   Bellevue, WA 98008-5452

   The report must include the following information:

   a. An updated listing of non-domestic industrial dischargers.

   b. Results of wastewater sampling at the treatment plant as specified in Subsection S6.B below. The Permittee must calculate removal rates for each pollutant and evaluate the adequacy of the existing local limits in prevention of treatment plant interference, pass through of pollutants that could affect receiving water quality and biosolids contamination.

   c. Status of program implementation, including:

      i. Any substantial modifications to the pretreatment program as originally approved by Ecology, including staffing and funding levels.

      ii. Any interferences, upsets, or permit violations experienced at the WWTP that are directly attributable to wastes from industrial users.

      iii. Listing of industrial users inspected and/or monitored, and a summary of the results.

      iv. Listing of industrial users scheduled for inspection and/or monitoring for the next year, and expected frequencies.

v. Listing of industrial users notified of promulgated pretreatment standards and/or local standards as required in 40 CFR 403.8(f)(2)(iii). The list must indicate which industrial users are on compliance schedules and the final date of compliance for each.

vi. Listing of industrial users issued industrial waste discharge permits.

vii. Planned changes in the pretreatment program implementation plan.

d. Status of compliance activities, including:

i. Listing of industrial users that failed to submit baseline monitoring reports or any other reports required under 40 CFR 403.12 and in the Permittee's pretreatment program, dated April 27, 1981.

ii. Listing of industrial users that were at any time during the reporting period not complying with federal, state, or local pretreatment standards or with applicable compliance schedules for achieving those standards, and the duration of such non-compliance.

iii. Summary of enforcement activities and other corrective actions taken or planned against non-complying industrial users. The Permittee must supply to Ecology a copy of the public notice of facilities that were in significant non-compliance.

5. The Permittee must request and obtain approval from Ecology before making any significant changes to the approved local pretreatment program. The Permittee must follow the procedure in 40 CFR 403.18 (b) and (c).

S6.B. Monitoring requirements

The Permittee must monitor its influent, effluent, and biosolids at the South Plant WWTP for the priority pollutants identified in Tables II and III of Appendix D of 40 CFR Part 122 as amended, any compounds identified as a result of Condition S6.B.4, and any other pollutants expected from nondomestic sources using U.S. EPA-approved procedures for collection, preservation, storage, and analysis. The Permittee must test influent, effluent, and biosolids samples for the priority pollutant metals (Table III, 40 CFR 122, Appendix D) on a quarterly basis throughout the term of this permit. The Permittee must test influent, effluent, and biosolids samples for the organic priority pollutants (Table II, 40 CFR 122, Appendix D) on an annual basis.

1. The Permittee must sample South Plant WWTP influent and effluent on a day when industrial discharges are occurring at normal to maximum levels. The Permittee must obtain 24-hour composite samples for the analysis of acid and base/neutral extractable compounds and metals. The Permittee must collect samples for the analysis of volatile organic compounds and samples must be collected using grab sampling techniques at equal intervals for a total of four grab samples per day.

   The laboratory may run a single analysis for volatile pollutants (using GC/MS procedures approved by 40 CFR 136) for each monitoring day by compositing equal volumes of each grab sample directly in the GC purge and trap apparatus in the laboratory, with no less than 1 ml of each grab included in the composite.

Unless otherwise indicated, all reported test data for metals must represent the total amount of the constituent present in all phases, whether solid, suspended, or dissolved, elemental or combined including all oxidation states.

The Permittee must handle, prepare, and analyze all wastewater samples taken for GC/MS analysis using procedures approved by 40 CFR 136.

2. The Permittee must collect a biosolids sample concurrently with a wastewater sample as a single grab sample of residual biosolids. Sampling and analysis must be performed using procedures approved by 40 CFR 136 unless the Permittee requests an alternate method and Ecology has approved.
3. The Permittee must take cyanide, phenols, and oils as grab samples. Oils must be hexane soluble or equivalent, and should be measured in the influent and effluent only.
4. In addition to quantifying pH, oil and grease, and all priority pollutants, the Permittee must make a reasonable attempt to identify all other substances and quantify all pollutants shown to be present by gas chromatograph/mass spectrometer (GC/MS) analysis using procedures approved by 40 CFR 136. The Permittee should attempt to make determinations of pollutants for each fraction, which produces identifiable spectra on total ion plots (reconstructed gas chromatograms). The Permittee should attempt to make determinations from all peaks with responses 5% or greater than the nearest internal standard. The 5% value is based on internal standard concentrations of 30 μg/l, and must be adjusted downward if higher internal standard concentrations are used or adjusted upward if lower internal standard concentrations are used. The Permittee may express results for non-substituted aliphatic compounds as total hydrocarbon content. The Permittee must use a laboratory whose computer data processing programs are capable of comparing sample mass spectra to a computerized library of mass spectra, with visual confirmation by an experienced analyst. For all detected substances which are determined to be pollutants, the Permittee must conduct additional sampling and appropriate testing to determine concentration and variability, and to evaluate trends.

S6.C. Reporting of monitoring results

The Permittee must include a summary of monitoring results in the Annual Pretreatment Report.

S6.D. Local limit development

As sufficient data become available, the Permittee must, in consultation with Ecology, reevaluate their local limits in order to prevent pass through or interference. If Ecology determines that any pollutant present causes pass through or interference, or exceeds established biosolids standards, the Permittee must establish new local limits or revise existing local limits as required by 40 CFR 403.5. Ecology may also require the Permittee to revise or establish local limits for any pollutant discharged from the treatment works that has a reasonable potential to exceed the water quality standards, sediment standards, or established effluent limits, or causes whole effluent toxicity. Ecology makes this determination in the form of an Administrative Order.

Ecology may modify this permit to incorporate additional requirements relating to the establishment and enforcement of local limits for pollutants of concern. Any permit modification is subject to formal due process procedures under state and federal law and regulation.

S7. Solid wastes

S7.A. Solid waste handling

The Permittee must handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

S7.B. Leachate

The Permittee must not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment, nor allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality Standards, Chapter 173-200 WAC. The Permittee must apply for a permit or permit modification as may be required for such discharges to state ground or surface waters.

S8. Spill control plan

S8.A Spill control plan submittals and requirements

The Permittee must:

1. Review the existing spill plan at least annually and update the spill plan as needed.
2. Send significant changes to the plan to Ecology.
3. Follow the plan and any supplements throughout the term of the permit.

S8.B. Spill control plan components

The spill control plan must include the following:

1. A list of all oil and petroleum products and other materials used and/or stored on-site, which when spilled, or otherwise released into the environment, designate as dangerous waste (DW) or extremely hazardous waste (EHW) by the procedures set forth in WAC 173-303-070. Include other materials used and/or stored on-site which may become pollutants or cause pollution upon reaching state's waters.

2. A description of preventive measures and facilities (including an overall facility plot showing drainage patterns) which prevent, contain, or treat spills of these materials.
3. A description of the reporting system the Permittee will use to alert responsible managers and legal authorities in the event of a spill.
4. A description of operator training to implement the plan.

The Permittee may submit plans and manuals required by 40 CFR Part 112, contingency plans required by Chapter 173-303 WAC, or other plans required by other agencies, which meet the intent of this section.

S9. Sediment monitoring

S9.A. Sediment sampling and analysis plan

The Permittee must submit to Ecology for review and approval a sediment sampling and analysis plan for sediment monitoring by December 1, 2016. The purpose of the plan is to recharacterize sediment (the nature and extent of chemical contamination and biological toxicity) quality in the vicinity of the Permittee's discharge locations. The Permittee must sample the top 10 cm of sediment at the same eight stations sampled during the previous permit term, and the sediments must be analyzed for the 47 chemicals with SMS numeric criteria as well as conventional analytes. The Permittee must follow the guidance provided in the current version of the *Sediment Source Control Standards User Manual, Appendix B: sediment sampling and analysis plan.*

S9.B. Sediment data report

Following Ecology approval of the sediment sampling and analysis plan, the Permittee must collect sediments between August 15th and September 30th of 2017. The Permittee must submit to Ecology a sediment data report containing the results of the sediment sampling and analysis no later than December 1, 2018. The sediment data report must conform to the approved sediment sampling and analysis plan. The report must document when the data was successfully loaded into EIM as required below.

In addition to a sediment data report, submit the sediment chemical and any biological data to Ecology's EIM database (http://www.ecy.wa.gov/eim/). Data must be submitted to EIM according to the instructions on the EIM website. The data submittal portion of the EIM website (http://www.ecy.wa.gov/eim/submitdata.htm) provides information and help on formats and requirements for submitting tabular data.

S10. Acute toxicity

S10.A. Testing when there is no permit limit for acute toxicity

The Permittee must:

1. Conduct acute toxicity testing on final effluent once in the first quarter of 2018 and once in the third quarter of 2018.
2. Conduct acute toxicity testing on a series of at least five concentrations of effluent, including 100% effluent and a control.
3. Use each of the following species and protocols for each acute toxicity test:

Acute Toxicity Tests	Species	Method
Fathead minnow 96-hour static-renewal test	*Pimephales promelas*	EPA-821-R-02-012
Daphnid 48-hour static test	*Ceriodaphnia dubia, Daphnia pulex,* or *Daphnia magna*	EPA-821-R-02-012

4. Submit the results to Ecology with the permit renewal application.

S10.B. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain toxicity data, bench sheets, and reference toxicant results for test methods. In addition, the Permittee must submit toxicity test data in electronic format (CETIS export file preferred) for entry into Ecology's database.
2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Subsection C and the Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.
5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Section A or pristine natural water of sufficient quality for good control performance.

6. The Permittee must collect effluent samples for whole effluent toxicity testing just prior to the chlorination step in the treatment process.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the acute critical effluent concentration (ACEC). The ACEC equals 0.54% effluent.
8. All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing must comply with the acute statistical power standard of 29% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S11. Chronic toxicity

S11.A. Testing when there is no permit limit for chronic toxicity

The Permittee must:

1. Conduct chronic toxicity testing on final effluent once in the second quarter of 2018 and once in the fourth quarter of 2018.
2. Conduct chronic toxicity testing on a series of at least five concentrations of effluent and a control. This series of dilutions must include the acute critical effluent concentration (ACEC). The ACEC equals 0.54% effluent. The series of dilutions should also contain the CCEC of 0.44% effluent.
3. Compare the ACEC to the control using hypothesis testing at the 0.05 level of significance as described in Appendix H, EPA/600/4-89/001.
4. Submit the results to Ecology with the next permit renewal application.
5. Perform chronic toxicity tests with all of the following species and the most recent version of the following protocols:

Saltwater Chronic Test	Species	Method
Topsmelt survival and growth	*Atherinops affinis*	EPA/600/R-95/136
Mysid shrimp survival and growth	*Americamysis bahia* (formerly *Mysidopsis bahia*)	EPA-821-R-02-014

S11.B. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain toxicity data, bench sheets, and reference toxicant results for test methods. In addition, the Permittee must submit toxicity test data in electronic format (CETIS export file preferred) for entry into Ecology’s database.

2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Section C and the Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.
5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Subsection C or pristine natural water of sufficient quality for good control performance.
6. The Permittee must collect effluent samples for whole effluent toxicity testing just prior to the chlorination step in the treatment process.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the CCEC and the ACEC. The CCEC and the ACEC may either substitute for the effluent concentrations that are closest to them in the dilution series or be extra effluent concentrations. The CCEC equals 0.44% effluent. The ACEC equals 0.54% effluent.
8. All whole effluent toxicity tests that involve hypothesis testing must comply with the chronic statistical power standard of 39% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S12. Use of effluent from effluent transfer system

The Permittee may distribute effluent from the effluent transfer system (ETS) for use and return to the ETS for discharge via Outfall #001 of this permit – without modification of this permit – under the following conditions:

1. The distributed ETS effluent must meet all treatment and disinfection requirements of Condition S1 of this permit.
2. The effluent is used at the Boeing facility in the approved, closed loop, noncontact chiller project.

3. The Permittee may distribute ETS effluent to a similar closed-loop, noncontact system only after it requests and receives specific written approval from both the Departments of Ecology and Health.
4. The effluent returned to the ETS system for discharge via Outfall #001 must meet all permit requirements for that discharge.
5. The Permittee obtains, files, and enforces a signed user contract assuring compliance with all requirements of the approved project. All new contracts must be approved by the Departments of Ecology and Health and signed by all parties prior to any distribution of the effluent.
6. The Permittee immediately notifies all users during instances of noncompliance.

No other uses of ETS effluent are authorized under this permit.

S13. Application for permit renewal or modification for facility changes

The Permittee must submit an application for renewal of this permit by July 31, 2019.

The Permittee must also submit a new application or supplement at least one hundred eighty (180) days prior to commencement of discharges, resulting from the activities listed below, which may result in permit violations. These activities include any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility.

General Conditions

G1. Signatory requirements

1. All applications, reports, or information submitted to Ecology must be signed and certified.
   a. In the case of corporations, by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
      - 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, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

   b. In the case of a partnership, by a general partner.
   c. In the case of sole proprietorship, by the proprietor.
   d. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

   Applications for permits for domestic wastewater facilities that are either owned or operated by, or under contract to, a public entity shall be submitted by the public entity.

2. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
   a. The authorization is made in writing by a person described above and submitted to Ecology.
   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to authorization. If an authorization under paragraph G1.2, above, is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph G1.2, above, must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section must make the following certification:

   "I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G2. Right of inspection and entry

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

1. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.
2. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.
3. To inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.
4. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. Permit actions

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the Permittee) or upon Ecology's initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 40 CFR 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

1. The following are causes for terminating this permit during its term, or for denying a permit renewal application:
   a. Violation of any permit term or condition.
   b. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.
   c. A material change in quantity or type of waste disposal.
   d. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination.

e. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or biosolids use or disposal practice controlled by the permit.

f. Nonpayment of fees assessed pursuant to RCW 90.48.465.

g. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

2. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:

   a. A material change in the condition of the waters of the state.

   b. New information not available at the time of permit issuance that would have justified the application of different permit conditions.

   c. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.

   d. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.

   e. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.

   f. Ecology has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.

   g. Incorporation of an approved local pretreatment program into a municipality’s permit.

3. The following are causes for modification or alternatively revocation and reissuance:

   a. When cause exists for termination for reasons listed in 1.a through 1.g of this section, and Ecology determines that modification or revocation and reissuance is appropriate.

   b. When Ecology has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G7) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. Reporting planned changes

The Permittee must, as soon as possible, but no later than one hundred eighty (180) days prior to the proposed changes, give notice to Ecology of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in:

1. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b).

2. A significant change in the nature or an increase in quantity of pollutants discharged.

3. A significant change in the Permittee's biosolids use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G5. Plan review required

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications must be submitted to Ecology for approval in accordance with chapter 173-240 WAC. Engineering reports, plans, and specifications must be submitted at least one hundred eighty (180) days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities must be constructed and operated in accordance with the approved plans.

G6. Compliance with other laws and statutes

Nothing in this permit excuses the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. Transfer of this permit

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee must notify the succeeding owner or controller of the existence of this permit by letter, a copy of which must be forwarded to Ecology.

1. Transfers by Modification

   Except as provided in paragraph (2) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

2. Automatic Transfers

   This permit may be automatically transferred to a new Permittee if:

   a. The Permittee notifies Ecology at least thirty (30) days in advance of the proposed transfer date.

   b. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.

   c. Ecology does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G8. Reduced production for compliance

The Permittee, in order to maintain compliance with its permit, must control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G9. Removed substances

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G10. Duty to provide information

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology upon request, copies of records required to be kept by this permit.

G11. Other requirements of 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. Additional monitoring

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. Payment of fees

The Permittee must submit payment of fees associated with this permit as assessed by Ecology.

G14. Penalties for violating permit conditions

Any person who is found guilty of willfully violating the terms and conditions of this permit is deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit may incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is deemed to be a separate and distinct violation.

G15. Upset

Definition – "Upset" means 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, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limits if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the Permittee can identify the cause(s) of the upset.
2. The permitted facility was being properly operated at the time of the upset.
3. The Permittee submitted notice of the upset as required in Special Condition S3.E.
4. The Permittee complied with any remedial measures required under S3.E of this permit.

In any enforcement action the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. Property rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. Duty to comply

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. Toxic pollutants

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. Penalties for tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment shall be a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or by both.

G20. Compliance schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than fourteen (14) days following each schedule date.

G21. Service agreement review

The Permittee must submit to Ecology any proposed service agreements and proposed revisions or updates to existing agreements for the operation of any wastewater treatment facility covered by this permit. The review is to ensure consistency with chapters 90.46 and 90.48 RCW as required by RCW 70.150.040(9). In the event that Ecology does not comment within a thirty-day (30) period, the Permittee may assume consistency and proceed with the service agreement or the revised/updated service agreement.

Appendix A

LIST OF POLLUTANTS WITH ANALYTICAL METHODS, DETECTION LIMITS AND QUANTITATION LEVELS

The Permittee must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table for permit and application required monitoring unless:

- Another permit condition specifies other methods, detection levels, or quantitation levels.
- The method used produces measurable results in the sample and EPA has listed it as an EPA-approved method in 40 CFR Part 136, or EPA has granted the laboratory written permission to use the method.
- The Permittee knows that an alternate, less sensitive method (higher DL and QL) from those listed below is sufficient to produce measurable results in their effluent.
- If the Permittee is unable to obtain the required DL and QL due to matrix effects (such as for treatment plant influent or CSO effluent), the Permittee must strive to achieve to lowest possible DL and QL and report the DL and QL in the required report.

If the Permittee uses an alternative method, not specified in the permit and as allowed above, it must report the test method, DL, and QL on the discharge monitoring report or in the required report.

All pollutants that have numeric limits in Section S1 of this permit must be analyzed with the methods specified below. When the permit requires the Permittee to measure the base neutral compounds in the list of priority pollutants, it must measure all of the base neutral pollutants listed in the table below. The list includes EPA required base neutral priority pollutants and several additional polynuclear aromatic hydrocarbons (PAHs). The Water Quality Program added several PAHs to the list of base neutrals below from Ecology's Persistent Bioaccumulative Toxics (PBT) List. It only added those PBT parameters of interest to Appendix A that did not increase the overall cost of analysis unreasonably.

Ecology added this appendix to the permit in order to reduce the number of analytical "non-detects" in permit-required monitoring and to measure effluent concentrations near or below criteria values where possible at a reasonable cost.

CONVENTIONAL PARAMETERS

Pollutant & CAS No. *(if available)*	Recommended Analytical Protocol	Detection (DL)[1], µg/L unless specified	Quantitation Level (QL)[2], µg/L unless specified
Biochemical Oxygen Demand	SM5210-B		2 mg/L
Total Suspended Solids	SM2540-D		5 mg/L
Total Ammonia (as N)	SM4500-NH3-B and C/D/E/G/H Kerouel & Aminot 1997		0.3 mg/L
Dissolved oxygen	SM4500-OC/OG		0.2 mg/L
Temperature (max. 7-day avg.)	Analog recorder or use micro-recording devices known as thermistors		0.2º C
pH	SM4500-H^+ B	N/A	N/A

NONCONVENTIONAL PARAMETERS

Pollutant & CAS No. (if available)	Recommended Analytical Protocol	Detection (DL)[1], µg/L unless specified	Quantitation Level (QL)[2], µg/L unless specified
Total Alkalinity	SM2320-B		5.0 mg/L as CaCO3
Chlorine, Total Residual	SM4500 Cl G 4500 Cl D/E, Hach 8370		50.0
Fecal Coliform	SM 9221E,9222 B, D	N/A	Specified in method - sample aliquot dependent
Total Coliform	SM 9221B, 9222B,9223B	N/A	Specified in method - sample aliquot dependent
Nitrate + Nitrite Nitrogen (as N)	SM4500-NO3- E/F/H		200
Nitrogen, Total Kjeldahl (as N)	SM4500-N_{org}B/C and SM4500NH_3-B/C/D/EF/G/H EPA 351.2		500
Nitrogen, Total (as N)	SM4500-N-C	50	100
Soluble Reactive Phosphorus (as P)	SM4500- PE/PF	100	100
Phosphorus, Total (as P)	SM 4500 PB followed by SM4500-PE/PF	100	300

Exhibit B

Pollutant & CAS No. (if available)	Recommended Analytical Protocol	Detection (DL)[1], µg/L unless specified	Quantitation Level (QL)[2], µg/L unless specified
Oil and Grease (HEM)	1664 A or B	1,400	5,000
Salinity	SM2520-B		3 practical salinity units or scale (PSU or PSS)
Settleable Solids	SM2540 -F		Sample and limit dependent
Sulfate (as mg/L SO_4)	SM4110-B, 4500-SO4 E		7.1 mg/L
Sulfide (as mg/L S)	SM4500-S^2F/D/E/G		200
Sulfite (as mg/L SO_3)	SM4500-SO3B		2000
Total dissolved solids	SM2540 C		98 mg/L
Total Hardness	SM2340B C, 200.7, 200.8		200 as $CaCO_3$
Aluminum, Total (7429-90-5)	200.8	2.0	10
Barium Total (7440-39-3)	200.8	0.5	2.0
BTEX (benzene +toluene + ethylbenzene + m,o,p xylenes)	EPA SW 846 8021/8260	1	2
Boron Total (7440-42-8)	200.8	2.0	10.0
Cobalt, Total (7440-48-4)	200.8	0.05	0.25
Iron, Total (7439-89-6)	200.7, 200.8	12.5	50
Magnesium, Total (7439-95-4)	200.7, 200.8	10	50
Molybdenum, Total (7439-98-7)	200.8	0.1	0.5
Manganese, Total (7439-96-5)	200.8	0.1	0.5
NWTPH Dx [4]	Ecology NWTPH Dx	250	250
NWTPH Gx [5]	Ecology NWTPH Gx	250	250
Tin, Total (7440-31-5)	200.8	0.3	1.5
Titanium, Total (7440-32-6)	200.8	0.5	2.5

Pollutant & CAS No. (if available)	Recommended Analytical Protocol	Detection (DL)[1], µg/L unless specified	Quantitation Level (QL)[2], µg/L unless specified
METALS, CYANIDE & TOTAL PHENOLS			
Antimony, Total (7440-36-0)	200.8	0.3	1.0
Arsenic, Total (7440-38-2)	200.8	0.1	0.5
Beryllium, Total (7440-41-7)	200.8	0.1	0.5
Cadmium, Total (7440-43-9)	200.8	0.05	0.25
Chromium (hex) dissolved (18540-29-9)	SM3500-Cr B	5	10
Chromium, Total (7440-47-3)	200.8	0.2	1.0
Copper, Total (7440-50-8)	200.8	0.4	2.0
Lead, Total (7439-92-1)	200.8	0.1	0.5
Mercury, Total (7439-97-6)	1631E	0.0002	0.0005
Nickel, Total (7440-02-0)	200.8	0.1	0.5
Selenium, Total (7782-49-2)	200.8	1.0	1.0
Silver, Total (7440-22-4)	200.8	0.04	0.2
Thallium, Total (7440-28-0)	200.8	0.09	0.36
Zinc, Total (7440-66-6)	200.8	0.5	2.5
Cyanide, Total (57-12-5)	335.4, SM4500-CN-C,E	5	10
Cyanide, Weak Acid Dissociable	SM4500-CN I	5	10
Cyanide, Free Amenable to Chlorination (Available Cyanide)	SM4500-CN G	5	10
Phenols, Total	EPA 420.1		50
ACID COMPOUNDS			
2-Chlorophenol (95-57-8)	625	1.0	2.0
2,4-Dichlorophenol (120-83-2)	625	0.5	1.0
2,4-Dimethylphenol (105-67-9)	625	0.5	1.0
4,6-dinitro-o-cresol (534-52-1) (2-methyl-4,6,-dinitrophenol)	625/1625B	2.0	4.0
2,4 dinitrophenol (51-28-5)	625	1.5	3.0
2-Nitrophenol (88-75-5)	625	0.5	1.0
4-nitrophenol (100-02-7)	625	1.0	2.0
Parachlorometa cresol (59-50-7) (4-chloro-3-methylphenol)	625	1.0	2.0
Pentachlorophenol (87-86-5)	625	0.5	1.0

Pollutant & CAS No. (if available)	Recommended Analytical Protocol	Detection (DL)[1], µg/L unless specified	Quantitation Level (QL)[2], µg/L unless specified
Phenol (108-95-2)	625	2.0	4.0
2,4,6-Trichlorophenol (88-06-2)	625	2.0	4.0
VOLATILE COMPOUNDS			
Acrolein (107-02-8)	624	5	10
Acrylonitrile (107-13-1)	624	1.0	2.0
Benzene (71-43-2)	624	1.0	2.0
Bromoform (75-25-2)	624	1.0	2.0
Carbon tetrachloride (56-23-5)	624/601 or SM6230B	1.0	2.0
Chlorobenzene (108-90-7)	624	1.0	2.0
Chloroethane (75-00-3)	624/601	1.0	2.0
2-Chloroethylvinyl Ether (110-75-8)	624	1.0	2.0
Chloroform (67-66-3)	624 or SM6210B	1.0	2.0
Dibromochloromethane (124-48-1)	624	1.0	2.0
1,2-Dichlorobenzene (95-50-1)	624	1.9	7.6
1,3-Dichlorobenzene (541-73-1)	624	1.9	7.6
1,4-Dichlorobenzene (106-46-7)	624	4.4	17.6
Dichlorobromomethane (75-27-4)	624	1.0	2.0
1,1-Dichloroethane (75-34-3)	624	1.0	2.0
1,2-Dichloroethane (107-06-2)	624	1.0	2.0
1,1-Dichloroethylene (75-35-4)	624	1.0	2.0
1,2-Dichloropropane (78-87-5)	624	1.0	2.0
1,3-dichloropropene (mixed isomers) (1,2-dichloropropylene) (542-75-6) [6]	624	1.0	2.0
Ethylbenzene (100-41-4)	624	1.0	2.0
Methyl bromide (74-83-9) (Bromomethane)	624/601	5.0	10.0
Methyl chloride (74-87-3) (Chloromethane)	624	1.0	2.0
Methylene chloride (75-09-2)	624	5.0	10.0
1,1,2,2-Tetrachloroethane (79-34-5)	624	1.9	2.0
Tetrachloroethylene (127-18-4)	624	1.0	2.0
Toluene (108-88-3)	624	1.0	2.0
1,2-Trans-Dichloroethylene (156-60-5) (Ethylene dichloride)	624	1.0	2.0
1,1,1-Trichloroethane (71-55-6)	624	1.0	2.0
1,1,2-Trichloroethane (79-00-5)	624	1.0	2.0
Trichloroethylene (79-01-6)	624	1.0	2.0
Vinyl chloride (75-01-4)	624/SM6200B	1.0	2.0
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)			
Acenaphthene (83-32-9)	625	0.2	0.4
Acenaphthylene (208-96-8)	625	0.3	0.6
Anthracene (120-12-7)	625	0.3	0.6
Benzidine (92-87-5)	625	20	40
Benzyl butyl phthalate (85-68-7)	625	0.3	0.6
Benzo(*a*)anthracene (56-55-3)	625	0.3	0.6
Benzo(b)fluoranthene (3,4-benzofluoranthene) (205-99-2) [7]	610/625	0.8	1.6
Benzo(j)fluoranthene (205-82-3) [7]	625	0.5	1.0
Benzo(k)fluoranthene (11,12-benzofluoranthene) (207-08-9) [7]	610/625	0.8	1.6
Benzo(r,s,t)pentaphene (189-55-9)	625	1.3	5.0
Benzo(*a*)pyrene (50-32-8)	610/625	0.5	1.0
Benzo(*ghi*)Perylene (191-24-2)	610/625	0.5	1.0
Bis(*2-chloroethoxy)*methane (111-91-1)	625	5.3	21.2
Bis(*2-chloroethyl*)ether (111-44-4)	611/625	0.3	1.0
Bis(*2-chloroisopropyl*)ether (39638-32-9)	625	0.5	1.0
Bis(*2-ethylhexyl*)phthalate (117-81-7)	625	0.3	1.0
4-Bromophenyl phenyl ether (101-55-3)	625	0.3	0.5
2-Chloronaphthalene (91-58-7)	625	0.3	0.6
4-Chlorophenyl phenyl ether (7005-72-3)	625	0.3	0.5

Pollutant & CAS No. (if available)	Recommended Analytical Protocol	Detection (DL)[1], µg/L unless specified	Quantitation Level (QL)[2], µg/L unless specified
Chrysene (218-01-9)	610/625	0.3	0.6
Dibenzo (a,h)acridine (226-36-8)	610M/625M	2.5	10.0
Dibenzo (a,j)acridine (224-42-0)	610M/625M	2.5	10.0
Dibenzo(a-*h*)anthracene (53-70-3)(1,2,5,6-dibenzanthracene)	625	0.8	1.6
Dibenzo(a,e)pyrene (192-65-4)	610M/625M	2.5	10.0
Dibenzo(a,h)pyrene (189-64-0)	625M	2.5	10.0
3,3-Dichlorobenzidine (91-94-1)	605/625	2.0	4.0
Diethyl phthalate (84-66-2)	625	1.9	7.6
Dimethyl phthalate (131-11-3)	625	1.6	6.4
Di-n-butyl phthalate (84-74-2)	625	0.5	1.0
2,4-dinitrotoluene (121-14-2)	609/625	1.0	2.0
2,6-dinitrotoluene (606-20-2)	609/625	1.0	2.0
Di-n-octyl phthalate (117-84-0)	625	0.3	0.6
1,2-Diphenylhydrazine (*as Azobenzene*) (122-66-7)	1625B, 625	5.0	20
Fluoranthene (206-44-0)	625	0.3	0.6
Fluorene (86-73-7)	625	0.3	0.6
Hexachlorobenzene (118-74-1)	612/625	0.3	0.6
Hexachlorobutadiene (87-68-3)	625	0.5	1.0
Hexachlorocyclopentadiene (77-47-4)	1625B/625	2.0	4.0
Hexachloroethane (67-72-1)	625	0.5	1.0
Indeno(*1,2,3-cd*)Pyrene (193-39-5)	610/625	0.5	1.0
Isophorone (78-59-1)	625	0.5	1.0
3-Methyl cholanthrene (56-49-5)	625	2.0	8.0
Naphthalene (91-20-3)	625	0.4	0.75
Nitrobenzene (98-95-3)	625	0.5	1.0
N-Nitrosodimethylamine (62-75-9)	607/625	2.0	4.0
N-Nitrosodi-n-propylamine (621-64-7)	607/625	0.5	1.0
N-Nitrosodiphenylamine (86-30-6)	625	1.0	2.0
Perylene (198-55-0)	625	1.9	7.6
Phenanthrene (85-01-8)	625	0.3	0.6
Pyrene (129-00-0)	625	0.3	0.6
1,2,4-Trichlorobenzene (120-82-1)	625	0.3	0.6
PCBs			
PCB-1242 [8]	608	0.25	0.5
PCB-1254	608	0.25	0.5
PCB-1221	608	0.25	0.5
PCB-1232	608	0.25	0.5
PCB-1248	608	0.25	0.5
PCB-1260	608	0.13	0.5
PCB-1016 [8]	608	0.13	0.5

1. Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR part 136, Appendix B.
2. Quantitation Level (QL) also known as Minimum Level of Quantitation (ML) – TThe smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).
3. Soluble Biochemical Oxygen Demand method note: First, filter the sample through a Millipore Nylon filter (or equivalent) - pore size of 0.45-0.50 um (prep all filters by filtering 250 ml of laboratory grade deionized water through the filter and discard). Then, analyze sample as per method 5210-B.
4. NWTPH Dx - Northwest Total Petroleum Hydrocarbons Diesel Extended Range – see http://www.ecy.wa.gov/biblio/97602.html
5. NWTPH Gx - Northwest Total Petroleum Hydrocarbons Gasoline Extended Range – see http://www.ecy.wa.gov/biblio/97602.html
6. 1, 3-dichloroproylene (mixed isomers) You may report this parameter as two separate parameters: cis-1, 3-dichlorpropropene (10061-01-5) and trans-1, 3-dichloropropene (10061-02-6).
7. Total Benzofluoranthenes – Because Benzo(b)fluoranthene, Benzo(j)fluoranthene and Benzo(k)fluoranthene co-elute you may report these three isomers as total benzofluoranthenes.
8. PCB 1016 & PCB 1242 – You may report these two PCB compounds as one parameter called PCB 1016/1242.

EXHIBIT C

Issuance Date: December 19, 2014
Effective Date: February 1, 2015
Expiration Date: January 31, 2020

National Pollutant Discharge Elimination System
Waste Discharge Permit No. WA0029181

State of Washington
DEPARTMENT OF ECOLOGY
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1342 et seq.

KING COUNTY WASTEWATER TREATMENT DIVISION – WEST POINT WASTEWATER TREATMENT PLANT & COMBINED SEWER OVERFLOW SYSTEM

King Street Center, KSC-NR-0512
201 South Jackson Street
Seattle, WA 98104-3855

is authorized to discharge in accordance with the Special and General Conditions that follow.

Facility Name	West Point Wastewater Treatment Plant (serves combined sewer area)	Alki Storage and CSO Treatment Plant	Carkeek Storage and CSO Treatment Plant	Denny/Elliott West Storage and CSO Treatment Plant	Henderson/MLK Storage and CSO Treatment Plant
Plant Address	1400 Discovery Park Blvd Seattle, WA 98199	3380 Beach Drive SW Seattle, WA 98116-2616	1201 NW Carkeek Park Rd, Seattle, WA 98177-4640	545 Elliott Ave W Seattle, WA 98119	Outlet Regulator 9829 42nd Ave S Seattle, WA 98118
Receiving Water	Puget Sound	Puget Sound	Puget Sound	Elliott Bay	Duwamish Waterway
Plant Type	Secondary, Activated Sludge, Chlorine Disinfection	Satellite CSO Storage and Treatment Plant	Satellite CSO Storage and Treatment Plant	Satellite CSO Storage and Treatment Plant	Satellite CSO Storage and Treatment Plant
Discharge Location:	Lat: 47.661111˚ Long: -122.446389˚	Lat: 47.57025˚ Long: -122.4225˚	Lat: 47.71264˚ Long: -122.38789˚	Lat: 47.61755˚ Long: -122.36186˚	Lat: 47.51194˚ Long: -122.29736˚

Kevin C. Fitzpatrick
Water Quality Section Manager
Northwest Regional Office
Washington State Department of Ecology

Exhibit C

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Summary of Permit Report Submittals

Section	Submittal	Frequency	First Submittal Date
S3.A	Discharge Monitoring Report	Monthly Annually	March 15, 2015 July 31, 2015
S3.F	Reporting Permit Violations	As necessary	
S4.B	Plans for Maintaining Adequate Capacity	As necessary	
S4.D	Notification of New or Altered Sources	As necessary	
S4.E	Wasteload Assessment	1/permit cycle	With permit application
S5.F	Bypass Notification	As necessary	
S5.G	Operations and Maintenance Update	As necessary	
S6.A	Pretreatment Report	1/year	March 31, 2015
S8	Acute Toxicity Effluent Tests (testing in 1st and 3rd quarters of 2017)	2 tests/permit cycle, 1 submittal/permit cycle	With permit application
S9	Chronic Toxicity Effluent Tests (testing in 2nd and 4th quarters of 2017)	2 tests/permit cycle, 1 submittal/permit cycle	With permit application
S10	Wet Weather Operation Reports	As necessary with monthly DMR submittal	
S11.C	CSO Monthly Report	Monthly with monthly DMR submittal	
S11.C	CSO Annual Report	Annually	July 31, 2015
S11.D	CSO Reduction Plan Amendment	1/permit cycle	With permit application
S11.F.d	CSO Post Construction Monitoring Data Report	1/permit cycle	December 1, 2019
S12	Spill Control Plan Update	As necessary	
S13.A	Sediment Sampling & Analysis Plan- West Pt Sediment Data Report - West Pt	1/permit cycle	December 1, 2016 December 1, 2018
S13.B	Sediment Sampling & Analysis Plan- CSO Outfalls Sediment Data Report - CSO Outfalls	1/permit cycle	December 1, 2016 December 1, 2018
S13.C	Sediment Quality at CSO Outfalls Summary Report	1/permit cycle	December 1, 2018
S14	Outfall Evaluation Reports – West Point and CSO TPs	1/permit cycle	With permit application
S15	Elliott West Copper Reduction Assessment	1/permit cycle	November 1, 2018
S16	Elliott West Settleable Solids Removal Assessment	1/permit cycle	November 1, 2018
S17	Application for Permit Renewal	1/permit cycle	January 31, 2019
G1	Notice of Change in Authorization	As necessary	
G4	Reporting Planned Changes	As necessary	
G5	Engineering Report for Construction or Modification Activities	As necessary	
G13	Payment of Fees	As assessed	

Exhibit C

Special Conditions

S1. Discharge limits

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit violates the terms and conditions of this permit.

S1.A. Effluent limits for Outfall 001 - West Point wastewater treatment plant

Beginning on the effective date of this permit and lasting through the expiration date, the Permittee may discharge treated municipal wastewater at the permitted locations subject to compliance with the following limits:

Effluent Limits: Outfall #001 - West Point WWTP Latitude: 47.661111˚ Longitude: -122.446389˚		
Parameter	**Average Monthly [a]**	**Average Weekly [b]**
Carbonaceous Biochemical Oxygen Demand (5-day)	25 milligrams/liter (mg/L) 44,800 pounds/day (lbs/day) May–Oct: 85% removal of influent $CBOD_5$ Nov–April: 80% removal of influent $CBOD_5$	40 mg/L 71,700 lbs/day
Total Suspended Solids	30 mg/L, 53,800 lbs/day May–Oct: 85% removal of influent TSS Nov–April: 80% removal of influent TSS	45 mg/L 80,700 lbs/day
	Monthly Geometric Mean	**Weekly Geometric Mean**
Fecal Coliform Bacteria [c]	200/100 mL	400/100 mL
	Instantaneous Minimum	**Instantaneous Maximum**
pH [d]	6.0	9.0
	Average Monthly [a]	**Maximum Daily [e]**
Total Residual Chlorine	139 µg/L	364 µg/L

[a] Average monthly effluent limit means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

[b] Average weekly discharge limit means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

[c] Ecology provides directions to calculate this value in publication No. 04-10-020, *Information Manual for Treatment Plant Operators,* available at: http://www.ecy.wa.gov/pubs/0410020.pdf.

[d] Report the instantaneous maximum and minimum pH monthly. Do not average pH values.

[e] Maximum daily effluent limit means the highest allowable daily discharge. The daily discharge is the average measurement of the pollutant over the day.

S1.B. Effluent limits for the CSO treatment plants

Beginning on the effective date of this permit and lasting through the expiration date, the Permittee may discharge treated combined sewer overflows at the following permitted locations subject to compliance with the following limits. Discharges from these outfalls are prohibited except as a result of precipitation events.

Effluent Limits: Outfall #051 - Alki CSO TP Latitude: 47.57025˚ Longitude: -122.4225˚		
Parameter	**Average Monthly**	**Annual Average** [a]
Total Suspended Solids Removal Efficiency [b]	Report	Equal to or greater than 50% removal of influent TSS
	Monthly Geometric Mean	
Fecal Coliform Bacteria	400/100 mL [c]	
		Annual Average [a]
Settleable Solids		0.3 mL/L/hr
	Instantaneous Minimum	**Instantaneous Maximum**
pH [d]	6.0	9.0
	Maximum Daily [e]	
Total Residual Chlorine	234 µg/L	
	Long-Term Average [f]	
Number of Discharge Events	29 events/year	
Discharge Volume	108 million gallons/year	

[a] Calculate annual averages as the average of all ‘event’ averages. Do not omit one event per year from calculation. Data must be collected and reported on a calendar year basis via WQWebDMR and in the Annual CSO Report.

[b] Calculate the TSS total removal efficiency on a mass balance basis as the percent of solids captured at the CSO treatment facility and then permanently removed at the West Point WWTP. The reported daily average TSS % removal efficiency at the West Point WWTP, corresponding to the event, must be used for calculating the total removal efficiency for the CSO facility. Note: While % TSS removal is reported on a monthly basis, compliance is based on the annual average as reported via WQWebDMR and in the annual CSO report as required in S11.

[c] For the monthly geometric mean, calculate the geometric mean of all samples collected during the month; use a value of 1 for the geomean calc when fecal coliform results are 0. Do not include non-discharge days in the calculation. Ecology provides directions to calculate this value in publication No. 04-10-020, *Information Manual for Treatment Plant Operators,* available at: http://www.ecy.wa.gov/pubs/0410020.pdf.

[d] Report the instantaneous maximum and minimum pH monthly. Do not average pH values.

[e] Maximum daily effluent limit means the highest allowable daily discharge. The daily discharge is the average measurement of the pollutant measured over a calendar day while discharging.

[f] Long-term average will be assessed using data collected over the full permit cycle. Data must be collected and reported for the period of the permit cycle prior to permit renewal, as required in S4.E.

Effluent Limits: Outfall #046 - Carkeek CSO TP Latitude: 47.71264˚ Longitude: -122.38789˚		
Parameter	**Average Monthly**	**Annual Average** [a]
Total Suspended Solids Removal Efficiency [b]	Report	Equal to or greater than 50% removal of influent TSS
	Monthly Geometric Mean	
Fecal Coliform Bacteria [c]	400/100 mL	
		Annual Average [a]
Settleable Solids		0.3 mL/L/hr
	Instantaneous Minimum	**Instantaneous Maximum**
pH [d]	6.0	9.0
	Maximum Daily [e]	
Total Residual Chlorine	490 µg/L	
	Long-Term Average [f]	
Number of Discharge Events	10 events/year	
Discharge Volume	46 million gallons/year	

[a] Calculate annual averages as the average of all 'event' averages. Do not omit one event per year from calculation. Data must be collected and reported on a calendar year basis via WQWebDMR and in the Annual CSO Report.

[b] Calculate the TSS total removal efficiency on a mass balance basis as the percent of solids captured at the CSO treatment facility and then permanently removed at the West Point WWTP. The reported daily average TSS % removal efficiency at the West Point WWTP, corresponding to the event, must be used for calculating the total removal efficiency for the CSO facility. Note: While % TSS removal is reported on a monthly basis, compliance is based on the annual average as reported via WQWebDMR and in the annual CSO report as required in S11.

[c] For the monthly geometric mean, calculate the geometric mean of all samples collected during the month; use a value of 1 for the geomean calc when fecal coliform results are 0. Do not include non-discharge days in the calculation. Ecology provides directions to calculate this value in publication No. 04-10-020, *Information Manual for Treatment Plant Operators,* available at: http://www.ecy.wa.gov/pubs/0410020.pdf.

[d] Report the instantaneous maximum and minimum pH monthly. Do not average pH values.

[e] Maximum daily effluent limit means the highest allowable daily discharge. The daily discharge is the average measurement of the pollutant measured over a calendar day while discharging.

[f] Long-term average will be assessed using data collected over the full permit cycle. Data must be collected and reported for the period of the permit cycle prior to permit renewal, as required in S4.E.

Effluent Limits: Outfall #027B - Elliott West CSO TP Latitude: 47.61755˚ Longitude: -122.361856˚		
Parameter	**Average Monthly**	**Annual Average** [a]
Total Suspended Solids Removal Efficiency [b]	Report	Equal to or greater than 50% removal of influent TSS
	Monthly Geometric Mean	
Fecal Coliform Bacteria [c]	400/100 mL	
		Annual Average [a]
Settleable Solids		0.3 mL/L/hr
	Instantaneous Minimum	**Instantaneous Maximum**
pH [d]	6.0	9.0
	Maximum Daily [e]	
Total Residual Chlorine	109 µg/L	

[a] Calculate annual averages as the average of all 'event' averages. Do not omit one event per year from calculation. Data must be collected and reported on a calendar year basis via WQWebDMR and in the Annual CSO Report.

[b] Calculate the TSS total removal efficiency on a mass balance basis as the percent of solids captured at the CSO treatment facility and then permanently removed at the West Point WWTP. The reported daily average TSS % removal efficiency at the West Point WWTP, corresponding to the event, must be used for calculating the total removal efficiency for the CSO facility. Note: While % TSS removal is reported on a monthly basis, compliance is based on the annual average as reported via WQWebDMR and in the annual CSO report as required in S11.

[c] For the monthly geometric mean, calculate the geometric mean of all samples collected during the month; use a value of 1 for the geomean calc when fecal coliform results are 0. Do not include non-discharge days in the calculation. Ecology provides directions to calculate this value in publication No. 04-10-020, *Information Manual for Treatment Plant Operators,* available at: http://www.ecy.wa.gov/pubs/0410020.pdf.

[d] Report the instantaneous maximum and minimum pH monthly. Do not average pH values.

[e] Maximum daily effluent limit means the highest allowable daily discharge. The daily discharge is the average measurement of the pollutant measured over a calendar day while discharging.

Effluent Limits: Outfall #044 - Henderson/MLK CSO TP Latitude: 47.51194˚ Longitude: -122.29736˚		
Parameter	**Average Monthly**	**Annual Average** [a]
Total Suspended Solids Removal Efficiency [b]	Report	Equal to or greater than 50% removal of influent TSS
	Monthly Geometric Mean	
Fecal Coliform Bacteria [c]	400/100 mL	
		Annual Average [a]
Settleable Solids		0.3 mL/L/hr
	Instantaneous Minimum	**Instantaneous Maximum**
pH [d]	6.0	9.0
	Maximum Daily [e]	
Total Residual Chlorine	39 µg/L	

[a] Calculate annual averages as the average of all 'event' averages. Do not omit one event per year from calculation. Data must be collected and reported on a calendar year basis via WQWebDMR and in the Annual CSO Report.

[b] Calculate the TSS total removal efficiency on a mass balance basis as the percent of solids captured at the CSO treatment facility and then permanently removed at the West Point WWTP. The reported daily average TSS % removal efficiency at the West Point WWTP, corresponding to the event, must be used for calculating the total removal efficiency for the CSO facility. Note: While % TSS removal is reported on a monthly basis, compliance is based on the annual average as reported via WQWebDMR and in the annual CSO report as required in S11.

[c] For the monthly geometric mean, calculate the geometric mean of all samples collected during the month; use a value of 1 for the geomean calc when fecal coliform results are 0. Do not include non-discharge days in the calculation. Ecology provides directions to calculate this value in publication No. 04-10-020, *Information Manual for Treatment Plant Operators,* available at: http://www.ecy.wa.gov/pubs/0410020.pdf.

[d] Report the instantaneous maximum and minimum pH monthly. Do not average pH values.

[e] Maximum daily effluent limit means the highest allowable daily discharge. The daily discharge is the average measurement of the pollutant measured over a calendar day while discharging.

S1.C. Mixing zone authorizations

Table 1 summarizes the mixing boundaries and dilution factors for the West Point WWTP and CSO treatment plant outfalls.

Table 1. Dilution zone sizes and dilution factors for permitted outfalls

Outfall	Mixing Zone Radius (feet) [a]		Dilution Factors			
	Chronic	**Acute**	**Aquatic Life Chronic**	**Aquatic Life Acute**	**Human Health: Carcinogen**	**Human Health: Non-Carcinogen**
West Point WWTP	430	43	188	28	324	324
Alki CSO [b]	343	34	99	20		
Carkeek CSO [b]	395	39.5	104	75		
Elliott West CSO [b]	260	26	9.7	8.4		
Henderson/MLK CSO [b]	312 [c]	31.2 [c]	10.3	1.9		

[a] As measured from each port.

[b] Mixing zone dilution modeling is more accurate for continuous discharges. The resultant dilution factor that is achieved in the mixing zone of an intermittent discharge such as this is an approximation that is based on reasonable assumptions about the flow characteristics of the discharge and conditions of the receiving water.

[c] Since this is a river discharge, these dimensions represent distance downstream of outfall instead of radius.

S2. Monitoring requirements

S2.A. Monitoring schedules

The Permittee must monitor in accordance with the schedules in the following tables and the requirements specified in Appendix A or any corresponding *Sampling Analysis Plan/Quality Assurance Project Plan (SAP/QAPP)* documents. Alternative methods from 40 CFR Part 136 are acceptable only for those parameters without limits and if the DL and QL are equivalent to those specified in Appendix A, any corresponding SAP/QAPP documents, or sufficient to produce a measurable quantity.

Table 2. Monitoring Schedule – West Point WWTP (001)

Parameter	Units	Minimum Frequency	Sample Type
(1) Wastewater Influent [a]			
BOD_5	mg/L	1/week	24-hr Composite [b]
	lbs/day [c]	1/week	Calculation
$CBOD_5$	mg/L	1/day	24-hr Composite
	lbs/day [c]	1/day	Calculation
TSS	mg/L	1/day	24-hr Composite
	lbs/day	1/day	Calculation
(2) Final Wastewater Effluent [d]			
Flow	MGD	Continuous [e]	Meter
$CBOD_5$ [f]	mg/L	1/day	24-hr Composite
	lbs/day [c]	1/day	Calculation
	% removal [g]	1/month	Calculation
TSS	mg/L	1/day	24-hr Composite
	lbs/day [c]	1/day	Calculation
	% removal [g]	1/month	Calculation
Chlorine (after dechlorination)	µg/L	Continuous [e]	Meter
Fecal Coliform	# /100 ml	1/day	Grab [h]
pH	Standard Units	Continuous [e]	Meter
(3) Effluent Characterization – Final Wastewater Effluent			
Total Ammonia	mg/L N	1/month	24-hr Composite
	lbs/day	1/month	Calculation
Nitrate + Nitrite Nitrogen	mg/L N	1/month	24-hr Composite
Total Kjeldahl Nitrogen	mg/L N	1/month	24-hr Composite
Total Phosphorus	mg/L P	1/month	24-hr Composite
Soluble Reactive Phosphorus	mg/L P	1/month	24-hr Composite
(4) Whole Effluent Toxicity Testing – Final Wastewater Effluent - As specified in Permit Conditions S8 & S9.			
Acute Toxicity Testing		2/permit cycle	24-hr Composite
Chronic Toxicity Testing		2/permit cycle	24-hr Composite
(5) Pretreatment - As specified in Permit Condition S6.			
(6) CSO Monitoring - As specified in Permit Condition S11.			
(7) Permit Application Requirements – Final Wastewater Effluent [j]			
Dissolved Oxygen	mg/L	1/year in Aug	Grab
Oil and Grease (HEM)	mg/L	1/year in Aug	Grab
Total Dissolved Solids	mg/L	1/year in Aug	24-hr Composite
Total Hardness	mg/L	1/year in Aug	24-hr Composite
Alkalinity	mg/L as CaCO3	1/year in Aug	Grab

Table 2. Monitoring Schedule – West Point WWTP (001)

Parameter	Units	Minimum Frequency	Sample Type
Temperature	˚C	1/year in Aug	Grab
Cyanide	µg/L	2/year [i, j]	Grab
Total Phenolic Compounds	µg/L	2/year [i, j]	Grab
Priority Pollutants (PP) – Total Metals	µg/L (ng for mercury)	2/year [i, j]	24-hr Composite; Grab for mercury
PP – Volatile Organic Compounds	µg/L	2/year [i, j]	Grab
PP – Acid-extractable Compounds	µg/L	2/year [i, j]	24-hr Composite
PP – Base-neutral Compounds	µg/L	2/year [i, j]	24-hr Composite
(8) Sediment Study - As specified in Permit Condition S13.A.			

[a] Wastewater Influent means the raw sewage flow from the collection system into the treatment facility. Sample the wastewater entering the headworks of the plant excluding any side-stream returns from inside the plant.

[b] 24-hour composite means a series of individual samples collected over a 24-hour period in a single container and analyzed as one sample.

[c] lbs/day = Concentration (in mg/L) x Flow (in MGD) x Conversion Factor (8.34) = lbs/day. Calculate using the average flow measured during the sample collection period.

[d] Final Wastewater Effluent means wastewater which is exiting, or has exited, the last treatment process or operation.

[e] "Continuous" means uninterrupted except for brief lengths of time for calibration, power failure, or unanticipated equipment repair or maintenance. The Permittee must sample every six hours when continuous monitoring is not possible.

[f] Effluent samples for $CBOD_5$ analysis may be taken before or after the disinfection process. If taken after, dechlorinate and reseed the sample.

[g] $$\% \text{ removal} = \frac{\text{Influent monthly average concentration (mg/L)} - \text{Effluent monthly average concentration (mg/L)}}{\text{Influent monthly average concentration (mg/L)}} \times 100$$

[h] "Grab" means an individual sample collected over a 15-minute, or less, period.

[i] One of the two annual sampling events must occur when flows are being diverted around the secondary process (i.e. instantaneous effluent flow rate is greater than 300 MGD) or when the average daily precipitation is equal to or greater than 0.25 inches.

[j] The Permittee must record and report the wastewater treatment plant flow discharged on the day it collects the sample for Appendix A pollutant testing with the discharge monitoring report.

See Appendix A or corresponding SAP/QAPP for the required detection (DL) or quantitation (QL) levels.

Report single analytical values below detection as "less than (detection level)" where (detection level) is the numeric value specified in Appendix A.

Report single analytical values between the detection and quantitation levels with qualifier code of 'j' following the value. If unable to obtain the required DL and QL due to matrix effects, the Permittee must submit a matrix specific MDL and a QL with appropriate laboratory documentation.

Table 3. Monitoring Schedule for all CSO TPs: Alki-051, Carkeek-046, Elliott West-027, Henderson/MLK-044

Parameter	Units	Minimum Frequency	Sample Type
(1) Influent [a]			
Volume	MG	Per Event [b]	Meter/Calculation [c]
BOD_5	mg/L	Per Event	Flow Proportional Composite [d]
TSS	mg/L	Per Event	Flow Proportional Composite
(2) Final Effluent [e]			
Volume	MG	Per Event	Meter/Calculation
BOD_5	mg/L	Per Event	Flow Proportional Composite
TSS	mg/L	Per Event	Flow Proportional Composite
	% removal [f]	1/month	Calculation
Settleable Solids	mL/L/hr	Per Event	Flow Proportional Composite
Total Residual Chlorine	ug/L	Continuous during events [g]	Meter
Fecal Coliform	# /100 ml	Per Event	Grab [h, i]
pH	Std Units	Continuous during events	Meter
Copper, total recoverable [j]	µg/L	Elliott West and Henderson/MLK: Per Event All others: 1/year	Flow Proportional Composite
Cyanide	µg/L	Elliott West: 4/yr	Grab
Dissolved Oxygen	mg/L	Elliott West: Per Event starting in Nov 2016 All others: 1/year	Meter or Grab
Discharge Duration	Hours	Per Event	Meter/Calculation
Storm Duration [k]	Hours	Per Event	Meter/Calculation
Precipitation	Inches	Per Event	Meter/Calculation
(3) Effluent Characterization – Final Effluent			
Total Ammonia	mg/L N	Henderson/MLK: 1st 4 discharge events, then 1/year All others: 1/year	Flow Proportional Composite
Nitrate-Nitrite Nitrogen	mg/L N		Flow Proportional Composite
Total Kjeldahl Nitrogen	mg/L N		Flow Proportional Composite
Total Phosphorus	mg/L P		Flow Proportional Composite
Soluble Reactive Phosphorus	mg/L P		Flow Proportional Composite
Total Alkalinity	mg $CaCO_3$/L		Flow Proportional Composite or Grab
Temperature	°C		Grab
Priority Pollutants (PP)–Total Metals	µg/L		Flow Proportional Composite; Grab for mercury
PP – Volatile Organic Compounds	µg/L		Grab
PP – Acid-extractable Compounds	µg/L		Flow Proportional Composite
PP – Base-neutral Compounds	µg/L		Flow Proportional Composite
Cyanide	µg/L		Grab
Total Phenols	µg/L		Grab
PP – Total PCBs [l]	µg/L	Henderson/MLK only: 1/year	Flow Proportional Composite
(4) Permit Application Requirements – Final Effluent [m]			
Oil and Grease	mg/L	1/year	Grab
Total Dissolved Solids	mg/L	1/year	Flow Proportional Composite

Table 3. Monitoring Schedule for all CSO TPs: Alki-051, Carkeek-046, Elliott West-027, Henderson/MLK-044

Parameter	Units	Minimum Frequency	Sample Type
Total Hardness	mg/L	1/year	Flow Proportional Composite

[a] Influent means the combined raw sewage and stormwater flows from the collection system into the treatment facility. Sample the wastewater entering the treatment plant.

[b] "Per Event" means a unique flow event as defined in the *Permit Writer's Manual*, p. V-30. Ecology defines the minimum inter-event period as 24 hours. A CSO event is considered to have ended only after at least 24 hours has elapsed since the last measured occurrence of an overflow.

[c] "Meter/Calculation" means the total volume of the discharge or amount of precipitation event as estimated by direct measurement or indirectly by calculation (i.e. flow weirs, pressure transducers, tipping bucket). Precipitation must be measured by the nearest precipitation-measuring device as owned and operated by King County and actively monitored during the period of interest.

[d] "Flow proportional composite" means a series of individual samples collected over a flow period in a single container, and analyzed as one sample. The composite sample should represent the entire discharge event.

[e] "Final Effluent" means treated CSO effluent which is discharged to the receiving water, sampled after the dechlorination process. The Permittee may take effluent samples for the BOD_5 analysis before or after the disinfection process. If taken after, dechlorinate and reseed the sample.

[f] The total removal efficiency for TSS is to be calculated on a mass balance basis as the percent of solids captured at the CSO Treatment Plant and then permanently removed at the West Point Treatment Plant based on the estimated removal efficiency at West Point.

[g] "Continuous" means uninterrupted except for brief lengths of time for calibration, power failure, or unanticipated equipment repair or maintenance. The Permittee must sample every hour when continuous monitoring is not possible.

[h] "Grab" means an individual sample collected over a 15-minute, or less, period.

[i] Fecal grab samples must be taken at specific time intervals after the discharge begins to the receiving water as follows:

1. 1 sample within first 3 hours.
2. 1 sample between 3-8 hours.
3. 1 sample between 20-24 hours.
4. If discharge extends beyond 24 hours, at a minimum take 1 sample each day until the discharge ends.

If more than 1 sample is collected within the time intervals listed above, report the average of the fecal values for that time interval. Report one fecal value for each interval (as appropriate for the discharge duration) and calculate the monthly geomean using all of the reported fecal values for the month.
Chlorine and pH analyzer readings must be logged when fecal coliform samples are taken. Each individual fecal coliform sample should be dechlorinated.

[j] Copper sampling must be performed with laboratory-verified sampling procedures.

[k] Storm duration is the total amount of time precipitation occurred that contributed to a discharge event; it is determined on a case-by-case basis.

[l] PCB monitoring only required for the Henderson/MLK CSO treatment plant. Total PCBs must be analyzed using method 1668 with a detection limit of 0.0001 µg/L or lower.

[m] The Permittee must record and report the wastewater treatment plant flow discharged on the day it collects the sample for Appendix A pollutant testing with the discharge monitoring report.

See Appendix A or corresponding SAP/QAPP for the required detection (DL) or quantitation (QL) levels.

Report single analytical values below detection as "less than [detection level]" where [detection level] is the numeric value specified in Appendix A.

Report single analytical values between the detection and quantitation levels with qualifier code of 'j' following the value.

Untreated CSO Outfalls

The Permittee must monitor all discharges from the CSO outfalls listed in Special Condition S11, not including any CSO treatment plants, using the following monitoring schedule. The Permittee must use automatic flow monitoring equipment to collect the information required below, and must calibrate flow monitoring equipment according to requirements in Condition S2.C. A CSO discharge is defined as any untreated CSO which will exit or has exited the CSO outfall.

Table 4. Monitoring Schedule – Untreated CSO Outfalls

Parameter	Units	Minimum Sampling Frequency	Sample Type
Volume Discharged	MG	Per Event [a]	Meter/Calculation [b]
Discharge Duration	Hours	Per Event	Meter/Calculation
Storm Duration [c]	Hours	Per Event	Meter/Calculation
Precipitation	Inches	Per Event	Meter/Calculation
Sediments – As specified in Permit Condition S13.C.			

[a] "Per Event" means a unique flow event as defined in the *Permit Writer's Manual*, p. V-30. Ecology defines the minimum inter-event period as 24 hours. A CSO event is considered to have ended only after at least 24 hours has elapsed since the last measured occurrence of an overflow.

[b] "Meter/Calculation" means the total volume of the discharge or amount of precipitation event as estimated by direct measurement or indirectly by calculation (i.e. flow weirs, pressure transducers, tipping bucket). Precipitation must be measured by the nearest possible precipitation-measuring device and actively monitored during the period of interest.

[c] Storm duration is the total amount of time precipitation occurred that contributed to a discharge event; it is determined on a case-by-case basis.

S2.B. Sampling and analytical procedures

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters. The Permittee must conduct representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions that may affect effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 (or as applicable in 40 CFR subchapters N [Parts 400–471] or O [Parts 501-503]) unless otherwise specified in this permit. Ecology may only specify alternative methods for parameters without permit limits and for those parameters without an EPA approved test method in 40 CFR Part 136.

S2.C. Flow measurement, field measurement, and continuous monitoring devices

The Permittee must:

1. Select and use appropriate flow measurement, field measurement, and continuous monitoring devices and methods consistent with accepted scientific practices.

2. Install and maintain these devices to ensure the accuracy of the measurements is consistent with the accepted industry standard and the manufacturer's recommendation for that type of device.
3. Calibrate continuous monitoring instruments consistent with the manufacturer's recommendation.
4. Maintain calibration records for at least three years.

S2.D. Laboratory accreditation

The Permittee must ensure that all monitoring data required by Ecology for permit specified parameters is prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. Flow, temperature, settleable solids, and internal process control parameters are exempt from this requirement. .

S3. Reporting and recording requirements

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

S3.A. Reporting

The first monitoring period begins on the effective date of the permit. The Permittee must:

1. Summarize, report, and submit monitoring data obtained during each monitoring period on the electronic Discharge Monitoring Report (DMR) form provided by Ecology within the Water Quality Permitting Portal. Include data for each of the parameters tabulated in Special Condition S2 and as required by the form. Report a value for each day sampling occurred (unless specifically exempted in the permit) and for the summary values (when applicable) included on the electronic form.

   To find out more information and to sign up for the Water Quality Permitting Portal go to: http://www.ecy.wa.gov/programs/wq/permits/paris/webdmr.html.
2. Enter the "no discharge" reporting code for an entire DMR, for a specific monitoring point, or for a specific parameter as appropriate, if the Permittee did not discharge wastewater or a specific pollutant during a given monitoring period.
3. Report single analytical values below detection as "less than the detection level (DL)" by entering < followed by the numeric value of the detection level (e.g. < 2.0) on the DMR. If the method used did not meet the minimum DL and quantitation level (QL) identified in the permit, report the actual QL and DL in the comments or in the location provided.
4. Report the test method used for analysis in the comments if the laboratory used an alternative method not specified in the permit and as allowed in Appendix A.

5. Calculate average values and calculated total values (unless otherwise specified in the permit) using:

   a. The reported numeric value for all parameters measured between the agency-required detection value and the agency-required quantitation value.

   b. One-half the detection value (for values reported below detection) if the lab detected the parameter in another sample for the reporting period.

   c. Zero (for values reported below detection) if the lab did not detect the parameter in another sample for the reporting period.

6. Report priority pollutant data on the WQWebDMR form and include sample date, concentration detected, detection limit (DL) (as necessary), laboratory quantitation level (QL) (as necessary), and CAS number. The Permittee must also submit an electronic PDF copy of the laboratory report as an attachment using WQWebDMR. The laboratory report must provide the following information: date sampled, sample location, date of analysis, parameter name, CAS number, analytical method/number, detection limit (DL), laboratory quantitation level (QL), reporting units, and concentration detected. The laboratory report must also include information on the chain of custody, QA/QC results, and documentation of accreditation for the parameter.

7. Submit DMRs for parameters with the monitoring frequencies specified in S2 (monthly, quarterly, annual, etc.) at the reporting schedule identified below. The Permittee must:

   a. Submit **monthly** DMRs by the 15th day of the following month.

   b. Submit **annual** DMRs by July 31th for the previous calendar year. The annual sampling period is the calendar year.

S3.B. Permit submittals and schedules

The Permittee must use the *Water Quality Permitting Portal – Permit Submittals* application to submit all other written permit-required reports by the date specified in the permit.

When another permit condition requires submittal of a report/file that cannot be accepted by the Water Quality Permitting Portal (i.e. video file for outfall inspection), the Permittee must ensure that the report/file is postmarked or received by Ecology no later than the dates specified by this permit. Send these reports/files to Ecology at:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

S3.C. Records retention

The Permittee must retain records of all monitoring information for a minimum of three (3) years. Such information must include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

S3.D. Recording of results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, method, and time of sampling or measurement.
2. The individual who performed the sampling or measurement.
3. The dates the analyses were performed.
4. The individual who performed the analyses.
5. The analytical techniques or methods used and the relevant detection limits.
6. The results of all analyses.

S3.E. Additional monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Special Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR or annual CSO report, as appropriate. If the Permittee monitors sediment or untreated CSO discharges more frequently than required by this permit, then the Permittee must enter the results of such monitoring into Ecology's EIM database or include the results in the annual CSO report, as appropriate.

S3.F. Reporting permit violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

1. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the non-compliance and correct the problem.
2. If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within thirty (30) days of sampling.

a. Immediate reporting

The Permittee must *immediately* report to Ecology and the Department of Health, Shellfish Program, and King County Public Health (at the numbers listed below), all:

- Failures of the disinfection systems.
- Collection system overflows other than permitted CSO discharges.

- Plant bypasses discharging to marine surface waters, other than as described in Section S10.
- Any other failures of the sewage system (pipe breaks, etc.)

Additionally, for any sanitary sewer overflow (SSO) that discharges to a municipal separate storm sewer system (MS4), the Permittee must notify the appropriate MS4 owner or operator.

Northwest Regional Office	425-649-7000
Department of Health, Shellfish Program	360-236-3330 (business hours) 360-789-8962 (after business hours)
Public Health of Seattle-King County	206-296-4932

b. *Twenty-four-hour reporting*

The Permittee must report the following occurrences of non-compliance by telephone, to Ecology at the telephone numbers listed above, within 24 hours from the time the Permittee becomes aware of any of the following circumstances:

1. Any non-compliance that may endanger health or the environment, unless previously reported under immediate reporting requirements.
2. Any unanticipated bypass that causes an exceedance of an effluent limit in the permit (See Section S5.F, "Bypass Procedures").
3. Any upset that causes an exceedance of an effluent limit in the permit (See G15, "Upset").
4. Any violation of a maximum daily or instantaneous maximum discharge limit for any of the pollutants in Section S1 of this permit for the West Point outfall 001.
5. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limit in the permit.

c. *Report within five days*

The Permittee must also submit a written report within five business days of the time that the Permittee becomes aware of any reportable event under subparts a or b, above. The report must contain:

1. A description of the non-compliance and its cause.
2. The period of non-compliance, including exact dates and times.
3. The estimated time the Permittee expects the non-compliance to continue if not yet corrected.
4. Steps taken or planned to reduce, eliminate, and prevent recurrence of the non-compliance.

5. If the non-compliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

d. Waiver of written reports

Ecology may waive the written report required in subpart c, above, on a case-by-case basis upon request if the Permittee has submitted a timely oral report.

e. All other permit violation reporting

The Permittee must report all permit violations, which do not require immediate or within 24 hours reporting, when it submits monitoring reports for S3.A ("Reporting"). The reports must contain the information listed in subpart c, above. Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

f. Report submittal

The Permittee must submit reports to the address listed in S3.B.

S3.G. Other reporting

a. Spills of oil or hazardous materials

The Permittee must report a spill of oil or hazardous materials in accordance with the requirements of RCW 90.56.280 and chapter 173-303-145. You can obtain further instructions at the following website: http://www.ecy.wa.gov/programs/spills/other/reportaspill.htm .

b. Failure to submit relevant or correct facts

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it must submit such facts or information promptly.

S3.H. Maintaining a copy of this permit

The Permittee must keep a copy of this permit at all treatment facilities and make it available upon request to Ecology inspectors.

S4. Facility loading (West Point WWTP)

S4.A. Design criteria

The flows or waste loads for the permitted West Point WWTP must not exceed the following design criteria:

Maximum Month Design Flow (MMDF)	215 MGD
BOD_5 Influent Loading for Maximum Month	201,000 lbs/day
TSS Influent Loading for Maximum Month	218,000 lbs/day

S4.B. *Plans for maintaining adequate capacity*

a. *Conditions triggering plan submittal*

The Permittee must submit a plan and a schedule for continuing to maintain capacity to Ecology when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months, or
2. The projected plant flow or loading would reach design capacity within five years.

b. *Plan and schedule content*

The plan and schedule must identify the actions necessary to maintain adequate capacity for the expected population growth and to meet the limits and requirements of the permit. The Permittee must consider the following topics and actions in its plan.

1. Analysis of the present design and proposed process modifications.
2. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.
3. Limits on future sewer extensions or connections or additional waste loads.
4. Modification or expansion of facilities.
5. Reduction of industrial or commercial flows or waste loads.

Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by Ecology prior to any construction.

S4.C. *Duty to mitigate*

The Permittee must take all reasonable steps to minimize or prevent any discharge, use, or disposal of sludge or biosolids in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

S4.D. *Notification of new or altered sources*

1. The Permittee must submit written notice to Ecology whenever any new discharge or a substantial change in volume or character of an existing discharge into the wastewater treatment plant is proposed which:
   a. Would interfere with the operation of, or exceed the design capacity of, any portion of the wastewater treatment plant.
   b. Is not part of an approved general sewer plan or approved plans and specifications.
   c. Is subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act.

2. This notice must include an evaluation of the wastewater treatment plant's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the treatment plant, and the anticipated impact on the Permittee's effluent [40 CFR 122.42(b)].

S4.E. Wasteload assessment

The Permittee must conduct wasteload assessments of the West Point WWTP and each CSO treatment plant and submit a report to Ecology with the next permit application. The Permittee must also submit the report electronically. The report must contain:

1. A description of compliance or non-compliance with the permit effluent limits.
2. A comparison between the existing and design:
   a. Monthly average dry weather and wet weather flows.
   b. Peak flows.
   c. $CBOD_5$ and TSS loadings (West Point only).
   d. 5-year average of annual discharge events and annual discharge volume for the Alki and Carkeek CSO treatment plants.
3. The percent change in the above parameters since the previous report.
4. The present and design population or population equivalent.
5. The projected population growth rate.
6. The estimated date upon which the Permittee expects the wastewater treatment plant to reach design capacity, according to the most restrictive of the parameters above.

S5. Operation and maintenance

The Permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances), which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes keeping a daily operation logbook (paper or electronic), adequate laboratory controls, and appropriate quality assurance procedures. This provision of the permit requires the Permittee to operate backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

S5.A. Certified operator

These permitted facilities must be operated by an operator certified by the state of Washington for at least a Class IV plant. This operator must be in responsible charge of the day-to-day operation of the wastewater treatment facilities. An operator certified for at least a Class III plant must be in charge during all regularly scheduled shifts.

S5.B. Operation and maintenance program

The Permittee must:

1. Maintain the operation and maintenance program for the entire sewage system under the ownership and control of KC.
2. Keep maintenance records on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records must clearly specify the frequency and type of maintenance recommended by the manufacturer and must show the frequency and type of maintenance performed.
3. Make maintenance records available for inspection at all times.

S5.C. Short-term reduction

The Permittee must schedule any facility maintenance, which might require interruption of wastewater treatment and degrade effluent quality, during non-critical water quality periods and carry this maintenance out in a manner approved by Ecology.

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limits on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee must:

1. Give written notification to Ecology, if possible, thirty (30) days prior to such activities.
2. Detail the reasons for, length of time of, and the potential effects of the reduced level of treatment.

This notification does not relieve the Permittee of its obligations under this permit.

S5.D. Electrical power failure

The Permittee must ensure that adequate safeguards prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations. Adequate safeguards include, but are not limited to, alternate power sources, standby generator(s), or retention of inadequately treated wastes.

The Permittee must maintain Reliability Class II (EPA 430-99-74-001) at the wastewater treatment plant. Reliability Class II requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions. Vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but must be sufficient to maintain the biota.

S5.E. Prevent connection of inflow

The Permittee must strictly enforce its sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system where under ownership and control of King County.

S5.F. Bypass procedures

This permit prohibits a bypass, which is the intentional diversion of waste streams from any portion of a treatment facility. Ecology may take enforcement action against a Permittee for a bypass unless one of the following circumstances (1, 2, or 3) applies.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

   This permit authorizes a bypass if it allows for essential maintenance and does not have the potential to cause violations of limits or other conditions of this permit, or adversely impact public health as determined by Ecology prior to the bypass. The Permittee must submit prior notice, if possible, at least ten (10) days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated, and results in non-compliance of this permit.

   This permit authorizes such a bypass only if:

   a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. “Severe property damage” means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

   b. No feasible alternatives to the bypass exist, such as:

      - The use of auxiliary treatment facilities.
      - Retention of untreated wastes.
      - Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass.
      - Transport of untreated wastes to another treatment facility or preventative maintenance.

   c. Ecology is properly notified of the bypass as required in Special Condition S3.E of this permit.

3. If bypass is anticipated and has the potential to result in non-compliance of this permit.

   a. The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:

      - A description of the bypass and its cause.
      - An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.
      - A cost-effectiveness analysis of alternatives including comparative resource damage assessment.

- The minimum and maximum duration of bypass under each alternative.
- A recommendation as to the preferred alternative for conducting the bypass.
- The projected date of bypass initiation.
- A statement of compliance with SEPA.
- A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.
- Details of the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

b. For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during preparation of the engineering report or facilities plan and plans and specifications and must include these to the extent practical. In cases where the Permittee determines the probable need to bypass early, the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.

c. Ecology will consider the following prior to issuing an administrative order for this type of bypass:

- If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.
- If feasible alternatives to bypass exist, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.
- If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, Ecology will approve or deny the request. Ecology will give the public an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Ecology will approve a request to bypass by issuing an administrative order under RCW 90.48.120.

S5.G. Operations and maintenance (O&M) manual

a. O&M manual submittal and requirements

The Permittee must:

1. Review the O&M manuals at least annually.

2. Submit to Ecology for review and approval substantial changes or updates to the O&M manuals whenever it incorporates them into the manual. The Permittee must submit an electronic copy (preferably as a PDF).
3. Keep the approved O&M manuals at the permitted facility.
4. Follow the instructions and procedures of these manuals.

b. O&M manual components

In addition to the requirements of WAC 173-240-080 (1) through (5), the O&M manuals must include:

- Emergency procedures for cleanup in the event of wastewater system upset or failure.
- A review of system components which if failed could pollute surface water or could impact human health. Provide a procedure for a routine schedule of checking the function of these components.
- Wastewater system maintenance procedures that contribute to the generation of process wastewater.
- Reporting protocols for submitting reports to Ecology to comply with the reporting requirements in the discharge permit.
- Any directions to maintenance staff when cleaning or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine).
- Treatment plant process control monitoring schedules.

S6. Pretreatment

S6.A. General requirements

1. The Permittee must implement the Industrial Pretreatment Program in accordance with King County Code 28.84.060 as amended by King County Ordinance No. 11963 on January 1, 1996, legal authorities, policies, procedures, and financial provisions described in the Permittee's approved pretreatment program submittal entitled "Industrial Pretreatment Program" and dated April 27, 1981; any approved revisions thereto; and the General Pretreatment Regulations (40 CFR Part 403). At a minimum, the Permittee must undertake the following pretreatment implementation activities:

    a. Enforce categorical pretreatment standards under Section 307(b) and (c) of the Federal Clean Water Act (hereinafter, the Act), prohibited discharge standards as set forth in 40 CFR 403.5, local limits, or state standards, which ever are most stringent or apply at the time of issuance or modification of a local industrial waste discharge permit. Locally derived limits are defined as pretreatment standards under Section 307(d) of the Act and are not limited to categorical industrial facilities.

b. Issue industrial waste discharge permits to all significant industrial users [SIUs, as defined in 40 CFR 403.3(v)(i)(ii)] contributing to the treatment system, including those from other jurisdictions. Industrial waste discharge permits must contain as a minimum, all the requirements of 40 CFR 403.8 (f)(l)(iii). The Permittee must coordinate the permitting process with Ecology regarding any industrial facility which may possess a state waste discharge permit issued by Ecology.

c. Maintain and update, as necessary, records identifying the nature, character, and volume of pollutants contributed by industrial users to the treatment works. The Permittee must maintain records for at least a three-year period.

d. Perform inspections, surveillance, and monitoring activities on industrial users to determine or confirm compliance with pretreatment standards and requirements. The Permittee must conduct a thorough inspection of SIUs annually, except Middle-Tier Categorical Industrial Users, as defined by 40 CFR 403.8(f)(2)(v)(B)&(C), need only be inspected once every two years, unless they discharge to a CSO outfall (controlled and uncontrolled) located within the Lower Duwamish Waterway cleanup site boundary, in which case they must be inspected annually. The Permittee must conduct regular local monitoring of SIU wastewaters commensurate with the character and volume of the wastewater but not less than once per year except for Middle-Tier Categorical Industrial Users which may be sampled once every two years. The Permittee must collect and analyze samples in accordance with 40 CFR Part 403.12(b)(5)(ii)-(v) and 40 CFR Part 136.

e. Enforce and obtain remedies for non-compliance by any industrial users with applicable pretreatment standards and requirements. Once violations have been identified, the Permittee must take timely and appropriate enforcement action to address the non-compliance. The Permittee's action must follow its enforcement response procedures and any amendments, thereof.

f. Publish, at least annually in a newspaper of general circulation within the Permittee's service area, a list of all non-domestic users which, at any time in the previous 12 months, were in significant non-compliance as defined in 40 CFR 403.8(f)(2)(vii).

g. If the Permittee elects to conduct sampling of an SIU's discharge in lieu of requiring user self-monitoring, it must satisfy all requirements of 40 CFR Part 403.12. This includes monitoring and record keeping requirements of sections 403.12(g) and (o). For SIU's subject to categorical standards (i.e., CIUs), the Permittee may either complete baseline and initial compliance reports for the CIU (when required by 403.12(b) and (d)) or require these of the CIU. The Permittee must ensure SIUs are provided the results of sampling in a timely manner, inform SIUs of their right to sample, their obligations to report any sampling they do, to respond to non-compliance, and to submit other notifications.

These include a slug load report (403.12(f)), notice of changed discharge (403.12(j)), and hazardous waste notifications (403.12(p)). If sampling for the SIU, the Permittee must not sample less than once in every six month period unless the Permittee's approved program includes procedures for reduction of monitoring for Middle-Tier or Non-Significant Categorical Users per 403.12(e)(2) and (3) and those procedures have been followed.

h. Develop and maintain a data management system designed to track the status of the Permittee's industrial user inventory, industrial user discharge characteristics, and compliance status.

i. Maintain adequate staff, funds, and equipment to implement its pretreatment program.

j. Establish, where necessary, contracts or legally binding agreements with contributing jurisdictions to ensure compliance with applicable pretreatment requirements by commercial or industrial users within these jurisdictions. These contracts or agreements must identify the agency responsible for the various implementation and enforcement activities to be performed in the contributing jurisdiction.

2. Per 40 CFR 403.8(f)(2)(vii), the Permittee must evaluate each Significant Industrial User to determine if a Slug Control Plan is needed to prevent slug discharges which may cause interference, pass-through, or in any other way result in violations of the Permittee's regulations, local limits or permit conditions. The Slug Control Plan evaluation shall occur within one year of a user's designation as a SIU. In accordance with 40 CFR 403.8(f)(1)(iii)(B)(6) the Permittee shall include slug discharge control requirements in an SIU's permit if the Permittee determines that they are necessary.

3. Whenever Ecology determines that any waste source contributes pollutants to the Permittee's treatment works in violation of Subsection (b), (c), or (d) of Section 307 of the Act, and the Permittee has not taken adequate corrective action, Ecology will notify the Permittee of this determination. If the Permittee fails to take appropriate enforcement action within 30 days of this notification, Ecology may take appropriate enforcement action against the source or the Permittee.

4. *Pretreatment Report*

The Permittee must provide to Ecology an annual report that briefly describes its program activities during the previous calendar year. By March 31st, the Permittee must send the annual report to Ecology at:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

The report must include the following information:

a. An updated listing of non-domestic industrial dischargers. Starting with the report submitted in 2016, the list must identify, for each discharger with a King County discharge authorization (minor or major) or discharge permit, the downstream CSO outfall(s) to which the discharger contributes, where applicable.

b. Results of wastewater sampling at the treatment plant as specified in Subsection S6.B below. The Permittee must calculate removal rates for each pollutant and evaluate the adequacy of the existing local limits in prevention of treatment plant interference, pass through of pollutants that could affect receiving water quality and biosolids contamination.

c. Status of program implementation, including:

   i. Any substantial modifications to the pretreatment program as originally approved by Ecology, including staffing and funding levels.

   ii. Any interferences, upsets, or permit violations experienced at the WWTP that are directly attributable to wastes from industrial users.

   iii. Listing of industrial users inspected and/or monitored, and a summary of the results.

   iv. Listing of industrial users scheduled for inspection and/or monitoring for the next year, and expected frequencies.

   v. Listing of industrial users notified of promulgated pretreatment standards and/or local standards as required in 40 CFR 403.8(f)(2)(iii). The list must indicate which industrial users are on compliance schedules and the final date of compliance for each.

   vi. Listing of industrial users issued industrial waste discharge permits.

   vii. Planned changes in the pretreatment program implementation plan.

d. Status of compliance activities, including:

   i. Listing of industrial users that failed to submit baseline monitoring reports or any other reports required under 40 CFR 403.12 and in the Permittee's pretreatment program, dated April 27, 1981.

   ii. Listing of industrial users that were at any time during the reporting period not complying with federal, state, or local pretreatment standards or with applicable compliance schedules for achieving those standards, and the duration of such non-compliance.

   iii. Summary of enforcement activities and other corrective actions taken or planned against non-complying industrial users. The Permittee must supply to Ecology a copy of the public notice of facilities that were in significant non-compliance.

5. The Permittee must request and obtain approval from Ecology before making any significant changes to the approved local pretreatment program. The Permittee must follow the procedure in 40 CFR 403.18 (b) and (c).

S6.B. Monitoring requirements

The Permittee must monitor its influent, effluent, and biosolids at the West Point WWTP for the priority pollutants identified in Tables II and III of Appendix D of 40 CFR Part 122 as amended, any compounds identified as a result of Condition S6.B.4, and any other pollutants expected from nondomestic sources using U.S. EPA-approved procedures for collection, preservation, storage, and analysis. The Permittee must test influent, effluent, and biosolids samples for the priority pollutant metals (Table III, 40 CFR 122, Appendix D) on a quarterly basis throughout the term of this permit. The Permittee must test influent, effluent, and biosolids samples for the organic priority pollutants (Table II, 40 CFR 122, Appendix D) on an annual basis.

1. The Permittee must sample West Point WWTP influent and effluent on a day when industrial discharges are occurring at normal to maximum levels. The Permittee must obtain 24-hour composite samples for the analysis of acid and base/neutral extractable compounds and metals. The Permittee must collect samples for the analysis of volatile organic compounds and samples must be collected using grab sampling techniques at equal intervals for a total of four grab samples per day.

   The laboratory may run a single analysis for volatile pollutants (using GC/MS procedures approved by 40 CFR 136) for each monitoring day by compositing equal volumes of each grab sample directly in the GC purge and trap apparatus in the laboratory, with no less than 1 ml of each grab included in the composite.

   Unless otherwise indicated, all reported test data for metals must represent the total amount of the constituent present in all phases, whether solid, suspended, or dissolved, elemental or combined including all oxidation states.

   The Permittee must handle, prepare, and analyze all wastewater samples taken for GC/MS analysis using procedures approved by 40 CFR 136.

2. The Permittee must collect a biosolids sample concurrently with a wastewater sample as a single grab sample of residual biosolids. Sampling and analysis must be performed using procedures approved by 40 CFR 136 unless the Permittee requests an alternate method and Ecology has approved.

3. The Permittee must take cyanide, phenols, and oils as grab samples. Oils must be hexane soluble or equivalent, and should be measured in the influent and effluent only.

4. In addition to quantifying pH, oil and grease, and all priority pollutants, the Permittee must make a reasonable attempt to identify all other substances and quantify all pollutants shown to be present by gas chromatograph/mass spectrometer (GC/MS) analysis using procedures approved by 40 CFR 136. The Permittee should attempt to make determinations of pollutants for each

fraction, which produces identifiable spectra on total ion plots (reconstructed gas chromatograms). The Permittee should attempt to make determinations from all peaks with responses 5% or greater than the nearest internal standard. The 5% value is based on internal standard concentrations of 30 μg/l, and must be adjusted downward if higher internal standard concentrations are used or adjusted upward if lower internal standard concentrations are used. The Permittee may express results for non-substituted aliphatic compounds as total hydrocarbon content. The Permittee must use a laboratory whose computer data processing programs are capable of comparing sample mass spectra to a computerized library of mass spectra, with visual confirmation by an experienced analyst. For all detected substances which are determined to be pollutants, the Permittee must conduct additional sampling and appropriate testing to determine concentration and variability, and to evaluate trends.

S6.C. Reporting of monitoring results

The Permittee must include a summary of monitoring results in the Annual Pretreatment Report.

S6.D. Local limit development

As sufficient data become available, the Permittee must, in consultation with Ecology, reevaluate their local limits in order to prevent pass through or interference. On a case-by-case basis, as applicable, the Permittee should consider the impacts of CSO discharges on the receiving waterbody when establishing limits for individual permittees. If Ecology determines that any pollutant present causes pass through or interference, or exceeds established biosolids standards, the Permittee must establish new local limits or revise existing local limits as required by 40 CFR 403.5. Ecology may also require the Permittee to revise or establish local limits for any pollutant discharged from the treatment works that has a reasonable potential to exceed the water quality standards, sediment standards, or established effluent limits, or causes whole effluent toxicity. Ecology makes this determination in the form of an Administrative Order.

Ecology may modify this permit to incorporate additional requirements relating to the establishment and enforcement of local limits for pollutants of concern. Any permit modification is subject to formal due process procedures under state and federal law and regulation.

S7. Solid wastes

S7.A. Solid waste handling

The Permittee must handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

S7.B. Leachate

The Permittee must not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment, nor allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality

Standards, Chapter 173-200 WAC. The Permittee must apply for a permit or permit modification as may be required for such discharges to state ground or surface waters.

S8. Acute toxicity

S8.A. Acute testing

The Permittee must:

1. Conduct acute toxicity testing on final West Point WWTP effluent during the first and third quarters of 2017.
2. Submit the results to Ecology with the permit renewal application.
3. Conduct acute toxicity testing on a series of at least five concentrations of effluent, including 100% effluent and a control.
4. Use each of the following species and protocols for each acute toxicity test:

Acute Toxicity Tests	Species	Method
Fathead minnow 96-hour static-renewal test	*Pimephales promelas*	EPA-821-R-02-012
Daphnid 48-hour static test	*Ceriodaphnia dubia, Daphnia pulex,* or *Daphnia magna*	EPA-821-R-02-012

S8.B. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain bench sheets and reference toxicant results for test methods. If the lab provides the toxicity test data in electronic format for entry into Ecology's database, then the Permittee must send the data to Ecology along with the test report, bench sheets, and reference toxicant results.
2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Subsection C and the Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.

5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Section A or pristine natural water of sufficient quality for good control performance.
6. The Permittee must collect effluent samples for whole effluent toxicity testing just prior to the chlorination step in the treatment process.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the acute critical effluent concentration (ACEC). The ACEC equals 3.6 % effluent.
8. All whole effluent toxicity tests that involve hypothesis testing must comply with the acute statistical power standard of 29% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S9. Chronic toxicity

S9.A. Chronic testing

The Permittee must:

1. Conduct chronic toxicity testing on final West Point WWTP effluent during the second and fourth quarters of 2017.
2. Submit the results to Ecology with the permit renewal application.
3. Conduct chronic toxicity testing on a series of at least five concentrations of effluent and a control. This series of dilutions must include the acute critical effluent concentration (ACEC). The ACEC equals 3.6% effluent. The series of dilutions should also contain the CCEC of 0.53 % effluent.
4. Compare the ACEC to the control using hypothesis testing at the 0.05 level of significance as described in Appendix H, EPA/600/4-89/001.
5. Perform chronic toxicity tests with all of the following species and the most recent version of the following protocols:

Saltwater Chronic Test	Species	Method
Topsmelt survival and growth	*Atherinops affinis*	EPA/600/R-95/136
Mysid shrimp survival and growth	*Americamysis bahia* (formerly *Mysidopsis bahia*)	EPA-821-R-02-014

S9.B. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain bench sheets and reference toxicant results for test methods. If the lab

provides the toxicity test data in electronic format for entry into Ecology's database, then the Permittee must send the data to Ecology along with the test report, bench sheets, and reference toxicant results.

2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Section C and the Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.
5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Subsection C or pristine natural water of sufficient quality for good control performance.
6. The Permittee must collect effluent samples for whole effluent toxicity testing just prior to the chlorination step in the treatment process.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the CCEC and the ACEC. The CCEC and the ACEC may either substitute for the effluent concentrations that are closest to them in the dilution series or be extra effluent concentrations. The CCEC equals 0.53% effluent. The ACEC equals 3.6% effluent.
8. All whole effluent toxicity tests that involve hypothesis testing must comply with the chronic statistical power standard of 39% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S10. Wet weather operation

CSO-related bypass of the secondary treatment portion of the West Point WWTP is authorized when the instantaneous flow rate to the WWTP exceeds 300 MGD as a result of precipitation events. Bypasses that occur when the instantaneous flow rate is less than 300 MGD are not authorized under this condition and are subject to the bypass provisions as stated in S5.F of the permit. In the event of a CSO-related bypass authorized under this condition, the Permittee must minimize the discharge of pollutants to the environment. At a minimum, CSO-related bypass flows must receive solids and floatables removal, primary clarification, and disinfection. The final discharge must at all times meet the effluent limits of this permit as listed in S1.

The Permittee must maintain records of all CSO-related bypasses at the treatment plant. These records must document the date, duration, and volume of each bypass event, and the magnitude of the precipitation event. The records must also indicate the effluent flow rate at the time when bypassing is initiated. The Permittee must report all occurrences of bypassing on a monthly and annual basis. The monthly report must include the above information and must be included in narrative form with the discharge monitoring report. The annual report must include all of the above information in summary format and should be reported in the annual CSO report per S11.C.

S11. Combined sewer overflows

S11.A. Authorized CSO discharge locations

Beginning on the effective date of this permit, the Permittee may discharge combined wastewater and stormwater from the 38 combined sewer overflow (CSO) outfalls listed in

Table 5. These point source discharges occur intermittently when rain events overload the combined sewer system. The permit prohibits discharges from the CSO outfall sites except as a result of precipitation. This permit does not authorize discharges from CSO outfalls that threaten characteristic uses of the receiving water as identified in the water quality standards, Chapter 173-201A WAC, or that result in an exceedance of the Sediment Management Standards, Chapter 173-204 WAC.

Table 5. Permitted CSO outfalls (38)

Outfall No.	Facility Name	Receiving Water	Latitude	Longitude
003	Ballard Siphon Reg.via Seattle storm drain	Lake Washington Ship Canal	47.663916˚	-122.382333˚
004	11th Ave NW (AKA East Ballard)	Lake Washington Ship Canal	47.659491˚	-122.370774˚
006	Magnolia Overflow	Elliott Bay/Puget Sound	47.630184˚	-122.399021˚
007	Canal Street Overflow	Lake Washington Ship Canal	47.651856˚	-122.358113˚
008	3rd Ave W and Ewing St.	Lake Washington Ship Canal	47.652084˚	-122.360052˚
009	Dexter Ave Regulator	Lake Union	47.632273˚	-122.339235˚
011	E Pine St. PS Emergency Overflow	Lake Washington	47.614926˚	-122.280304˚
012	Belvoir Pump Station Emergency Overflow	Lake Washington	47.656698˚	-122.287589˚
013	MLK Trunkline Overflow - via storm drain	Lake Washington	47.523285˚	-122.262950˚
014	Montlake Overflow	Lake Washington Ship Canal	47.647110˚	-122.304861˚
015	University Regulator	Lake Washington Ship Canal	47.648929˚	-122.311296˚
018	Matthews Park PS Emergency Overflows	Lake Washington	47.697458˚	-122.272650˚
027a	Denny Way Regulator	Elliott Bay	47.618139˚	-122.361888˚
028	King Street Regulator	Elliott Bay	47.599003˚	-122.337425˚
029	Kingdome	Elliott Bay	47.592532˚	-122.342106˚
030	Lander St. Regulator	Elliott Bay	47.581476˚	-122.342997˚

Outfall No.	Facility Name	Receiving Water	Latitude	Longitude
031a, b, c	Hanford #1 Overflow - Via Diagonal Storm Drain	Duwamish River	47.563108°	-122.345315°
032	Hanford #2 Regulator	Duwamish - East Waterway	47.577223°	-122.34278°
033	Rainier Ave Pump Station	Lake Washington	47.571374°	-122.27553°
034	E. Duwamish Pump Station	Duwamish River	47.562985°	-122.345272°
035	W. Duwamish Pump Station	Duwamish River	47.563224°	-122.348256°
036	Chelan Ave Regulator	Duwamish - West Waterway	47.573667°	-122.357779°
037	Harbor Avenue Regulator	Duwamish to Elliott Bay	47.573706°	-122.361159°
038	Terminal 115 Overflow	Duwamish River	47.54826°	-122.340503°
039	Michigan S. Regulator	Duwamish River	47.54353°	-122.334967°
040	8th Ave South Reg. (W. Marginal Way PS)	Duwamish River	47.533648°	-122.322639°
041	Brandon Street Regulator	Duwamish River	47.554661°	-122.340832°
042	Michigan W. Regulator	Duwamish River	47.541561°	-122.334994°
043	East Marginal Pump Station	Duwamish River	47.537048°	-122.31849°
044a	Norfolk Outfall	Duwamish River	47.511941°	-122.297356°
045	Henderson Pump Station	Lake Washington	47.523285°	-122.26295°
048a,b	North Beach Pump Station: a.) wet well, b) inlet structure	Puget Sound	47.704007° 47.702142°	-122.392337° -122.392564°
049	30th Avenue NE Pump Station	Lake Washington	47.656698°	-122.287589°
052	53rd Avenue SW Pump Station	Puget Sound	47.584799°	-122.402552°
054	63rd Avenue SW Pump Station	Puget Sound	47.570016°	-122.416301°
055	SW Alaska Street Overflow	Puget Sound	47.559442°	-122.406947°
056	Murray Street Pump Station	Puget Sound	47.540275°	-122.400003°
057	Barton Street Pump Station	Puget Sound	47.523886°	-122.396393°

S11.B. Nine minimum controls

In accordance with chapter 173-245 WAC and US EPA CSO control policy (59 FR 18688), the Permittee must implement and document the following nine minimum controls (NMC) for CSOs. The Permittee must document compliance with the NMCs in the annual CSO report as required in Special Condition S11.C.

The NMCs are considered technology-based requirements for CSO systems. In order to comply with these requirements, the Permittee must:

1. Implement proper operation and maintenance programs for the sewer system and all CSO outfalls to reduce the magnitude, frequency, and duration of CSOs. The program must consider regular sewer inspections; sewer, catch basin, and regulator cleaning; equipment and sewer collection system repair or replacement, where necessary; and disconnection of illegal connections.
2. Implement procedures that will maximize use of the collection system for wastewater storage that can be accommodated by the storage capacity of the collection system in order to reduce the magnitude, frequency, and duration of CSOs.

3. Review and modify, as appropriate, its existing pretreatment program to minimize CSO impacts from the discharges from non-domestic users. Starting with its annual Pretreatment Report submitted in 2016, the County must include in the report, for each discharger with a King County discharge authorization (major or minor) or discharge permit, the downstream CSO outfall(s) to which the discharger contributes, where applicable.
4. Operate the wastewater treatment plant at maximum treatable flow during all wet weather flow conditions to reduce the magnitude, frequency, and duration of CSOs. The Permittee must deliver all flows to the treatment plant within the constraints of the treatment capacity of the treatment works.
5. Not discharge overflows from CSO outfalls except as a result of precipitation events; dry weather overflows from CSO outfalls are prohibited. The Permittee must report each dry weather overflow to the permitting authority immediately per Special Condition S3.E. When it detects a dry weather overflow, the Permittee must begin corrective action immediately and inspect the dry weather overflow each subsequent day until it has eliminated the overflow.
6. Implement measures to control solid and floatable materials in CSOs.
7. Implement a pollution prevention program focused on reducing the impact of CSOs on receiving waters. Best management practices (BMPs) to control pollutant sources in stormwater in CSO basins must be an element of the pollution prevention program. Ecology’s *Stormwater Management Manual for Western Washington* (2012) contains appropriate BMPs for reference.

   Starting with the Annual CSO Report submitted in 2017, the Permittee must include a detailed description of the pollution prevention program, appropriate BMPs, and the legal authority and administrative procedures that will be used to ensure the program is being implemented. If the legal authority and/or administrative procedures are not in place, the Annual CSO Report must include a detailed description of the steps needed to establish such a program and the timeline for getting the program in place.
8. Continue to implement the public notification process that informs citizens of when and where CSOs occur. The process must continue to include (a) a mechanism to alert citizens of CSO occurrences and (b) a system to determine the nature and duration of conditions that are potentially harmful for users of receiving waters due to CSOs.
9. Monitor CSO outfalls to characterize CSO impacts and the efficacy of CSO controls. This must include collection of data to document existing baseline conditions and to evaluate the efficacy of the technology-based controls. This data must include:

   a. Characteristics of the combined sewer system, including the population served by the combined portion of the system and locations of all CSO outfalls.

b. Total number of CSO events, and the frequency and duration of CSOs for all events.

c. Locations and designated uses of receiving water bodies.

d. Water quality data for receiving water bodies.

e. Water quality impacts directly related to CSO (e.g., beach closing, floatables, wash-up episodes, fish kills).

S11.C. Combined sewer overflow reporting

1. *Monthly CSO Report*

The Permittee must submit a monthly report by the 15th of each month that includes:

a. Discharge monitoring reports (DMRs) and narrative summaries for each CSO treatment plant (Alki, Carkeek, Elliott West, and Henderson), and

b. An event-based summary that includes discharge volume, duration, and precipitation for all CSO discharge events that occur during the reporting period.

2. *Annual CSO Report*

The Permittee must submit a CSO Annual Report to Ecology for review by July 31st of each year. The CSO Annual Report must cover the previous calendar year. The report must comply with the requirements of WAC 173-245-090(1) and must include documentation of compliance with the Nine Minimum Controls for CSOs described in Special Condition S11.B. The Permittee must submit paper and electronic copies of the report, and Excel spreadsheet copies of significant spreadsheets. The CSO Annual Report must include the following information:

a. A summary of the number and volume of untreated discharge events per outfall for that year.

b. A summary of the 20-year moving average number of untreated discharge events per outfall, calculated once annually.

c. An event-based reporting form (provided by Ecology) for all CSO discharges for the reporting period, summarizing all data collected according to the monitoring schedule in Special Condition S11.B.9.

d. An explanation of the previous year's CSO reduction accomplishments.

e. A list of CSO reduction projects planned for the next year.

f. A list of which permitted CSO outfalls can be categorized as meeting the one untreated discharge per year on a 20-year moving average performance standard. This annual assessment may be based on historical long-term discharge data, modeling, or other reasonable methods as approved by Ecology.

S11.D. *Combined sewer overflow reduction plan amendment*

The Permittee must submit an amendment of its *2012 Long Term Control Plan Amendment* (also referred to as a CSO Reduction Plan) to Ecology for review and approval with the application for permit renewal. The amendment must comply with the requirements of WAC 173-245-090(2).

S11.E. *Engineering reports and plans and specifications for CSO reduction projects*

The Permittee must submit to Ecology an engineering report for each specific CSO reduction construction project. Engineering documents associated with each CSO reduction project must meet the requirements of WAC 173-240-060, *Engineering Report*, and be approved by Ecology prior to construction. The report must:

1. Specify any contracts, ordinances, methods of financing, or any other arrangements necessary to achieve this objective.
2. Describe how each project will achieve the performance standard of *greatest reasonable control* and explicitly state the expected frequency of overflow events per year per associated outfall after the CSO reduction construction project has been completed.
3. Identify the potential hydraulic impacts of the project on downstream conveyance and treatment facilities.

For each specific CSO reduction construction project, the Permittee must prepare and submit approvable plans and specifications consistent with chapter 173-240-070 WAC to Ecology for review and approval. Ecology must approve plans and specifications prior to construction.

Prior to the start of construction, the Permittee must submit to Ecology a construction quality assurance plan as required by chapter 173-240-075 WAC.

S11.F. *Requirements for controlled combined sewer overflows*

a. CSOs identified as controlled

Based on monitoring data presented in King County's *2012 Annual CSO Report* and King County's *2012 Long Term Control Plan Amendment*, the 16 CSO outfalls listed in Table 6 meet the requirement of "greatest reasonable reduction" as defined in chapter WAC 173-245-020(22). Frequency of overflow events at these CSO outfalls, as a result of precipitation events, must continue to meet the performance standard.

Table 6. Controlled CSO outfalls (16)

CSO Outfall No	Location/Name	Receiving Water	Latitude	Longitude
007	Canal Street Overflow	Lake Washington Ship Canal	47.651856˚	-122.358113˚
011	E Pine St. PS Emergency Overflow	Lake Washington	47.614926˚	-122.280304˚
012	Belvoir PS Emergency Overflow	Lake Washington	47.656698˚	-122.287589˚
013	MLK Trunkline Overflow - via storm drain	Lake Washington	47.523285˚	-122.26295˚
018	Matthews Park PS Emergency Overflows	Lake Washington	47.697458˚	-122.27265˚
033	Rainier Ave Pump Station	Lake Washington	47.571374˚	-122.27553˚
034	E. Duwamish Pump Station	Duwamish River	47.563224˚	-122.348256˚
035	W. Duwamish Pump Station	Duwamish River	47.562986˚	-122.345272˚
040	8th Ave South Reg. (W Marginal Way PS)	Duwamish River	47.533648˚	-122.322639˚
043	East Marginal Pump Station	Duwamish River	47.537048˚	-122.31849˚
044a	Norfolk Outfall	Duwamish River	47.511941˚	-122.297356˚
045	Henderson Pump Station	Lake Washington	47.523285˚	-122.26295˚
049	30th Avenue NE Pump Station	Lake Washington	47.656698˚	-122.287589˚
052	53rd Avenue SW Pump Station	Puget Sound	47.584799˚	-122.402552˚
054	63rd Avenue SW Pump Station	Puget Sound	47.570016˚	-122.416301˚
055	SW Alaska Street Overflow	Puget Sound	47.559442˚	-122.406947˚

b. *Performance standards for controlled CSO outfalls*

The performance standard for each controlled CSO outfall is not more than one discharge event per outfall per year on average, due to precipitation. Ecology evaluates compliance with the performance standard annually based on a 20 year moving average. The Permittee must report the running 20-year average number of overflow events per year during this permit term from these CSO outfalls in the *CSO Annual Report* required in Section S11.C.

c. *CSO post construction monitoring*

The Permittee must continue to implement a post construction compliance monitoring program to verify the effectiveness of CSO controls and to demonstrate compliance with water quality standards and protection of designated uses. The Permittee must follow the approved *King County 2012 Post Construction Monitoring Plan* and submit to Ecology for review and approval any proposed changes to this plan.

d. *CSO post construction monitoring data report*

The Permittee must submit to Ecology, by December 1, 2019, a post-construction monitoring summary report that demonstrates how each CSO outfall listed as controlled in Table 6, as well as those brought under control during the permit term, achieves performance requirements and complies with state water and sediment quality standards. The report must conform to the approved *CSO Post Construction Monitoring Plan*. For outfalls with SMS exceedances associated with CSO discharges, the report must describe clean-up activities in the vicinity including clean-up actions planned or that have been performed, targeted chemicals, any available pre- and post-cleanup monitoring results, clean-up project schedule, post-project monitoring schedule, and a list of parties involved.

The outfalls scheduled to be controlled during this permit term and to be discussed in the CSO post construction monitoring data report include: Dexter Avenue Regulator (DSN 009), Denny Way Regulator (DSN 027a), Harbor Avenue Regulator (DSN 037), Ballard Siphon Regulator (DSN 003), Barton (DSN 057), Murray (DSN 056), South Magnolia (DSN 006), and North Beach (DSN 048).

S12. Spill control plan

The Permittee must:

1. Review the West Point WWTP Spill Plan at least annually and update as needed.
2. Send updated plans to Ecology when significant changes are made.
3. Follow the plan and any supplements throughout the term of the permit.

The spill control plan must include the following:

1. A list of all oil and petroleum products and other materials used and/or stored on site, which when spilled, or otherwise released into the environment, designate as dangerous waste (DW) or extremely hazardous waste (EHW) by the procedures set forth in WAC 173-303-070. Include other materials used and/or stored on site which may become pollutants or cause pollution upon reaching state's waters.
2. A description of preventive measures and facilities (including an overall facility plot showing drainage patterns) which prevent, contain, or treat spills of these materials.
3. A description of the reporting system the Permittee will use to alert responsible managers and legal authorities in the event of a spill.
4. A description of operator training to implement the plan.

S13. Sediment monitoring

S13.A. Sediment sampling – West Point WWTP

a. *Sediment sampling and analysis plan*

The Permittee must submit to Ecology for review and approval a sediment sampling and analysis plan for sediment monitoring for the West Point WWTP outfall. The Permittee must submit one paper copy and an electronic copy (preferably as a PDF) by December 1, 2016. The purpose of the plan is to re-characterize sediment quality in the vicinity of the discharge location.

The Permittee must:

- Follow the guidance provided in the *Sediment Source Control Standards User Manual, Appendix B: sediment sampling and analysis plan* (Ecology, 2008). Method detection limits must be listed in the plan.
- Collect enough sediment in the top 10 cm at each station to allow for conventional parameter testing (percent solids, total organic carbon, particle size), chemistry testing, and if necessary, bioassay testing. Chemistry tests must be performed before bioassay tests and if there are Sediment Quality Standard (SQS) exceedances, then bioassay tests must be performed.
- Chemistry: Analyze conventional parameters and the full suite of 47 Sediment Management Standards (SMS) marine chemicals at all stations.
- Bioassay: Perform bioassay tests at all stations with SQS exceedances. Run parallel larval echinoderm tests, using standard protocols and screen tube manipulation, in order to see if a physical influence from turbidity in the overlying test water continues to lead to failed bioassays.
- Stations: Collect samples at the same stations as the previous sampling events. Identify the predominant current direction in the vicinity of the outfall on all figures.

b. Sediment data report

Following Ecology approval of the Sediment Sampling and Analysis Plan, the Permittee must collect sediments between August 15th and September 15th. The Permittee must submit to Ecology a Sediment Data Report containing the results of the sediment sampling and analysis no later than December 1, 2018. The Permittee must submit two paper copies and an electronic copy (preferably as a PDF). The sediment data report must conform to the approved sediment sampling and analysis plan.

In addition to a Sediment Data Report, the sediment chemical and biological data must be submitted to Ecology's EIM database (http://www.ecy.wa.gov/eim/), and Ecology's MyEIM tools must be used to confirm the accuracy of the submitted data (http://www.ecy.wa.gov/eim/MyEIM.htm).

S13.B. Sediment sampling – CSO outfalls

The Permittee must model and/or collect sediment samples in the vicinities of controlled CSO outfalls: E. Pine Street Pump Station Emergency Overflow (011), Belvoir (012)/30th Ave NE Pump Station (049), Martin Luther King (013)/Henderson Pump Station (045), Matthews Park Pump Station Emergency Overflow (018), and Rainier Avenue Pump Station Emergency Overflow (033). A sediment sampling and analysis plan (SAP) must be submitted by December 1, 2016 in accordance with (a) below. Following Ecology approval of the sediment SAP, the Permittee must collect sediments according to the SAP. The Permittee must submit to Ecology a sediment data report, in accordance with (b) below, that contains the sediment sampling and analysis results no later than December 1, 2018.

In addition, the Permittee must model and/or sample sediments in accordance with their approved *2012 Post Construction Monitoring Plan* or any subsequent approved plan revisions. Post construction monitoring of sediments is required with the completion of CSO projects once the CSO has been deemed controlled unless sufficient recent data exists that shows there are no SMS exceedances. An exception is made if an area-wide cleanup project is planned with sediment sampling scheduled at cleanup project completion.

For each CSO outfall site that requires sediment monitoring, the Permittee must submit a sediment sampling and analysis plan and data report in accordance with the following.

a. *Sediment sampling and analysis plan*

The Permittee must submit to Ecology for review and approval a sediment sampling and analysis plan (SSAP) for sediment monitoring at least eight months prior to sediment testing. The Permittee must submit one paper copy and an electronic copy (preferably as a PDF). The purpose of the plan is to characterize sediment (the nature and extent of chemical contamination and biological toxicity) quality in the vicinity of the discharge locations. The SSAP must be consistent with the *CSO Sediment Quality Characterization Sampling and Analysis Plan* in Appendix H of the County's approved *Post-Construction Monitoring Plan.* The Permittee must list method detection limits in the plan.

b. *Sediment data report*

Following Ecology approval of the Sediment Sampling and Analysis Plan, the Permittee must collect sediments according to the plan. The Permittee must submit to Ecology a Sediment Data Report containing the results of the sediment sampling and analysis no later than ten months after the data was collected. The Permittee must submit two paper copies and an electronic copy (preferably as a PDF). The sediment data report must conform to the approved sediment sampling and analysis plan.

In addition to a Sediment Data Report, the sediment chemical and biological data must be submitted to Ecology's EIM database (http://www.ecy.wa.gov/eim/), and Ecology's MyEIM tools must be used to confirm the accuracy of the submitted data (http://www.ecy.wa.gov/eim/MyEIM.htm).

S13.C. Sediment quality summary at CSO outfalls

The Permittee must submit to Ecology an update to the *2009 Comprehensive Sediment Quality Summary Report* no later than December 1, 2018. The 2009 report summarizes sediment data collected at all CSO outfalls including CSO treatment plants. The purpose of this update is to keep CSO sediment monitoring history information consolidated to help King County and Ecology assess the potential for sediment impacts from CSO discharges.

This update report must provide any new site-specific information including quantity and quality of the discharges, receiving water characteristics, and new knowledge about sediment quality near the CSO outfalls. The report must also include a status of sediment cleanup sites and monitoring plans.

Data not previously submitted and not yet formatted and future data must be formatted in the EIM format.

S14. Outfall evaluation

The Permittee must inspect, once during the permit term, the submerged portions of the West Point WWTP and CSO treatment plant outfall lines and diffusers to document their integrity and continued function. If conditions allow for a photographic verification, the Permittee must include such verification in the reports. The Permittee must submit the inspection reports to Ecology with the NPDES Permit renewal application. The inspector must at minimum:

- Assess the physical condition of the outfall pipes, diffusers, and associated couplings.
- Determine the extent of sediment accumulation in the vicinity of the diffusers.
- Ensure diffuser ports are free of obstructions and are allowing uniform flow.
- Confirm physical location (latitude/longitude) and depth (at MLLW) of the diffuser sections of the outfalls.
- Assess physical condition of anchors used to secure the submarine lines.
- For the West Point WWTP, follow-up on the findings from the 2011 inspection by inspecting gaps and checking for leaks at station 30.

S15. Elliott West CSO treatment plant – copper reduction assessment

The Permittee must assess copper discharges from the Elliott West CSO treatment plant and submit a *Copper Reduction Assessment Report* to Ecology by November 1, 2018. As part of the assessment, the Permittee must:

1. Evaluate sample reliability/accuracy of copper measurements, including potential sample interferences, from the Elliott West facility.
2. Assess copper discharge patterns such as first flush or seasonal (wet season vs. dry season) impacts, land use patterns, etc.
3. Conduct a copper source inventory and provide a list of significant copper sources.
4. Provide a description of copper source control options.
5. Examine opportunities for outfall mixing enhancements.
6. Recommend a preferred strategy with corresponding schedule to address copper discharges from the Elliott West CSO treatment plant.

S16. Elliott West CSO treatment plant – settleable solids removal assessment

The Permittee must assess settleable solids discharges from the Elliott West CSO treatment plant and submit a *Settleable Solids Reduction Assessment Report* to Ecology by November 1, 2018. As part of the assessment, the Permittee must:

1. Assess settleable solids discharge patterns such as seasonal or first flush impacts, stormwater vs. domestic wastewater concentrations, etc.

2. Recommend a preferred strategy with corresponding schedule to address settleable solids discharges from the Elliott West CSO treatment plant in order to meet the annual average settleable solids limit.

S17. Application for permit renewal or facility modifications

The Permittee must submit an application for renewal of this permit one year prior to its expiration date, or by January 31, 2019. The Permittee must submit a paper copy and an electronic copy (preferably as a PDF).

The Permittee must also submit a new application or application supplement at least one hundred eighty (180) days prior to commencement of discharges, resulting from the activities listed below, which may result in permit violations. These activities include any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility.

General Conditions

G1. Signatory requirements

1. All applications, reports, or information submitted to Ecology must be signed and certified.

   a. In the case of corporations, by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

      - 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, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

   b. In the case of a partnership, by a general partner.

   c. In the case of sole proprietorship, by the proprietor.

   d. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

   Applications for permits for domestic wastewater facilities that are either owned or operated by, or under contract to, a public entity shall be submitted by the public entity.

2. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described above and submitted to Ecology.

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to authorization. If an authorization under paragraph G1.2, above, is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of

paragraph G1.2, above, must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section must make the following certification:

   I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

G2. Right of inspection and entry

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

1. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.
2. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.
3. To inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.
4. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. Permit actions

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the Permittee) or upon Ecology's initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 40 CFR 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

1. The following are causes for terminating this permit during its term, or for denying a permit renewal application:
   a. Violation of any permit term or condition.
   b. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.
   c. A material change in quantity or type of waste disposal.
   d. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination.

e. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or biosolids use or disposal practice controlled by the permit.

f. Nonpayment of fees assessed pursuant to RCW 90.48.465.

g. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

2. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:

   a. A material change in the condition of the waters of the state.

   b. New information not available at the time of permit issuance that would have justified the application of different permit conditions.

   c. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.

   d. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.

   e. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.

   f. Ecology has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.

   g. Incorporation of an approved local pretreatment program into a municipality's permit.

3. The following are causes for modification or alternatively revocation and reissuance:

   a. When cause exists for termination for reasons listed in 1.a through 1.g of this section, and Ecology determines that modification or revocation and reissuance is appropriate.

   b. When Ecology has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G7) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. Reporting planned changes

The Permittee must, as soon as possible, but no later than one hundred eighty (180) days prior to the proposed changes, give notice to Ecology of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in:

1. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b)

2. A significant change in the nature or an increase in quantity of pollutants discharged.

3. A significant change in the Permittee's biosolids use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing

application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G5. Plan review required

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications must be submitted to Ecology for approval in accordance with chapter 173-240 WAC. Engineering reports, plans, and specifications must be submitted at least one hundred eighty (180) days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities must be constructed and operated in accordance with the approved plans.

G6. Compliance with other laws and statutes

Nothing in this permit excuses the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. Transfer of this permit

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee must notify the succeeding owner or controller of the existence of this permit by letter, a copy of which must be forwarded to Ecology.

1. Transfers by Modification

   Except as provided in paragraph (2) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

2. Automatic Transfers

   This permit may be automatically transferred to a new Permittee if:

   a. The Permittee notifies Ecology at least thirty (30) days in advance of the proposed transfer date.

   b. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.

   c. Ecology does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G8. Reduced production for compliance

The Permittee, in order to maintain compliance with its permit, must control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G9. Removed substances

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G10. Duty to provide information

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology upon request, copies of records required to be kept by this permit.

G11. Other requirements of 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. Additional monitoring

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. Payment of fees

The Permittee must submit payment of fees associated with this permit as assessed by Ecology.

G14. Penalties for violating permit conditions

Any person who is found guilty of willfully violating the terms and conditions of this permit is deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit may incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is deemed to be a separate and distinct violation.

G15. Upset

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

An upset constitutes an affirmative defense to an action brought for non-compliance with such technology-based permit effluent limits if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the Permittee can identify the cause(s) of the upset.
2. The permitted facility was being properly operated at the time of the upset.
3. The Permittee submitted notice of the upset as required in Special Condition S3.F.
4. The Permittee complied with any remedial measures required under S3.F of this permit.

In any enforcement action the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. Property rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. Duty to comply

The Permittee must comply with all conditions of this permit. Any permit non-compliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. Toxic pollutants

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. Penalties for tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment shall be a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or by both.

G20. Compliance schedules

Reports of compliance or non-compliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than fourteen (14) days following each schedule date.

G21. Service agreement review

The Permittee must submit to Ecology any proposed service agreements and proposed revisions or updates to existing agreements for the operation of any wastewater treatment facility covered by this permit. The review is to ensure consistency with chapters 90.46 and 90.48 RCW as required by RCW 70.150.040(9). In the event that Ecology does not comment within a thirty-day (30) period, the Permittee may assume consistency and proceed with the service agreement or the revised/updated service agreement.

Appendix A

LIST OF POLLUTANTS WITH ANALYTICAL METHODS, DETECTION LIMITS AND QUANTITATION LEVELS

The Permittee must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table for permit and application required monitoring unless:

- Another permit condition specifies other methods, detection levels, or quantitation levels.
- The method used produces measurable results in the sample and EPA has listed it as an EPA-approved method in 40 CFR Part 136, or EPA has granted the laboratory written permission to use the method.
- The Permittee knows that an alternate, less sensitive method (higher DL and QL) from those listed below is sufficient to produce measurable results in their effluent.
- If the Permittee is unable to obtain the required DL and QL due to matrix effects (such as for treatment plant influent or CSO effluent), the Permittee must strive to achieve to lowest possible DL and QL and report the DL and QL in the required report.

If the Permittee uses an alternative method, not specified in the permit and as allowed above, it must report the test method, DL, and QL on the discharge monitoring report or in the required report.

All pollutants that have numeric limits in Section S1 of this permit must be analyzed with the methods specified below. When the permit requires the Permittee to measure the base neutral compounds in the list of priority pollutants, it must measure all of the base neutral pollutants listed in the table below. The list includes EPA required base neutral priority pollutants and several additional polynuclear aromatic hydrocarbons (PAHs). The Water Quality Program added several PAHs to the list of base neutrals below from Ecology's Persistent Bioaccumulative Toxics (PBT) List. It only added those PBT parameters of interest to Appendix A that did not increase the overall cost of analysis unreasonably.

Ecology added this appendix to the permit in order to reduce the number of analytical "non-detects" in permit-required monitoring and to measure effluent concentrations near or below criteria values where possible at a reasonable cost.

CONVENTIONAL PARAMETERS

Pollutant & CAS No. *(if available)*	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
Biochemical Oxygen Demand	SM5210-B		2 mg/L
Total Suspended Solids	SM2540-D		5 mg/L
Total Ammonia (as N)	SM4500-NH3-B and C/D/E/G/H Kerouel & Aminot 1997		0.3 mg/L
Dissolved oxygen	SM4500-OC/OG		0.2 mg/L
Temperature (max. 7-day avg.)	Analog recorder or use micro-recording devices known as thermistors		0.2º C
pH	SM4500-H^+ B	N/A	N/A

NONCONVENTIONAL PARAMETERS

Pollutant & CAS No. (if available)	**Recommended Analytical Protocol**	**Detection (DL)[1] µg/L unless specified**	**Quantitation Level (QL)[2] µg/L unless specified**
Total Alkalinity	SM2320-B		1.3 mg/L as CaCO3
Chlorine, Total Residual	SM4500 Cl G 4500 Cl D/E, Hach 8370		50.0
Fecal Coliform	SM 9221E,9222	N/A	Specified in method - sample aliquot dependent
Nitrate + Nitrite Nitrogen (as N)	SM4500-NO3- E/F/H		200
Nitrogen, Total Kjeldahl (as N)	SM4500-N_{org}B/C and SM4500NH_3-B/C/D/EF/G/H EPA 351.2		500

Exhibit C

Pollutant & CAS No. (if available)	Recommended Analytical Protocol	Detection (DL)[1] µg/L unless specified	Quantitation Level (QL)[2] µg/L unless specified
Nitrogen, Total (as N)	SM4500-N-C	50	100
Soluble Reactive Phosphorus (as P)	SM4500- PE/PF	100	100
Phosphorus, Total (as P)	SM 4500 PB followed by SM4500-PE/PF	100	300
Oil and Grease (HEM)	1664 A or B	1,400	5,000
Salinity	SM2520-B		3 practical salinity units or scale (PSU or PSS)
Settleable Solids	SM2540 -F		Sample and limit dependent
Sulfate (as mg/L SO_4)	SM4110-B, 4500-SO4 E		7.1 mg/L
Sulfide (as mg/L S)	SM4500-S^2F/D/E/G		200
Sulfite (as mg/L SO_3)	SM4500-SO3B		2000
Total dissolved solids	SM2540 C		20 mg/L
Total Hardness	SM2340B C, 200.7, 200.8		200 as $CaCO_3$
Aluminum, Total (7429-90-5)	200.8	2.0	10
Barium Total (7440-39-3)	200.8	0.5	2.0
BTEX (benzene +toluene + ethylbenzene + m,o,p xylenes)	EPA SW 846 8021/8260	1	2
Boron Total (7440-42-8)	200.8	2.0	10.0
Cobalt, Total (7440-48-4)	200.8	0.05	0.25
Iron, Total (7439-89-6)	200.7, 200.8	12.5	50
Magnesium, Total (7439-95-4)	200.7, 200.8	10	50
Molybdenum, Total (7439-98-7)	200.8	0.1	0.5
Manganese, Total (7439-96-5)	200.8	0.1	0.5
NWTPH Dx [4]	Ecology NWTPH Dx	250	250
NWTPH Gx [5]	Ecology NWTPH Gx	250	250
Tin, Total (7440-31-5)	200.8	0.3	1.5
Titanium, Total (7440-32-6)	200.8	0.5	2.5

METALS, CYANIDE & TOTAL PHENOLS			
Antimony, Total (7440-36-0)	200.8	0.3	1.0
Arsenic, Total (7440-38-2)	200.8	0.1	0.5
Beryllium, Total (7440-41-7)	200.8	0.1	0.5
Cadmium, Total (7440-43-9)	200.8	0.05	0.25
Chromium (hex) dissolved (18540-29-9)	SM3500-Cr B	5	10
Chromium, Total (7440-47-3)	200.8	0.2	1.0
Copper, Total (7440-50-8)	200.8	0.4	2.0
Lead, Total (7439-92-1)	200.8	0.1	0.5
Mercury, Total (7439-97-6)	1631E	0.0002	0.0005
Nickel, Total (7440-02-0)	200.8	0.1	0.5
Selenium, Total (7782-49-2)	200.8	1.0	1.0
Silver, Total (7440-22-4)	200.8	0.04	0.2
Thallium, Total (7440-28-0)	200.8	0.09	0.36
Zinc, Total (7440-66-6)	200.8	0.5	2.5
Cyanide, Total (57-12-5)	335.4, SM4500-CN-C,E	5	10
Cyanide, Weak Acid Dissociable	SM4500-CN I	5	10
Cyanide, Free Amenable to Chlorination (Available Cyanide)	SM4500-CN G	5	10
Phenols, Total	EPA 420.1		50
ACID COMPOUNDS			
2-Chlorophenol (95-57-8)	625	1.0	2.0
2,4-Dichlorophenol (120-83-2)	625	0.5	1.0

2,4-Dimethylphenol (105-67-9)	625	0.5	1.0
4,6-dinitro-o-cresol (534-52-1) (2-methyl-4,6,-dinitrophenol)	625/1625B	2.0	4.0
2,4 dinitrophenol (51-28-5)	625	1.5	3.0
2-Nitrophenol (88-75-5)	625	0.5	1.0
4-nitrophenol (100-02-7)	625	1.0	2.0
Parachlorometa cresol (59-50-7) (4-chloro-3-methylphenol)	625	1.0	2.0
Pentachlorophenol (87-86-5)	625	0.5	1.0
Phenol (108-95-2)	625	2.0	4.0
2,4,6-Trichlorophenol (88-06-2)	625	2.0	4.0
VOLATILE COMPOUNDS			
Acrolein (107-02-8)	624	5	10
Acrylonitrile (107-13-1)	624	1.0	2.0
Benzene (71-43-2)	624	1.0	2.0
Bromoform (75-25-2)	624	1.0	2.0
Carbon tetrachloride (56-23-5)	624/601 or SM6230B	1.0	2.0
Chlorobenzene (108-90-7)	624	1.0	2.0
Chloroethane (75-00-3)	624/601	1.0	2.0
2-Chloroethylvinyl Ether (110-75-8)	624	1.0	2.0
Chloroform (67-66-3)	624 or SM6210B	1.0	2.0
Dibromochloromethane (124-48-1)	624	1.0	2.0
1,2-Dichlorobenzene (95-50-1)	624	1.9	7.6
1,3-Dichlorobenzene (541-73-1)	624	1.9	7.6
1,4-Dichlorobenzene (106-46-7)	624	4.4	17.6
Dichlorobromomethane (75-27-4)	624	1.0	2.0
1,1-Dichloroethane (75-34-3)	624	1.0	2.0
1,2-Dichloroethane (107-06-2)	624	1.0	2.0
1,1-Dichloroethylene (75-35-4)	624	1.0	2.0
1,2-Dichloropropane (78-87-5)	624	1.0	2.0
1,3-dichloropropene (mixed isomers) (1,2-dichloropropylene) (542-75-6) [6]	624	1.0	2.0
Ethylbenzene (100-41-4)	624	1.0	2.0
Methyl bromide (74-83-9) (Bromomethane)	624/601	5.0	10.0
Methyl chloride (74-87-3) (Chloromethane)	624	1.0	2.0
Methylene chloride (75-09-2)	624	5.0	10.0
1,1,2,2-Tetrachloroethane (79-34-5)	624	1.9	2.0
Tetrachloroethylene (127-18-4)	624	1.0	2.0
Toluene (108-88-3)	624	1.0	2.0
1,2-Trans-Dichloroethylene (156-60-5) (Ethylene dichloride)	624	1.0	2.0
1,1,1-Trichloroethane (71-55-6)	624	1.0	2.0
1,1,2-Trichloroethane (79-00-5)	624	1.0	2.0
Trichloroethylene (79-01-6)	624	1.0	2.0
Vinyl chloride (75-01-4)	624/SM6200B	1.0	2.0
BASE/NEUTRAL COMPOUNDS (compounds in bold are Ecology PBTs)			
Acenaphthene (83-32-9)	625	0.2	0.4
Acenaphthylene (208-96-8)	625	0.3	0.6
Anthracene (120-12-7)	625	0.3	0.6
Benzidine (92-87-5)	625	20	40
Benzyl butyl phthalate (85-68-7)	625	0.3	0.6
Benzo(*a*)anthracene (56-55-3)	625	0.3	0.6
Benzo(b)fluoranthene (3,4-benzofluoranthene) (205-99-2) [7]	610/625	0.8	1.6
Benzo(j)fluoranthene (205-82-3) [7]	625	0.5	1.0
Benzo(k)fluoranthene (11,12-benzofluoranthene) (207-08-9) [7]	610/625	0.8	1.6
Benzo(r,s,t)pentaphene (189-55-9)	625	1.3	5.0
Benzo(*a*)pyrene (50-32-8)	610/625	0.5	1.0

Benzo(*ghi*)Perylene (191-24-2)	610/625	0.5	1.0
Bis(*2-chloroethoxy)*methane (111-91-1)	625	5.3	21.2
Bis(*2-chloroethyl*)ether (111-44-4)	611/625	0.3	1.0
Bis(*2-chloroisopropyl*)ether (39638-32-9)	625	0.5	1.0
Bis(*2-ethylhexyl*)phthalate (117-81-7)	625	0.3	1.0
4-Bromophenyl phenyl ether (101-55-3)	625	0.3	0.5
2-Chloronaphthalene (91-58-7)	625	0.3	0.6
4-Chlorophenyl phenyl ether (7005-72-3)	625	0.3	0.5
Chrysene (218-01-9)	610/625	0.3	0.6
Dibenzo (a,h)acridine (226-36-8)	610M/625M	2.5	10.0
Dibenzo (a,j)acridine (224-42-0)	610M/625M	2.5	10.0
Dibenzo(a-*h*)anthracene (53-70-3)(1,2,5,6-dibenzanthracene)	625	0.8	1.6
Dibenzo(a,e)pyrene (192-65-4)	610M/625M	2.5	10.0
Dibenzo(a,h)pyrene (189-64-0)	625M	2.5	10.0
3,3-Dichlorobenzidine (91-94-1)	605/625	2.0	4.0
Diethyl phthalate (84-66-2)	625	1.9	7.6
Dimethyl phthalate (131-11-3)	625	1.6	6.4
Di-n-butyl phthalate (84-74-2)	625	0.5	1.0
2,4-dinitrotoluene (121-14-2)	609/625	1.0	2.0
2,6-dinitrotoluene (606-20-2)	609/625	1.0	2.0
Di-n-octyl phthalate (117-84-0)	625	0.3	0.6
1,2-Diphenylhydrazine (*as Azobenzene*)(122-66-7)	1625B, 625	5.0	20
Fluoranthene (206-44-0)	625	0.3	0.6
Fluorene (86-73-7)	625	0.3	0.6
Hexachlorobenzene (118-74-1)	612/625	0.3	0.6
Hexachlorobutadiene (87-68-3)	625	0.5	1.0
Hexachlorocyclopentadiene (77-47-4)	1625B/625	2.0	4.0
Hexachloroethane (67-72-1)	625	0.5	1.0
Indeno(*1,2,3-cd*)Pyrene (193-39-5)	610/625	0.5	1.0
Isophorone (78-59-1)	625	0.5	1.0
3-Methyl cholanthrene (56-49-5)	625	2.0	8.0
Naphthalene (91-20-3)	625	0.4	0.75
Nitrobenzene (98-95-3)	625	0.5	1.0
N-Nitrosodimethylamine (62-75-9)	607/625	2.0	4.0
N-Nitrosodi-n-propylamine (621-64-7)	607/625	0.5	1.0
N-Nitrosodiphenylamine (86-30-6)	625	1.0	2.0
Perylene (198-55-0)	625	1.9	7.6
Phenanthrene (85-01-8)	625	0.3	0.6
Pyrene (129-00-0)	625	0.3	0.6
1,2,4-Trichlorobenzene (120-82-1)	625	0.3	0.6
DIOXIN			
2,3,7,8-Tetra-Chlorodibenzo-P-Dioxin (176-40-16) (2,3,7,8 TCDD)	1613B	1.3 pg/L	5 pg/L

1. Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR part 136, Appendix B.
2. Quantitation Level (QL) also known as Minimum Level of Quantitation (ML) – The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency, December 2007).
3. Soluble Biochemical Oxygen Demand method note: First, filter the sample through a Millipore Nylon filter (or equivalent) - pore size of 0.45-0.50 um (prep all filters by filtering 250 ml of laboratory grade deionized water through the filter and discard). Then, analyze sample as per method 5210-B.
4. NWTPH Dx - Northwest Total Petroleum Hydrocarbons Diesel Extended Range – see http://www.ecy.wa.gov/biblio/97602.html
5. NWTPH Gx - Northwest Total Petroleum Hydrocarbons Gasoline Extended Range – see http://www.ecy.wa.gov/biblio/97602.html
6. 1, 3-dichloroproylene (mixed isomers) - You may report this parameter as two separate parameters: cis-1, 3-dichlorpropropene (10061-01-5) and trans-1, 3-dichloropropene (10061-02-6).
7. Total Benzofluoranthenes - Because Benzo(b)fluoranthene, Benzo(j)fluoranthene and Benzo(k)fluoranthene co-elute you may report these three isomers as total benzofluoranthenes.

EXHIBIT D

Issuance Date:	January 16, 2017
Effective Date:	March 1, 2017
Expiration Date:	February 28, 2022

National Pollutant Discharge Elimination System Waste Discharge Permit No. WA0022527

State of Washington
DEPARTMENT OF ECOLOGY
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1342 et seq.

Vashon Wastewater Treatment Plant
King County Department of Natural Resources & Parks
Wastewater Treatment Division
201 S. Jackson St.
Seattle, WA 98104-3855

is authorized to discharge in accordance with the Special and General Conditions that follow.

Plant Location: 9621 SW 171 Street Vashon, WA 98070 Treatment Type: Oxidation Ditch	Receiving Water: Puget Sound

Mark Henley, P.E.
Water Quality Section Manager
Northwest Regional Office
Washington State Department of Ecology

Exhibit D

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Summary of Permit Report Submittals

Refer to the Special and General Conditions of this permit for additional submittal requirements.

Permit Section	Submittal	Frequency	First Submittal Date
S3.A	Discharge Monitoring Report (DMR)	Monthly	April 15, 2017
S3.A	Discharge Monitoring Report (DMR)	Quarterly	July 15, 2017
S3.F	Reporting Permit Violations	As necessary	
S4.B	Plans for Maintaining Adequate Capacity	As necessary	
S4.D	Notification of New or Altered Sources	As necessary	
S5.F	Bypass Notification	As necessary	
S6.A.3	Pretreatment Report	1/year	April 30, 2017
S8	Acute Toxicity Effluent Test Results with Permit Renewal Application	2/permit cycle July 2019 January 2020	July 31, 2021
S9	Chronic Toxicity Effluent Test Results with Permit Renewal Application	2/permit cycle October 2019 March 2020	July 31, 2021
S10	Application for Permit Renewal	1/permit cycle	July 31, 2021
G1	Notice of Change in Authorization	As necessary	
G4	Reporting Planned Changes	As necessary	
G5	Engineering Report for Construction or Modification Activities	As necessary	
G7	Notice of Permit Transfer	As necessary	
G10	Duty to Provide Information	As necessary	
G20	Compliance Schedules	As necessary	
G21	Contract Submittal	As necessary	

Special Conditions

S1. Discharge limits

S1.A. Effluent limits

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit violates the terms and conditions of this permit.

Beginning on the effective date of this permit, the Permittee may discharge treated domestic wastewater to the Puget Sound at the permitted location subject to compliance with the following limits:

<table>
<tr><th colspan="3">Effluent Limits: Outfall 001
Latitude: 47.452917 Longitude: -122.433333</th></tr>
<tr><th>Parameter</th><th>Average Monthly [a]</th><th>Average Weekly [b]</th></tr>
<tr><td>Biochemical Oxygen Demand (5-day) (BOD_5)</td><td>30 milligrams/liter (mg/L)
130 pounds/day (lbs/day)
85% removal of influent BOD_5</td><td>45 mg/L
195 lbs/day</td></tr>
<tr><td>Total Suspended Solids (TSS)</td><td>30 mg/L
130 lbs/day
85% removal of influent TSS</td><td>45 mg/L
195 lbs/day</td></tr>
<tr><th>Parameter</th><th>Minimum</th><th>Maximum</th></tr>
<tr><td>pH</td><td>6.0 standard units</td><td>9.0 standard units</td></tr>
<tr><th>Parameter</th><th>Monthly Geometric Mean</th><th>Weekly Geometric Mean</th></tr>
<tr><td>Fecal Coliform Bacteria [c]</td><td>200/100 milliliter (mL)</td><td>400/100 mL</td></tr>
<tr><th>Parameter</th><th colspan="2">Maximum Daily [d]</th></tr>
<tr><td>Total Residual Chlorine [f]</td><td colspan="2">0.75 mg/L</td></tr>
<tr><td>a</td><td colspan="2">Average monthly effluent limit means the highest allowable average of daily discharges over a calendar month. To calculate the discharge value to compare to the limit, you add the value of each daily discharge measured during a calendar month and divide this sum by the total number of daily discharges measured. See footnote c for fecal coliform calculations.</td></tr>
<tr><td>b</td><td colspan="2">Average weekly discharge limit means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges' measured during that week. See footnote c for fecal coliform calculations.</td></tr>
<tr><td>c</td><td colspan="2">Ecology provides directions to calculate the monthly and the weekly geometric mean in publication No. 04-10-020, Information Manual for Treatment Plant Operators available at: http://www.ecy.wa.gov/pubs/0410020.pdf</td></tr>
<tr><td>d</td><td colspan="2">Maximum daily effluent limit is the highest allowable daily discharge. The daily discharge is the average discharge of a pollutant measured during a calendar day. For pollutants with limits expressed in units of mass, calculate the daily discharge as the total mass of the pollutant discharged over the day. This does not apply to pH or temperature.</td></tr>
<tr><td>f</td><td colspan="2">Chlorine limits apply only during periods when chlorine is used for partial or full disinfection of the effluent. When UV disinfection is the only disinfection method used, chlorine limits do not apply. When not using chlorine for disinfection during the monitoring period, enter qualifier code “M” into the WQWebDMR form.</td></tr>
</table>

S1.B. Mixing zone authorization

Mixing zone for Outfall 001

The following paragraphs define the maximum boundaries of the mixing zones:

Chronic mixing zone

The mixing zone is a circular region with radius of 400 feet measured from the center of the discharge port. The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the chronic zone must meet chronic aquatic life criteria and human health criteria.

Acute mixing zone

The acute mixing zone is a circular region with radius of 40 feet measured from the center of the discharge port. The mixing zone extends from the bottom to the top of the water column. The concentration of pollutants at the edge of the acute zone must meet acute aquatic life criteria.

Available Dilution (dilution factor)	
Acute Aquatic Life Criteria	89
Chronic Aquatic Life Criteria	681
Human Health Criteria - Carcinogen	681
Human Health Criteria - Non-carcinogen	681

S2. Monitoring requirements

S2.A. Monitoring schedule

The Permittee must monitor in accordance with the following schedule and the requirements specified in Appendix A.

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
(1) Wastewater influent			
Wastewater Influent means the raw sewage flow from the collection system into the treatment facility. Sample the wastewater entering the headworks of the treatment plant excluding any side-stream returns from inside the plant.			
Flow	gpd	Continuous [a]	Metered/Recorded
BOD_5	mg/L	2/week [c]	24-hr Composite [b]
BOD_5	lbs/day	2/week	Calculation [d]
TSS	mg/L	2/week	24-hr Composite
TSS	lbs/day	2/week	Calculation [d]
(2) Final wastewater effluent			
Final Wastewater Effluent means wastewater exiting the last treatment process or operation. Typically, this is after or at the exit from the chlorine contact chamber or other disinfection process. The Permittee may take effluent samples for the BOD_5 analysis before or after the disinfection process. If taken after, the Permittee must dechlorinate and reseed the sample.			
BOD_5 [g]	mg/L	2/week	24-hr Composite
BOD_5	lbs/day	2/week	Calculation [d]
BOD_5	% removal	1/month	Calculation [e]
TSS	mg/L	2/week	24-hr Composite

Parameter	Units & Speciation	Minimum Sampling Frequency	Sample Type
TSS	lbs/day	2/week	Calculation
TSS	% removal	1/month	Calculation
Chlorine (Total Residual) [h]	mg/L	Daily, when used for disinfection	Grab [f]
Fecal Coliform [i]	CFUs /100 ml	2/week	Grab
pH [j]	Standard Units	Continuous	Metered/Recorded
(3) Effluent characterization – final wastewater effluent			
Acute Toxicity Testing	--	2/permit cycle	24-hr Composite
Chronic Toxicity Testing	--	2/permit cycle	24-hr Composite
Additional requirements specified in Permit Conditions S8 & S9.			
(4) Effluent characterization – final wastewater effluent			
Total Ammonia	mg/L as N	Quarterly [k]	24-hr Composite
Nitrate plus Nitrite Nitrogen	mg/L as N	Quarterly	24-hr Composite
Total Kjeldahl Nitrogen (TKN)	mg/L as N	Quarterly	24-hr Composite
(5) Permit renewal application requirements – final wastewater effluent			
The Permittee must record and report the wastewater treatment plant flow discharged on the day it collects the sample for priority pollutant testing with the discharge monitoring report.			
Temperature [l]	Degrees Celsius	Quarterly during 2020	Measurement
Dissolved Oxygen	mg/L	Quarterly during 2020	Grab
Oil and Grease	mg/L	Quarterly during 2020	Grab
Total Dissolved Solids	mg/L	Quarterly during 2020	24-hr Composite
Total Hardness	mg/L	Quarterly during 2020	24-hr Composite
Cyanide	micrograms/liter (µg/L)	Quarterly during 2020	Grab
Total Phosphorus	mg/L	Quarterly during 2020	24-hr Composite
Priority Pollutants (PP) – Total Metals	µg/L; nanograms(ng/L) for mercury	Quarterly during 2020	24-hr Composite Grab for mercury

a	Continuous means uninterrupted except for brief lengths of time for calibration, power failure, or unanticipated equipment repair or maintenance. The time interval for the associated data logger must be no greater than 30 minutes. The Permittee must sample every 4 hours when continuous monitoring is not possible.
b	24-hour composite means a series of individual samples collected over a 24-hour period into a single container, and analyzed as one sample.
c	2/week means two (2) times during each calendar week.
d	Calculated means figured concurrently with the respective sample, using the following formula: Concentration (in mg/L) X Flow (in MGD) X Conversion Factor (8.34) = lbs/day
e	% removal = $\frac{\text{Influent concentration (mg/L)} - \text{Effluent concentration (mg/L)}}{\text{Influent concentration (mg/L)}} \times 100$ Calculate the percent (%) removal of BOD_5 and TSS using the above equation.
f	Grab means an individual sample collected over a fifteen (15) minute, or less, period.
g	Take effluent samples for the BOD_5 analysis before or after the disinfection process. If taken after, and if sampling occurs during a period when chlorine is being used for disinfection, dechlorinate and reseed the sample.
h	Chlorine limits apply only during emergency periods when UV disinfection is not available and the Permittee uses chlorine to disinfect effluent. During normal operations with UV disinfection, chlorine limits do not apply. When not using chlorine during the monitoring period, enter qualifier code “M” into the WQWebDMR form to indicate that for chlorine was conditional and not required for the monitoring period.

Parameter		Units & Speciation	Minimum Sampling Frequency	Sample Type
i	Report a numerical value for fecal coliforms following the procedures in Ecology's *Information Manual for Wastewater Treatment Plant Operators*, Publication Number 04-10-020 available at: http://www.ecy.wa.gov/programs/wq/permits/guidance.html . Do not report a result as too numerous to count (TNTC).			
j	The Permittee must report the instantaneous maximum and minimum pH daily. Do not average pH values.			
k	Quarterly sampling periods are January through March, April through June, July through September, and October through December. See condition S3.A.10.b for additional details.			
l	Temperature grab sampling must occur when the effluent is at or near its daily maximum temperature, which usually occurs in the late afternoon.			

S2.B. Sampling and analytical procedures

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters. The Permittee must conduct representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions that may affect effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit must conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 (or as applicable in 40 CFR subchapters N [Parts 400–471] or O [Parts 501-503]) unless otherwise specified in this permit . Ecology may only specify alternative methods for parameters without permit limits and for those parameters without an EPA approved test method in 40 CFR Part 136.

S2.C. Flow measurement and continuous monitoring devices

The Permittee must:

1. Select and use appropriate flow measurement and continuous monitoring devices and methods consistent with accepted scientific practices.
2. Install, calibrate, and maintain these devices to ensure the accuracy of the measurements is consistent with the accepted industry standard, the manufacturer's recommendation, and approved O&M manual procedures for the device and the wastestream.
3. Calibrate continuous monitoring instruments weekly unless it can demonstrate a longer period is sufficient based on monitoring records. The Permittee:
   a. May calibrate apparatus for continuous monitoring of dissolved oxygen by air calibration.
   b. Must calibrate continuous pH measurement instruments using a grab sample analyzed in the lab with a pH meter calibrated with standard buffers and analyzed within 15 minutes of sampling.

4. Calibrate flow-monitoring devices at a minimum frequency of at least one calibration per year or according to manufacturer's recommendation for that type of device.
5. Maintain calibration records for at least three years.

S2.D. Laboratory accreditation

The Permittee must ensure that all monitoring data required by Ecology for permit specified parameters is prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. Flow, temperature, settleable solids, conductivity, pH, and internal process control parameters are exempt from this requirement. The Permittee must obtain accreditation for conductivity and pH if it must receive accreditation or registration for other parameters.

S2.E. Request for reduction in monitoring

The Permittee may request a reduction of the sampling frequency after twelve (12) months of monitoring. Ecology will review each request and at its discretion grant the request when it reissues the permit or by a permit modification.

The Permittee must:

1. Provide a written request.
2. Clearly state the parameters for which it is requesting reduced monitoring.
3. Clearly state the justification for the reduction.

S3. Reporting and recording requirements

The Permittee must monitor and report in accordance with the following conditions. Falsification of information submitted to Ecology is a violation of the terms and conditions of this permit.

S3.A. Discharge monitoring reports

The first monitoring period begins on the effective date of the permit (unless otherwise specified). The Permittee must:

1. Summarize, report, and submit monitoring data obtained during each monitoring period on the electronic discharge monitoring report (DMR) form provided by Ecology within the Water Quality Permitting Portal. Include data for each of the parameters tabulated in Special Condition S2 and as required by the form. Report a value for each day sampling occurred (unless specifically exempted in the permit) and for the summary values (when applicable) included on the electronic form.
2. Enter the "No Discharge" reporting code for an entire DMR, for a specific monitoring point, or for a specific parameter as appropriate, if the Permittee did not discharge wastewater or a specific pollutant during a given monitoring period.

3. Report single analytical values below detection as “less than the detection level (DL)” by entering < followed by the numeric value of the detection level (e.g. < 2.0) on the DMR. If the method used did not meet the minimum DL and quantitation level (QL) identified in the permit, report the actual QL and DL in the comments or in the location provided.
4. **Not** report zero for bacteria monitoring. Report as required by the laboratory method.
5. Calculate and report an arithmetic average value for each day for bacteria if multiple samples were taken in one day.
6. Calculate the geometric mean values for bacteria (unless otherwise specified in the permit) using:
    a. The reported numeric value for all bacteria samples measured above the detection value except when it took multiple samples in one day. If the Permittee takes multiple samples in one day it must use the arithmetic average for the day in the geometric mean calculation.
    b. The detection value for those samples measured below detection.
7. Report the test method used for analysis in the comments if the laboratory used an alternative method not specified in the permit and as allowed in Appendix A.
8. Calculate average values and calculated total values (unless otherwise specified in the permit) using:
    a. The reported numeric value for all parameters measured between the agency-required detection value and the agency-required quantitation value.
    b. One-half the detection value (for values reported below detection) if the lab detected the parameter in another sample from the same monitoring point for the reporting period.
    c. Zero (for values reported below detection) if the lab did not detect the parameter in another sample for the reporting period.
9. Report single-sample grouped parameters (for example: priority pollutants) on the WQWebDMR form and include: sample date, concentration detected, detection limit (DL) (as necessary), and laboratory quantitation level (QL) (as necessary).

    The Permittee must also submit an electronic copy of the laboratory report as an attachment using WQWebDMR. The contract laboratory reports must also include information on the chain of custody, QA/QC results, and documentation of accreditation for the parameter.
10. Ensure that DMRs are electronically submitted no later than the dates specified below, unless otherwise specified in this permit.
11. Submit DMRs for parameters with the monitoring frequencies specified in S2 (monthly, quarterly, annual, etc.) at the reporting schedule identified below.

The Permittee must:

a. Submit **monthly** DMRs by the 15th day of the following month.

b. Submit **quarterly DMRs**, unless otherwise specified in the permit, by the 15th day of the month following the monitoring period. Quarterly sampling periods are January through March, April through June, July through September, and October through December. The Permittee must submit the first quarterly DMR on July 15, 2017 for the quarter beginning on April 1, 2017.

S3.B. Permit submittals and schedules

The Permittee must use the Water Quality Permitting Portal – Permit Submittals application (unless otherwise specified in the permit) to submit all other written permit-required reports by the date specified in the permit.

When another permit condition requires submittal of a paper (hard-copy) report, the Permittee must ensure that it is postmarked or received by Ecology no later than the dates specified by this permit. Send these paper reports to Ecology at:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

S3.C. Records retention

The Permittee must retain records of all monitoring information for a minimum of three (3) years. Such information must include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

S3.D. Recording of results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, method, and time of sampling or measurement.
2. The individual who performed the sampling or measurement.
3. The dates the analyses were performed.
4. The individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

S3.E. Additional monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Special Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR unless otherwise specified by Special Condition S2.

S3.F. Reporting permit violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

1. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance and correct the problem.
2. If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within thirty (30) days of sampling.

a. Immediate reporting

The Permittee must **immediately** report to Ecology and the Department of Health, Shellfish Program, and the Local Health Jurisdiction (at the numbers listed below), all:

- Failures of the disinfection system.
- Collection system overflows.
- Plant bypasses discharging to marine surface waters.
- Any other failures of the sewage system (pipe breaks, etc.)

Northwest Regional Office	**425-649-7000**
Department of Health, Shellfish Program	**360-236-3330 (business hours)** **360-789-8962 (after business hours)**
Public Health Seattle-King County	**206-477-8050 (Mon-Fri 8 am to 4 pm)**

Additionally, for any sanitary sewer overflow (SSO) that discharges to a municipal separate storm sewer system (MS4), the Permittee must notify the appropriate MS4 owner or operator.

b. Twenty-four-hour reporting

The Permittee must report the following occurrences of noncompliance by telephone, to Ecology at the telephone numbers listed above, within 24 hours from the time the Permittee becomes aware of any of the following circumstances:

1. Any noncompliance that may endanger health or the environment, unless previously reported under immediate reporting requirements.
2. Any unanticipated bypass that causes an exceedance of an effluent limit in the permit (See Part S5.F, “Bypass Procedures”).
3. Any upset that causes an exceedance of an effluent limit in the permit (See G.15, “Upset”).
4. Any violation of a maximum daily or instantaneous maximum discharge limit for any of the pollutants in Section S1.A of this permit.
5. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limit in the permit.

c. Report within five days

The Permittee must also submit a written report within five days of the time that the Permittee becomes aware of any reportable event under subparts a or b, above. The report must contain:

1. A description of the noncompliance and its cause.
2. The period of noncompliance, including exact dates and times.
3. The estimated time the Permittee expects the noncompliance to continue if not yet corrected.
4. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
5. If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.

d. Waiver of written reports

Ecology may waive the written report required in subpart c, above, on a case-by-case basis upon request if the Permittee has submitted a timely oral report.

e. All other permit violation reporting

The Permittee must report all permit violations, which do not require immediate or within 24 hours reporting, when it submits monitoring reports for S3.A ("Reporting"). The reports must contain the information listed in subpart c, above. Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

S3.G. Other reporting

a. Spills of oil or hazardous materials

The Permittee must report a spill of oil or hazardous materials in accordance with the requirements of RCW 90.56.280 and chapter 173-303-145. You can obtain further instructions at the following website: http://www.ecy.wa.gov/programs/spills/other/reportaspill.htm .

b. Failure to submit relevant or correct facts

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to Ecology, it must submit such facts or information promptly.

S3.H. Maintaining a copy of this permit

The Permittee must keep a copy of this permit at the facility and make it available upon request to Ecology inspectors.

S4. Facility loading

S4.A. Design criteria

The flows or waste loads for the permitted facility must not exceed the following design criteria:

Maximum Month Design Flow (MMDF)	**0.52 MGD**
BOD_5 Influent Loading for Maximum Month	**671 lbs/day**
TSS Influent Loading for Maximum Month	**671 lbs/day**

S4.B. Plans for maintaining adequate capacity

a. Conditions triggering plan submittal

The Permittee must submit a plan and a schedule for continuing to maintain capacity to Ecology when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months.
2. The projected plant flow or loading would reach design capacity within five years.

b. Plan and schedule content

The plan and schedule must identify the actions necessary to maintain adequate capacity for the expected population growth and to meet the limits and requirements of the permit. The Permittee must consider the following topics and actions in its plan.

1. Analysis of the present design and proposed process modifications.
2. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.
3. Limits on future sewer extensions or connections or additional waste loads.
4. Modification or expansion of facilities.
5. Reduction of industrial or commercial flows or waste loads.

Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by Ecology prior to any construction.

S4.C. Duty to mitigate

The Permittee must take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

S4.D. Notification of new or altered sources

1. The Permittee must submit written notice to Ecology whenever any new discharge or a substantial change in volume or character of an existing discharge into the wastewater treatment plant is proposed which:

a. Would interfere with the operation of, or exceed the design capacity of, any portion of the wastewater treatment plant.

b. Is not part of an approved general sewer plan or approved plans and specifications.

c. Is subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act.

2. This notice must include an evaluation of the wastewater treatment plant's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the treatment plant, and the anticipated impact on the Permittee's effluent [40 CFR 122.42(b)].

S5. Operation and maintenance

The Permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances), which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes keeping a daily operation logbook (paper or electronic), adequate laboratory controls, and appropriate quality assurance procedures. This provision of the permit requires the Permittee to operate backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

S5.A. Certified operator

This permitted facility must be operated by an operator certified by the state of Washington for at least a Class II plant. This operator must be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class I plant must be in charge during all regularly scheduled shifts. The Permittee must notify Ecology when the operator in charge at the facility changes. It must provide the new operator's name and certification level and provide the name of the operator leaving the facility.

S5.B. Operation and maintenance program

The Permittee must:

1. Institute an adequate operation and maintenance program for the entire sewage system.
2. Keep maintenance records on all major electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records must clearly specify the frequency and type of maintenance recommended by the manufacturer and must show the frequency and type of maintenance performed.
3. Make maintenance records available for inspection at all times.

S5.C. Short-term reduction

The Permittee must schedule any facility maintenance, which might require interruption of wastewater treatment and degrade effluent quality, during non-critical water quality periods and carry this maintenance out according to the approved O&M manual or as otherwise approved by Ecology.

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limits on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee must:

1. Give written notification to Ecology, if possible, thirty (30) days prior to such activities.
2. Detail the reasons for, length of time of, and the potential effects of the reduced level of treatment.

This notification does not relieve the Permittee of its obligations under this permit.

S5.D. Electrical power failure

The Permittee must ensure that adequate safeguards prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations. Adequate safeguards include, but are not limited to, alternate power sources, standby generator(s), or retention of inadequately treated wastes.

The Permittee must maintain Reliability Class II (EPA 430-99-74-001) at the wastewater treatment plant. Reliability Class II requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions. Vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but must be sufficient to maintain the biota.

S5.E. Prevent connection of inflow

The Permittee must strictly enforce its sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system.

S5.F. Bypass procedures

A bypass is the intentional diversion of waste streams from any portion of a treatment facility. This permit prohibits all bypasses except when the bypass is for essential maintenance, as authorized in special condition S5.F.1, or is approved by Ecology as an anticipated bypass following the procedures in S5.F.2.

1. **Bypass for essential maintenance without the potential to cause violation of permit limits or conditions**

   This permit allows bypasses for essential maintenance of the treatment system when necessary to ensure efficient operation of the system. The Permittee may bypass the treatment system for essential maintenance only if doing so does not cause violations of effluent limits. The Permittee is not required to notify Ecology when bypassing for essential maintenance. However the Permittee must comply with the monitoring requirements specified in special condition S2.B.

2. **Anticipated bypasses for non-essential maintenance**

   Ecology may approve an anticipated bypass under the conditions listed below. This permit prohibits any anticipated bypass that is not approved through the following process.

   a. If a bypass is for non-essential maintenance, the Permittee must notify Ecology, if possible, at least ten (10) days before the planned date of bypass. The notice must contain:

      - A description of the bypass and the reason the bypass is necessary.
      - An analysis of all known alternatives which would eliminate, reduce, or mitigate the potential impacts from the proposed bypass.
      - A cost-effectiveness analysis of alternatives.
      - The minimum and maximum duration of bypass under each alternative.
      - A recommendation as to the preferred alternative for conducting the bypass.
      - The projected date of bypass initiation.
      - A statement of compliance with SEPA.
      - A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.
      - Details of the steps taken or planned to reduce, eliminate, and prevent recurrence of the bypass.

   b. For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during the project planning and design process. The project-specific engineering report as well as the plans and specifications must include details of probable construction bypasses to the extent practical. In cases where the Permittee determines the probable need to bypass early, the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.

c. Ecology will determine if the Permittee has met the conditions of special condition S5.F.2 a and b and consider the following prior to issuing a determination letter, an administrative order, or a permit modification as appropriate for an anticipated bypass:

- If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.
- If the bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.
- If feasible alternatives to the bypass exist, such as:
  - The use of auxiliary treatment facilities.
  - Retention of untreated wastes.
  - Stopping production.
  - Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance.
  - Transport of untreated wastes to another treatment facility.

S5.G. Operations and maintenance (O&M) manual

a. O&M manual submittal and requirements

The Permittee must:

1. Review the O&M Manual at least annually.
2. Submit to Ecology for review and approval substantial changes or updates to the O&M Manual whenever it incorporates them into the manual.
3. Keep the approved O&M Manual at the permitted facility.
4. Follow the instructions and procedures of this manual.

b. O&M manual components

In addition to the requirements of WAC 173-240-080(1) through (5), the O&M manual must be consistent with the guidance in Table G1-3 in the *Criteria for Sewage Works Design* (Orange Book), 2008. The O&M manual must include:

1. Emergency procedures for cleanup in the event of wastewater system upset or failure.

2. A review of system components which if failed could pollute surface water or could impact human health. Provide a procedure for a routine schedule of checking the function of these components.
3. Wastewater system maintenance procedures that contribute to the generation of process wastewater.
4. Reporting protocols for submitting reports to Ecology to comply with the reporting requirements in the discharge permit.
5. Any directions to maintenance staff when cleaning or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank, blocking all floor drains before beginning the overhaul of a stationary engine).
6. The treatment plant process control monitoring schedule.
7. Minimum staffing adequate to operate and maintain the treatment processes and carry out compliance monitoring required by the permit.

S6. Pretreatment

S6.A. General requirements

1. The Permittee must implement the Industrial Pretreatment Program in accordance with King County Code 28.84.060 and 28.82 as amended by King County Ordinance No. 11963 on January 1, 1996 and Ordinance No. 16929 on September 30, 2010; legal authorities, policies, procedures, and financial provisions described in the Permittee's approved pretreatment program submittal entitled "Industrial Pretreatment Program" and dated April 27, 1981; any approved revisions thereto; and the General Pretreatment Regulations (40 CFR Part 403), including any revisions to 40 CFR Part 403. At a minimum, the Permittee must undertake the following pretreatment implementation activities:
   a. Enforce categorical pretreatment standards under Section 307(b) and (c) of the Federal Clean Water Act (hereinafter, the Act), prohibited discharge standards as set forth in 40 CFR 403.5, local limits, or state standards, whichever are most stringent or apply at the time of issuance or modification of a local industrial waste discharge permit. Locally derived limits are defined as pretreatment standards under Section 307(d) of the Act and are not limited to categorical industrial facilities.
   b. Issue industrial waste discharge permits to all significant industrial users [SIUs, as defined in 40 CFR 403.3(v)(i)(ii)] contributing to the treatment system, including those from other jurisdictions. Industrial waste discharge permits must contain, as a minimum, all the requirements of 40 CFR 403.8 (f)(l)(iii). The Permittee must coordinate the permitting process with Ecology regarding any industrial facility that may possess a State Waste Discharge Permit issued by Ecology. Once issued, an industrial waste discharge permit takes precedence over a state-issued waste discharge permit.

c. Maintain and update, as necessary, records identifying the nature, character, and volume of pollutants contributed by industrial users to the POTW. The Permittee must maintain records for at least a three-year period.

d. Perform inspections, surveillance, and monitoring activities on industrial users to determine or confirm compliance with pretreatment standards and requirements. The Permittee must conduct a thorough inspection of SIUs annually. The Permittee must conduct regular local monitoring of SIU wastewaters commensurate with the character and volume of the wastewater but not less than once per year per SIU. If an SIU qualifies for reduced monitoring under 40 CFR 403.12(e)(3) (Middle Tier Categorical Industrial Users), inspection and monitoring must be conducted no less frequently than once every 2 years. The Permittee must collect and analyze samples in accordance with 40 CFR Part 403.12(b)(5)(ii)-(v) and 40 CFR Part 136.

e. Enforce and obtain remedies for noncompliance by any industrial users with applicable pretreatment standards and requirements. Once it identifies violations, the Permittee must take timely and appropriate enforcement action to address the noncompliance. The Permittee's action must follow its enforcement response procedures and any amendments, thereof.

f. Publish, at least annually in the largest daily newspaper in the Permittee's service area, a list of all non-domestic users which, at any time in the previous 12 months, were in significant noncompliance as defined in 40 CFR 403.8(f)(2)(vii).

g. If the Permittee elects to conduct sampling of an SIU's discharge in lieu of requiring user self-monitoring, it must satisfy all requirements of 40 CFR Part 403.12. This includes monitoring and record keeping requirements of Sections 403.12(g) and (o). For SIUs subject to categorical standards (CIUs), the Permittee may either complete baseline and initial compliance reports for the CIU (when required by 403.12(b) and (d)) or require these of the CIU. The Permittee must ensure that it provides SIUs the results of sampling in a timely manner, inform SIUs of their right to sample, their obligations to report any sampling they do, to respond to non-compliance, and to submit other notifications. These include a slug load report (403.12(f)), notice of changed discharge (403.12(j)), and hazardous waste notifications (403.12(p)). If sampling for the SIU, the Permittee must not sample less than once in every six-month period unless the Permittee's approved program includes procedures for reduction of monitoring for Middle-Tier or Non-Significant Categorical Users per 403.12(e)(2) and (3) and those procedures have been followed.

h. Develop and maintain a data management system designed to track the status of the Permittee's industrial user inventory, industrial user discharge characteristics, and compliance status.

i. Maintain adequate staff, funds, and equipment to implement its pretreatment program.

j. Establish, where necessary, contracts or legally binding agreements with contributing jurisdictions to ensure compliance with applicable pretreatment requirements by commercial or industrial users within these jurisdictions. These contracts or agreements must identify the agency responsible to perform the various implementation and enforcement activities in the contributing jurisdiction. To the extent that there are contributing jurisdictions in which the Permittee has legal authority which is inadequate with respect to the requirements of 40 CFR 403.8(f)(1), the Permittee must enter into a joint powers agreement that specifies the specific roles, responsibilities, and pretreatment requirements of each jurisdiction and enables the Permittee to enforce its pretreatment regulations within the contributing jurisdiction(s).

k. The Permittee must evaluate whether each new SIU needs a plan to control Slug Discharges within 1 year of designating the entity as a SIU. For purposes of this subsection, a Slug Discharge is any Discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch Discharge, which has a reasonable potential to cause Interference or Pass Through, or in any other way violate the permittee’s regulations, local limits or permit conditions. The Permittee must make this evaluation available to Ecology upon request. The Permittee must required each SIU to immediately notify them of any changes at its facility affecting the potential for a Slug Discharge. If the Permittee decides that a slug control plan is needed, the plan shall contain, at a minimum, the following elements:

   i. Description of discharge practices, including non-routine batch Discharges;

   ii. Description of stored chemicals;

   iii. Procedures for immediately notifying the POTW of Slug Discharges, including any Discharge that would violate a prohibition under 40 CFR 403.5(b) with procedures for follow-up written notification within five days;

2. If necessary, procedures to prevent adverse impact from accidental spills, including inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site run-off, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents), and/or measures and equipment for emergency response. Whenever Ecology determines that any waste source contributes pollutants to the Permittee's treatment works in violation of Section (b), (c), or (d) of Section 307 of the Act, and the Permittee has not taken adequate corrective action, Ecology will notify the Permittee of this determination. If the Permittee fails to take appropriate enforcement action within 30 days of this notification, Ecology may take appropriate enforcement action against the source or the Permittee.

3. Pretreatment Report

The Permittee must provide to Ecology an annual report that briefly describes its program activities during the previous calendar year.

The Permittee must submit the annual report to Ecology by April 30th of each year. The report must include the following information:

a. An updated non-domestic inventory.

b. Results of wastewater sampling at the treatment plant conducted to support local limit development, if completed during the reporting year. The Permittee must calculate removal rates for each pollutant and evaluate the adequacy of the existing local limits in prevention of treatment plant interference, pass through of pollutants that could affect receiving water quality, and sludge contamination.

c. Status of program implementation, including:

    i. Any substantial modifications to the pretreatment program as originally approved by Ecology, including staffing and funding levels.
    ii. Any interference, upset, or permit violations experienced at the POTW that are directly attributable to wastes from industrial users.
    iii. Listing of industrial users inspected and/or monitored, and a summary of the results.
    iv. Listing of industrial users scheduled for inspection and/or monitoring for the next year, and expected frequencies.
    v. Listing of industrial users notified of promulgated pretreatment standards and/or local standards as required in 40 CFR 403.8(f)(2)(iii). The list must indicate which industrial users are on compliance schedules and the final date of compliance for each.
    vi. Listing of industrial users issued industrial waste discharge permits.
    vii. Planned changes in the approved local pretreatment program. (See Subsection A.7. below)

d. Status of compliance activities, including:

    i. Listing of industrial users that failed to submit baseline monitoring reports or any other reports required under 40 CFR 403.12 and in the Permittee's pretreatment program, dated April 27, 1981.
    ii. Listing of industrial users that were at any time during the reporting period not complying with federal, state, or local pretreatment standards or with applicable compliance schedules for achieving those standards, and the duration of such noncompliance.
    iii. Summary of enforcement activities and other corrective actions taken or planned against non-complying industrial users. The Permittee must supply to Ecology a copy of the public notice of facilities that were in significant noncompliance.

4. The Permittee must request and obtain approval from Ecology before making any significant changes to the approved local pretreatment program. The Permittee must follow the procedure in 40 CFR 403.18 (b) and (c).

S6.B. Local limit development

As sufficient data become available, the Permittee, in consultation with Ecology, must reevaluate its local limits in order to prevent pass through or interference. If Ecology determines that any pollutant present causes pass through or interference, or exceeds established sludge standards, the Permittee must establish new local limits or revise existing local limits as required by 40 CFR 403.5. Ecology may also require the Permittee to revise or establish local limits for any pollutant discharged from the POTW that has a reasonable potential to exceed the Water Quality Standards, Sediment Standards, or established effluent limits, or causes whole effluent toxicity. Ecology makes this determination in the form of an Administrative Order.

Ecology may modify this permit to incorporate additional requirements relating to the establishment and enforcement of local limits for pollutants of concern. Any permit modification is subject to formal due process procedures under state and federal law and regulation.

S7. Solid wastes

S7.A. Solid waste handling

The Permittee must handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

S7.B. Leachate

The Permittee must not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment, nor allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality Standards, Chapter 173-200 WAC. The Permittee must apply for a permit or permit modification as may be required for such discharges to state ground or surface waters.

S8. Acute toxicity

S8.A. Testing when there is no permit limit for acute toxicity

The Permittee must:

1. Conduct acute toxicity testing on final effluent during the third quarter of 2019 and the first quarter of 2020.
2. Conduct acute toxicity testing on a series of at least five concentrations of effluent, including 100% effluent and a control.
3. Submit the results to Ecology with the permit renewal application.
4. Use each of the following species and protocols for each acute toxicity test:

Acute Toxicity Tests	Species	Method
Fathead minnow 96-hour static-renewal test	*Pimephales promelas*	EPA-821-R-02-012
Daphnid 48-hour static test	*Ceriodaphnia dubia, Daphnia pulex,* or *Daphnia magna*	EPA-821-R-02-012

S8.B. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain toxicity data, bench sheets, and reference toxicant results for test methods. In addition, the Permittee must submit toxicity test data in electronic format (CETIS export file preferred) for entry into Ecology's database.
2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Subsection C and the Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.
5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Section A or pristine natural water of sufficient quality for good control performance.
6. The Permittee must conduct whole effluent toxicity tests on an unmodified sample of final effluent.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the acute critical effluent concentration (ACEC). The ACEC equals 1.12% effluent.
8. All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing must comply with the acute statistical power standard of 29% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S9. Chronic toxicity

S9.A. Testing when there is no permit limit for chronic toxicity

The Permittee must:

1. Conduct acute toxicity testing on final effluent during fourth quarter of 2019 and the second quarter of 2020.
2. Conduct chronic toxicity testing on a series of at least five concentrations of effluent and a control. This series of dilutions must include the acute critical effluent concentration (ACEC). The ACEC equals 1.12% effluent. The series of dilutions should also contain the CCEC of 0.15% effluent.
3. Compare the ACEC to the control using hypothesis testing at the 0.05 level of significance as described in Appendix H, EPA/600/4-89/001.
4. Submit the results to Ecology with the permit renewal application.
5. Perform chronic toxicity tests with all of the following species and the most recent version of the following protocols:

Saltwater Chronic Test	Species	Method
Topsmelt survival and growth	*Atherinops affinis*	EPA/600/R-95/136
Mysid shrimp survival and growth	*Americamysis bahia* (formerly *Mysidopsis bahia*)	EPA-821-R-02-014

S9.B. Sampling and reporting requirements

1. The Permittee must submit all reports for toxicity testing in accordance with the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. Reports must contain toxicity data, bench sheets, and reference toxicant results for test methods. In addition, the Permittee must submit toxicity test data in electronic format (CETIS export file preferred) for entry into Ecology's database.
2. The Permittee must collect 24-hour composite effluent samples for toxicity testing. The Permittee must cool the samples to 0 - 6 degrees Celsius during collection and send them to the lab immediately upon completion. The lab must begin the toxicity testing as soon as possible but no later than 36 hours after sampling was completed.
3. The laboratory must conduct water quality measurements on all samples and test solutions for toxicity testing, as specified in the most recent version of Ecology Publication No. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*.
4. All toxicity tests must meet quality assurance criteria and test conditions specified in the most recent versions of the EPA methods listed in Section C and the Ecology Publication no. WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*. If Ecology determines any test results to be invalid or anomalous, the Permittee must repeat the testing with freshly collected effluent.

5. The laboratory must use control water and dilution water meeting the requirements of the EPA methods listed in Subsection C or pristine natural water of sufficient quality for good control performance.
6. The Permittee must conduct whole effluent toxicity tests on an unmodified sample of final effluent.
7. The Permittee may choose to conduct a full dilution series test during compliance testing in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control. The series of concentrations must include the CCEC and the ACEC. The CCEC and the ACEC may either substitute for the effluent concentrations that are closest to them in the dilution series or be extra effluent concentrations. The CCEC equals 0.15% effluent. The ACEC equals 1.12% effluent.
8. All whole effluent toxicity tests that involve hypothesis testing must comply with the chronic statistical power standard of 39% as defined in WAC 173-205-020. If the test does not meet the power standard, the Permittee must repeat the test on a fresh sample with an increased number of replicates to increase the power.

S10. Application for permit renewal or modification for facility changes

The Permittee must submit an application for renewal of this permit by July 31, 2021.

The Permittee must also submit a new application or addendum at least one hundred eighty (180) days prior to commencement of discharges, resulting from the activities listed below, which may result in permit violations. These activities include any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility.

General Conditions

G1. Signatory requirements

1. All applications, reports, or information submitted to Ecology must be signed and certified.
    a. In the case of corporations, by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
        - 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, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

    b. In the case of a partnership, by a general partner.
    c. In the case of sole proprietorship, by the proprietor.
    d. In the case of a municipal, state, or other public facility, by either a principal executive officer or ranking elected official.

    Applications for permits for domestic wastewater facilities that are either owned or operated by, or under contract to, a public entity shall be submitted by the public entity.
2. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
    a. The authorization is made in writing by a person described above and submitted to Ecology.
    b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)
3. Changes to authorization. If an authorization under paragraph G1.2, above, is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph G1.2, above, must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section must make the following certification:

   "I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G2. Right of inspection and entry

The Permittee must allow an authorized representative of Ecology, upon the presentation of credentials and such other documents as may be required by law:

1. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.
2. To have access to and copy, at reasonable times and at reasonable cost, any records required to be kept under the terms and conditions of this permit.
3. To inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.
4. To sample or monitor, at reasonable times, any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. Permit actions

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the Permittee) or upon Ecology's initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 40 CFR 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

1. The following are causes for terminating this permit during its term, or for denying a permit renewal application:
   a. Violation of any permit term or condition.
   b. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.
   c. A material change in quantity or type of waste disposal.
   d. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination.

e. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or sludge use or disposal practice controlled by the permit.

f. Nonpayment of fees assessed pursuant to RCW 90.48.465.

g. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

2. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:

   a. A material change in the condition of the waters of the state.

   b. New information not available at the time of permit issuance that would have justified the application of different permit conditions.

   c. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.

   d. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.

   e. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR Part 122.62.

   f. Ecology has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.

   g. Incorporation of an approved local pretreatment program into a municipality's permit.

3. The following are causes for modification or alternatively revocation and reissuance:

   a. When cause exists for termination for reasons listed in 1.a through 1.g of this section, and Ecology determines that modification or revocation and reissuance is appropriate.

   b. When Ecology has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G7) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. Reporting planned changes

The Permittee must, as soon as possible, but no later than one hundred eighty (180) days prior to the proposed changes, give notice to Ecology of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in:

1. The permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b).
2. A significant change in the nature or an increase in quantity of pollutants discharged.
3. A significant change in the Permittee's sludge use or disposal practices. Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation.

G5. Plan review required

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications must be submitted to Ecology for approval in accordance with chapter 173-240 WAC. Engineering reports, plans, and specifications must be submitted at least one hundred eighty (180) days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities must be constructed and operated in accordance with the approved plans.

G6. Compliance with other laws and statutes

Nothing in this permit excuses the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. Transfer of this permit

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee must notify the succeeding owner or controller of the existence of this permit by letter, a copy of which must be forwarded to Ecology.

1. Transfers by Modification

   Except as provided in paragraph (2) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

2. Automatic Transfers

   This permit may be automatically transferred to a new Permittee if:

   a. The Permittee notifies Ecology at least thirty (30) days in advance of the proposed transfer date.

   b. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.

   c. Ecology does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G8. Reduced production for compliance

The Permittee, in order to maintain compliance with its permit, must control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G9. Removed substances

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters must not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G10. Duty to provide information

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology upon request, copies of records required to be kept by this permit.

G11. Other requirements of 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G12. Additional monitoring

Ecology may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G13. Payment of fees

The Permittee must submit payment of fees associated with this permit as assessed by Ecology.

G14. Penalties for violating permit conditions

Any person who is found guilty of willfully violating the terms and conditions of this permit is deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars ($10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit may incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars ($10,000) for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is deemed to be a separate and distinct violation.

G15. Upset

Definition – “Upset” means 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, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limits if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset must demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and that the Permittee can identify the cause(s) of the upset.
2. The permitted facility was being properly operated at the time of the upset.
3. The Permittee submitted notice of the upset as required in Special Condition S3.F.
4. The Permittee complied with any remedial measures required under S3.F of this permit.

In any enforcement action the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G16. Property rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

G17. Duty to comply

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G18. Toxic pollutants

The Permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G19. Penalties for tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this condition, punishment shall be a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four (4) years, or by both.

G20. Compliance schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than fourteen (14) days following each schedule date.

G21. Service agreement review

The Permittee must submit to Ecology any proposed service agreements and proposed revisions or updates to existing agreements for the operation of any wastewater treatment facility covered by this permit. The review is to ensure consistency with chapters 90.46 and 90.48 RCW as required by RCW 70.150.040(9). In the event that Ecology does not comment within a thirty-day (30) period, the Permittee may assume consistency and proceed with the service agreement or the revised/updated service agreement.

Appendix A

LIST OF POLLUTANTS WITH ANALYTICAL METHODS, DETECTION LIMITS AND QUANTITATION LEVELS

The Permittee must use the specified analytical methods, detection limits (DLs) and quantitation levels (QLs) in the following table for permit and application required monitoring unless:

- Another permit condition specifies other methods, detection levels, or quantitation levels.
- The method used produces measurable results in the sample and EPA has listed it as an EPA-approved method in 40 CFR Part 136.

If the Permittee uses an alternative method, not specified in the permit and as allowed above, it must report the test method, DL, and QL on the discharge monitoring report or in the required report.

If the Permittee is unable to obtain the required DL and QL in its effluent due to matrix effects, the Permittee must submit a matrix-specific detection limit (MDL) and a quantitation limit (QL) to Ecology with appropriate laboratory documentation.

Ecology added this appendix to the permit in order to reduce the number of analytical "non-detects" in permit-required monitoring and to measure effluent concentrations near or below criteria values where possible at a reasonable cost.

The lists below include conventional pollutants (as defined in CWA section 502(6) and 40 CFR Part 122.), some toxic or priority pollutants as defined in CWA section 307(a)(1) and listed in 40 CFR Part 122 Appendix D, 40 CFR Part 401.15 and 40 CFR Part 423 Appendix A), and nonconventionals. 40 CFR Part 122 Appendix D (Table V) identifies toxic pollutants and hazardous substances which are required to be reported by dischargers if expected to be present. This permit Appendix A list does not include those parameters.

CONVENTIONAL POLLUTANTS

Pollutant	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] *µg/L unless specified*	Quantitation Level (QL)[2] *µg/L unless specified*
Biochemical Oxygen Demand		SM5210-B		2 mg/L
Biochemical Oxygen Demand, Soluble		SM5210-B [3]		2 mg/L
Fecal Coliform		SM 9221E,9222	N/A	Specified in method - sample aliquot dependent
Oil and Grease (HEM) (Hexane Extractable Material)		1664 A or B	1,400	5,000
pH		SM4500-H^+ B	N/A	N/A
Total Suspended Solids		SM2540-D		5 mg/L

NONCONVENTIONAL POLLUTANTS

Pollutant & CAS No. (if available)	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] µg/L unless specified	Quantitation Level (QL)[2] µg/L unless specified
Alkalinity, Total		SM2320-B		5 mg/L as CaCO3
Aluminum, Total	7429-90-5	200.8	2.0	10
Ammonia, Total (as N)		SM4500-NH3-B and C/D/E/G/H		20
Barium Total	7440-39-3	200.8	0.5	2.0
BTEX (benzene +toluene + ethylbenzene + m,o,p xylenes)		EPA SW 846 8021/8260	1	2
Boron, Total	7440-42-8	200.8	2.0	10.0
Chemical Oxygen Demand		SM5220-D		10 mg/L

NONCONVENTIONAL POLLUTANTS

Pollutant & CAS No. (if available)	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL)[1] µg/L unless specified	Quantitation Level (QL)[2] µg/L unless specified
Chloride		SM4500-Cl B/C/D/E and SM4110 B		Sample and limit dependent
Chlorine, Total Residual		SM4500 Cl G		50.0
Cobalt, Total	7440-48-4	200.8	0.05	0.25
Color		SM2120 B/C/E		10 color units
Dissolved oxygen		SM4500-OC/OG		0.2 mg/L
Flow		Calibrated device		
Fluoride	16984-48-8	SM4500-F E	25	100
Hardness, Total		SM2340B		200 as $CaCO_3$
Iron, Total	7439-89-6	200.7	12.5	50
Magnesium, Total	7439-95-4	200.7	10	50
Manganese, Total	7439-96-5	200.8	0.1	0.5
Molybdenum, Total	7439-98-7	200.8	0.1	0.5
Nitrate + Nitrite Nitrogen (as N)		SM4500-NO3- E/F/H		100
Nitrogen, Total Kjeldahl (as N)		SM4500-N_{org}B/C and SM4500NH_3-B/C/D/EF/G/H		300
NWTPH Dx [4]		Ecology NWTPH Dx	250	250
NWTPH Gx [5]		Ecology NWTPH Gx	250	250
Phosphorus, Total (as P)		SM 4500 PB followed by SM4500-PE/PF	3	10
Salinity		SM2520-B		3 practical salinity units or scale (PSU or PSS)
Settleable Solids		SM2540 -F		Sample and limit dependent
Soluble Reactive Phosphorus (as P)		SM4500-P E/F/G	3	10
Sulfate (as mg/L SO_4)		SM4110-B		0.2 mg/L
Sulfide (as mg/L S)		SM4500-S^2F/D/E/G		0.2 mg/L
Sulfite (as mg/L SO_3)		SM4500-SO3B		2 mg/L
Temperature (max. 7-day avg.)		Analog recorder or use micro-recording devices known as thermistors		0.2º C
Tin, Total	7440-31-5	200.8	0.3	1.5
Titanium, Total	7440-32-6	200.8	0.5	2.5
Total Coliform		SM 9221B, 9222B, 9223B	N/A	Specified in method - sample aliquot dependent
Total Organic Carbon		SM5310-B/C/D		1 mg/L
Total dissolved solids		SM2540 C		20 mg/L

PRIORITY POLLUTANTS	**PP #**	**CAS Number (if available)**	**Recommended Analytical Protocol**	**Detection (DL)[1] *µg/L unless specified***	**Quantitation Level (QL)[2] *µg/L unless specified***
METALS, CYANIDE & TOTAL PHENOLS					
Antimony, Total	114	7440-36-0	200.8	0.3	1.0
Arsenic, Total	115	7440-38-2	200.8	0.1	0.5
Beryllium, Total	117	7440-41-7	200.8	0.1	0.5
Cadmium, Total	118	7440-43-9	200.8	0.05	0.25
Chromium (hex) dissolved	119	18540-29-9	SM3500-Cr C	0.3	1.2
Chromium, Total	119	7440-47-3	200.8	0.2	1.0
Copper, Total	120	7440-50-8	200.8	0.4	2.0
Lead, Total	122	7439-92-1	200.8	0.1	0.5
Mercury, Total	123	7439-97-6	1631E	0.0002	0.0005
Nickel, Total	124	7440-02-0	200.8	0.1	0.5
Selenium, Total	125	7782-49-2	200.8	1.0	1.0
Silver, Total	126	7440-22-4	200.8	0.04	0.2
Thallium, Total	127	7440-28-0	200.8	0.09	0.36
Zinc, Total	128	7440-66-6	200.8	0.5	2.5
Cyanide, Total	121	57-12-5	335.4	5	10
Cyanide, Weak Acid Dissociable	121		SM4500-CN I	5	10
Cyanide, Free Amenable to Chlorination (Available Cyanide)	121		SM4500-CN G	5	10
Phenols, Total	65		EPA 420.1		50

1. Detection level (DL) or detection limit means the minimum concentration of an analyte (substance) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero as determined by the procedure given in 40 CFR part 136, Appendix B.

2. Quantitation Level (QL) also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10^n, where n is an integer (64 FR 30417).
   ALSO GIVEN AS:
   The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

3. Soluble Biochemical Oxygen Demand method note: First, filter the sample through a Millipore Nylon filter (or equivalent) - pore size of 0.45-0.50 um (prep all filters by filtering 250 ml of laboratory grade deionized water through the filter and discard). Then, analyze sample as per method 5210-B.

4. NWTPH Dx - Northwest Total Petroleum Hydrocarbons Diesel Extended Range – see http://www.ecy.wa.gov/biblio/97602.html

5. NWTPH Gx - Northwest Total Petroleum Hydrocarbons Gasoline Extended Range – see http://www.ecy.wa.gov/biblio/97602.html

From: Brown, Chad (ECY) <CHBR461@ECY.WA.GOV>
Sent: Wednesday, December 07, 2022 2:21 PM EST
To: Gildersleeve, Melissa (ECY) <MGIL461@ECY.WA.GOV>
CC: Bugica, Kalman (ECY) <kbug461@ECY.WA.GOV>
Subject: Notes on EPA Ecology discussion of NC process / PS D.O.

Melissa,
Here are some key points from the outcome of this meeting---

- We explained our key points referenced below.
- After a lot of questions and discussion EPA agrees accepts our approach and accepts that we aren't going to be doing anything special for D.O. in Puget Sound.
- EPA latched on to one of our draft ideas that we could develop NC procedure documents for each parameter type and waterbody. For example. Performance-base process for each D.O.in marine; D.O. in freshwater; Temperature in freshwater; Temperature in Marine (not sure we need)…. And possibly pH in marine and fresh as well. They felt this gave them more approval options in the case the needed to move forward with just marine D.O. I pointed out that they would need a reason, not convenience for there process, to hold back others and move with just marine D.O.
- We identified two questions that Ecology needs to hear from EPA early in this process
    - Will a rule that considers only the NC of waters make it through ESA without any assessment of the species impacts? This is the basis of NC provisions – need to know this is not changing. (EPA R10 staff still seem to conflate NC with site-specific criteria development process in our standards which are based on biology.)
    - Will EPA support a Performance-based procedure that uses state boundary reference inputs? Example- is NC process now going to require that we model oceanic influence to pre-industrial conditions? Ben Cope has been supporting our take on this – he had use reference for incoming water from Canada on the Columbia R. TMDL.
- EPA R10 counsel attended but no legal staff from EPA HQ – Alex Fidis is tasked with bringing the 'decisions' from this meet to EPA counsel and the DOJ.

From: Brown, Chad (ECY)
Sent: Monday, November 21, 2022 5:26 PM
To: Lavigne, Ronald L (ATG) <ronald.lavigne@atg.wa.gov>
Cc: Bugica, Kalman (ECY) <kbug461@ECY.WA.GOV>; Koberstein, Marla (ECY) <mkob461@ECY.WA.GOV>; Gildersleeve, Melissa (ECY) <MGIL461@ECY.WA.GOV>
Subject: Follow-up information from today

Ron,

Thanks for the pre-meeting today. Here is a write-up regarding what we shared with you in the meeting.

Overview or the issue

EPA is asking that Ecology develop site-specific criteria for the Puget Sound within/ or concurrent to our current rulemaking for natural conditions provision. We believe that EPA's own policies and previous decisions work against a defensible rulemaking for Puget Sound D.O. until our current rulemaking is complete. We cannot add this element to the current rulemaking because it is beyond the scope of the CR-101 (attached to this email) which focuses on updating our NC provisions, not proposing any waterbody-specific criteria.

We also don't believe that these 2 rulemakings could be performed concurrently, because a PS D.O. criteria development that incorporates natural conditions would require us to rely on a process that has not yet been adopted into rule nor approved by EPA.

EPA's Current Policy

EPA's current national policy regarding natural conditions is found within *A Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Aquatic Life Criteria for Temperature, Dissolved Oxygen, and pH: Interim Document* (EPA 820-R-15-001; February 2015). Prior to announcing our rulemaking, we asked EPA is this guidance document stands as EPA's current methodology regarding natural condition. EPA confirmed this in a response letter to our inquiry. (response letter attached to this email.)

In this document, EPA states that their policy regarding establishing site-specific natural background criteria is that you establish site-specific numeric aquatic life criteria equal to the value of the natural background, where natural background is defined as due *only* to non-anthropogenic sources.

To do this, EPA says that States and authorized Tribes "should include the following [elements] in their water quality standards":

1. A definition of natural background
2. A provision that site-specific criteria may be set equal to natural background
3. A procedure for determining natural background or reference to another documenting describing the binding procedure that will be used.

These three elements are not novel to this document. In 1997, EPA released a memo entitled *Establishing Site Specific Aquatic Life Criteria Equal to Natural Background* (EPA Office of Water; November 1997). In that document, EPA notes that "in setting criteria equal to natural background the State or Tribe should, at a minimum, include in their water quality standards" the same three elements listed above.

Washington's Current WQS

For Washington's current water quality standards, I'd like to walk through each of these three elements:

1. **A definition of natural background.**

   At WAC 173-201A-020 *Definitions*, we define "natural conditions" or "natural background levels" as the surface water quality present before any human-caused pollution.

   Thus, in my perspective, our WQS contains this element.

2. **A provision that site-specific criteria may be set equal to natural background.**

   At WAC 173-201A-260(1) *Natural and irreversible human conditions*, we state that when a water body does not meet its assigned criteria due to "natural climatic or landscape attributes", the natural conditions are the criteria.

   Thus, our WQS contains this element. **However**, this section of our standards was disapproved by EPA in November 2021. Thus, this element is not applicable for Clean Water Act purposes.

   Additionally, we have this element at WAC 173-201A-310(3) in our Tier I protections. Note that this element was**not** disapproved by EPA in November 2021 but has the same identified "flaw" as -260(1) -- that it does not limit application to only aquatic life criteria.

3. **A procedure for determining natural background.**

   The WQS does not contain detailed language for how to determine natural background, as such.

   At 173-201A-430, we provide the steps that must be taken to develop site-specific criteria. This asserts that development of new criteria must be "scientifically justifiable", among other requirements.

   Thus, I am unsure if our WQS contains language that meets the requirements of this specific element.

Chelan UAA consideration

When we conducted the rulemaking for the Chelan UAA, we referred to the temperature criteria that resulted from the UAA as "site-specific criteria". During our preliminary review of the rule with EPA, they had us modify the technical support document to state that the SSC proposed in the Chelan UAA rule was not based on our SSC provision in part 430 of the standards. EPA asserted that we could not site this provision because part 430 must be based on a the biological needs of organisms in the waterbody and not on natural conditions of the waterbody.

When we reviewed our SSC provision, we agreed because it states that…

"The site-specific analyses for the development of a new water quality criterion must be conducted in a manner that is scientifically justifiable and consistent with the assumptions and rationale in "Guidelines for Deriving National Water Quality Criteria for the Protection of Aquatic Organisms and their Uses," EPA 1985; and conducted in accordance with the procedures established in the "Water Quality Standards Handbook," EPA 1994, as revised." EPA, 1985 are procedures for developing biologically-based numeric criteria and do not consider natural conditions.

Therefore, based on EPA's comments and our review of Part 430, we placed the following note in the Chelan UAA rulemaking based on their comments – "Site-specific criteria [*established in this rule*] are used to describe water body specific criteria associated with the highest attainable use analysis and not the process described in CFR 131.11 or WAC 173-201A-430"

Conclusion

To conclude, from a federal perspective, we do not believe that our WQS contains all three elements necessary to establish site-specific criteria set equal to the natural background. While we clearly have a definition of natural conditions, we fail to have a specific procedure detailed on how we will determine natural background. However, even if one considers our site-specific criteria language to be sufficient, our SSC provision in WAC 173-201A-430 is not sufficient for basing an SSC on natural condition, as made clear in the language of the provision and as echoed in EPA's comments regarding the Chelan UAA rulemaking.

Chad Brown | Water Quality Management Unit Supervisor | Washington Department of Ecology
chad.brown@ecy.wa.gov | 360-522-6441 - mobile

Puget Sound Clean Water Alliance

February 28, 2023

Agenda

Time	Content	Speakers
9:00 – 9:10 AM	Introduction	Cassandra Moore Teresa Peterson
9:10 – 9:25	Context: PSCWA and Puget Sound Institute	Joel Baker
9:25 – 10:10 AM	Puget Sound Wastewater Service Affordability Analysis	Aimee Kinney Susan Burke
10:10 – 10:20 AM	Break	
10:20 – 11:15 AM	Overview of Modeling Results • Whidbey Region • Strait of Georgia & Northern Bays Region	Joel Baker
11:15 – 11:45 AM	Draft Modeling Workplan	Stefano Mazzilli
11:45 – 12:00 PM	Vision and Next Steps for PS CWA	Cassandra Moore Teresa Peterson

University of Washington Puget Sound Institute

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Ongoing Collaboration

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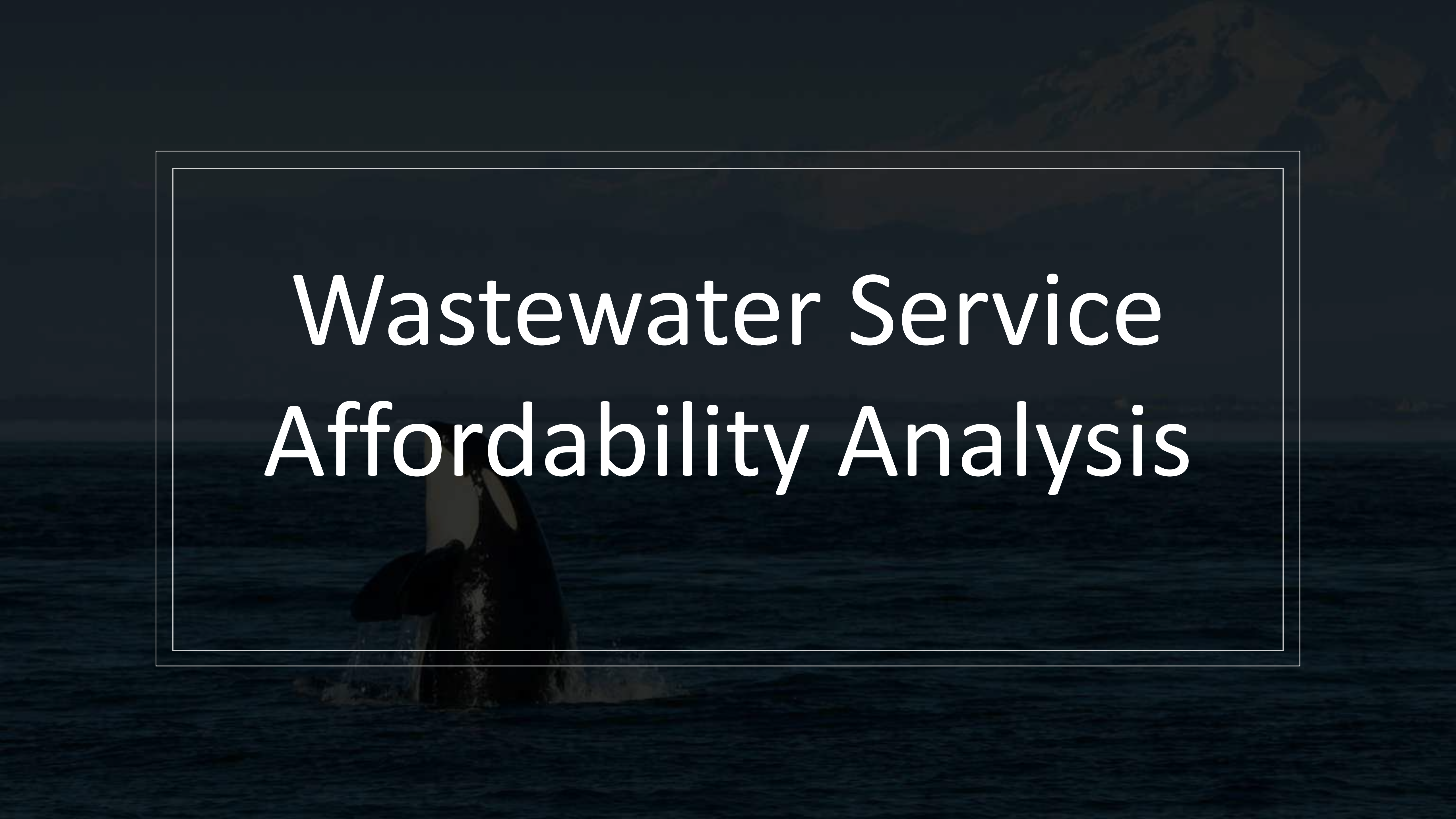
Puget Sound clean water alliance

- Address emerging science needs in the context of utility-scale decision making
- Move beyond nitrogen to consider water quality holistically and proactively
- Collaborate to leverage limited resources
- Provide relevant, timely, and independent scientific analysis
- Connect to cutting-edge research at the University of Washington and globally
- Trusted, scientific journalism
- Coordinate with regulatory and incentive programs



Wastewater Service Affordability Analysis

Wastewater Service Affordability Analysis

Susan Burke, ECO Resource Group & WWU
Aimee Kinney, Puget Sound Institute
Audrey Barber, WWU student
Nate Jo, WWU student
Kevin Bogue, Puget Sound Institute
Sandra Davis, ECO Resource Group

ECO RESOURCE GROUP

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WESTERN WASHINGTON UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS

West Point Treatment Plant (Photo: King County)

SUBSCRIBER EDITION

THE BELLINGHAM HERALD

HOMEPAGE

Bellingham sewer rates may quadruple. Here's why

BY ROBERT MITTENDORF

MAY 10, 2022 12:10 PM

Questions

1. How "affordable" are current sewer service costs in the Puget Sound region as measured by %MHI and %LQI?

2. How many sewer service providers would exceed a 2% "affordability" threshold if projected increases attributable to PSNGP-required upgrades are added to current service costs?

3. Is the regional distribution of clean water costs and benefits equitable?

   Are costs borne by ratepayers proportional across providers?
   Will all that benefit from clean water pay a "fair" share?

METHODS

Broad regional survey

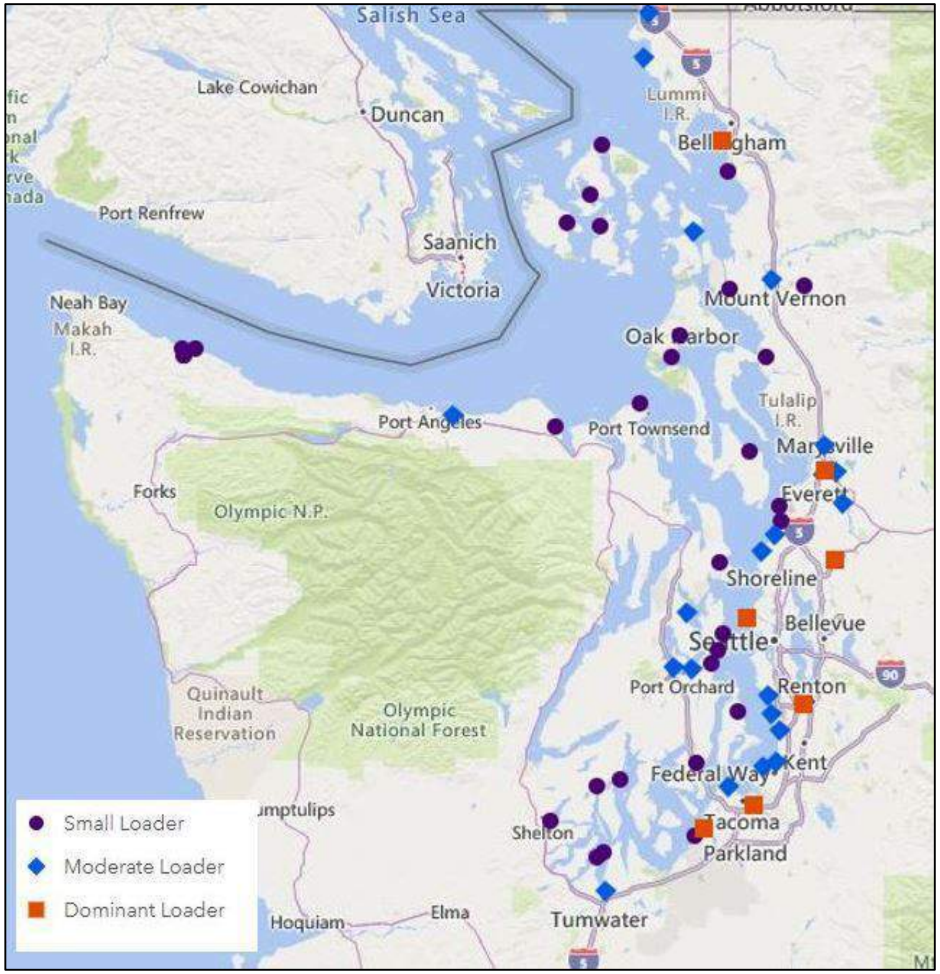
$\neq$

Statistically rigorous for EPA financial capability assessment

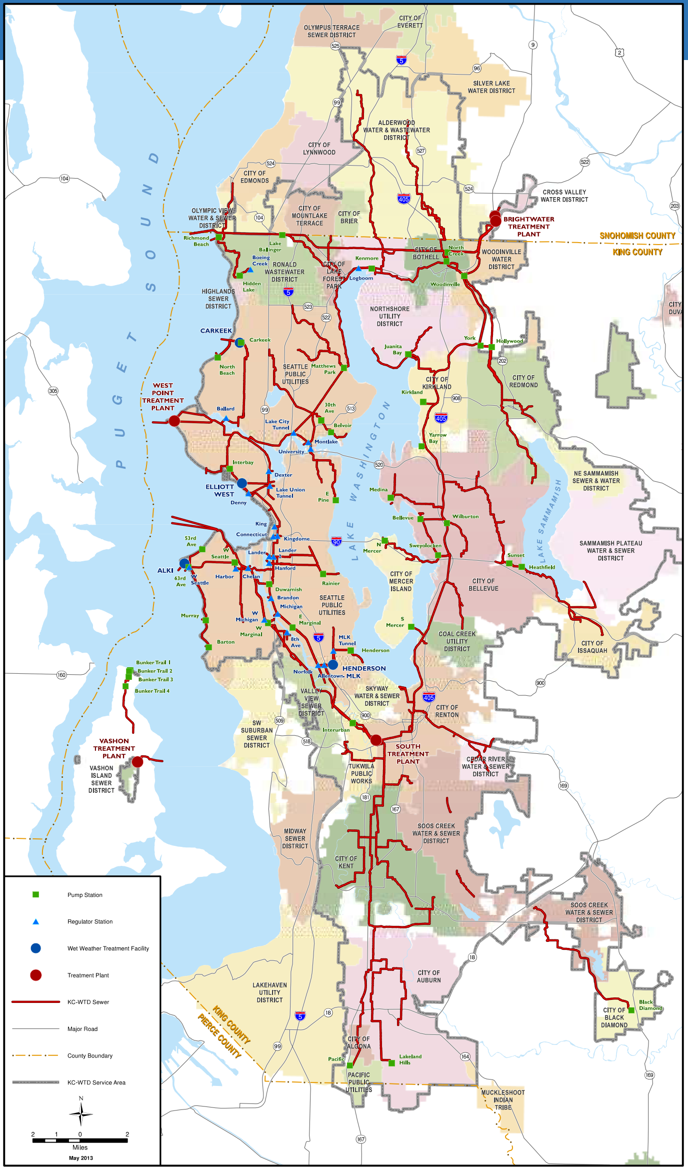
All datasets available open access

https://digital.lib.washington.edu/researchworks/

(1) Identified and obtained service area boundaries for local sewer service providers affected by the PSNGP



WWTPs (n=55)
Permittees (n=40)



Local sewer providers (n=89)

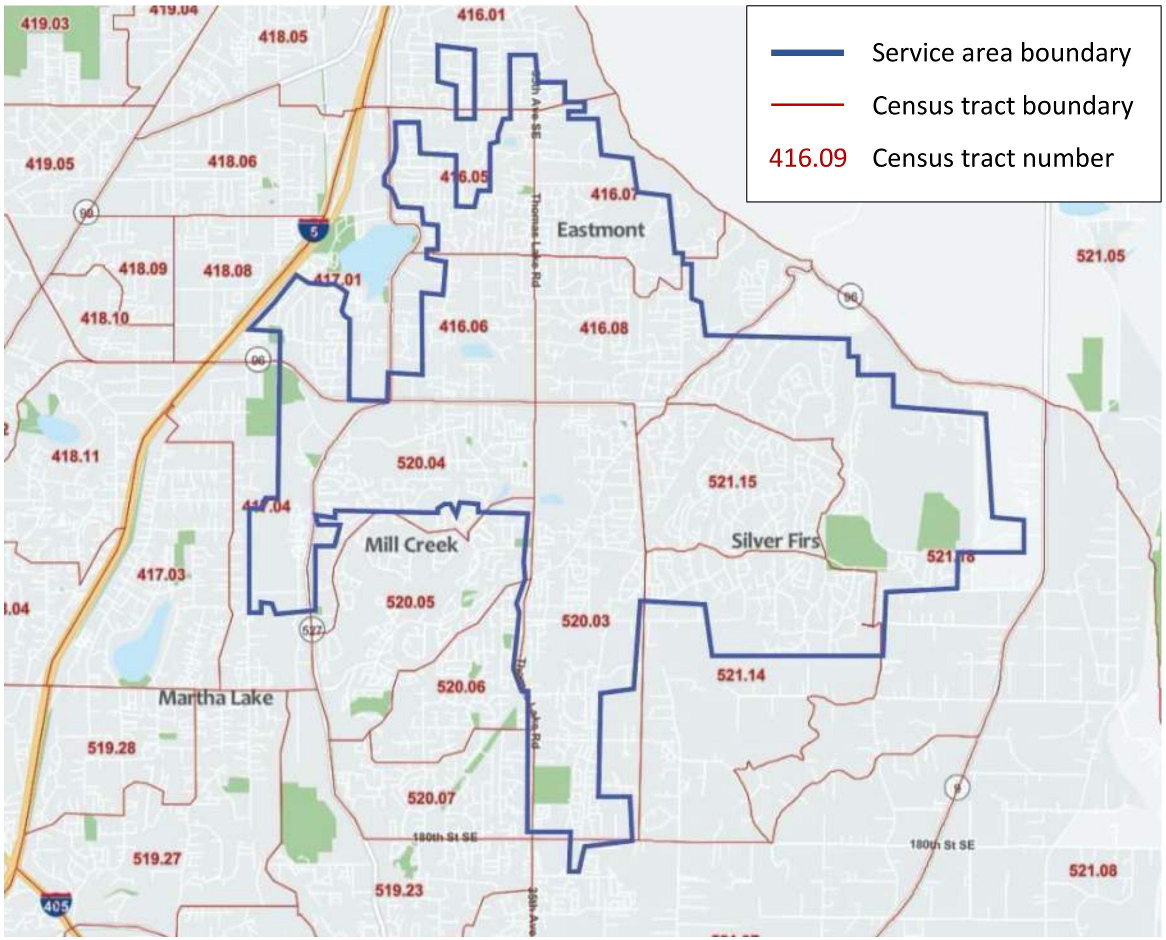
(2) Compiled rate data for local sewer providers and estimated monthly sewer service costs assuming standardized volume (5.5 ccf/household)

	ORGDOHNum	Name/Webpage link	Flat Rate	Number of months in flat rate	Variable Rate	Unit of measure for variable rate (1 = CF, 2 = CCF, 3 = Gallons)	Estimated Monthly Use (based on units of variable rate)	Monthly Flat Rate	Monthly Variable Cost	Total Monthly Sewer Cost
2	01300E	Alderwood Water District	$144.38	2	$0.00	1	5.5	$72.19	$0.00	*$72.19*
3	95904U	Birch Bay Water and Sewer Distr	$22.20	1	$2.90	1	5.5	$22.20	$4.35	*$26.55*
4	418007	Cedar River Water and Sewer Dis	$152.58	2	$0.00	1	5.5	$76.29	$0.00	*$76.29*
5	01450V	City of Algona	$68.02	1	$0.00	1	5.5	$68.02	$0.00	*$68.02*
6	02200C	City of Anacortes	$43.14	1	$0.03	2	550	$43.14	$18.72	*$61.86*
7	03350V	City of Auburn	$75.26	1	$0.00	1	5.5	$75.26	$0.00	*$75.26*
8	97650T	City of Bainbridge Island	$43.54	1	$7.34	1	5.5	$43.54	$40.37	*$83.91*
9	05575B	City of Bellevue	$99.00	2	$5.15	1	5.5	$49.50	$28.33	*$77.83*
10	56003	City of Bellingham	$98.20	2	$0.00	1	5.5	$49.10	$0.00	*$49.10*
11	72207	City of Black Diamond	$72.37	1	$0.00	1	5.5	$72.37	$0.00	*$72.37*
12	07300U	City of Blaine	$115.07	1	$0.00	1	5.5	$115.07	$0.00	*$115.07*
13	07900L	City of Bothell	$139.78	2	$4.63	1	5.5	$69.89	$16.21	*$86.10*
14	08200R	City of Bremerton	$67.23	1	$5.00	1	5.5	$67.23	$27.50	*$94.73*
15	WW_11	City of Brier	$113.78	2	$0.00	1	5.5	$56.89	$0.00	*$56.89*
16	25050N	City of Fife	$90.56	1	$0.00	1	5.5	$90.56	$0.00	*$90.56*

Sources of error:

- Multi-family buildings not included
- State and local utility taxes sometimes incorporated into rates, sometimes not
- Household size and seasonal variation not incorporated into our standardized volume assumption
- Several utilities contacted indicated their actual volumes are higher

(3) Compiled income and population data for 700+ Census tracts
(4) Conducted spatial analysis to correspond service area or city boundaries with Census tracts
(5) Calculated population-weighted MHI & LQI for each service area



Sources: https://www.slwsd.com/servicearea.html and https://data.census.gov/cedsci/table?q=United%20States

Sources of error:

- Service areas and Census tract boundaries differ
- Service area and city boundaries differ
- Households with septic systems within sewer service area not excluded

(6) Calculated annual SFR service cost for 80 local providers as a percentage of MHI and LQI

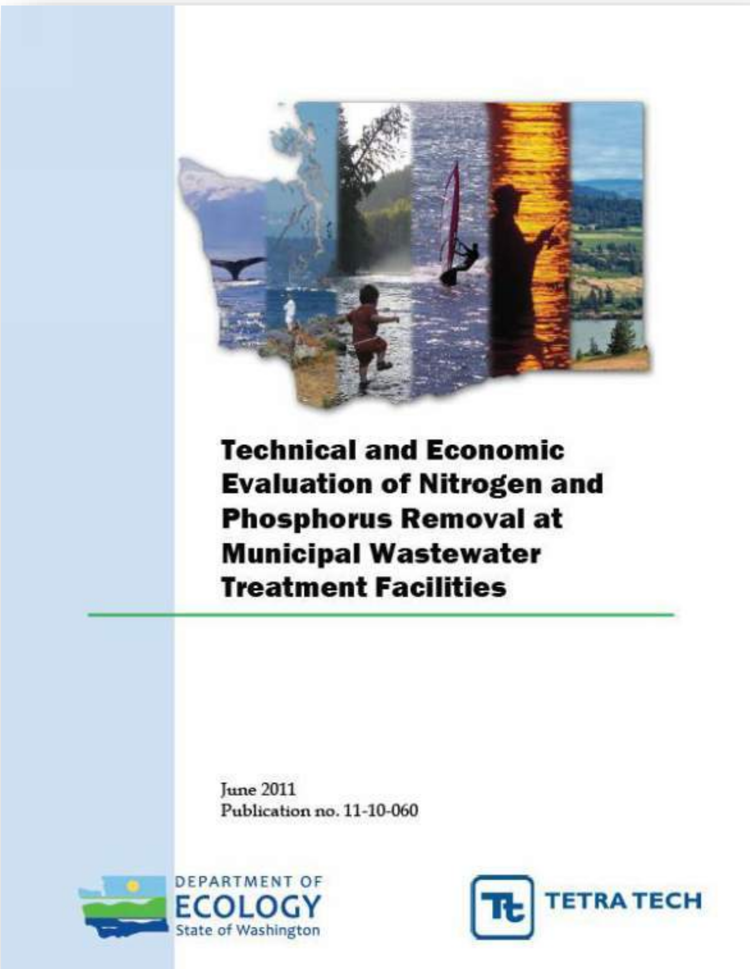
$$\%MHI = \frac{\text{Annual cost of sewer service}}{\text{Median Household Income}}$$

$$\%LQI = \frac{\text{Annual cost of sewer service}}{\text{Lowest Quintile Income}}$$

Sources of error:

- No universally accepted definition of "affordable"
- EPA guidance is in flux, but we elected to present our results relative to the commonly used 2% benchmark

(7) Added predicted monthly cost increase associated with 2 PSNGP upgrade scenarios to service costs estimated in Step 2
(8) Calculated PSNGP-adjusted cost as a percentage of MHI and LQI



	TIN <3 mg/L year-round	TIN <8 mg/L dry season
$ 2010 [a]	$ 19.48	$ 9.43
$ 2022 [b]	$ 35.36	$ 17.12

Sources:

(a) Table ES-3 of 2011 report

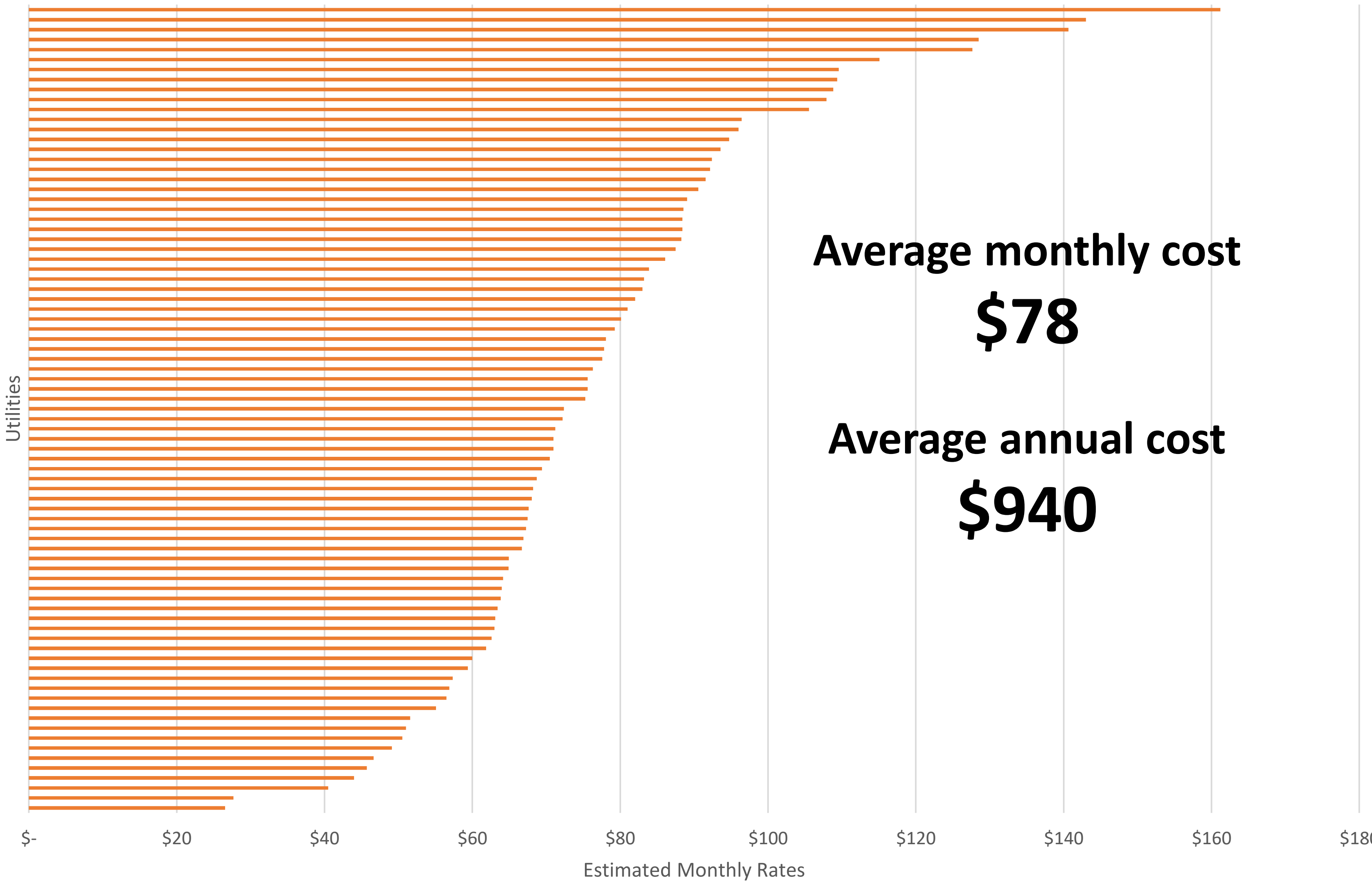
(b) Costs adjusted by inflation factor of 182% (PPI by Commodity: Special Indexes, Construction Materials)

Sources of error:

- Utility Caucus to PSNGP Advisory Committee noted costs will be higher than estimated in the 2011 report
- Projected PSNGP-adjusted cost doesn't include already-scheduled rate increases needed to accommodate other needs

RESULTS

Monthly wastewater service cost



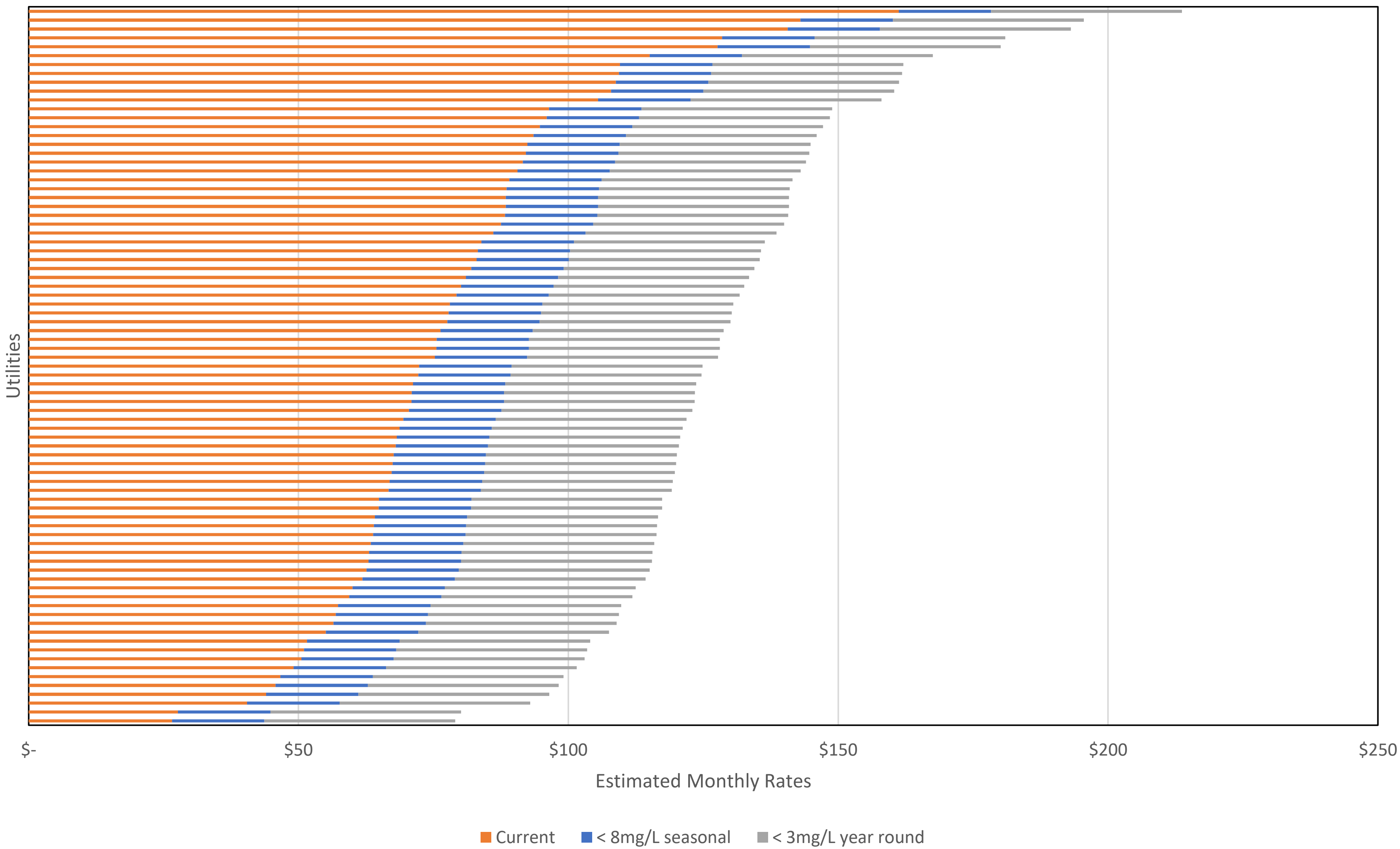
Average monthly cost

$78

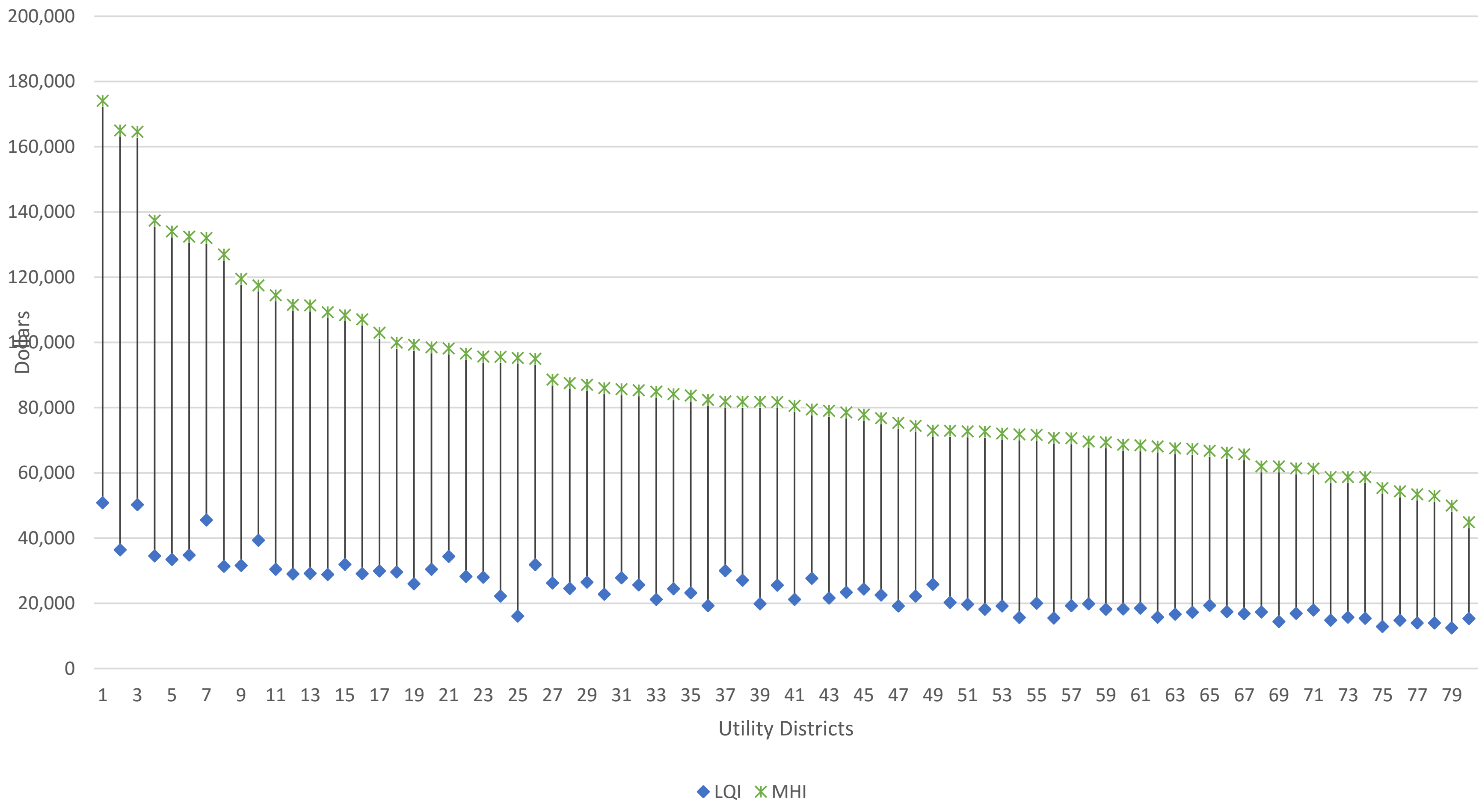
Average annual cost

$940

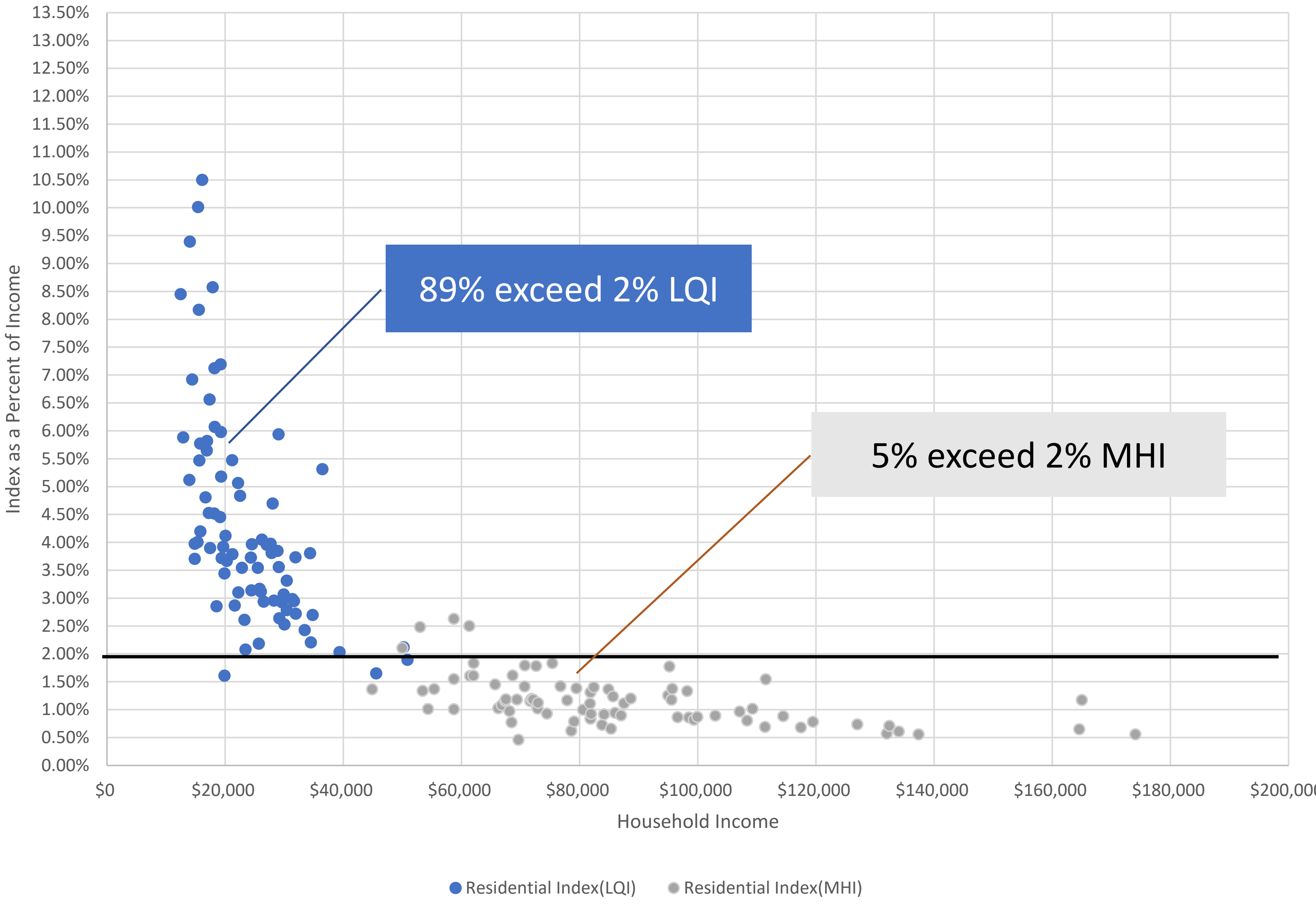
PSNGP-adjusted monthly cost



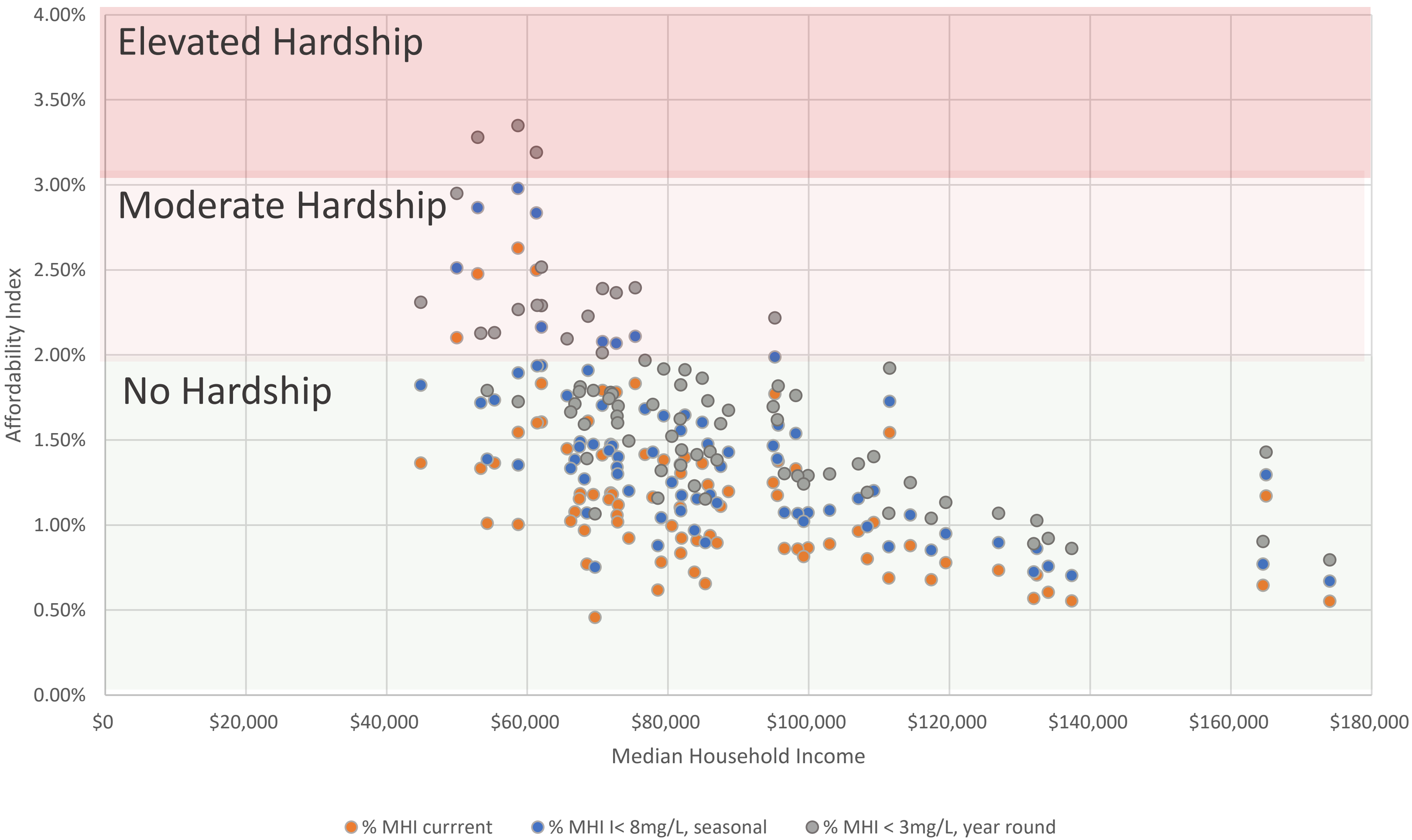
Household Income Ranges



Are current service costs affordable?



PSNGP-adjusted wastewater service costs as %MHI

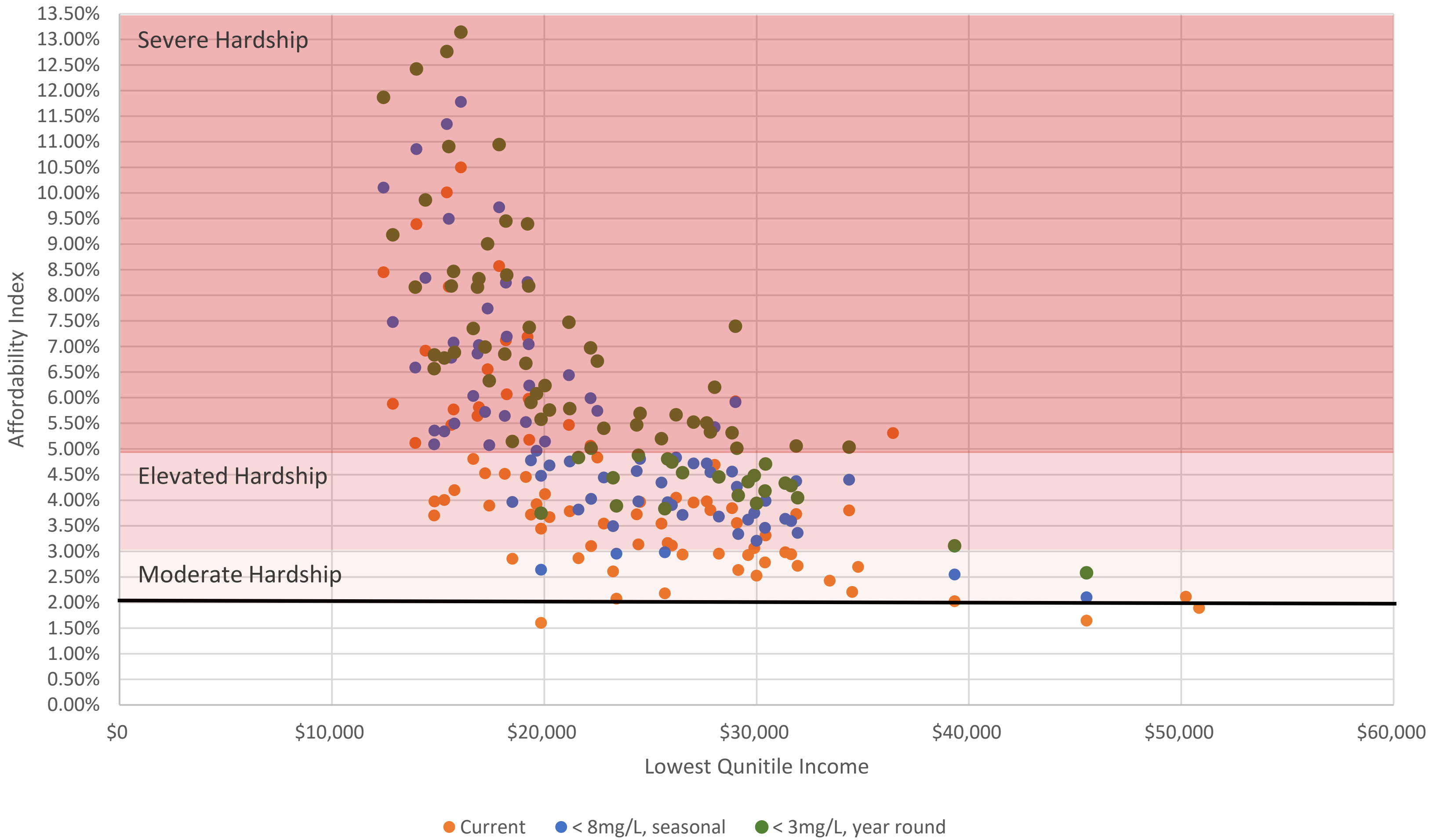


Current
4 hardship utilities (5%)

<8 mg/L seasonal
8 hardship utilities (10%)

<3 mg/L year round
18 hardship utilities (23%)

PSNGP-adjusted wastewater service costs as %LQI



Current
77 utilities >2% (96%)

<8 mg/L seasonal
80 utilities >2% (100%)

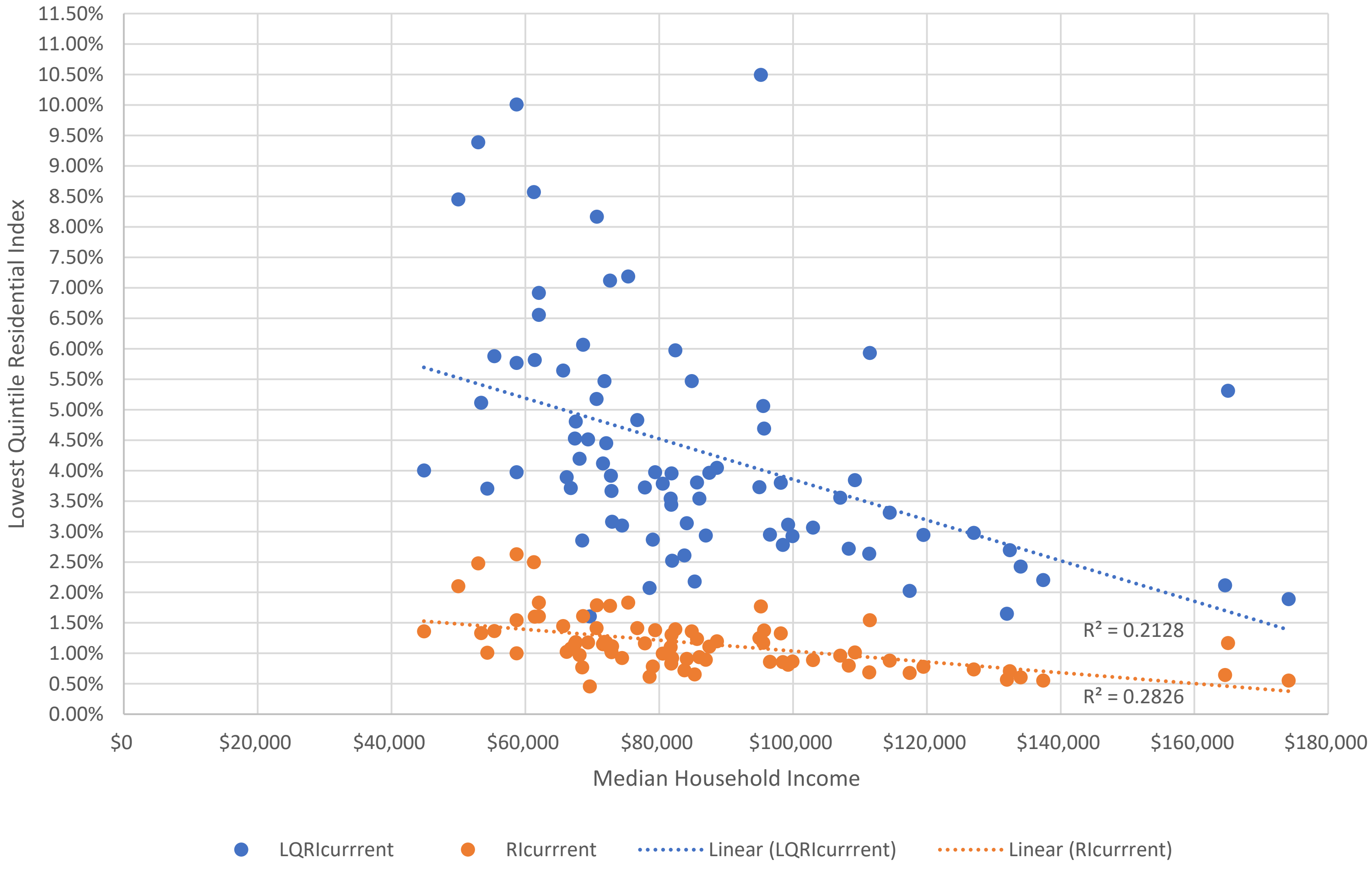
<3 mg/L year round
80 utilities >2% (100%)

Conclusion: The number of ratepayers at being billed >5% of their income for sewer service will increase with PSNGP requirements and potentially threaten the financial resiliency of wastewater service providers

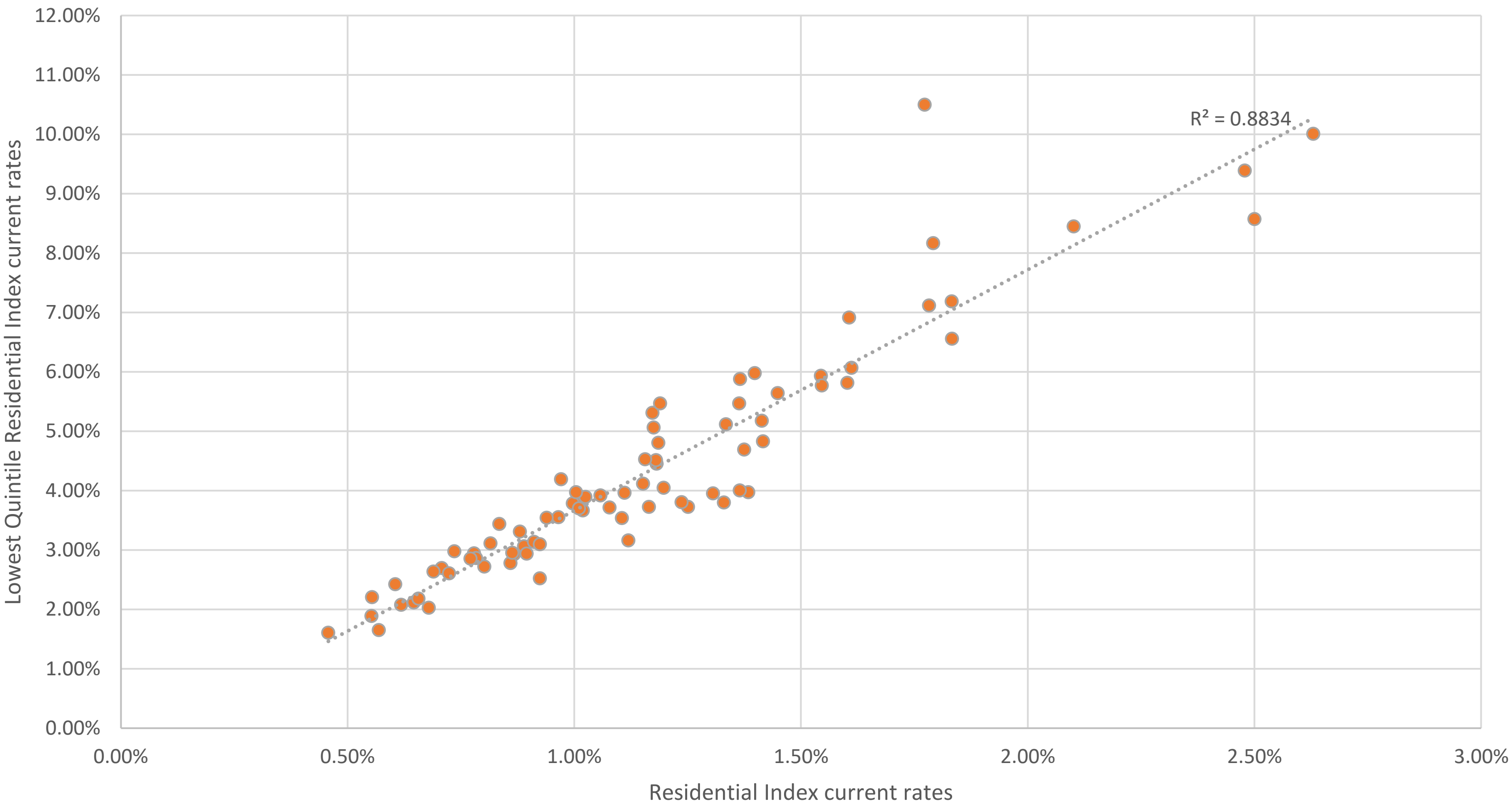
Recommendation: Develop a state or region-wide low-income assistance program designed to reduce administrative burdens on and legal challenges to wastewater service providers. LIHWAP/ LIHEAP as model?

Recommendation: Consider a feasibility study on changing rate structures using a financial resilience model

Is MHI good proxy for %MHI? NO



Is %MHI good proxy for %LQI?
YES



Conclusion: The criteria used by Ecology to make grant and hardship loan decisions don’t fully address current affordability issues in the region

Recommendation: Use %MHI instead of MHI to allocate Puget Sound Nutrient Grant Program funding among jurisdictions.

Recommendation: Incorporate %LQI as a component of eligibility determinations for CWSRF additional subsidization.

Possible Next Steps?

- Develop a spatial data layer with accurate service area boundaries for all wastewater utilities
- Improve Census tract – service area correspondence methodology
- Compile utility-provided data on number of housing units served residential usage, and current sewer service cost
    - Multi-family housing units
    - Cost of drinking water service (and stormwater fees)
- Compile utility-provided data on already-planned rate increases and those that would be required to cover PSNGP upgrades


Tacoma Central Wastewater Treatment Plant (Photo: City of Tacoma)

Questions and discussion

burkes5@wwu.edu

aimeek@uw.edu

Q&A

Break

Overview of Modeling Results

DEPARTMENT OF ECOLOGY
State of Washington

Nutrient modeling includes:

- Model scenarios to refine nutrient limits
- Refine watershed modeling for nutrients (SPARROW)

PUGET SOUND INSTITUTE

Advance Model Interpretation, Capacity, & Access

- Launched Salish Sea Modeling Center
- Expanded computational capacity
- Increased access to model outputs by region with:
- Daily results
  - Concentrations
  - Other parameters
- Developed a volume-based metric
- Increased access to model and scripts

Applied modeling to inform utility decisions

PUGET SOUND INSTITUTE

Develop Modeling Tools and Research

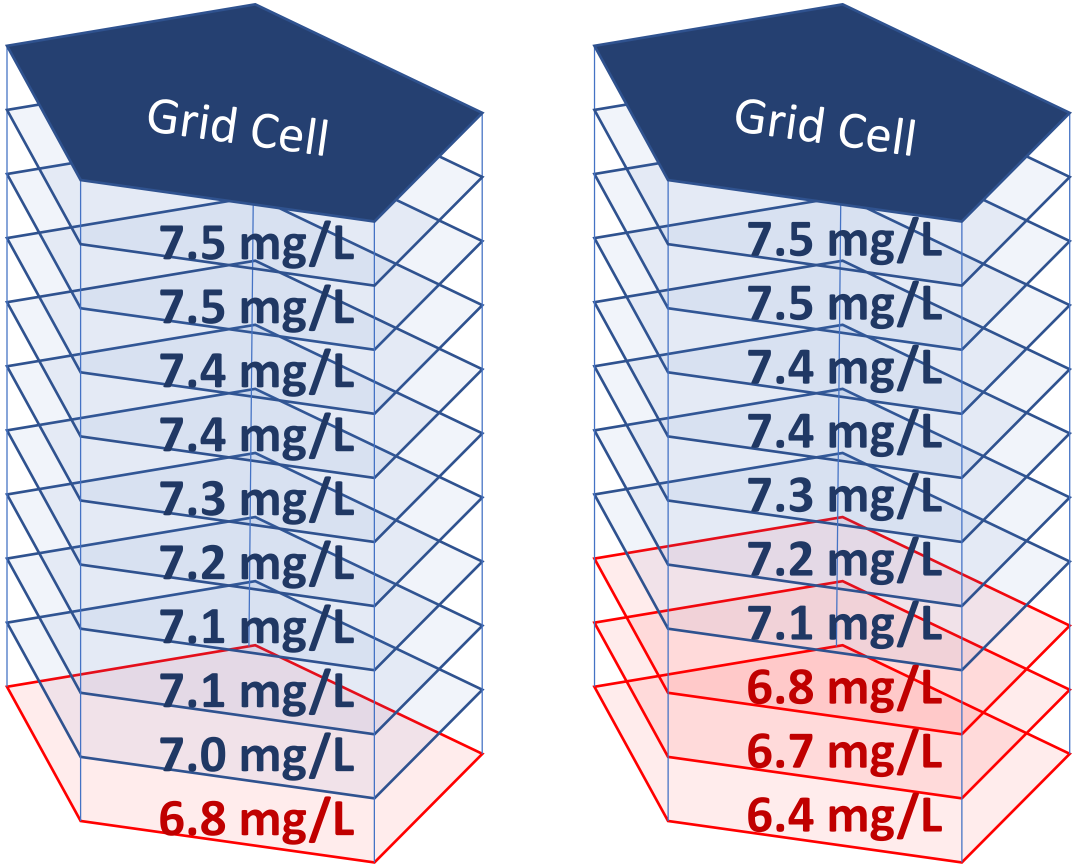
- Leading the Puget Sound Integrated Modeling Framework
- Developing a Toxics Fate and Transport Module
- Evaluating social-ecological outcomes using qualitative ecosystem models
- Coordinating the PSEMP Modeling Work Group
- Convening a Model Evaluation Group
- Facilitating workshops and communicating insights to inform decision making

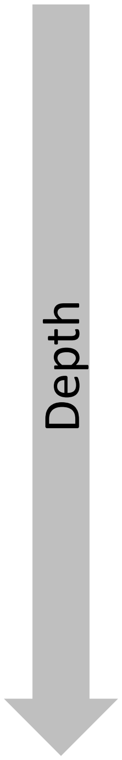
+ Puget Sound Institute's research allows for a more holistic and effective approach to water quality

Volume Days Refresher

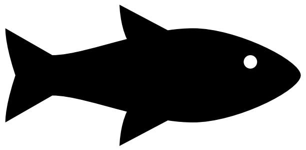
	Day A	Day B
Day	Non-Compliant	Non-Compliant
Area	10 km^2	10 km^2
Volume	1 km^3	3 km^3

- Non-compliant area and days are the same
- Volume is more nuanced and relevant to biological impacts





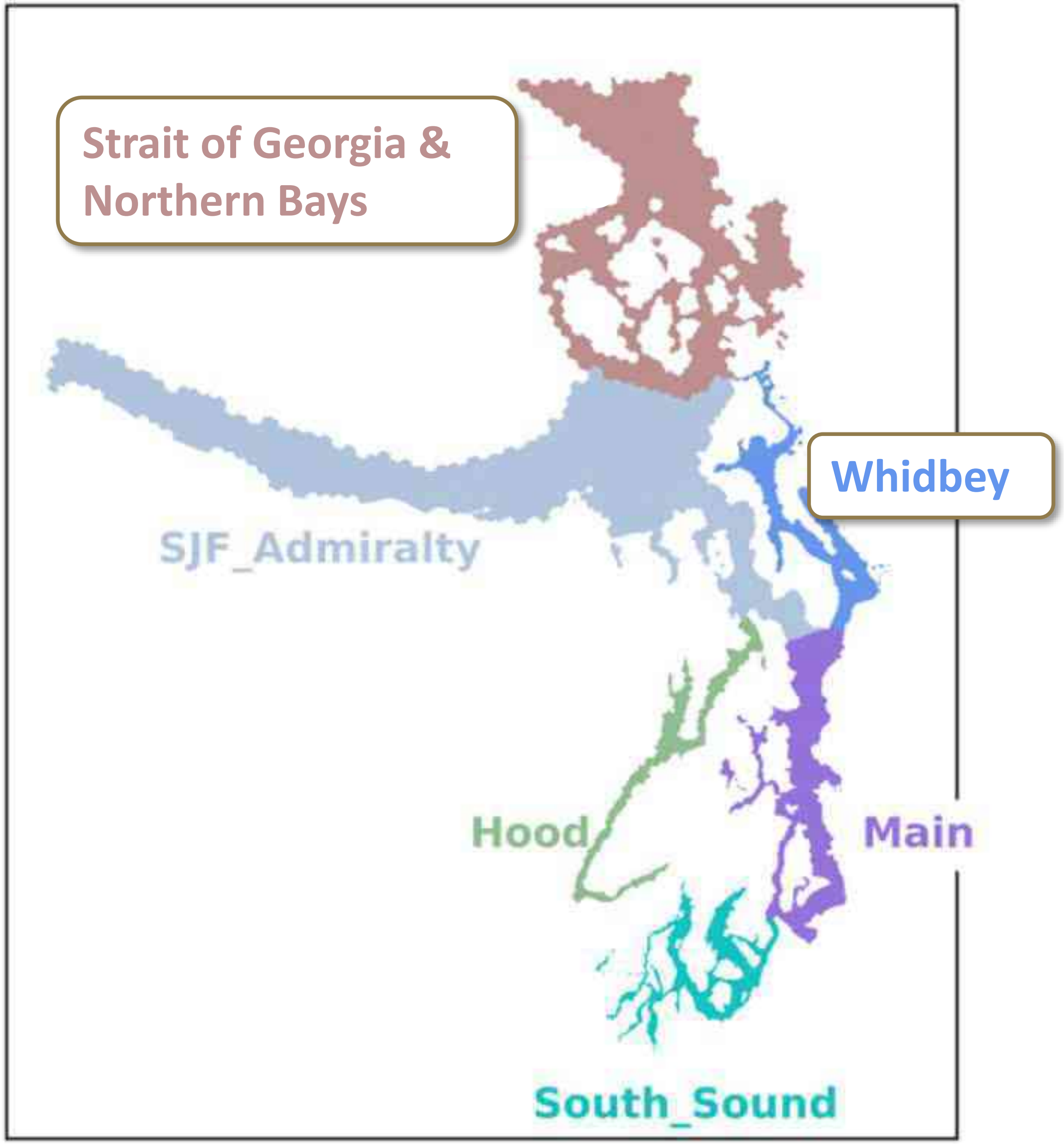
Standard: Excellent 7 mg/L



Red: Dissolved oxygen minimum does **not** meet the standard for any hour

Blue: Dissolved oxygen minimum meets the standard every hour

Regional Reports | Scenarios in 2014



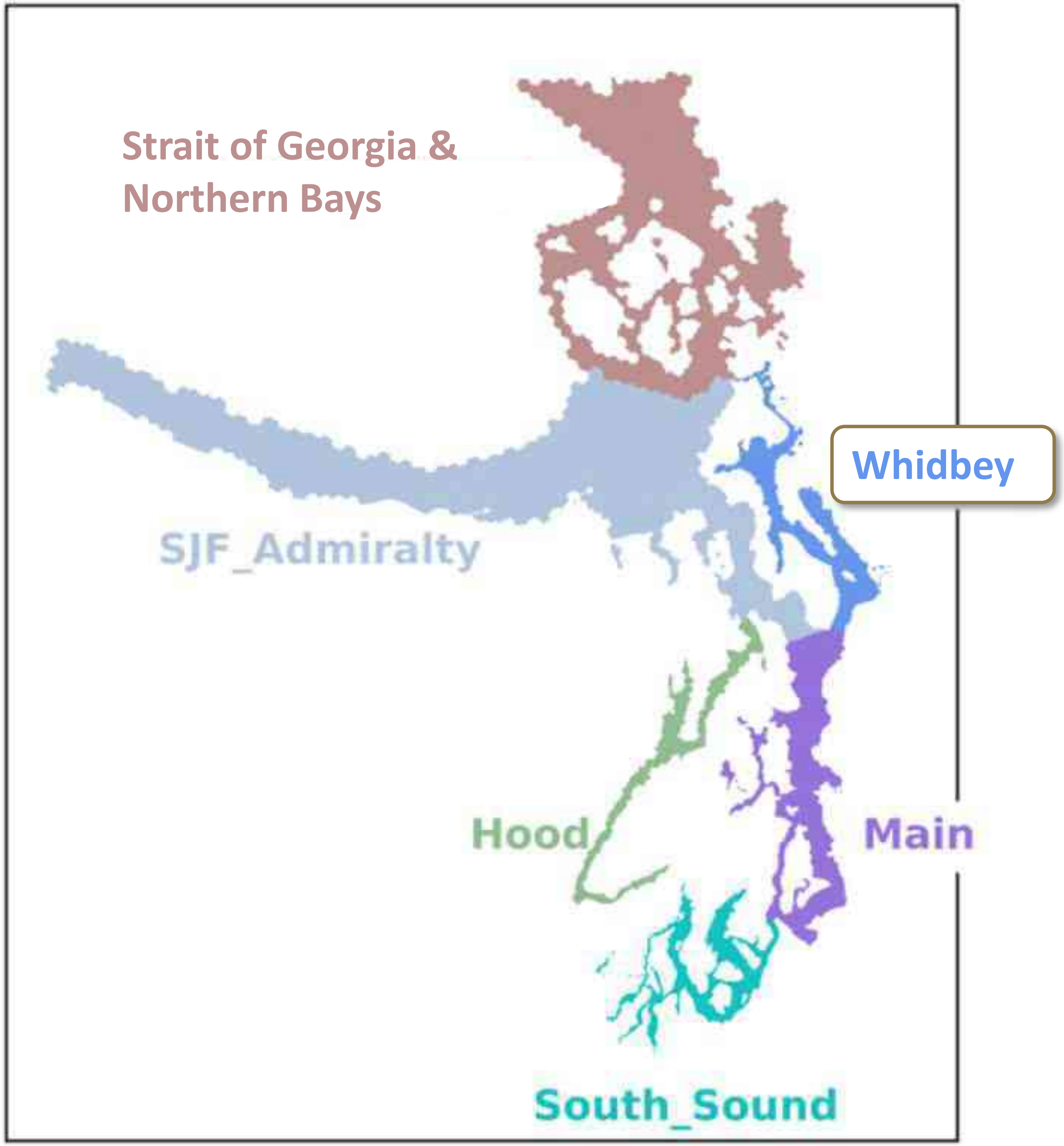
Alter nitrogen concentrations (both NO_2^-/NO_3^- and NH_4^+) for local wastewater treatment plants and rivers, but maintain flows

- Keep concentrations at 'current conditions' in other regions

Maintain other conditions (e.g., hydrodynamics, meteorology, biogeochemical kinetics, ocean exchange, etc.) at their 'current conditions'

Classify wastewater treatment plants as **small, moderate (medium), and dominant** in alignment with the State's permit documentation (issued 12/1/2021)

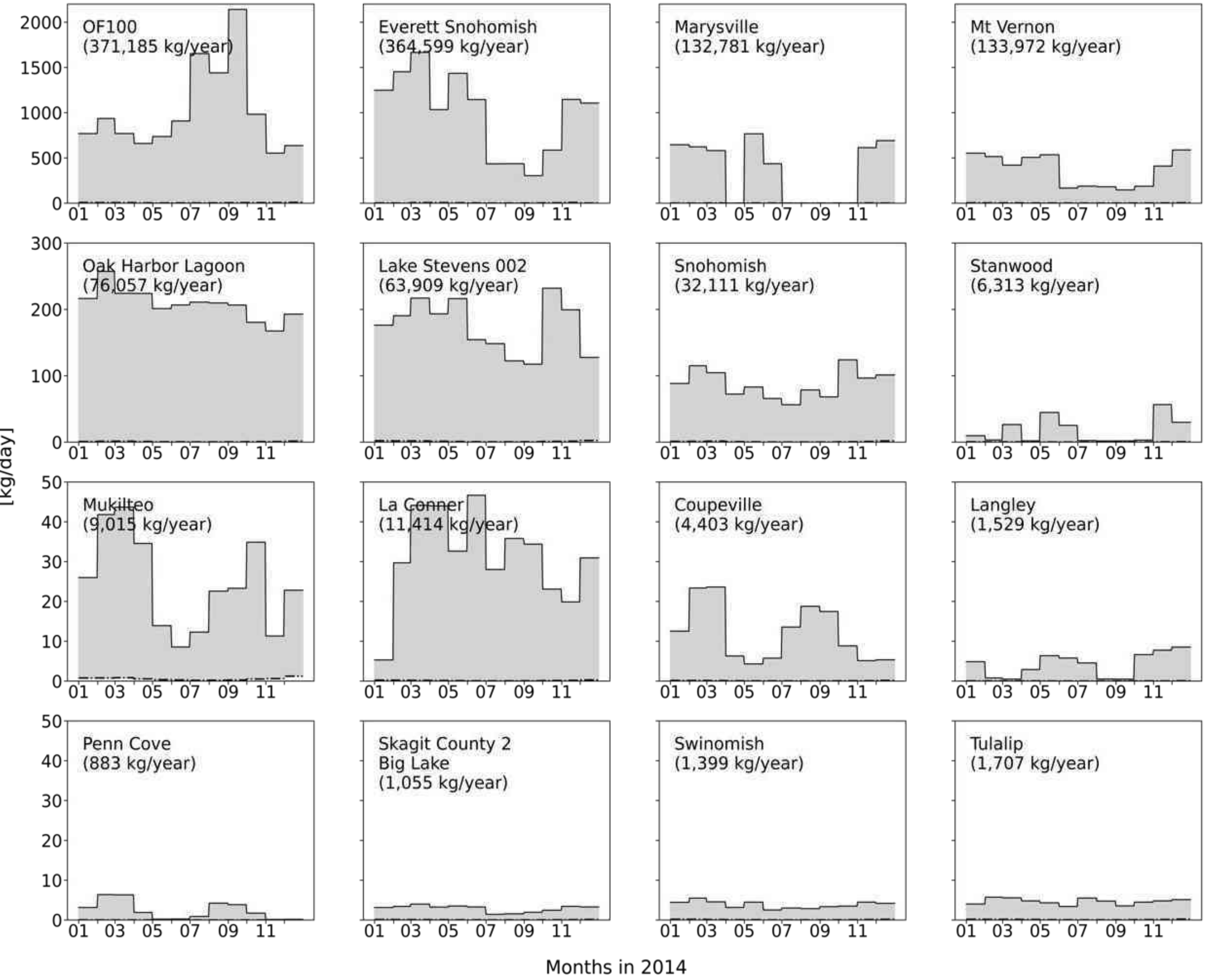
Whidbey Basin



Whidbey Basin| Local Nitrogen Loading in 2014

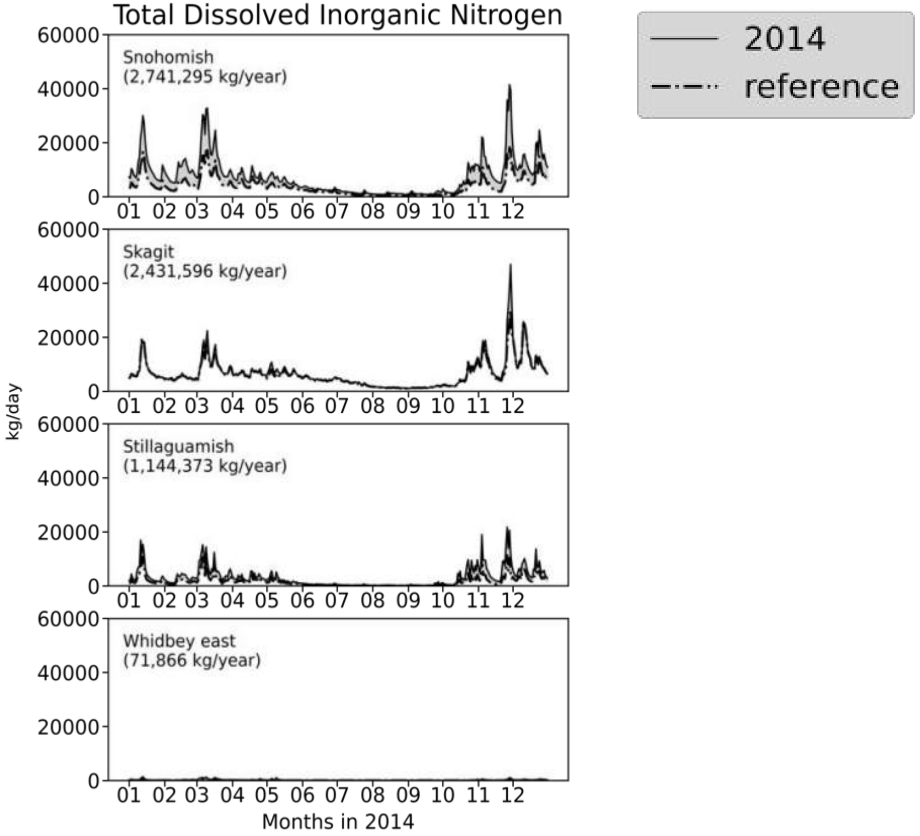
Wastewater Treatment Plants

Total Dissolved Inorganic Nitrogen



River Loading

Total Dissolved Inorganic Nitrogen



1.2 million kg/year wastewater

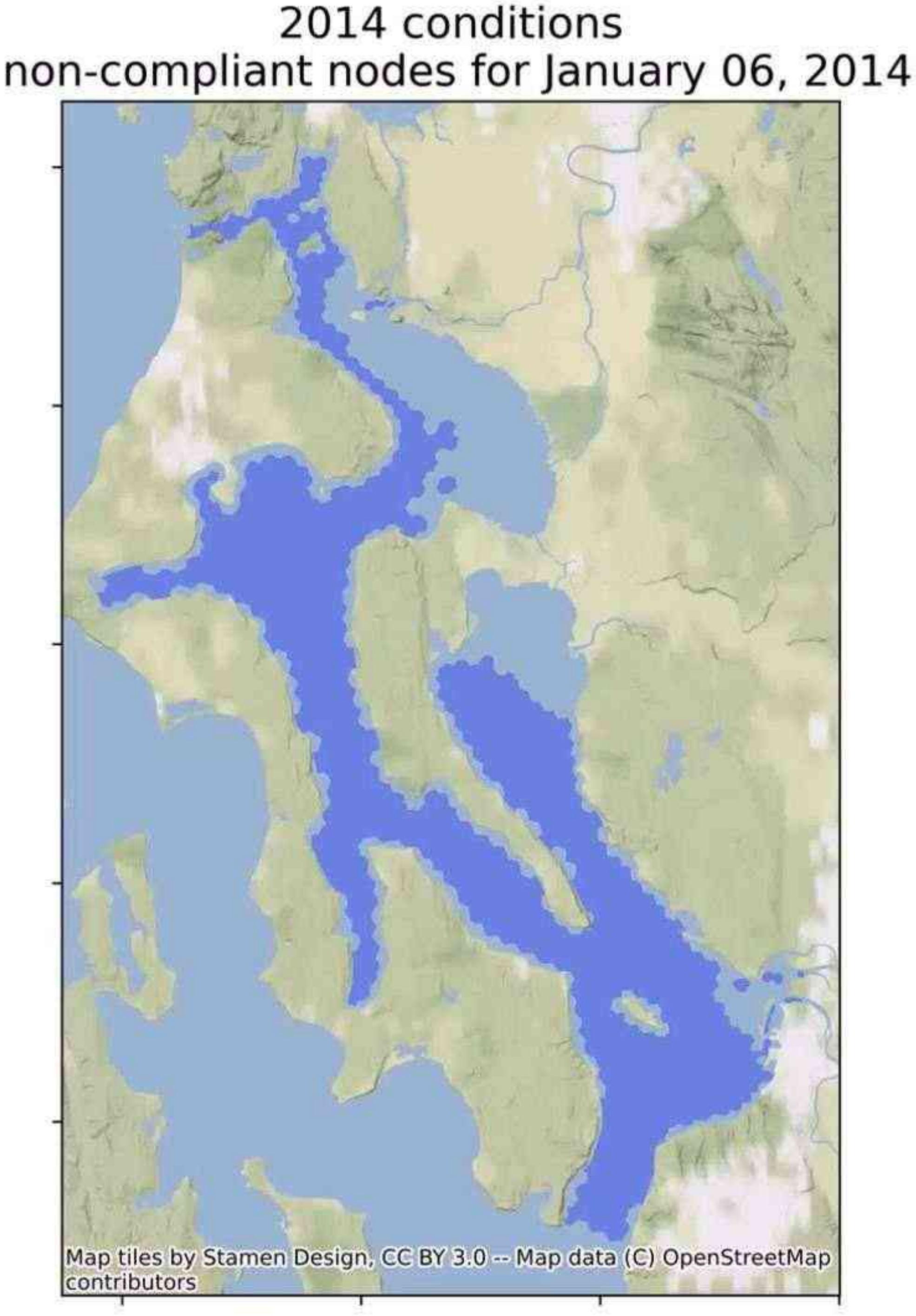
2.0 million kg/year rivers, human influence

4.4 million kg/year rivers, natural

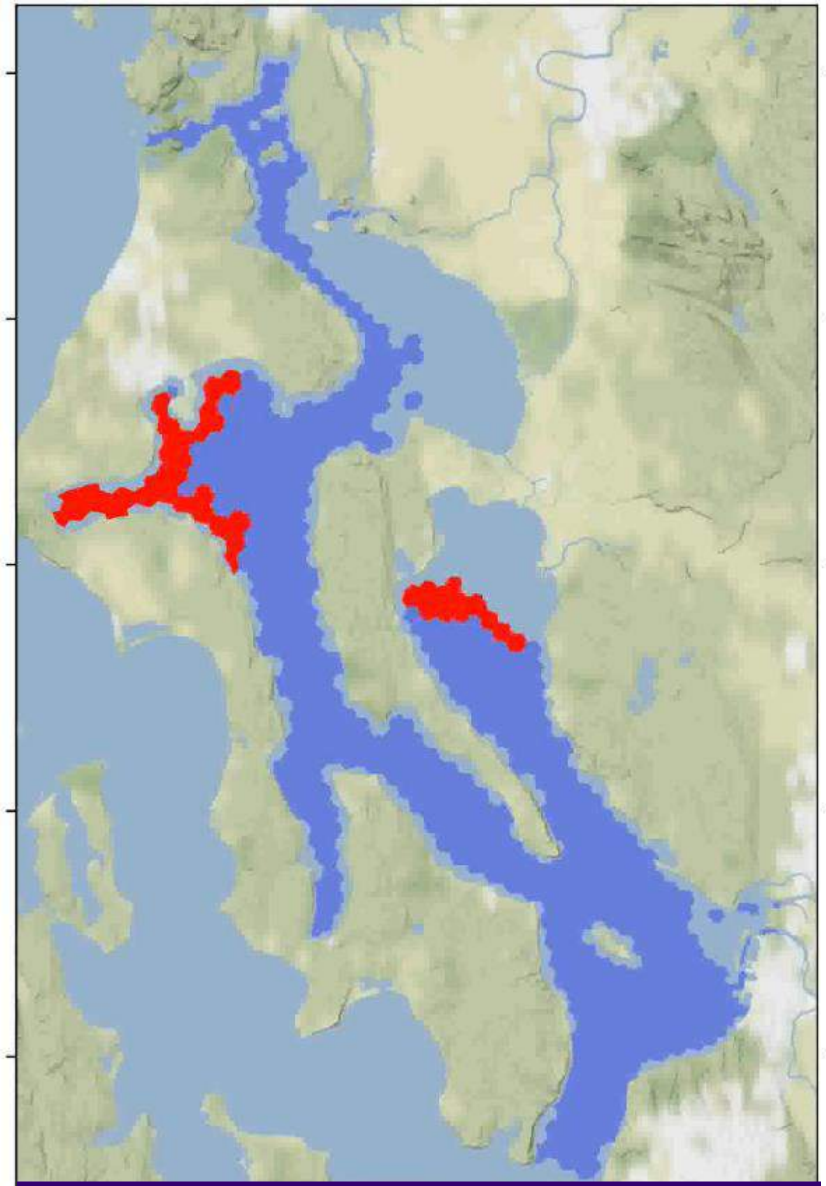
Whidbey Basin | Current Conditions in 2014

Within Whidbey Basin

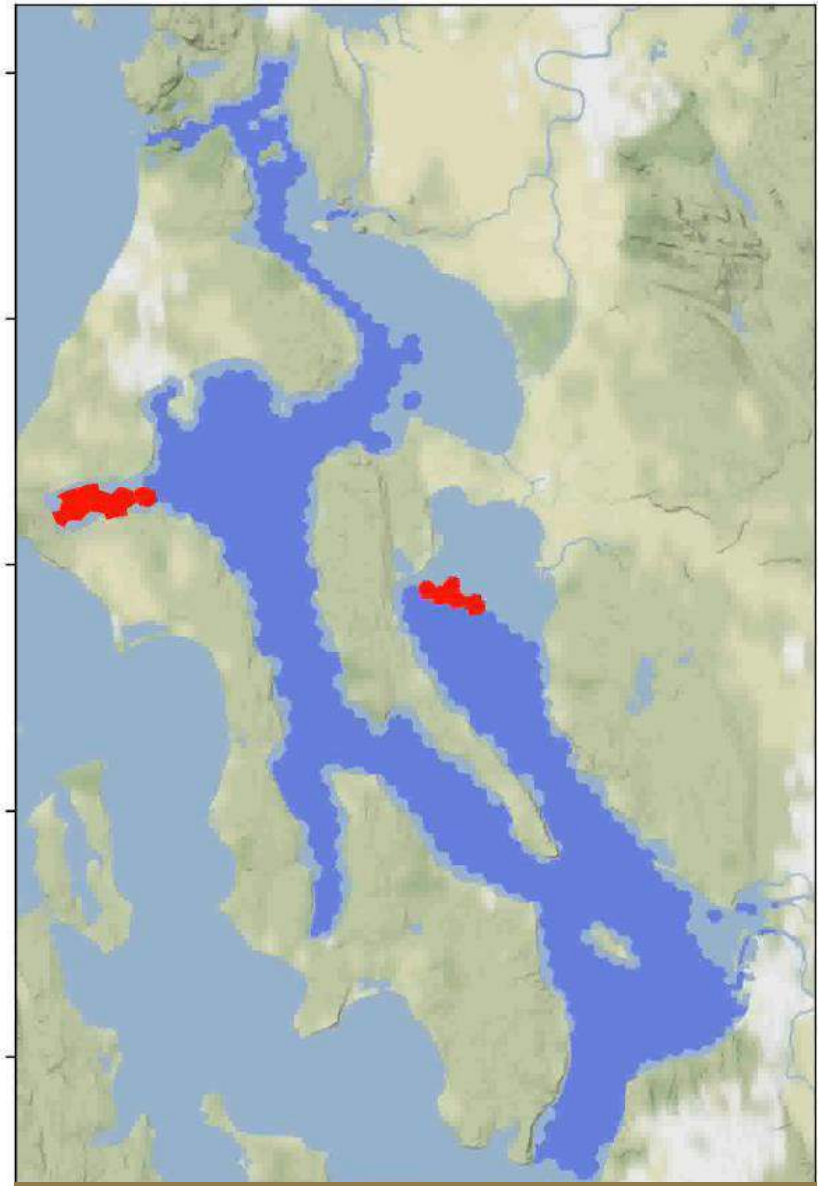
- 174 days non-compliant
- Peak non-compliant volume is 3%
  - Non-compliant volume is sustained above 1% for 4 months, peaking in August and September



Whidbey Basin | Current vs. Reference



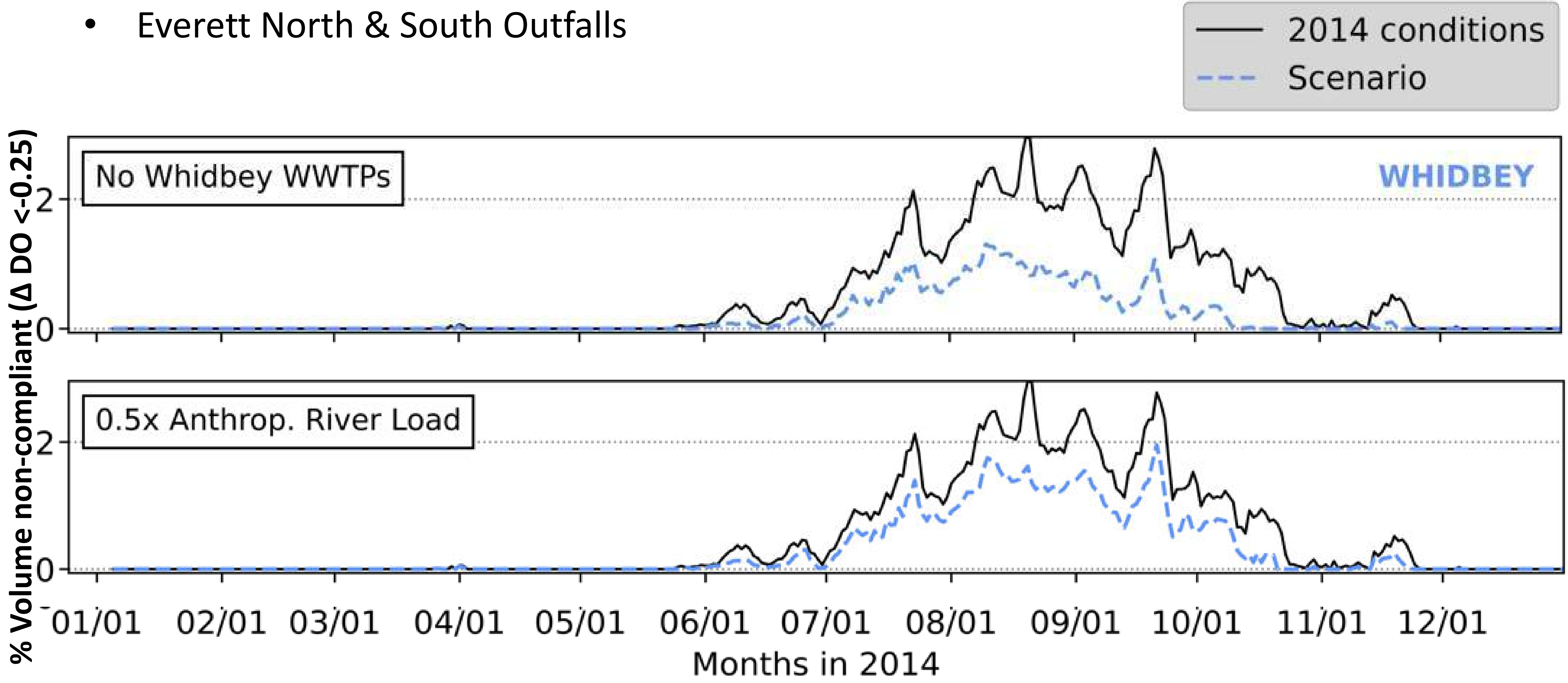
DO < 2 mg/L *Current Conditions*



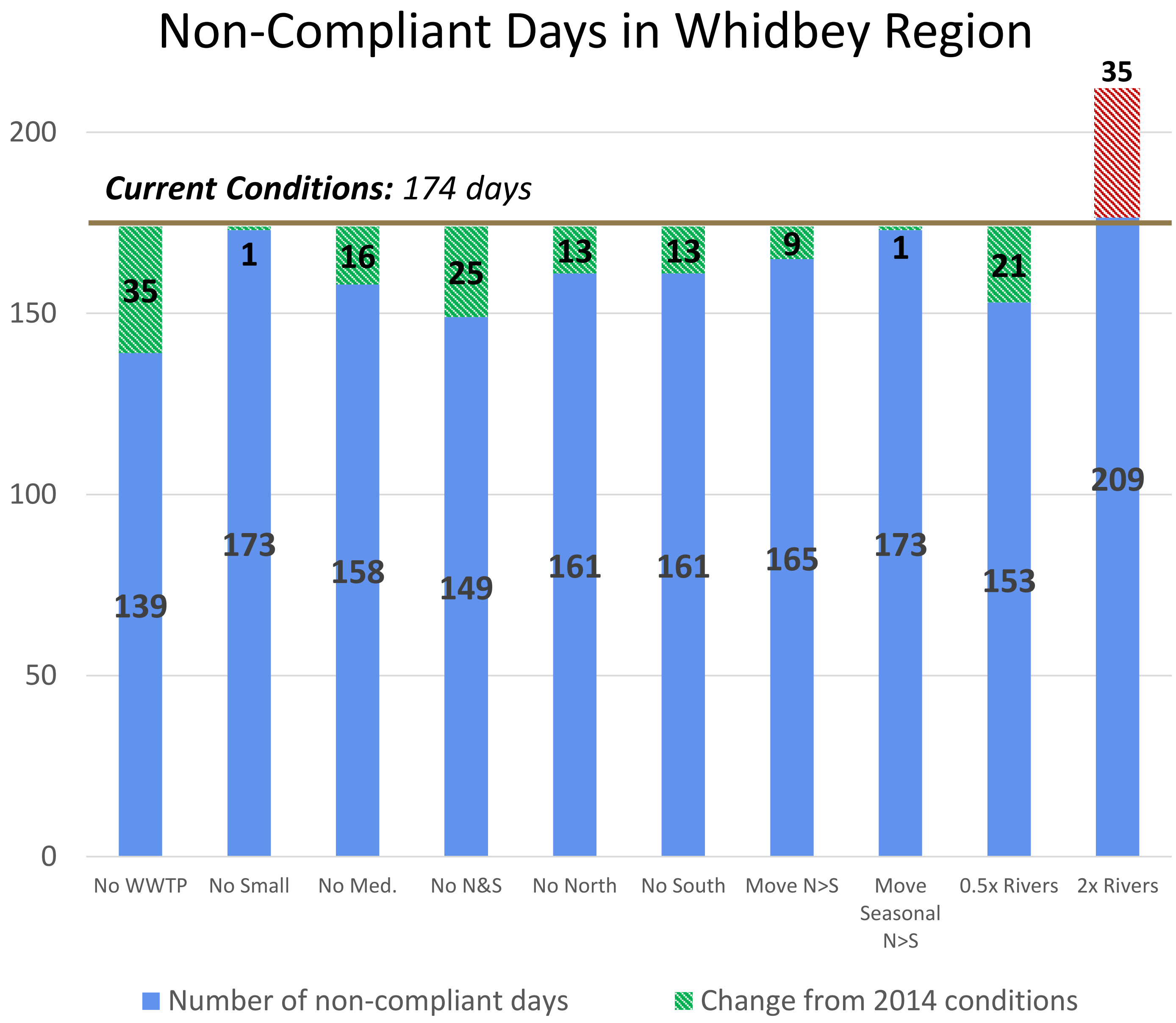
DO < 2 mg/L *Reference Conditions*

Whidbey Basin| Scenarios

- No small, medium, large, or any local wastewater treatment plants
- No local river loading, double river loading, and half the anthropogenic load
- Everett North & South Outfalls



Whidbey Basin| Within the Region



- Eliminating all **wastewater treatment plants:**
  - Reduces non-compliance from 174 to 139 days (↓ 35)
  - Decreases the max volume of non-compliant water from 3% to 1%
  - Shortens the duration of non-compliance by a few weeks
- No demonstrable impact from small plants
- Halving the human contribution to **river** loading:
  - Reduces non-compliance from 174 153 days (↓ 21)
  - Decreases the max volume of non-

Whidbey Basin| Everett North & South Outfalls

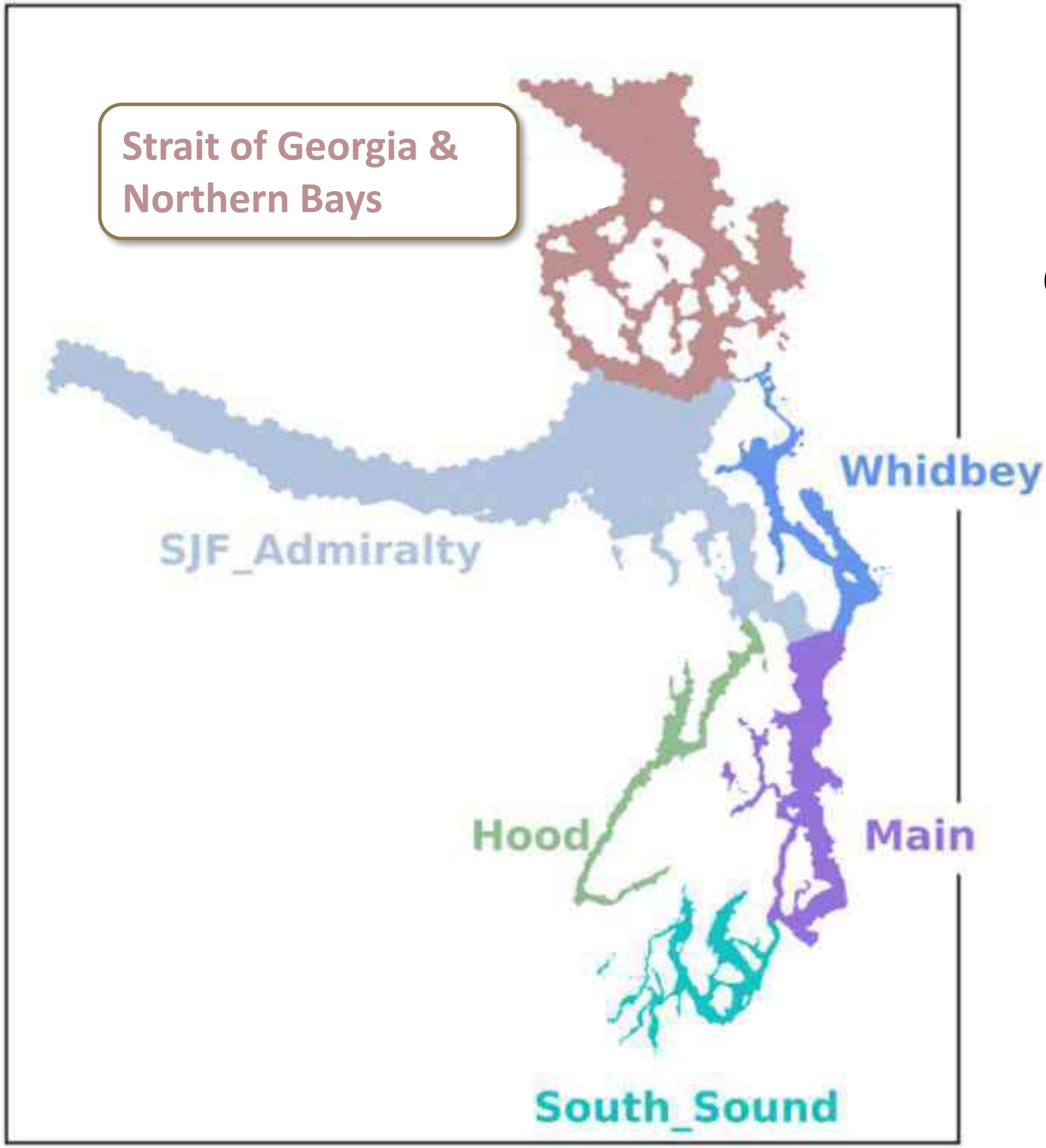
Number of Non-Compliant Days

	2014 Conditions	**Wtp4** No N&S	**Wtp5** No North	**Wtp6** No South	**Wtp7** Move N>S	**Wtp8** Move Seas.N>S
Whidbey Basin	174	149	161	161	165	173
Hood Canal	146	134	135	142	138	145
Main Basin	162	153	156	160	160	162
Strait of Juan de Fuca & Admiralty	0	0	0	0	0	0
Strait of Georgia & Northern Bays	39	37	37	37	37	39
South Sound	176	176	176	176	176	176

- Everett North & South outfalls have a similar impact on Whidbey Basin
- Everett North & South outfalls, respectively, have a similar influence as all the medium plants collectively
- The North outfall may have a larger influence on Hood Canal and Main Basin despite having a similar load to the South outfall

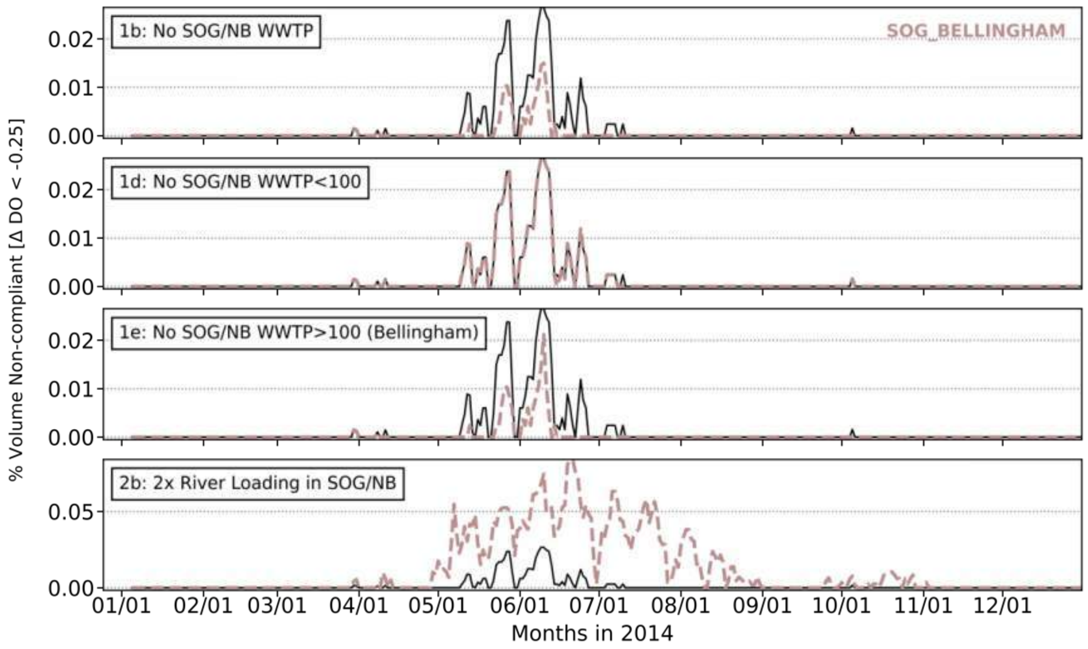
Whidbey Basin| Scenarios

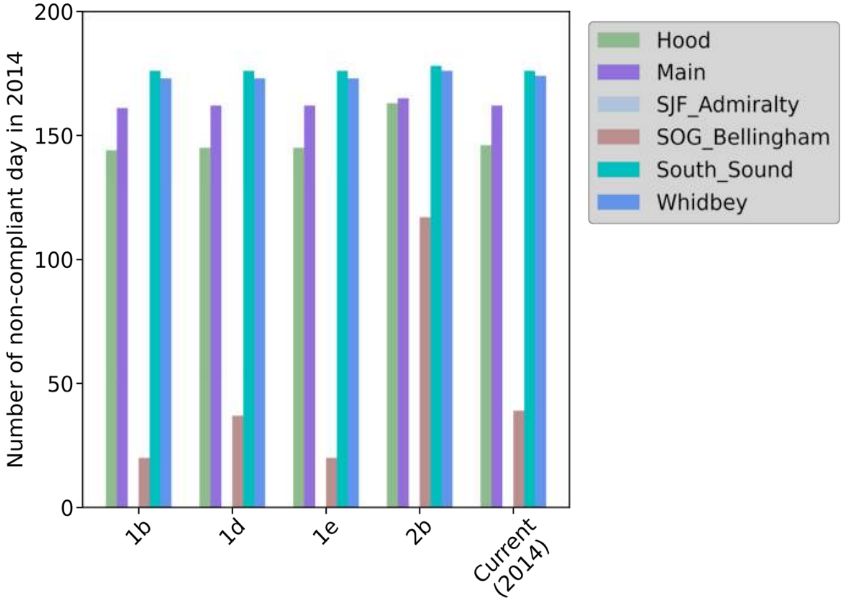
	2014 Conditions	Wtp1 No WWTP	Wtp2 No Small	Wtp3 No Med.	Wtp4 No N&S	Wtp5 No North	Wtp6 No South	Wtp7 Move N>S	Wtp8 Move Seas.N>S	Wr1 No Rivers	Wr2 0.5x Rivers	Wr3 2x Rivers
Days Non-Compliant												
Whidbey Basin	174	139	173	158	149	161	161	165	173	0	153	209
Hood Canal	146	130	145	137	134	135	142	138	145	41	133	207
Main Basin	162	147	162	158	153	156	160	160	162	38	153	185
Strait of Juan de Fuca & Admiralty	0	0	0	0	0	0	0	0	0	0	0	0
Strait of Georgia & Northern Bays	39	36	39	37	37	37	37	37	39	0	36	45
South Sound	176	175	176	176	176	176	176	176	176	103	176	183
ALL REGIONS	229	215	228	223	221	223	224	223	229	115	222	270
Percent Volume Days Non-Compliant												
Whidbey Basin	0.50	0.18	0.49	0.35	0.29	0.37	0.40	0.45	0.50	0.00	0.30	5.05
Hood Canal	0.05	0.04	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.01	0.04	0.25
Main Basin	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01
Strait of Juan de Fuca & Admiralty	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Strait of Georgia & Northern Bays	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
South Sound	1.15	1.02	1.14	1.10	1.06	1.09	1.12	1.11	1.14	0.05	1.06	1.79
ALL REGIONS	0.05	0.03	0.05	0.04	0.04	0.04	0.05	0.05	0.05	0.00	0.04	0.26



Strait of Georgia & Northern Bays

Strait of Georgia & Northern Bays | Recap





Within the Strait of Georgia & Northern Bays

- 0.5 million kg/year from local wastewater treatment plants and 2.4 million kg/year from local rivers
- Current conditions in 2014:
  - 52 days non-compliant
  - Peak non-compliant volume is 0.025%
  - Primarily in May & June
- Eliminating small wastewater treatment plant loads reduced the non-compliance from 39 to 37 days
- Eliminating the largest plant load, Bellingham, reduced non-compliance from 39 to 20 days
- Eliminating wastewater loads from the Strait of Georgia Northern Bays, did not substantially alter conditions in the other five regions (Δ ≤ 2 days)

Q&A

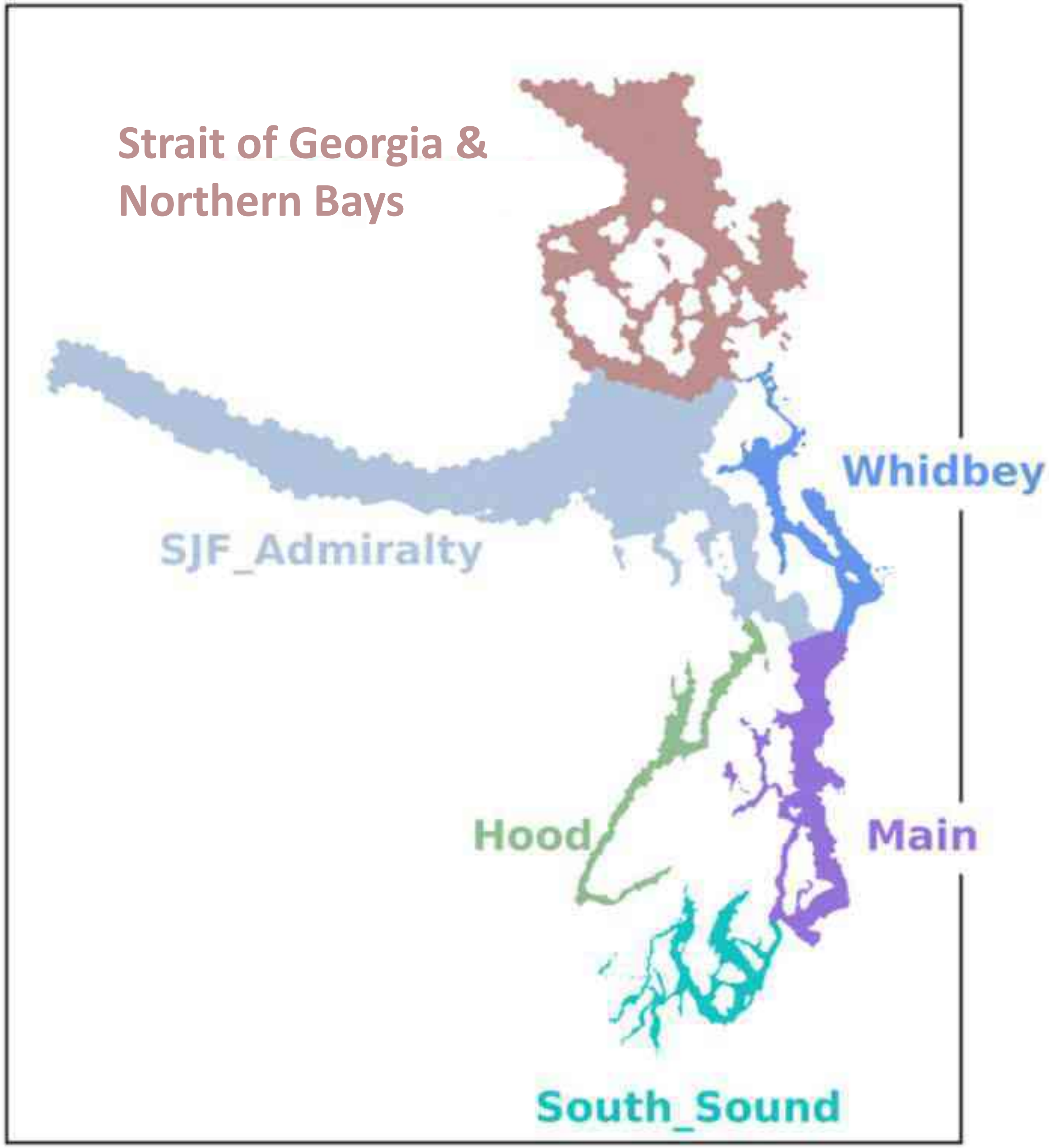
Draft Modeling Workplan

King County Scenarios

- West Point load reduced to 85%, South Plant and Brightwater TIN reduced to 3mg/l
- West Point, South Plant, Brightwater load reduced to 85%
- West Point load reduced to 50%
- West Point load reduced to 0%
- South Plant load reduced to 50%
- South Plant load reduced to 0%
- Brightwater load reduced to 50%
- Brightwater load reduced to 0%
- Green River 50% reduction in pre-anthropogenic loading
- *West Point, South Plant, Brightwater TIN reduced to 3mg/l (April – October only)*

Photo courtesy of King County

Draft Workplan | Regional Reports



- ❑ Main Basin (5 runs)
- ❑ South Sound (8 runs)
- ❑ Hood Canal (8 runs)
- ❑ Canadian treatment plants and river impact on Puget Sound (8 runs)
- ❑ ~~Strait of Juan de Fuca & Admiralty Inlet~~

Each Report Typically Includes

- Baseline (current conditions)
- Pre-anthropogenic (reference conditions)
- No small, medium, large, or any local wastewater treatment plants
- Half the anthropogenic load and double the current loads of local rivers
- + 2 customized scenarios

Draft Workplan | Scientific Engagement & Leadership

- Proactively address water quality issues in the Puget Sound (e.g., PFAS)
- This year, focus code development on dissolved oxygen available to organisms
  - Consider temperature and multiple stressors like climate change

[Presentation by Martha Sutula at The Science of Puget Sound Water Quality workshop on July 26, 2022]

May 26, 2023

WA Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

US Environmental Protection Agency
U.S. EPA, Region 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101

RE: The Marine Dissolved Oxygen Water Quality Criteria of WA State

Dear Sirs and Madams,

It is the view of the Stillaguamish Tribe that the Marine Dissolved Oxygen Water Quality Criteria (MDOWQC: Table 210 WAC 173-201A-210 (1)(d)) of WA State are in need of thoughtful, science-based revision. They are outdated, simplistic, and fail to consider the geography and hydrology of Puget Sound. Neither are they based on or referenced with scientific research. The Sound is a fjord-like estuary complex comprised of multiple deep-water basins separated by shallow sills, and many basins terminate in shallow inlets that may also include shallow brackish river deltas. The current marine dissolved oxygen standards are neither reasonable nor realistic and in many locations the standards will never be achieved due to these physical factors.

The State should rewrite the MDOWQC to address the natural seasonal conditions of various waterbodies in the Sound as they relate to the biological requirements of organisms using those habitats. Each type of waterbody (deep basin water, open water, shallow bay water, shallow intertidal, shallow estuary) need standards that match its natural condition for each season. The criteria should include minimums for 7-day and 30-day means in addition to instantaneous values, to address seasonal averages and trends. These conditions can be defined using the results of local science and monitoring efforts.

The state has identified waters not meeting the MDOWQC, yet that determination does not demonstrate the waters are truly impaired. Once appropriate standards are established, it is likely many of so-called water quality exceedances will cease to exist. Currently marine waters with 5 mg/L dissolved oxygen in many deep-water basins are considered non-compliant, when in fact this oxygen level poses no threat to organisms that might be using it. Scientists in the region commonly acknowledge that the harm to a deep-water marine biological community does not occur until the water becomes hypoxic, that is, when oxygen levels drop below 2 mg/L.

Agencies are spending a great deal of focus, time, and money to determine nitrogen inputs and how they move around the Sound. Yet the models used to determine loading and circulation have inadequate inputs for important parameters such agricultural loading and shoreline septic systems. Even as Ecology plans to install nutrient monitoring devices in various watersheds, these devices will mostly be located upstream of agricultural lowlands and/or they will not be measuring total nitrogen. Shoreline residences of Puget Sound that are on septic systems are another potential source of nitrogen that is not measured. Some counties such as Snohomish do not even have regular required inspections and have inadequate inventories of their shoreline septic systems.

While nutrient loading in Puget Sound may be excessive and unhealthy in some locations, we feel that the amount of money, time, and resources spent on nutrients in the marine water are ignoring several other "elephants in the water" that harm wildlife and their habitat. The Tribe is concerned about preventing marine impacts from water quality issues that often lack required treatment and adequate source prevention: storm water, shoreline septics, persistent organic pollutants, and emerging contaminants.

The Stillaguamish Tribe urges the state and EPA to conduct a complete, science-based revision of the Washington Marine Dissolved Oxygen Water Quality Criteria. Because Marine Dissolved Oxygen Water Quality Criteria are driving the listing of impaired waters, these criteria must be based on scientifically defensible methods.

Sincerely,

Sara Thitipraserth, Director
Stillaguamish Tribe Natural Resources Department

FILED
SUPREME COURT
STATE OF WASHINGTON
4/12/2024 12:56 PM
BY ERIN L. LENNON
CLERK

Supreme Court No. 102479-7

SUPREME COURT OF THE STATE OF WASHINGTON

CITY OF TACOMA, BIRCH BAY WATER AND SEWER DISTRICT, KITSAP COUNTY, SOUTHWEST SUBURBAN SEWER DISTRICT, and ALDERWOOD WATER & WASTEWATER DISTRICT,

Respondents,

v.

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY,

Petitioner.

AMICUS CURIAE BRIEF BY BUILDING INDUSTRY ASSOCIATION OF WASHINGTON

BUILDING INDUSTRY ASSOCIATION OF WASHINGTON
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I. INTRODUCTION

Affordable housing is a luxury in Washington, one which becomes more elusive to average citizens every day. Allowing the Washington State Department of Ecology ("Ecology") to require tertiary treatment at wastewater treatment plants ("WWTP") (or subject WWTP to total inorganic nitrogen ("TIN") load caps in the interim) without following the necessary procedures under the Administrative Procedure Act ("APA") will make owning and building homes in western Washington practically impossible.

The Building Industry Association of Washington ("BIAW" or the "Association") is the trade association for home builders and associated trades in Washington and has firsthand knowledge of the impact that additional wastewater and sewer bills will have upon Washingtonians. Without the Department following the requirements of the APA, and permitting the necessary stakeholders to meaningfully participate in discussions surrounding a requirement to add tertiary treatment, the following will happen: 1) Washington citizens, especially racial and social minorities, will be further unable to afford to purchase or rent homes in the communities where they currently live and work; 2) Washington citizens will not be permitted, nor will they be able to afford to build homes in western Washington counties; and 3) other private businesses and citizens will be detrimentally impacted when working with state agencies regarding rulemaking. For these reasons, this Court should affirm the decision of the lower court, and hold that the Department violated the APA when it issued its directive regarding the total inorganic nitrogen cap load.

II. FACTUAL AND PROCEDURAL BACKGROUND

In the interest of judicial economy, this brief defers to the thorough recitation of the facts and procedural background of this case as provided by the Court below, and the Respondent before this Court.

III. IDENTITY AND INTEREST OF AMICUS CURIAE

BIAW represents nearly 8,000 members of the Washington home-building industry. The Association is made up of fourteen affiliated local associations: the Central Washington Home Builders Association, the Building Industry Association of Clark County, the Jefferson County Home Builders Association, the Master Builders Association of King and Snohomish Counties, the Kitsap Building Association, the Lower Columbia Contractors Association, the North Peninsula Builders Association, the Olympia Master Builders, the Master Builders Association of Pierce County, the San Juan Building Association, the Skagit-Island Counties Builders Association, the Spokane Home Builders Association, the Home Builders Association of Tri-Cities, and the Building Industry Association of Whatcom County. BIAW is one of the largest home-building associations in America, championing the rights of its members and fighting for affordable home ownership at all levels of government. BIAW pursues these goals through several means including legal challenges, legislative and policy work, and through our research center, the Washington Center for Housing Studies ("WCHS"). Additionally, BIAW supports its members by providing awardwinning education, employee healthcare plans, and the state's largest, longest-operating Retro (Retrospective Rating) safety incentive program, ROII[1].

BIAW offers this brief to assist the Court in considering the harmful impacts of requiring tertiary treatment, and/or TIN load caps, at WWTP on homeowners in Washington, as well as the uncertainty created if government agencies are permitted to create rules outside of the APA process.

IV. ISSUES ADDRESSED

1. Whether requiring tertiary treatment, and/or TIN load caps, at WWTP will increase costs to homeowners and result in the denial of permits for affordable housing in Washington.

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[1] Retro is a safety incentive program offered by the Washington State Department of Labor and Industries ("L&I"). In Retro a participating company can earn a partial refund of their workers' compensation premiums if the company can reduce workplace injuries and lower associated claim losses. *See* About Retrospective Rating (Retro), last viewed March 18, 2024, https://www.lni.wa.gov/insurance/rates-risk-classes/reducing-rates/about-retro.

2. Whether permitting Washington State agencies to create administrative rules and regulations outside of the APA process will create uncertainty in other regulatory agencies like the State Building Code Council ("SBCC") and L&I.

V. ARGUMENT

A. Requiring Tertiary Treatment Will Further Prevent Affordable Housing in Washington

If the Department of Ecology requires tertiary treatment at WWTP in Washington, then monthly housing-related bills will increase for homeowners and renters. Additionally, housing supply will inevitably decrease when this requirement, or a TIN load cap, leads to canceled development permits.[2]

---

[2] Canceled and delayed building permits are not speculative hypotheticals, rather they present a very real risk to affordable housing. A delay in permitting can cost home builders and owners thousands of dollars. Statewide, the average permit delay is six and a half months, costing on average $31,375 in total holding cost. "For every $1,000 added to the cost of constructing a new home, 2,200 families lose their ability to purchase a new home." Andrea Smith, *Cost of Permitting Delays*, Washington Center for Housing Studies – BIAW, https://www.biaw.com/research-center/cost-of-permitting-delays/ (internal quotations omitted). Immediately following Ecology's denial letter stating it would "set nutrient loading limits at current levels…", the City of Tacoma placed "caveats in

Washingtonians, cannot afford additional bills – especially not an additional $500 added on to their monthly sewer bill. Nor can Washingtonians continue to be priced out of opportunities for home ownership, and rentals.

Data shows that Washington State is one of the most expensive states to live in and that the demand for affordable homes to rent and own is significantly greater than the supply.[3]

---

building permits allowing the City to 'rescind the permit' in the event Ecology limited the City's treatment capacity by capping nitrogen discharges. This put several major projects in limbo, including multifamily housing developments, a behavioral health hospital, and an expansion at Bates Technical College Medical School." *City of Tacoma v. Dep't of Ecology*, 28 Wn. App. 2d 221, 233-34 (2023) (internal citation omitted).

[3] The expense of home ownership is apparent when viewing the increase in typical home value. Between 2000 and 2023 the increase in Washington was 216 percent. The only seven states higher were Hawaii (309 percent), California (259 percent), Idaho (258 percent), D.C. (254 percent), Florida (248 percent), Maine (240 percent), and Vermont (219 percent). Matt Brannon, *Home Prices vs. Inflation: Why Americans Can't Afford a House in 2024*, Clever (March 11, 2024), https://listwithclever.com/research/housing-inflation-2024/. Further, Washington is now home to 18 cities where the typical home is worth $1 million or more, ranking seventh in the nation for having the most million-dollar cities. King 5 Staff, *Report: Washington now home to 18 cities where the typical home is*

BIAW's research center, WCHS, has been working tirelessly to help inform decision-makers and politicians about the ever-rising costs and barriers to homebuilding, homeownership, and the rental market in Washington. BIAW and the National Association of Home Builders ("NAHB") estimate that a change of less than $1,000 to monthly bills would result in home ownership and renting being entirely unaffordable to most Americans, resulting in increased debt and homelessness. *See* Na Zhao, *NAHB Priced-Out Estimates for 2023*, National Association of Home Builders (March 2023), https://www.nahb.org/-/media/NAHB/news-and-economics/docs/housing-economics-plus/special-studies/2023/special-study-nahb-priced-out-estimates-for-2023-march-2023.pdf.

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worth $1 million or more, King 5 News (April 4, 2024 at 1:21 pm), https://www.king5.com/article/money/washington-home-to-18-cities-typical-home-worth-1-million-or-more/281-3225a860-e9a5-461a-9ab4-982211caabfc.

1. Cost is the greatest barrier for homes to own or rent in Washington.

The population growth in Washington State outpaces and outmatches the available, affordable homes. The Washington State Department of Commerce ("Commerce"), as well as WCHS, have determined, after reviewing the available data, that home ownership is nearly unattainable for most people in Washington. *See*, *Washington state will need more than 1 million homes in next 20 years*, Washington State Department of Commerce (March 2, 2023), https://www.commerce.wa.gov/news/washington-state-will-need-more-than-1-million-homes-in-next-20-years/, *see also,* Andrea Smith, *Housing Affordability In Washington*, Washington Center for Housing Studies - BIAW (March 1, 2024), https://www.biaw.com/research-center/washington-states-housing-affordability-index/. Inflation, an aging workforce, supply chain issues, rising construction costs, regulatory costs, and an ever-increasing cost of living all contribute to the barriers to home ownership and the ability to rent in Washington. The impact, however, of unaffordable housing ultimately lands upon low- and middle-income households, disproportionately affecting minorities - especially Black, Indigenous, and people of color ("BIPOC"), immigrants, LGBTQ2+ individuals, individuals with disabilities, first-time home buyers, and those living outside the nuclear family.[4]

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[4] *See, e.g.,* "Home ownership in Washington has followed a disturbing pattern […] 69% of White families are homeowners compared to only 34% of Black families. Fifty years ago, in 1970, 50% of Black families owned homes." The Racial Restrictive Covenants Project, *Homeownership by race 1970-2022 – Washington State*, Civil Rights and Labor History Consortium University of Washington (last viewed March 18, 2024), https://depts.washington.edu/covenants/homeownership_washington.shtml; "[…] Black, Indigenous, and people of color (BIPOC) would need to buy more than 140,000 houses in the state to achieve parity with white homeownership on a percentage basis. The housing gap is even more significant today than in the 1960s, when housing discrimination and redlining were legal." *Report: Black, Indigenous, and people of color (BIPOC) would need to buy more than 140,000 houses in the state to achieve parity with white homeownership in Washington State*, Washington Department of Commerce (last viewed on March 18, 2024), https://www.commerce.wa.gov/news/report-black-indigenous-and-people-of-color-bipoc-would-need-to-buy-more-than-140000-houses-to-achieve-parity-with-white-homeownership-in-washington-state/ (emphasis added); "According to a 2021 Public Health – Seattle & King County

survey […] 35% of LGBTQ respondents reported earning less than $30,000 per year, which isn't enough to live anywhere, let alone [Capitol Hill]." Rich Smith, *Seattle's LGBTQ Communities Demand Rent Stabilization*, The Stranger (February 22, 2024, 9:00 am), https://www.thestranger.com/olympia/2024/02/21/79395600/seattles-lgbtq-communities-demand-rent-stabilization; "Only 16% of [transgender] people owned their homes, in contrast to 63% in the U.S. population." James, S.E., *et al.*, *The Report of the U.S. Transgender Survey*, Washington, DC: National Center for Transgender Equality (last viewed March 19, 2024), https://calculators.io/national-transgender-discrimination-survey/; "One of the greatest priorities of the Legislature is the work to mitigate the impacts of the housing affordability crisis. […] the crisis remains acute and the barriers to housing are unacceptably high. This is just as true for those with intellectual and developmental disabilities in Washington as it is for everyone else. A recent grant program in the Housing Trust Fund received twice as many applications for more housing in Supported Living as expected, confirming an unmet need for housing continues." Jamila Taylor, *People with disabilities are part of the WA housing crisis, too*, Seattle Times (February 13, 2024, 4:23 pm), https://www.seattletimes.com/opinion/people-with-disabilities-are-part-of-the-wa-housing-crisis-too/; "Small, independently rented residential units with shared kitchen and common spaces may soon be allowed in cities and counties across Washington […] Co-living housing units are similar to dorm rooms, with each sleeping quarters independently rented and other parts of the building shared. […] Housing advocates say co-living is one of the best ways to increase the amount of affordable housing in Washington." Laurel Demkovich, *WA House approves bill to expand dormitory-like housing*, Washington State Standard (February 7, 2024, 12:10 pm), BIAW's Housing Affordability Index, a Washington-based resource for understanding the extent to which county-level housing markets are providing a range of choices that are affordable and attainable to Washingtonians found that "[h]ome ownership is unaffordable for 84 percent of Washington families, based on the median-priced home of $586,100." *See Housing Affordability In Washington*, *supra*. In less than a year, home prices in Washington have increased by 36 percent, rising from an average of $430,000 in June 2023 to an average of $586,100 in March 2024. *Housing Affordability Index: Homes less affordable today*, BIAW (March 11, 2024), https://www.biaw.com/housing-less-affordable/. To afford the current median home prices, BIAW's WCHS has determined that Washington homeowners need to earn approximately $165,100 per year, however, the statewide median income is $90,325 –

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https://washingtonstatestandard.com/2024/02/07/wa-house-approves-bill-to-expand-dormitory-like-housing/.

almost $75,000 less per year than the necessary income to afford a median-priced home.

WCHS's research shows that should a Washingtonian, making the median income, have the necessary downpayment, and qualify for the purchase of the current median-priced home this purchase will result in an average monthly payment of $3,862 (or 51 percent of their monthly gross income) – eking out 49 percent of their income to spend on every other bill a household may maintain including necessities such as food, electricity, water, as well as student loans, and medical debt. Personal finance experts only recommend a household spend 30 percent of their income on housing.[5] Only 16.2 percent of households in Washington can afford median-priced homes with

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[5] The NAHB adopts for purposes of its yearly "Priced-Out" report that the sum of the mortgage payment for a household (which includes principal, loan interest, property tax, as well as homeowners' property and private mortgage insurance premiums) is no more than 28 percent of the monthly gross household income. *See* Zhao, *supra*.

a conventional mortgage, and 83.8 percent of Washingtonians are not able to afford homes with a conventional mortgage.

Inflation also greatly impacts the affordability of homes. In a new study from Clever Real Estate, based on Redfin data, the cost of a typical home in the U.S. is $412,778 - 24 times more expensive than the cost of a home in the 1960s, while inflation is only 10 times more expensive since the 1960s. Ana Teresa Solá, *Home prices rose 2.4 times faster than inflation since 1960s, study finds. What that means for homebuyers*, CNBC (March 19, 2024, 2:12 pm), https://www.cnbc.com/2024/03/19/why-home-prices-have-risen-faster-than-inflation-since-the-1960s.html. This same study found that home prices have risen 2.4 times faster than inflation, pointing out that if home prices had kept pace with inflation since the 1960s, homes would on average only cost $177,500, not nearly half a million dollars. Matt Brannon, *Home Prices vs. Inflation: Why Americans Can't Afford a House in 2024*, Clever (March 11, 2024), https://listwithclever.com/research/housing-inflation-2024/.

Further, the study found that in the 1980s, it took about three and a half years' worth of household income to purchase the typical home. Now, in 2024, it takes six years and four months' worth of household income to purchase the same home. *Id.*

Across Washington, the shortage of affordable homes to own and rent impacts extremely low-income households ("ELI"), whose incomes are at or below the poverty guideline, or 30 percent of their area's median income. Many of these households are spending more than half of their income on housing, and these individuals are more likely than others to sacrifice necessities such as food and healthcare to continue to pay their mortgage or rent, and face the risk of eviction or foreclosure at a greater rate.

2. <u>The Cost of Adding Tertiary Treatment at WWTP Will Prevent More Washingtonians from Affording A Home.</u>

Division III understood the main barrier to the implementation of tertiary treatment – cost. As discussed *supra*, several factors play into housing affordability, however, the cost of monthly, recurring bills such as a sewer or wastewater bill can place housing in jeopardy if increased. The Court below acknowledged the unintended consequences of an interim TIN load cap while a WWTP raises the funds necessary to implement tertiary treatment – halting development, creating a de facto moratorium. *See City of Tacoma*, 28 Wn. App. 2d at 234. A City, such as Tacoma, would have to place conditions on the sewer availability notices leading to impaired lending, and effectively halting most developments including affordable housing, shelters, and accessory dwelling units. *Id.* The answer to many issues in western Washington is <u>more</u> affordable housing, not less. Preventing affordable homes from being built due to sewer limits from the addition of tertiary treatment (or TIN load caps) <u>will</u> force ELI families from urban communities, and further place the fragile Washington housing supply into a "tailspin."

BIAW's WCHS is currently working on a report to be published later this year regarding the cost of Washington water and sewer connections, and the data demonstrates that the average cost of hookups to homes in communities <u>without</u>

tertiary treatment is already $5,601.86. This data is tied to new builds, but costs for sewage and other wastewater exist on a monthly and recurring basis, not including emergencies which are often the responsibility of the homeowner or renter. These costs can severely impact a household's ability to pay all its bills. Nearly all WWTP in Washington State do not currently have tertiary treatment available at their plant, and do not have the current infrastructure to add tertiary treatment without passing on significant costs to the customers they serve or the tax base as a whole.

One of the only WWTP in Washington to implement tertiary treatment, out of several hundred public WWTPs, is the Riverside Park Water Reclamation Facility ("Riverside") in Spokane. Riverside added tertiary treatment based on the Department of Ecology's requirement due to excess levels of phosphorus being released into the Spokane River. *The Riverside Park Water Reclamation Facility*, Spokane City (last viewed April 1, 2024), https://my.spokanecity.org/publicworks/wastewater/treatment-plant/. The addition of tertiary treatment to Riverside was estimated to cost $126 million for the construction alone. *Id.* This figure does not include additional maintenance, testing, and other costs associated with tertiary treatment. These costs must be borne by someone, and inevitably these costs will be borne by those with the least access to the funds necessary to cover these costs, resulting in increased homelessness, and individuals moving further from their work and communities to be able to afford to live.

The City of Tacoma estimates that the addition of tertiary treatment at its WWTPs connected to the Salish Sea will cost anywhere from $250 million to $750 million in construction costs alone. *See*, *City of Tacoma*, 28 Wn. App. 2d at 233, AR 620. The cost of constructing tertiary treatment for WWTPs in western Washington, without formal rule-making processes allowing stakeholders and the public to voice their concerns would render housing even more unaffordable to

Washingtonians. As mentioned *supra*, there are substantial costs to add tertiary treatment or to enforce TIN load caps, and the average Washingtonian cannot afford to cover that cost.

The APA provides the necessary procedures to prevent injustices in the administrative rule-making process – injustices such as allowing underprivileged individuals to bear the burden of cost for the decrease of nitrogen into the Salish Sea. There are alternative opportunities available to ensure the health of the environment while still providing affordable housing in Washington. However, without the salient opportunities for all necessary parties to raise their concerns, opinions, and solutions, there cannot be a world in which we can prioritize both of these goals.

B. Permitting Governmental Agencies to Create State Rules and Directives Without Engaging in Formal Rule Making Under the APA Harms the Citizens of Washington

The APA provides certainty and security to the citizens of Washington. The APA was enacted to "clarify the existing law of administrative procedure, to achieve greater consistency with other states and the federal government in administrative procedure, and to provide greater public and legislative access to administrative decision making. *See* RCW 34.05.001 (emphasis added).

The APA provides certainty to parties, and those participating in an agency's decision-making process, especially regarding the role the judiciary plays in reviewing decisions. For many, knowing that the Washington State Supreme Court sits in the same position as the superior court, applying the APA directly to the same record before the agency, provides great comfort by leveling the proverbial "playing field" for all parties and providing clear, administrable rules. *Dep't of Labor & Industries v. Rowley*, 185 Wn.2d 186, 200 (2016) (citing *Brown v. Dep't of Commerce*, 184 Wn.2d 509 (2015)). This Court has consistently stated that "[r]ules are invalid unless adopted in compliance with the APA." *Northwest Pulp & Paper Ass'n v. Dep't of Ecology*, 200 Wn.2d 666, 672 (2022) (citing *Hillis v. Dep't of Ecology*, 131 Wn.2d 373, 398 (1997)). This Court has acknowledged that “[r]ule making procedures under the APA involves providing the public with notice of the proposed rule and an opportunity to comment on the proposal. These procedures allow members of the public to meaningfully participate in the development of agency policies that affect them. *Id.* (internal citations omitted).

BIAW, and ROII, both participate closely with several State agencies including L&I and the SBCC. Should either of these agencies act similarly to Ecology and enact rules and directives without following the necessary steps under the APA, this decision would be detrimental to both BIAW and ROII’s work. Trade associations play a major role in advising members on how laws, regulations, and administrative rules impact their day-to-day operations.

For example, in the building industry, BIAW takes on the task of updating its members on all the changes to the building code when a new code cycle goes into effect. This communication is necessary for several reasons: 1) our members are dedicated to providing the highest quality of products to their clients and need to be aware of the newest regulations; 2) our members are leaders in the building industry and want to be ahead of the curve when it comes to health and safety; and 3) our members are dedicated to building affordable homes for Washingtonians. BIAW staff participate in every SBCC meeting, attend work groups, advise on proposed directives and regulations, and, if necessary, file litigation to protect the rights of our members. BIAW can participate in the rulemaking process because the APA provides the necessary procedures to do so. Similarly, ROII participates in all aspects of L&I regarding home building – everything from safety at work to ensuring that injured employees are appropriately assisted to ensure the greatest recovery possible. ROII staff can participate in these processes with L&I staff because of the APA process. It allows the ROII staff to have certainty in the relationship with L&I, and the manner in which L&I will handle all of their rules.

Should Ecology be permitted to issue directives regarding WWTP without following the APA rulemaking process, this decision will remove the voice of numerous private businesses in Washington that work closely with State agencies.

VI. CONCLUSION

Washingtonians cannot afford houses in Washington as it currently stands, let alone if required to pay for the addition of tertiary treatment, or a TIN load cap in the interim, to WWTP. This Court should affirm Division III's decision, and confirm that the Department of Ecology cannot issue a directive requiring the addition of tertiary treatment without following APA rules.

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Respectfully submitted this 12th day of April, 2024.

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CITY OF TACOMA, BIRCH BAY WATER AND SEWER DISTRICT, KITSAP COUNTY, SOUTHWEST SUBURBAN SEWER DISTRICT, and ALDERWOOD WATER & WASTEWATER DISTRICT,

Respondents,

v.

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY,

Petitioner.

BRIEF OF AMICUS CURIAE KING COUNTY

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I. INTRODUCTION AND INTEREST OF AMICUS CURIAE

King County (the "County") is the largest wastewater utility in the Puget Sound (the "Sound"). Through operation of five municipal domestic wastewater treatment facilities ("WWTFs") – the Carnation, Brightwater, Vashon, South, and West Point facilities – the County provides wastewater treatment and disposal service to 18 cities, 15 sewer districts, and the Muckleshoot Tribe, serving approximately two million people in over a 424 square mile service area. Four of these facilities discharge treated wastewater pursuant to the Puget Sound Nutrient General Permit and an individual Clean Water Act National Pollutant Discharge Elimination System ("NPDES") permit issued by the Department of Ecology ("Ecology").

King County shares Ecology's goal of improving Puget Sound's water quality and is not opposed to the adoption of more stringent regulations to address low dissolved oxygen and any resulting harm to aquatic organisms. But those regulations must be science-based and adopted through a transparent rulemaking process that includes a cost-benefit analysis and a least cost alternative developed through a robust public comment period.

The County has committed to a robust set of actions to protect and restore water quality in Puget Sound. In 2020, the County projected it would invest $9.5 billion in the next decade, the vast majority of which will be directed to improving the quality of its wastewater discharges and combined sewer overflows. Additional investments will be used for stormwater management, toxic pollutant source control, legacy site-remediation and salmon restoration and recovery. Notably, the $9.5 billion projection does not reflect the significant additional expenditures the County must now earmark to comply with Ecology's nutrient regulation-- the subject of this appeal.

Every dollar spent is raised through rates paid by the public. For this reason, it is imperative that public investments of this magnitude, which include measures the County must take to comply with environmental rules, are informed by regulatory processes that fully consider the costs as well as the ecological outcomes and community impacts-- including effects on housing affordability-- of these investments.

In 2019, without satisfying the rulemaking requirements set out in RCW chapter 34.05, Ecology directed its permit writers to impose on *all* dischargers a nitrogen nutrient loading limit ("TIN Rule"). That limit effectively froze the amount of nitrogen discharged from each WWTF at then-current levels, without regard to the anticipated population growth or cost. In so doing, it purported to enact a new "rule" that required notice and comment. *City of Tacoma v. Dep't of Ecology* ("*Tacoma*"), 28 Wn.

App. 2d 221, 535 P.3d 462 (2023) (invalidating the rule). As a result of Ecology's violation of RCW chapter 34.05, the State Administrative Procedures Act ("APA"), in imposing the new TIN Rule, King County and the public were deprived of an opportunity to comment on this significant proposed change.

This is no small matter. To comply requires the County to spend between $25 and $50 million in the next five years, $100 to $200 million in the next 10 to 15 years, and between $9 billion and $14 billion on future nitrogen removal. This results in monthly sewer rate increases of between $20 and $130 per month *per household,* representing a 40% to 230% increase to residents' current monthly sewer rates. Rate increases of this staggering magnitude will impact housing affordability, especially for the communities least able to afford these increases.

Making matters worse, because Ecology failed to engage in the robust and deliberate rulemaking process required by RCW chapter 34.05, it blinded itself to the environmental and societal costs of imposing the one-size-fits-all TIN Rule.

Given that the County's WWTFs discharge 50% of all wastewater discharged to the Sound, the County is the local government that is most financially and operationally impacted by the illegally adopted rule that is the subject of this appeal. By submitting this amicus brief, the County seeks to assist the Court in appreciating the real-world impacts of Ecology's failure to conduct a rulemaking process that will yield robust information about the costs, benefits and real-world impacts of actions taken to address low dissolved oxygen that has a higher likelihood of leading to more impactful and less costly improvements for the Sound.

The Court of Appeals correctly ruled that Ecology was not free to dispense with notice and comment in imposing the new TIN Rule. *Tacoma*, Wn. App. 2d at 251. By *requiring* its permit writers to "[s]et nutrient loading limits at current levels from *all permitted dischargers* in Puget Sound," Ecology adopted a rule that must go through formal rulemaking. *Id*. at 232 (emphasis added) (a directive to staff to add new terms for reissuing a permit is a rule). Because the TIN Rule violated the APA, the decision below should be affirmed.

II. ARGUMENT

King County incorporates the Court of Appeals' statement of the case background. *Tacoma,* 28 Wn. App. 2d at 224-36. This brief will address the key issue of whether Ecology's TIN Rule is a "rule" under the APA, the Rule's likely effects on the regulated community, and why formal rulemaking is essential. *Id*. at 246 ("The precise issue presented in this appeal is whether a directive can be an internal directive, *e.g.,* a commitment by Ecology that its own staff will impose new requirements on permittees.”).

A. The Court of Appeals Should Be Affirmed

The APA defines a “rule” broadly as

> ***any*** agency order, ***directive***, or regulation ***of general applicability*** (a) ***the violation of which subjects a person to a penalty or administrative sanction***; (b) which establishes, alters, or revokes any procedure, practice, or requirement relating to agency hearings; ***(c) which establishes, alters, or revokes any qualification or requirement relating to the enjoyment of benefits or privileges conferred by law***; (d) which establishes, alters, or revokes any qualifications or standards for the issuance, suspension, or revocation of licenses to pursue any commercial activity, trade, or profession; or (e) which establishes, alters, or revokes any mandatory standards for any product or material which must be met before distribution or sale.

RCW 34.05.010(16) (emphasis added); *see also* RCW 34.05.001 (“[T]he courts should interpret provisions of [the APA] consistently with decisions of other courts interpreting similar provisions of other states, the federal government, and model acts.”); *Wells Fargo Bank, N.A. v. Dep’t of Revenue*, 166 Wn. App. 342, 354, 271 P.3d 268 (2012) (interpretation of the state act consistent with federal APA).

The test is one of substance, not labels preferred by the agency. *McGee Guest Home., Inc v. Dep’t of Soc. & Health Servs*., 142 Wn.2d 316, 322, 12 P.3d 144 (2000). It involves a two-step inquiry: first, the court determines whether the purported rule is an “‘order, ***directive***, or regulation of general applicability’; [s]econd, the court determines whether [it] ‘fall[s] into one of the five enumerated categories'" in RCW 34.05.010(16)(a) through (e). *Tacoma*, Wn. App. 2d at 237 (citations omitted).

A directive "impel[s] one to act." *Id*. at 238, 245-46. Further, a "directive" is of "general applicability" – and therefore a "rule" – where "'the challenge is to a policy applicable to all participants in a program, not its implementation under a single contract or assessment of individual benefits.'" *Id*. at 238 (quoting *Failor's Pharm. v. Dep't of Soc. Health & Health Servs.,* 125 Wn.2d 488, 886 P.2d 147 (1994)); *see also Simpson Tacoma Kraft Co. v. Dep't of Ecology*, 119 Wn.2d 640, 648, 835 P.2d 1030 (1992) (holding that "'the nature of a rule [is] that it [must] apply to individuals ***only as members of a class***,'" and ruling that the numeric standard was a directive of general applicability because it applied "***uniformly to the entire class*** of entities which discharges dioxin into the state's waters ..." (emphasis added; citation omitted)).

Contrary to statutory language, Ecology insists that for a directive to be a rule it must have "independent regulatory effect" directly binding the regulated community. Petitioner State of Washington, Department of Ecology's Supplemental Brief ("Ecology Supp. Br.") at 21, 23. But the APA explicitly defines agency actions that govern *internal agency procedures* as rules. RCW 34.05.010(16)(c) (action that alters requirements for privilege or benefit is rule), (d) (action that alters standards for issuance of license is rule).

In addition, RCW 34.05.413(3) requires formal rulemaking before agencies like Ecology can make any changes to the procedural form provided to aggrieved persons when seeking an adjudicative proceeding. Obviously, rules like this are not self-executing and have no independent regulatory or binding effect on the regulated community – until an applicant fills out the form and requests an adjudicative proceeding. Ecology's argument would render both RCW 34.05.413(3) and RCW 34.05.010(16)(c) and (d) meaningless. *See Hillis v. State, Dep't of Ecology*, 131 Wn. 2d 373, 399, 932 P.2d 139 (1997) (agency procedures for processing water rights applications were a rule).

Not only are Ecology's arguments contrary to the Washington APA, but they are also contrary to the federal APA and caselaw adjudicating this same issue. That caselaw is consistent with King County's interpretation and should be followed because the APA is modeled after the federal APA and because the permits that Ecology issues are part of a federally delegated program supervised by the Environmental Protection Agency ("EPA") under the CWA. RCW 34.05.010(16); 33 U.S.C. § 1342(b)-(d).

Under federal law, the key is whether the agency's action or statement binds private parties ***or the agency itself*** with the force of law.

See, e.g., CropLife Am. v. EPA, 329 F.3d 876, 881 (D.C. Cir. 2003) (EPA's statement that it would cease using third-party human study data in evaluating pesticide safety used "clear and unequivocal language, reflecting] an obvious change in established agency practice, creates a 'binding norm' that is 'finally determinative of the issues or rights to which it is addressed'" because the statement divested EPA staff of discretion, it was a binding rule that must go through notice and comment rulemaking (citation omitted)); *Nat. Res. Defense Counsel v. EPA*, 643 F.3d 311, 405 (D.C. Cir. 2011) (EPA's "guidance" purporting to interpret the Clean Air Act, was a rule that must go through notice and comment because it authorized EPA regional air division directors to accept alternative compliance plans for the regulation of particulate matter, where they previously did not have discretion to do so); *Gen. Elec. Co. v. EPA*, 290 F.3d 377, 384-85 (D.C. Cir. 2002) (EPA guidance addressing alternatives for evaluating risks from waste containing polychlorinated biphenyls was a rule because it "b[ou]nd the Agency to accept applications" using the identified toxicity factor and imposed "further obligation[] on EPA" to now categorically accept the use of the identified toxicity factor); *Am. Trucking Ass'ns v. Interstate Com. Comm'n,* 659 F.2d 452, 463-64 (5th Cir. 1981) (court looks to the language of the agency document to determine if it "'genuinely leaves the agency and its decision-makers free to exercise discretion'"; when "the specifics … are couched in terms of command" and the guidelines, while "decorated with words that appear to be carefully chosen to avert classification as rules … lead all applicants toward one course … these are not guidelines but normative rules, and must be evaluated as such." (citation omitted)).

In the case below, the Court of Appeals correctly applied a similar methodology. As in *Simpson* and the federal cases discussed above, internal agency guidance constitutes a rule that must go through notice and comment when "the agency's employees were directed to include a new standard in all renewed permits and, by doing so, the permittees were subject to punishment if they violated the new standard." *Tacoma*, 28 Wn. App. 2d at 247. "*Simpson* stands for the proposition that 'directive' includes an agency's ***internal directive to its staff*** for issuing permits." *Id*. (emphasis added); *see also Nat. Res. Defense Counsel,* 643 F.3d at 405.

Here, Ecology's rule took the form of a letter dated January 11, 2019 (the "NWEA denial letter"), denying a rulemaking petition filed by Northwest Environmental Advocates to require tertiary nitrogen treatment for all 79 Puget Sound WWTFs to satisfy the regulatory requirement[1] to employ "all known, available and reasonable treatment" ("AKART").

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[1] WAC 173-201A-020.

Ecology issued the NWEA denial letter because AKART technologies must be economically feasible and cost-effective, and tertiary treatment was cost prohibitive. To satisfy its procedural obligation to identify an alternative action to address NWEA's concerns as required under the APA, RCW 34.05.330(1), Ecology committed to have its staff include nitrogen limits, based on current nitrogen loads, in ***all*** future individual permits:

> Ecology *will* through the individual permitting process:
>
> 1. Set nutrient loading limits at current levels <u>from all permitted dischargers in Puget Sound</u> and its key tributaries to prevent increases in loading that would continue to contribute to Puget Sound's impaired status.
>
> 2. <u>Require permittees to initiate planning efforts to evaluate different effluent nutrient reduction targets</u>.
>
> 3. For treatment plants that already use a nutrient removal process, require reissued discharge permits to reflect the treatment efficiency of the existing plant by implementing numeric effluent limits used as design parameters in facility specific engineering reports.

Nw. Env't Advocs. v. Dep't of Ecology ("*NWEA*"), 18 Wn. App. 2d 1005, 2021 WL 2556573, at *11 (2021) (unpublished). "The record indicates these requirements were nondiscretionary and were part and parcel of the commitments Ecology made to NWEA." *Tacoma*, 28 Wn. App. 2d at 248.

Ecology tries to distance itself from these commitments arguing that its staff "were not bound" by the alternative measures identified in the denial letter. Ecology Supp. Br. at 24. This is contrary to reality and Ecology cannot have it both ways. Having defended its rulemaking petition denial by relying on its commitment to employ the TIN Rule alternative, Ecology cannot disclaim that commitment here, especially because the Court of Appeals relied on that promise in upholding Ecology's petition denial. *NWEA,* 2021 WL 2556573*,* at *11-13 (finding that Ecology satisfied its procedural requirements in denying a rulemaking petition by listing the alternative measures it ***was taking*** to apply AKART to its individual treatment plant permitting process: "Ecology's denial letter … stated the alternative means by which it ***will*** address NWEA's concerns." (emphasis added)).

More to the point, Ecology should be judicially estopped from disclaiming that promise, given the Court of Appeals' reliance on those commitments. *New Hampshire v. Maine*, 532 U.S. 742, 749-50, 121 S.Ct. 1808 (2001) (judicial estoppel prevents a party from prevailing on an argument and then relying on a contradictory argument to prevail simply because the party's interests have changed). The doctrine is designed to prevent Ecology from doing what it is doing here – seeking an advantage by litigating on one theory and then pursuing a contrary theory to gain a litigation advantage.

Ecology's argument that it is simply using its "existing pollution control authority to regulate nutrient pollution" is equally deficient. Ecology Supp. Br. at 25. The TIN Rule does not allow permit writers to use their discretion to employ a facility-specific approach to address nutrients, as would be appropriate under existing regulations. Instead, the TIN Rule requires Ecology's permit writers to apply the same loading limit to *each* WWTF in the Puget Sound, regardless of "case-by-case" factors. The TIN Rule is directly binding on Ecology and imposes a new, substantive legal obligation not previously found in the statute or regulations for issuing discharge permits and was subject to notice and comment.

B. By Promulgating the TIN Rule Without Public Notice and Comment, the Agency Deprived Itself of Foundational Information That May Have Led to a More Cost-Effective and Environmentally Beneficial Alternative

The purpose of the rulemaking procedures established by the APA is "to ensure that members of the public can participate meaningfully in the development of agency policies which affect them." *Simpson*, 119 Wn.2d at 649. By promulgating the TIN Rule without public comment, Ecology not only violated the purpose and intent of the APA, it failed to account for the impacts of the TIN Rule or identify alternative, less burdensome means to achieve the same or similar result.

In 1995, the Legislature amended the APA to "ensure that the citizens and environment of this state receive the highest level of protection, *in an effective and efficient manner*, without stifling legitimate activities and responsible economic growth." H.B. 1010, Reg. Sess. § 1(2) (Wash. 1995) (emphasis added). The Regulatory Reform Act of 1995 added requirements for agencies to follow in promulgating significant legislative rules. *Id.* § 201; RCW 34.05.328. These additional requirements were designed to ensure that, when an agency adopted a substantive rule, it would do so "responsibly" so that the rule is "justified and reasonable" and "obligations imposed are truly in the public interest." H.B. 1010 § 1(2)(b).

The TIN Rule falls within the definition of "significant legislative rule," RCW 34.05.328(5)(c)(iii), yet Ecology undertook none of the analysis required to ensure that it was justified, cost-effective and reasonable, and that the obligations it imposed were in the public interest. Ecology's failure to follow APA rulemaking procedures has deprived County ratepayers and the public of the opportunity to meaningfully understand the impacts of, and provide comment on, the TIN Rule. More significantly, Ecology's procedural failings also deprived ***it*** of critical public input that may have led to a different decision that would ensure that ratepayers' funds were spent wisely given the inherent uncertainties in existing science concerning what is causing the dissolved oxygen impairments in the Sound.

Indeed, there is insufficient evidence that reducing nitrogen in wastewater effluent will be effective at increasing dissolved oxygen in impaired and sensitive areas of the Sound. As the Court of Appeals emphasized, it is currently unknown to what extent excess nitrogen in parts of the Sound is due to WWTF discharges. *Tacoma*, 28 Wn. App. 2d at 228. This is because, while nitrogen can be measured at the point of discharge, Ecology cannot determine where that nitrogen goes once it gets carried away with the currents and mixes with the rest of the Sound. *Id.* at 227. And, while the Salish Sea Model is an important tool for high-level water quality modeling, leading scientists at the University of Washington have criticized Ecology's heavy reliance on it for site-specific regulatory purposes, given its inability to isolate the water quality impacts of individual WWTFs. *Id.*

Given the gaps in the current scientific knowledge about the complex factors causing dissolved oxygen impairments in the shallow embayments of the Sound, coupled with the enormity of the costs associated with nitrogen removal, it was particularly important for Ecology to adhere to formal rulemaking requirements in promulgating the TIN Rule.

Had Ecology followed the process required by the APA, it would have 1) evaluated whether alternative methods were available for achieving the purpose of the TIN Rule; 2) conducted a cost-benefit analysis; 3) evaluated whether the TIN Rule was the least burdensome alternative for wastewater utilities in the Puget Sound; and 4) evaluated whether compliance with the TIN Rule would impede or prevent compliance with other competing NPDES permit obligations. RCW 34.05.328. Ecology would have also evaluated the environmental impacts of the TIN Rule and determined whether adoption of the Rule would have resulted in significant environmental impacts under the State Environmental Policy Act ("SEPA"). RCW 43.21C.030; WAC 197-11-960. Ecology's failure to comply with the APA and SEPA left the benefits and impacts of the TIN Rule unquantified and therefore unknown, even where, as here, EPA has cautioned that "careful consideration should be given to the benefits from lower nutrient levels compared to the potential environmental and economic costs associated with treatment processes used to achieve those levels."[2]

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[2] U.S. EPA, Life Cycle and Cost Assessments of Nutrient Removal Technologies in Wastewater Treatment Plants ("Life Cycle") at iii (Aug. 2021), https://www.epa.gov/system/files/documents/2023-06/life-cycle-nutrient-removal.pdf.

1. The Lack of Cost-Benefit Analysis Hampered Ecology's Decision-Making

The APA requires that Ecology prepare a cost-benefit analysis that determines the probable benefits of the rule are greater than its probable costs. RCW 34.05.328(1)(c), (d). By failing to quantify either the costs or the benefits of the TIN Rule, Ecology shielded itself from receiving and developing foundational information that may well have resulted in a very different outcome that would have provided County ratepayers with a greater public, and water quality, benefit at a fraction of the cost.

This failure is particularly acute considering what Ecology already knows about the significant costs of reducing nutrient loading in effluent from WWTFs. Ecology denied NWEA's rulemaking petition because of the enormous costs associated with installing and operating tertiary treatment to reduce nutrient loading. *NWEA,* 2021 WL 2556573, at *15. Although Ecology chose a different path to reduce nutrient loading, it promulgated the TIN Rule requiring WWTFs to newly install nutrient treatment technology without considering the associated costs. Given the magnitude of nutrient treatment costs, and knowing that some plants, including the County's West Point Facility, have no additional land on which to expand or build additional treatment infrastructure,[3] it is nothing

[3] *Tacoma*, 28 Wn. App. 2d at 225-26.

short of remarkable that the agency decided to take the shortcut it took by forgoing the formal cost/benefit analysis.

Compounding this omission is the fact that the population of Puget Sound is rapidly growing and is projected to continue to grow into the future. This growth requires utility providers, such as King County, to plan for and provide additional wastewater treatment capacity. The County alone is on track to spend between $25 million to $50 million in the next five years to comply with the TIN Rule and hold nutrient discharges at current levels. Additional required nutrient removal projects will cost up to $200 million in the next 10 to 15 years.

As explained above, these additional costs will directly impact King County ratepayers, at a time when rates are already set to double over the next decade to meet non-TIN Rule obligations, capacity needs, and critical maintenance requirements. The City of Tacoma estimated that full-scale improvements required for it to meet the TIN Rule would cost between $250 million and over $750 million. *Tacoma*, 28 Wn. App. 2d at 234 (citing AR at 620). Tacoma and King County are but two examples of the significant costs the TIN Rule imposes on utilities, and more importantly, ratepayers, that were ignored by Ecology in issuing the rule.

Equally problematic, Ecology did not assess the potential benefits of the TIN Rule. As the Court of Appeals observed, the Salish Sea Model that Ecology used to develop the rule has been criticized as "not yet ready for prime time" and cannot "isolate the effect of individual WWT[Fs]" on water quality in the Puget Sound. *Id.* at 229. Accordingly, Ecology does not know what effect, if any, application of the TIN Rule will have on water quality in the Sound, and as Division III notes, the agency does not know to what extent the nitrogen discharged by WWTFs actually causes the Sound's dissolved oxygen impairment. *Id*. at 228. Without this information, it is not possible to reasonably regulate nitrogen discharges from WWTFs. *Id*.

2. Ecology Failed to Evaluate Alternative Methods of Reducing Nutrient Discharges and Failed to Determine if Less Burdensome Alternatives Were Available

In adopting the TIN Rule, Ecology did not use its underlying regulatory authority to develop facility-specific approaches that would have evaluated the technological feasibility of removing nutrients at meaningful levels. Nor did it analyze ratepayer impacts, and perhaps most importantly, effects to water quality from a facility-specific, data-driven and scientifically-tailored effluent limits. Instead, it took a shortcut by developing a one-size-fits-all rule and applied it irrespective of the impacts or alternatives.

By regulating nutrient loading through the TIN Rule as an unanalyzed stand-alone requirement, instead of an integrated suite of individual, facility-specific permit conditions, Ecology has prioritized nutrient load reduction at the potential expense of other CWA requirements. Had Ecology performed the least- burdensome alternatives analysis required by the APA, it might have found that a more flexible approach would allow utilities to experiment with phased treatment process changes over time to obtain more meaningful results.

Indeed, upgrading wastewater facilities that are as large as the County's is not unlike turning an aircraft carrier or stopping a train – it takes time. These are large, complex systems that have complicated processes that require multiple stages of careful planning and engineering, as well as technical and financial analyses before making significant upgrades. Changes to one aspect of the treatment or pollutant removal process often has rippling effects on other parts of the WWTF. Facilities as large as the County's cannot be re-engineered on a dime to address one factor without causing other externalities, which is why it often takes 10 to 15 years or more to implement significant capital improvements. For example, because the County's WWTFs were not designed for nitrogen removal, a more deliberate and flexible approach to managing TIN would have avoided the unintended consequences that occurred at the County's South Treatment Plant. Staff efforts to meet the TIN Rule resulted in changes to the pH level, another regulated parameter. This required the

County to incur significant labor costs in spending an additional $3 million to construct a chemical addition system to prevent pH violations of its individual NPDES permit.

Similarly, a more flexible approach might have also allowed utilities to conduct rigorous nutrient influent and effluent monitoring to better understand what the Court of Appeals found is currently missing from existing science – *i.e.,* the real-world water quality impacts of WWTFs' discharges. *Id.* at 228. While King County has developed a robust marine water quality science program and has spent millions of dollars collecting physical, chemical, and biological data in Puget Sound, including dissolved oxygen measurements, our collective understanding of how best to remedy the dissolved oxygen deficits impacting water quality is admittedly very limited. By failing to identify, let alone evaluate, alternatives to determine if there is a less burdensome approach than adoption of the TIN Rule, Ecology not only violated the APA, but more importantly blind-sighted itself to other alternatives that were much less expensive and much more environmentally beneficial to the Region.

3. Ecology Failed to Evaluate the Environmental Impacts of the TIN Rule

Ecology's SEPA regulations require all state agencies to consider the environmental impacts of a proposed rule.[4] *See* WAC 197-11-960. Yet, Ecology ignored its own regulations and failed to quantify the potential environmental impacts of the TIN Rule. This is particularly problematic considering that Ecology has previously recognized the potential environmental impacts of requiring WWTFs to adopt additional nutrient removal technology – including the likelihood that tertiary treatment will not only generate more effluent sludge that will require disposal but will also require two to three times the amount of electrical energy currently used in WWTFs. *NWEA,* 2021 WL 2556573, at *9. Ecology also ignored climate change impacts of its Rule, including the fact that nitrogen removal from wastewater converts some nitrogen in the wastewater to nitrous oxide, a greenhouse gas that is 300 times more potent than carbon dioxide.[5]

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[4] The County notes that, to the extent Ecology, or other *amici,* are concerned about the rate at which Ecology is addressing water quality concerns in the Puget Sound, the Superior Court held that Ecology was required to go through notice and comment rulemaking over two years ago. But instead of doing so, Ecology chose to appeal. In the time it has taken Ecology to arrive before this Court, it could have completed the rulemaking process and achieved a legally and scientifically defensible path to reducing nutrient loading to the Sound.
[5] *See* Life Cycle, *supra* note 2, at 4-7.

In addition to the above, the rule will lead to an increase in the cost of living for County residents. Affordability is not just an economic issue for our communities; it is an environmental issue. When rates and other expenses of living in urban areas increase, housing development sprawls to rural areas where urban sewer systems do not reach. On a per capita basis, rural septic is far more polluting and can result in untreated septic waste entering Puget Sound. *Tacoma*, 28 Wn. App. 2d at 234.

Finally, SEPA required Ecology to evaluate the impacts of the TIN Rule on low-income and environmental justice communities. Given the enormity of the costs associated with its implementation, Ecology ignored the TIN Rule's impact on housing affordability and increased utility rates for those who are least able to afford them.

III. CONCLUSION

Had Ecology gone through the rulemaking process, as required by the APA, King County would have actively participated to help identify workable and scientifically sound solutions. The County cares deeply about the health of Puget Sound and has worked for years to find scientifically sound ways to improve its water quality. The County, ratepayers, and public were denied the opportunity for meaningful public engagement and as a result, no one – not Ecology, the regulated community, this Court, nor the public – knows the true impacts of

Ecology's rule. For all these reasons and those set forth in Tacoma's Supplemental Brief, the Court of Appeals should be affirmed, and Ecology should be required to comply with the APA.

I certify that this document contains 4806 words, pursuant to RAP 18.17.

DATED: April 15, 2024.

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**IN THE SUPREME COURT
OF THE STATE OF WASHINGTON**

CITY OF TACOMA, BIRCH BAY WATER AND SEWER DISTRICT, KITSAP COUNTY, SOUTHWEST SUBURBAN SEWER DISTRICT, and ALDERWOOD WATER & WASTEWATER DISTRICT,

Respondents,

v.

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY,

Petitioner.

WASHINGTON ASSOCIATION OF SEWER & WATER DISTRICTS' MOTION FOR LEAVE TO JOIN IN AMICUS BRIEF FILED BY KING COUNTY

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Attorneys for Washington Association of Sewer & Water Districts

Pursuant to Rules of Appellate Procedure 10.6, the Washington Association of Sewer & Water Districts ("WASWD") seeks this Court's permission to join in the *amicus curiae* brief filed by King County. [1]

I. IDENTITY AND INTEREST OF *AMICUS* PARTY

WASWD seeks to join King County's *amicus* brief since WASWD represents members that share substantially the same positions and concerns as those raised by King County due to the fact that approximately 26 of WASWD's members collect and/or discharge treated wastewater directly or indirectly into the waters of Puget Sound. In fact, 15 WASWD members

[1] The undersigned counsel has requested the parties' position relating to WASWD's motion. As of the filing of this motion, the City of Tacoma, Kitsap County and Southwest Suburban Sewer District have indicated that they do not oppose and support WASWD's motion. The Department of Ecology, Alderwood Water & Wastewater District and Birch Bay Water and Sewer District have not yet responded. Although, Alderwood and Birch Bay both support King County's motion for leave to file an amicus brief and are not expected to take a different position on WASWD's motion. Further, King County has responded that it supports WASWD's motion.

receive wastewater treatment and disposal services from King County under wastewater treatment contracts. The impacts described by King County in its a*micus* brief will similarly affect these WASWD members and their respective customers.

Allowing WASWD to join in King County's *amicus* brief serves the underlying purposes of RAP 10.6, including providing access to the appellate court by those persons or groups who will be significantly affected by the outcome of issues on review which will materially assist the Court in the decision-making processing. *See* 3 Washington Practice, Rules Practice, RAP 10.6 at 110 (Task Force Comment).

A. WASWD'S Mission and Membership.

WASWD has been providing education, advocacy and collaboration for sewer and water districts throughout the State of Washington since 1961. WASWD supports sewer and water districts in providing environmentally responsible wastewater collection and treatment and safe drinking water in an informed, efficient and effective manner. WASWD strives to ensure that its members providing sewer and water services throughout the State of Washington remain at the forefront of these ever-evolving industries, while ensuring effective operations, and appropriate regulatory and legislative representation.

There are approximately 180 sewer and water districts located throughout the State of Washington, each governed by locally elected officials. These districts provide cost-effective sewer and water services ranging from the state's largest population centers to the smallest rural communities. WASWD regularly works with these sewer and water districts to ensure the districts have a voice in regulatory matters that impact the delivery of sewer and water services.

B. WASWD's Interests Relating to this Appeal.

WASWD has 15 members that receive wastewater treatment and disposal services under contracts with King County which is the largest wastewater utility in the Puget Sound region. Four of King County's wastewater treatment facilities discharge treated wastewater into Puget Sound pursuant to the Puget Sound Nutrient General Permit ("PSNGP") and an individual Clean Water Act National Pollutant Discharge Elimination System ("NPDES") permit issued by the Department of Ecology ("Ecology") to King County. County Brief at 1. The impacts described by King County relating to the issues on appeal will also affect WASWD's 15 members and their respective customers who reside throughout the greater Puget Sound area. In addition, WASWD has 11 members operating wastewater treatment facilities that discharge treated wastewater directly or indirectly into Puget Sound under the PSNGP and separate NPDES permits issued by Ecology.

WASWD desires to participate in this appeal on behalf of its members to make sure the Court understands fully the real-world impacts of this Court's decision. These impacts will similarly extend to WASWD's members located in the greater Puget Sound region. More broadly, ensuring that state agencies follow proper rulemaking procedures affects and benefits all of

WASWD's members that provide sewer or water services throughout the state, especially since the sewer and water industries are heavily regulated. If Ecology is allowed to set binding regulatory rules through staff directives like occurred here, then Ecology could do it in other situations that will affect WASWD members throughout the state. Therefore, WASWD has a strong interest and desire to actively participate in this appeal to weigh in on these important issues.

C. WASWD'S Involvement in the PSNGP Process.

WASWD has been actively involved in the regulatory development process and review of the potential impacts of Ecology's PSNGP given the potential impacts of the proposed PSNGP. In fact, WASWD had a seat at the regulatory table through the appointment of a WASWD representative to serve as a member of the General Permit Advisory Committee which was formed and convened by Ecology in March of 2020. The WASWD representative's role was to provide input on behalf of small to medium sized wastewater treatment plants covering the entire Puget Sound region. The stated purpose of the Advisory Committee was to advise Ecology in drafting general permit requirements for domestic wastewater treatment plants discharging to Puget Sound.

The Advisory Committee met throughout 2020 to develop recommendations for general permit conditions. Final Recommendations relating to the development of the PSNGP were completed in October of 2020 and were released in November of 2020.[2] The Final Recommendations reflect significant areas of disagreement between members of the Advisory Committee with Ecology's position on various matters relating to the PSNGP.

WASWD was also an active participant on behalf of its members when Ecology issued the preliminary draft of the

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[2]The Final Recommendations of the Advisory Committee are available at the following link: https://www.ezview.wa.gov/Portals/_1962/Documents/nutrients/PSNGP%20AC%20final%20recommendations%202020_10_21_Final.pdf.

PSGNP in January of 2021 and the formal draft of the PSGNP in June of 2021 by providing comments on the draft PSGNP and raising and documenting its members' concerns about various portions of the draft PSGNP before it was adopted.

While WASWD was able to participate in the rulemaking process relating to the PSNGP before it was adopted, Ecology provided no opportunity to WASWD, the regulated community, or the public to provide comments or raise concerns relating to Ecology's 2019 directive to its permit writers to impose on all wastewater treatment facilities (WWTFs) discharging to Puget Sound a nitrogen nutrient limit ("total inorganic nitrogen" or "TIN Rule") that froze the amount of nitrogen that could be discharged at current levels, without regard to the anticipated population growth or cost. Had Ecology engaged in the required rulemaking procedures before adopting its TIN Rule, WASWD would have been an active participant in that rulemaking process on behalf of its members, just as it was during the process of Ecology adopting the PSGNP. Having been denied by Ecology of the opportunity to participate in the required rulemaking process that should have occurred prior to the adoption and implementation of the TIN Rule, WASWD is committed to being actively engaged in this important appeal because of the significant implications this case will have on WASWD's members.

D. Relationship to and Support of King County's Arguments and Positions.

As stated in King County's *amicus* brief, Ecology's decision to adopt the TIN Rule without complying with formal rulemaking procedures significantly impacts King County's ability to affordably serve its growing population and thus presents an issue of critical importance to King County and the 2 million people it serves. County Brief at 1-3. Importantly, WASWD's members that either receive wastewater treatment and disposal services from King County under contracts or otherwise discharge directly or indirectly treated wastewater into Puget Sound are similarly impacted by Ecology's unlawful rulemaking and stand in substantially the same position as King County.

In its *amicus* brief, King County advises the Court that in order to comply with Ecology's directive King County will need to spend between $25 and $50 million in the next five years, $100 to $200 million in the next 10 to 15 years, and between $9 billion and $14 billion on future nitrogen removal. County Brief at 3. King County states that these expenditures will result in monthly sewer rate increases of between $20 and $130 per month per household, representing a 40% - 230% increase to residents' current monthly sewer rates. *Id.* Importantly, the magnitude of these rate increases will have a negative impact on housing affordability, including those communities or areas that are least able to afford these increases. *Id.*

Based on a review of the State Legislature's Detailed Legislative Reports Topical Index[3] for the 2019-20, 2021-22 and 2023-24 biennia, more than 30 separate pieces of legislation to address affordable housing issues have been adopted by the Legislature and signed into law during the referenced time periods. Therefore, it is clear that affordable housing issues are now a focal point of the State Legislature and local governments seeking to address the affordable housing concerns and mandates. The sewer rate increases that will naturally flow from Ecology's unlawful rulemaking process relating to the TIN Rule will be borne by both King County and WASWD's members, and their respective customers, which will make the affordable housing issues even more challenging.

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[3] The Topical Index can be found at the following location on the State Legislature website: https://app.leg.wa.gov/bi/topicalindex.

WASWD believes it is important for the Court to understand and appreciate that increases in costs to King County to comply with the TIN Rule will be paid by the County's customers and contract agencies, which includes 15 WASWD members that contract with King County for wastewater treatment services. In the utility industry, rates are established based on the cost of service. As King County's costs of complying with Ecology's directives increase, those costs will have to be recovered through higher rates charged to WASWD's 15 members. In turn, WASWD's members will then have to adopt higher rates which must be paid by their respective customers. In some cases, smaller districts with fewer customers end up being impacted more by increased regulatory costs because they have a smaller customer base over which to share the financial burden.

A representative sampling of the published sewer rates charged by 6 WASWD members that receive wastewater treatment services from King County reveals that their rates are already heavily influenced by treatment costs imposed on them by King County. For example, the published sewer rates for 6 of the 15 WASWD members that contract with King County for wastewater treatment services show that approximately 46.3% to 69.4% of the total sewer bills charged to the members' customers are directly attributable to the cost of wastewater treatment that gets paid to King County. The sewer rate schedules for these 6 WASWD members are publicly available on their official websites.[4] The rate schedules are offered to illustrate the point that these sewer districts lack the

---

[4] Cedar River Water & Sewer District (https://www.crwsd.com/wp-content/uploads/2024/03/Rate-Fee-Schedule-Final-Rev.-03-2024.pdf); Coal Creek Utility District (https://www.ccud.org/uploads/1/0/3/0/10309811/2022_rate_sheet.pdf); Northeast Sammamish Sewer & Water District (https://www.nesswd.org/customer-rates-and-charges/); Sammamish Plateau Water & Sewer District (https://spwater.org/DocumentCenter/View/1718/12052023-Master-Fees-and-Charges-Schedule-PDF?bidId=); Skyway Water & Sewer District (https://www.skywayws.org/billing.php); Soos Creek Water & Sewer District (https://www.sooscreek.com/utility-rates-2024).

ability to control costs that are imposed on them by King County which make up approximately one-half or more of the cost of sewer service charged to their customers. Any increased costs incurred by King County to comply with the TIN Rule will get passed down to WASWD's members that contract with King County and will eventually get paid by their respective customers in the form of increased sewer rates. The increases in costs paid by these 15 WASWD members will put an additional financial strain on their funding capacity to address their other regulatory or facility repair and replacement requirements. As described by King County, these rate increases are going to be substantial given the projected costs of complying with the TIN Rule.

Given the nature of the current treatment technology utilized by most WWTFs, it is not an exaggeration to say that every resident within the greater Puget Sound region that is served by King County is going to experience substantial rate increases associated with the TIN Rule without Ecology ever having engaged in proper rulemaking. Such a result is contrary to the purposes of the Administrative Procedures Act (APA) which is "to provide greater public and legislative access to administrative decision making." RCW 34.05.001. The purpose of APA-required rulemaking procedures is to give notice to the public of the proposed rule and to allow it to comment on the proposal. *Hunter v. Univ. of Wash.*, 101 Wn. App. 283, 293, 2 P.3d 1022 (2000) (*citing Hillis v. Dep't of Ecology*, 131 Wn.2d 373, 399). Notice and comment rulemaking "ensure[s] that members of the public can participate meaningfully in the development of agency policies which affect them." *Hillis*, 131 Wn.2d at 399.

As stated by King County, Ecology failed to engage in the robust and deliberate rulemaking process required by chapter 34.05 RCW. By doing so, Ecology intentionally overlooked or ignored the environmental and societal costs and benefits of imposing the one-size-fits-all TIN Rule. Like King County, WASWD and its members care about the health of

Puget Sound and they acknowledge that further investment will have to be made in order to protect water quality, protect and restore habitat, and assist in salmon recovery. However, WASWD and its members have an interest in making sure that Ecology does not take short cuts when engaging in rulemaking, especially when the costs associated with a rule or directive are as substantial as those that will have to be incurred to comply with the TIN Rule.

II. WASWD'S FAMILIARITY WITH THE ISSUES

As discussed in Section I above, WASWD has been actively involved in Ecology's efforts to adopt the PSNGP since the beginning of the process. WASWD and many of its members that will be directly impacted by Ecology's unlawful rulemaking are very familiar with the issues involved in this appeal and WASWD has been closely monitoring this matter since the initial lawsuit challenging Ecology's TIN Rule was commenced in Superior Court. WASWD has regularly followed the legal proceedings because the outcome of this case could have a significant impact on many of WASWD's members.

Further, legal counsel for WASWD has reviewed the applicable pleadings and appellate briefs filed in this matter.

III. ISSUES ADDRESSED IN KING COUNTY'S *AMICUS* BRIEF WHICH WASWD SEEKS TO JOIN

As discussed above, WASWD's interests are closely aligned with King County's interests. Given the similarity of interests, WASWD seeks the Court's approval for WASWD to participate in this appeal by joining in King County's *amicus* brief which was well briefed and set forth compelling legal arguments which are fully endorsed and supported by WASWD. By joining in the legal arguments made by King County, WASWD believes it can achieve its goal of ensuring that the Court has the benefit of hearing from WASWD on the important issues affecting WASWD's members.

With respect to the merits of the appeal, King County addresses how Ecology's decision to impose a TIN cap on all

WWTFs discharging to Puget Sound was a significant legislative rule that required formal rulemaking pursuant to chapter 34.05 RCW. Specifically, King County presents two issues for the Court's consideration which are shared and supported by WASWD. First, King County responds to Ecology's argument that a directive is not a rule unless it has "independent regulatory effect" that directly binds the regulated community. County Brief at 6 (*citing* Ecology Supp. Br. at 21, 23). King County demonstrates that Ecology's argument is contrary to the plain text of the State Administrative Procedure Act, specifically rendering RCW 34.05.413(3) a nullity. King County further demonstrates that Ecology's argument is also contrary to the Federal Administrative Procedure Act and federal case law adjudicating this same issue. King County explains that this case law is particularly informative where, as here, the State APA was modeled after the federal APA, and where Ecology's permitting authority derives from authority the

Environmental Protection Agency granted it under a federally supervised program. County Brief at 7.

Second, King County demonstrates that formal commitments made by Ecology to satisfy Ecology's procedural obligations under RCW 34.05.330(1) in denying a petition for rulemaking filed by Northwest Environmental Advocates ("NWEA") were both promoted by Ecology in defending its denial and relied on by Division II in upholding Ecology's denial. Those commitments specifically included the TIN Rule (*i.e.*, capping TIN in WWTF discharges at current levels) which Ecology now attempts to disavows by insisting that its staff "were not bound" by the measures Ecology put forward as an alternative to the very costly "tertiary treatment" to remove TIN being advocated by NWEA. King County argues that Ecology should be judicially estopped from disclaiming that promise, given the Court of Appeals' reliance on those commitments in upholding Ecology's decision in *Nw. Env't Advocs. v. Dep't of Ecology*, 18 Wn. App. 2d 1005, 2021 WL 2556573, at *11

(2021). *See New Hampshire v. Maine*, 532 U.S. 742, 749-50 (2001) (judicial estoppel prevents a party from prevailing in one phase of a case on an argument and then relying on a contradictory argument to prevail in another phase simply because the party's interests have changed). County Brief at 10-11.

Beyond the merits, King County argues by promulgating the TIN Rule without public comment Ecology not only violated the purpose and intent of the APA, but Ecology also entirely failed to account for the impacts of the TIN Rule or to identify alternative, less burdensome means to achieve the same or similar result. County Brief at 12. King County demonstrates that Ecology's procedural failings also deprived Ecology of critical public input that may have led to a different decision that ensured that taxpayers' funds were spent wisely given the inherent uncertainties in existing science concerning what is causing the dissolved oxygen impairments in Puget Sound. King County argues that given the gaps in the current scientific knowledge about the complex factors causing dissolved oxygen impairments in the shallow embayments of Puget Sound, coupled with the enormity of the costs associated with nitrogen removal, it was particularly important for Ecology to adhere to formal rulemaking requirements in promulgating the TIN Rule. County Brief at 14.

By regulating nutrient loading through the TIN Rule as an unanalyzed stand-alone requirement, instead of an integrated suite of individual, facility-specific, permit conditions, King County shows that Ecology has prioritized nutrient load reduction at the potential expense of other Clean Water Act requirements. Had Ecology performed the “less burdensome analysis” required by the APA, Ecology might have found a more flexible approach that would allow utilities to experiment with phased treatment process changes over time to obtain more meaningful results. County Brief at 18.

King County also explains how upgrading wastewater facilities that are as large as King County’s facilities is a complicated process which takes time. WWTFs are large complex systems that have complicated processes that require multiple stages of careful planning and engineering, as well as technical and financial analyses before making significant upgrades. Changes to one aspect of the treatment or pollutant removal process often has rippling effects on other parts of the WWTF. King County shows how facilities as large as the County's cannot be re-engineered on a dime to address one factor without causing other externalities which is why it often takes 10-15 years or more to implement significant capital improvements. County Brief at 19. These same issues apply to other wastewater treatment facilities owned or utilized by WASWD's members outside of areas served by King County.

Similarly, King County asserts that a more flexible approach might have allowed utilities to conduct rigorous nutrient influent and effluent monitoring to better understand what Division III found is currently missing from existing science - *i.e.*, the real-world water quality impacts of WWTFs' discharges. By failing to identify, let alone evaluate alternatives to determine if there is a less burdensome approach than adoption of the TIN Rule, Ecology not only violated the APA, but more importantly overlooked or ignored other alternatives that were both much less expensive and more environmentally beneficial to the greater Puget Sound region. County Brief at 19-20.

WASWD unequivocally supports and endorses all of the arguments made by King County. WASWD believes that these arguments will help the Court understand the real impact of Ecology's unlawful rulemaking when Ecology directed its staff to implement the TIN Rule.

IV. ADDITIONAL ARGUMENT IS NECESSARY TO INFORM THE COURT OF THE CONSEQUENCES OF THE TIN RULE

The additional arguments made by King County in its *amicus* brief which WASWD seeks to join are necessary to raise important arguments on the merits that have a different focus than were made by the named parties to the appeal.

Additional argument is also necessary to help educate the Court about the very real consequences of Ecology's decision to adopt the TIN Rule without adhering to formal rulemaking requirements.

Had Ecology gone through the rulemaking process, as required by the APA, WASWD would have actively participated in the rulemaking process to help identify workable and scientifically sound solutions. WASWD would have advocated on behalf of its members impacted by the TIN Rule for a more flexible approach that would require sewer utilities discharging treated wastewater directly or indirectly into Puget Sound to conduct rigorous nutrient influent and effluent monitoring to better understand the real-world water quality impacts of WWTFs' discharges.

Additional argument is also necessary to demonstrate the information that would have been gathered had Ecology followed the procedures mandated by the State Environmental Policy Act, including the environmental externalities that have and will continue to result from putting TIN removal above other water quality improvements and other impacts that have resulted from these actions. If Ecology had satisfied its SEPA mandate, that process would have also revealed the environmental justice ramifications of Ecology's decision to impose TIN caps across the board rather than on a case-by-case basis.

Like King County, WASWD's members desire to be good stewards of the environment and to protect the health of Puget Sound. However, WASWD and its members were denied the opportunity for meaningful public engagement regarding Ecology's TIN Rule directive. As a result, all interested parties have not had an opportunity to weigh in on the true impact of Ecology's TIN Rule.

V. CONCLUSION

For reasons discussed above, WASWD seeks permission from the Court to participate as an *amicus* party by joining in King County's *amicus* brief. WASWD and its members stand in a similar position as King County, but with a slightly different perspective. WASWD believes it is important for WASWD to participate in this appeal to advocate for its members since the TIN Rule will have significant ramifications to the districts providing wastewater collection and treatment services not only in the Puget Sound region, but throughout the state.

I certify that this document contains 3896 words, pursuant to RAP 18.17.

DATED: April 15, 2024

INSLEE, BEST, DOEZIE & RYDER, P.S.

s/ Eric C. Frimodt
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DECLARATION OF SERVICE

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Katia R. Perez, Legal Assistant

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April 15, 2024 - 2:18 PM

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Peterson, Teresa

From: James A. Tupper
Sent: Tuesday, July 2, 2024 10:40 AM
To: Emma L. Lautanen
Subject: FW: Thoughts regarding natural conditions criteria

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MARTEN LAW

From: Lincoln Loehr <lcloehr@yahoo.com>
Sent: Wednesday, April 17, 2024 4:07 PM
To: James A. Tupper <jtupper@martenlaw.com>
Subject: Fw: Thoughts regarding natural conditions criteria

Kalman's response

----- Forwarded Message -----
From: Bugica, Kalman (ECY) <kbug461@ecy.wa.gov>
To: Lincoln Loehr <lcloehr@yahoo.com>
Sent: Tuesday, April 16, 2024 at 06:42:37 PM PDT
Subject: Re: Thoughts regarding natural conditions criteria

Good afternoon Lincoln,

I appreciate your thoughts on natural conditions.

I'll talk more about our approach for this rulemaking next week to provide details, but in short, I'm not considering recommending changing the intent of WAC 173-201A-260(1)(a) regarding our approach to use of natural conditions. I.e., my recommendation is to keep our current approach, but tailor it to just aquatic life criteria.

Regarding DO criteria and those designated uses, I appreciate your thoughts. I would like to think that any DO criteria update may consider use updates as well, so perhaps there may be further distinctions between uses in the future.

Those changes might be necessary, as well, to avoid the scenario you identified below: where we would need to impair waters that aren't meeting 6 mg/l or 7 mg/L, but could still meet 5 mg/L.

Have a good afternoon, and I hope you plan on attending the preliminary decisions webinar for natural conditions next week.

Cheers,

Kalman

From: Lincoln Loehr <lcloehr@yahoo.com>
Sent: Friday, April 12, 2024 3:24 PM
To: Bugica, Kalman (ECY) <kbug461@ECY.WA.GOV>
Subject: Thoughts regarding natural conditions criteria

External Email

Kalman,

As you work on trying to satisfy EPA on a way to interpret natural conditions, I ask that the use of natural condition based approaches and the allowance for some human caused decrease should apply only when current numeric criteria are not met. (This is the current approach in our regulations.) The same allowance should also be available in the future when our marine DO criteria get a badly needed update to criteria similar to Chesapeake Bay's.

Given the explanation of our current numeric criteria, the natural condition trigger should only be when 5 mg/L (Good use) is not met. 5 mg/L is identified as protective *for most uses including, but not limited to, salmonid migration and rearing; 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.*

True there are also criteria of 6 mg/L (Excellent use) and 7 mg/L (Extraordinary use), but the are identified as protecting all of the same uses that are protected by 5 mg/L (Good), and hence are unnecessary as triggers for natural condition considerations when not met. Granted, the Good use says "most uses" while the other uses have needless wording of "shall markedly and uniformly exceed the requirements for all uses including ...." and "shall meet or exceed the requirements for all uses including ...." When originally adopted in 1967, the list of uses included salmonid spawning for Excellent and Extraordinary, but did not include it for Good, hence the use of "most" in the list of uses protected by the Good classification. After 50 years, Ecology realized salmonids do not spawn in salt water, so that use was dropped, leaving three different classes (Extraordinary, Excellent, and Good) protecting all the same uses, without exceptions.

Given the common uses identified for 7, 6, and 5 mg/L, one cannot look to our criteria and assert there is impairment when DO is less than 7 or 6, but still meets 5 mg/L.

Please give these concerns consideration as you proceed with your rule-making task.

Lincoln Loehr

Preliminary Regulatory Analyses:

Including the:

- Preliminary Cost-Benefit Analysis
- Least-Burdensome Alternative Analysis
- Administrative Procedure Act Determinations
- Regulatory Fairness Act Compliance

Chapter 173-201A WAC

Water Quality Standards for Surface Waters of the State of Washington

By

Logan Blair, Ph.D.

Emma Diamond

For the

Water Quality Program

Washington State Department of Ecology

Olympia, Washington

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Headquarters	Across Washington	P.O. Box 46700 Olympia, WA 98504	360-407-6000

Preliminary Regulatory Analyses

Including the:

Preliminary Cost-Benefit Analysis

Least-Burdensome Alternative Analysis

Administrative Procedure Act Determinations

Regulatory Fairness Act Compliance

Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington

Water Quality Program
Washington State Department of Ecology

Olympia, WA

May 2024 | Publication 24-10-022

DEPARTMENT OF
ECOLOGY
State of Washington

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Abbreviations and Acronyms

APA	Administrative Procedure Act
CBA	Cost Benefit Analysis
CFR	Code of Federal Regulations
CWA	Clean Water Act
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
ESA	Endangered Species Act
GP	General Permit
IP	Individual Permit
LBA	Least Burdensome Alternative
MGD	Million Gallons per Day
O&M	Operations and Maintenance
PPM	Parts Per Million
pH	potential of Hydrogen
RCW	Revised Code of Washington
RFA	Regulatory Fairness Act
SU	Standard Units
TMDL	Total Maximum Daily Load
UAA	Use Attainability Analysis
ug/L	Micrograms Per Liter
USFWS	United States Fish and Wildlife Service
WAC	Washington Administrative Code
WLA	Waste Load Allocations
WQ	Water Quality
WQS	Water Quality Standards

Executive Summary

This report presents the determinations made by the Washington State Department of Ecology as required under Chapters 34.05 RCW and 19.85 RCW, for the proposed amendments to the Water Quality Standards for the Surface Waters of the State of Washington rule (Chapter 173-201A WAC; the "rule"). This includes the:

- Preliminary Cost-Benefit Analysis (CBA)
- Least-Burdensome Alternative Analysis (LBA)
- Administrative Procedure Act Determinations
- Regulatory Fairness Act Compliance

why hasn't this been updated for DO since 1967?

Washington's administrative code contains numeric water quality criteria for temperature, DO, and pH that are determined by designated use categories, as well as aquatic life toxics criteria such as copper, lead, and zinc. These numeric criteria are designed to protect designated uses and form the basis for water quality actions including permit limits.

However, numeric criteria do not always capture the unique chemical, physical, or biological characteristics that exist in any one system. Inconsistencies may be due to natural processes or seasonal conditions that vary across geography like water source, natural shading, and flow rate, among others. For example, a naturally low-flowing stream in a natural prairie without any human alteration may have seasonally higher temperatures than the numeric limit set to protect aquatic life. Here, a difficult situation may arise in which water bodies fail to meet water quality standards because of natural conditions, yet regulations require their improvement.

We are considering rule amendments to address EPA's 2021 disapproval of previously-approved natural condition provisions in our standards, including for fresh and marine dissolved oxygen (DO) and temperature (excluding lakes). Nearly all states have some provision of this kind. Washington needs natural conditions provisions to recognizing that conditions in some surface waters naturally do not always meet water quality criteria throughout the year, and to effectively implement our Clean Water Act programs.

The proposed rule amendments consist of:

how is this defined? It wasn't detailed in the natural condition.

Proposed revisions to existing criteria:

- Updates to the natural conditions provision to limit use to aquatic life criteria.
- Updating allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when the natural conditions constitute the water quality criteria.

- Updates to the site-specific criteria process for an allowance for natural conditions to be used as a basis for developing these criteria.

Other proposed changes:

- Adding definitions for the performance-based approach and local and regional sources of human-caused pollution.
- Adding a new section detailing the use of the performance-based approach and applicable aquatic life criteria.
- Adding a rule document referenced in the water quality standards that details the methodology of the performance-based approach.

Minor non-substantive edits:

- One update to reflect the latest and current revision for a referenced EPA document

Costs from the proposed rule amendments would originate from any actions taken by permittees to comply with procedures or conditions that generate new capital expenses (e.g. technology, engineering solutions or land acquisition), labor cost (e.g. source control and monitoring), or other miscellaneous activities (scientific studies) compared to costs experienced under baseline conditions.

see EPA comment on costs (previous approval)

Based on guidance and conversations with Ecology staff, we determined that the most likely action to occur because of the proposed rule amendments taken together, would be meeting waste load allocations based on natural conditions criteria developed through the total maximum daily load (TMDL) process compared to meeting numeric temperature, DO, and / or pH criterion.[2] After filtering future TMDL studies for these criteria, with potential for natural conditions, and prioritized in the next 20 years, we identified 3,671 associated permits.

EPA previous approval concern...

no stakeholder process?

We cannot quantify the costs of the proposed rulemaking to associated permits because future TMDL studies have not been performed yet. Qualitatively, the most likely actions taken because of the proposed rulemaking are not likely to impose new costs, but rather produce benefits in the form of avoided costs. Historical TMDLs reviewed by the study team and the general logic of natural conditions provisions suggest that criteria considering local factors and seasonal variation would be more easily met through fewer actions or investments—up to avoiding paradoxical situations in which permittees need to improve the quality of the water they discharged to beyond what is achievable without any human influence.[3]

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[2] See other potential actions and baseline comparisons detailed in Section 3.

[3] We note that if it were determined that for one part of the year natural conditions criteria are more stringent than the biologically based criteria (e.g. lower temperatures in winter months), permittees might face new cost during this period compared to baseline under the proposed rule. However, other aspects of the proposed rule like the human allowance and limiting allowances to local and regional sources, could mitigate these to an unknown degree. The net impact on costs would depend on the relative size of new costs and cost-savings. Ultimately, data

based on what?

We cannot fully quantify the extent of potential benefits of the proposed rulemaking because future TMDL studies have not been performed yet. However, through a pair of illustrative examples, we applied a small and arbitrary temperature and DO criteria change to a selection of potentially impacted permits—akin to just one scenario when meeting natural conditions under the proposed rulemaking. We estimated a total 20-year present value benefit of $675 million through this exercise, but stress that this represents partial benefits and should be considered a conservative lower bound. Additional, but unquantified, benefits include the avoided costs of meeting numeric criteria for freshwater pH compared to a natural condition based criteria, and any avoided cost of independent science by permittees in support of Ecology performing site-specific criteria and UAA in the baseline.

The baseline conditions and proposed rulemaking (if adopted) would be considered protective of aquatic life and designated uses. Therefore, we do not expect new costs or benefits from a material change in related ecosystem services.

We conclude, based on a reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the proposed rule amendments, as compared to the baseline, that the benefits of the proposed rule amendments are greater than the costs.

After considering alternatives, within the context of the goals and objectives of the authorizing statute, we determined that the proposed rule represents the least-burdensome alternative of possible rule requirements meeting the goals and objectives.

Based on this analysis, Ecology is exempt from performing additional analyses under the Regulatory Fairness Act, under RCW 19.85.025(4) which states that, "This chapter does not apply to the adoption of a rule if an agency is able to demonstrate that the proposed rule does not affect small businesses." Moreover, by not imposing compliance costs, the proposed rule amendments do not meet the RFA applicability standard under RCW 19.85.030(1)(a).

limitations prevent us from quantifying a forecast of how often this might occur and the net cost of such a scenario.

Chapter 1: Background and Introduction

1.1 Introduction

This report presents the determinations made by the Washington State Department of Ecology, as required under Chapters 34.05 RCW and 19.85 RCW, for the proposed Water Quality Standards for the Surface Waters of the State of Washington rule (Chapter 173-201A WAC; the "rule"). This includes the:

- Preliminary Cost-Benefit Analysis (CBA)
- Least-Burdensome Alternative Analysis (LBA)
- Administrative Procedure Act Determinations
- Regulatory Fairness Act Compliance

The Washington Administrative Procedure Act (APA; RCW 34.05.328(1)(d)) requires Ecology to evaluate significant legislative rules to "determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the law being implemented." Chapters 1 – 5 of this document describe that determination.

The APA also requires Ecology to "determine, after considering alternative versions of the rule…that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives" of the governing and authorizing statutes. Chapter 6 of this document describes that determination.

The APA also requires Ecology to make several other determinations (RCW 34.05.328(1)(a) – (c) and (f) – (h)) about the rule, including authorization, need, context, and coordination. Appendix A of this document provides the documentation for these determinations.

The Washington Regulatory Fairness Act (RFA; Chapter 19.85 RCW) requires Ecology to evaluate the relative impact of proposed rules that impose costs on businesses in an industry. It compares the relative compliance costs for small businesses to those of the largest businesses affected. Chapter 7 of this document documents that analysis, when applicable.

All determinations are based on the best available information at the time of publication. We encourage feedback (including specific data) that may improve the accuracy of this analysis.

1.1.1 Background

The distribution, health, and survival of many aquatic species in Washington directly or indirectly depend on the quality of the water in which they live. Changes in water temperature, for example, can materially impact the life of a salmonid given that cooler river water temperatures in the fall signal upstream migration. Human activities can directly contribute to thermal input to rivers, reduce groundwater that serves to moderate stream temperatures, or reduce the capacity of a river to absorb heat. Importantly, seasonal swings in temperature and variations in climatic conditions can also push temperatures outside the optimal range (USEPA, 2003).

DO, another important criterion, is the amount of oxygen that is present in water, which all aquatic animals need to breathe. Low levels of oxygen (hypoxia) or no oxygen levels (anoxia) can occur when excess organic materials, such as large algal blooms, are decomposed by microorganisms. As DO levels drop, some sensitive animals may move away, decline in health, or die (EPA, 2023). DO can be affected directly by local human actions such as contributing organic and inorganic materials that are metabolized by organisms (consuming available oxygen), and by actions that raise the temperature of waterbodies (thus reducing the solubility of oxygen). Like temperature, DO levels also fluctuate periodically, seasonally, and as part of the daily ecology of the aquatic resource (Ecology, 2018).

Variation in pH above (basic) or below (acidic) safe ranges may physiologically stress species and can result in decreased reproduction, decreased growth, disease, or death. While human activity can contribute to fluctuations in pH, pH levels vary naturally with the draining of wetlands or floodplains, substrate composition, and dissolved vegetative material or photosynthetic activity (EPA, 2024). Other toxic pollutants known to threaten aquatic life in a waterbody such as copper, lead, and zinc, may also come from human and natural contributors.

This rulemaking seeks to establish provisions that allow the use of natural conditions as a basis when setting aquatic life criteria through site-specific rulemaking or use attainability analysis (UAA). For temperature, DO and the potential of hydrogen ion concentration in freshwater (pH) specifically, this rulemaking provides a pathway for Ecology to set these criteria based on natural conditions without subsequent rulemaking through a performance-based approach. In waters where temperature and DO natural conditions apply, this rulemaking will limit human actions, or allowances. The rulemaking also includes definitions and methodological documentation supporting these proposed changes.

In this document, we predominantly focus our attention on describing and analyzing the proposed rule as it concerns temperature, DO and pH criteria given that establishing other criteria under this rulemaking will require additional rulemaking and regulatory analysis.

Numeric Criteria

Washington's administrative code contains numeric water quality criteria determined by designated use categories (see for example temperature in 173-201A-200(1)(c) WAC and 173-201A-210(1)(c) WAC, and DO in 173-201A-200(1)(d) WAC and 173-201A-210(1)(d) WAC), as well as a complete list of aquatic life toxics criteria in 173-201A-240 WAC.[4] Designated uses, sometimes called "beneficial uses," describe uses specified in Washington's water quality standards, and use designations are made for each surface water body or water body segment (see 173-201A-600 WAC and 173-201A-610 WAC).

Numeric criteria are designed to protect designated uses and form the basis for water quality actions including permit limits. There are six designated uses related to aquatic life for

[4] Note that 173-201A-610 WAC contain all site-specific criteria where applicable.

freshwater bodies including: char spawning and rearing; core summer salmonid habitat; and salmonoid spawning, rearing, and migration. There are four marine water designated uses related to aquatic life ranging from extraordinary to fair quality. Each designated use is associated with a biologically-based numeric criterion (“numeric criteria” hereafter) determined to be protective of aquatic life. In the fresh water temperate criteria, for example, the numeric criterion for freshwater segments designated char spawning and rearing is 12 degrees Celsius (53.6 degrees Fahrenheit).[5]

Natural Condition Provisions at Ecology

Numeric criteria do not always capture the unique chemical, physical, or biological characteristics that exist in any one system. Inconsistencies may be due to natural processes or seasonal conditions that vary across geography like water source, natural shading, and flow rate among others. For example, a naturally low-flowing stream in a natural prairie without any human alteration may have seasonally higher temperatures than the numeric limit set to protect aquatic life.

In the example above, a difficult situation may arise in which water bodies fail to meet water quality standards because of natural conditions, yet regulations require their improvement. Permitting and enforcement would be costly if not impossible in this regulatory environment. Not only would dischargers need to curb their impacts, but they would be required to bring water quality to a state that is potentially unachievable, even in their collective absence.

To overcome these and similar challenges, the US Environmental Protection Agency (EPA) recommends that generalized aquatic life criteria be further refined through adoption of local criteria to protect unique characteristics inherent to a specific water (USEPA, 2015).[6] In this way, Ecology’s regulatory work has relied on “natural condition provisions” to reconcile numeric criteria and local conditions before human alteration.[7]

Natural conditions provisions were adopted into the first water quality standards for the state in 1967 which placed limits on non-natural increases for temperature and allowed limited modifications when natural water quality conditions dropped due to “unusual and not reasonably foreseeable” natural causes.

The 1973 updates to the Water Quality Standards (WQS) introduced a general natural conditions provision, stating that “[w]henever the natural conditions are of a lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria.” This was further refined in 2003 and migrated to WAC 173-201A-260:

> “It is recognized that portions of many water bodies cannot meet the assigned criteria due to the natural conditions of the water body. When a water body does not meet its assigned criteria due to natural climatic or landscape attributes, the natural conditions constitute the water quality criteria.”

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[5] See tables 200(1)(c), 200(1)(d), 210(1)(c), and 210(1)(d) in 173-201A WAC for additional details.
[6] https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf
[7] See WAC 173-201A-260(1); 173-201A-200(1)(c)(i); -210(1)(c)(i)); 173-201A-200(1)(d)(i); -210(1)(d)(i)).

Human action values were subsequently adopted to limit temperature (WAC 173-201A-200(1)(c)(i), -210(1)(c)(i))) and DO (WAC 173-201A-200(1)(d)(i), -210(1)(d)(i))) increases caused by human activity. For example, with respect to freshwater temperature (WAC 173-201A-200(1)(c)(i)):

> "When a water body's temperature is warmer than the criteria in Table 200 (1)(c) (or within 0.3°C (0.54°F) of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F)"

EPA Disapproval

On Nov. 19, 2021, the EPA reconsidered and disapproved some of Ecology's previously approved natural conditions provisions and criteria in Surface Water Quality Standards (USEPA, 2021)[8] EPA disapproved the following WQS:

- A general provision that allows a water body's natural conditions to serve as the water quality standard. [WAC 173-201A-260(1)(a)]
- A specific provision that sets the temperature requirement to how cool a water body would be without human alterations. This provision also limits temperature increases caused by human activity cumulatively to less than 0.3 degrees Celsius. [WAC 173-201A-200(1)(c)(i), -210(1)(c)(i))]
- A specific provision that sets the dissolved oxygen requirement to the highest concentration a water body can achieve without human alterations. This provision also states that human activity cannot cumulatively cause dissolved oxygen in a water body to decrease more than 0.2 mg/L. [WAC 173-201A-200(1)(d)(i), -210(1)(d)(i)]

EPA stated in its justification of disapproving WAC 173-201A-260(1)(a) that the provision is broadly drafted and does not specify the types of criteria or pollutants to which it applies. Therefore, such a provision could apply to a wide range of naturally occurring pollutants, including toxic pollutants, and even allow an exception from otherwise applicable numeric human health criteria. This is not consistent with EPA's interpretation of the relationship between natural conditions and protection of designated human health uses. Washington's adopted provision did not limit in scope the natural conditions provision to aquatic life uses or specific pollutants.

EPA noted that there are no changes necessary to address the disapproval. Washington's WQS currently include applicable numeric criteria that EPA has determined to be protective of designated uses. EPA did, however, provide discretionary recommendations. EPA noted that it continues to believe an "appropriately drafted natural condition provision can serve an

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[8] In February 2014, the Northwest Environmental Advocates (NWEA) filed a complaint with the United States District Court for the Western District of Washington (Case No. 2:14-cv-0196-RSM) over EPA's 2008 CWA Section 303(c) approval. In October 2018, the Court issued an Order Granting a Stay (Dkt. 95) pending EPA's reconsideration of its prior determinations and subsequently granted an extension (Dkt. 118) for EPA to complete its reconsideration of these natural condition provisions by November 19, 2021. See https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf for EPA's decisions.

important role in state WQS by reflecting a naturally occurring spatial and temporal variability in water quality that is protective of uses" (Opalski, 2021). EPA notes that a new provision for natural conditions narrowly tailored to aquatic life uses could be adopted. Alternative, the adoption of a performance-based approach could be used to establish aquatic life criteria reflecting the natural condition for specific pollutants.

In their justification for disapproving human allowance provisions in WAC 173-201A-200 and -210, EPA noted that it had disapproved the general provision in WAC 173-201A-260(1)(a) (as discussed above). Without an approved WQS that allows for natural conditions to constitute the applicable water quality criteria, then the applicable criteria for temperature and DO are the numeric criteria. The natural condition provisions for allowable human contribution are not based on these biologically based numeric criteria, but on the natural condition of the waterbody. Further, these provisions do not authorize human actions to cause insignificant exceedances to the applicable numeric criteria. Thus, EPA disapproved these provisions because such impacts are not tied to approved criteria that are in effect for Clean Water Act (CWA) purposes.

EPA noted again that no changes were necessary to address the disapproval, but that Washington could adopt new natural conditions criteria specific to temperature or DO. For instance, a performance-based approach for establishing these criteria representative of the natural condition of a waterbody could be adopted into the WQS. Another option would be for Washington to adopt numeric temperature and dissolved oxygen criteria that account for natural conditions using the best available relevant data. This could include site-specific criteria. EPA notes that Washington could also choose to adopt a new WQS provision that allows for human actions to cause insignificant decreases in DO or increases to temperature.

1.2 Reasons for the proposed rule amendments

We are considering rule amendments to address EPA's 2021 disapproval of previously-approved natural condition provisions in our standards, including for fresh and marine dissolved oxygen and temperature (excluding lakes).

It is important that we have a provision in the WQS recognizing that conditions in some surface waters naturally do not meet water quality criteria at all times throughout the year. Nearly all states have some provision of this kind. Washington needs natural conditions provisions to effectively implement our Clean Water Act programs.

1.3 Summary of the proposed rule amendments

In this rulemaking, we are using information from previous ESA consultations, prior EPA biological evaluations, EPA memorandums, EPA guidance documents, exploration of how other states address natural conditions, and the latest scientific information to propose natural conditions criteria that will protect designated and existing uses in Washington; while recognizing that some waters in Washington do not meet applicable biologically based numeric criteria due to natural or seasonal factors (see *inter alia* USEPA 2003, 2005, 2007, 2009, 2015b, 2021, 2023; USFWS, 2008).

The proposed rule amendments consist of:

Proposed revisions to existing criteria:

- Updates to the natural conditions provision to limit use to aquatic life criteria.
- Updating allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when the natural conditions constitute the water quality criteria
- Updates to the site-specific criteria process for an allowance for natural conditions to be used as a basis for developing these criteria.

Other proposed changes:

- Adding definitions for the performance-based approach and local and regional sources of human-caused pollution.
- Adding a new section detailing the use of the performance-based approach and applicable aquatic life criteria.
- Adding a rule document referenced in the water quality standards that details the methodology of the performance-based approach.

Minor non-substantive edits:

- One update to reflect the latest and current revision for a referenced EPA document

1.4 Document organization

The chapters of this document are organized as follows:

- **Chapter 2 - Baseline and the proposed rule amendments:** Description and comparison of the baseline (what would occur in the absence of the proposed rule amendments) and the proposed rule requirements.
- **Chapter 3 - Likely costs of the proposed rule amendments:** Analysis of the types and sizes of costs we expect impacted entities to incur as a result of the proposed rule amendments.
- **Chapter 4 - Likely benefits of the proposed rule amendments:** Analysis of the types and sizes of benefits we expect to result from the proposed rule amendments.
- **Chapter 5 - Cost-benefit comparison and conclusions:** Discussion of the complete implications of the CBA.
- **Chapter 6 - Least-Burdensome Alternative Analysis:** Analysis of considered alternatives to the contents of the proposed rule amendments.

- **Chapter 7 - Regulatory Fairness Act Compliance:** When applicable. Comparison of compliance costs for small and large businesses; mitigation; impact on jobs.
- **Appendix A - APA Determinations:** RCW 34.05.328 determinations not discussed in chapters 5 and 6.
- **Appendix B - Additional Tables and Figures**

Chapter 2: Baseline and Proposed Rule Amendments

2.1 Introduction

We analyzed the impacts of the proposed rule amendments relative to the existing rule, within the context of all existing requirements (federal and state laws and rules). This context for comparison is called the baseline and reflects the most likely regulatory circumstances that entities would face if Ecology does not adopt the proposed rule.

2.2 Baseline

The baseline is what allows us to make a consistent comparison between the state of the world with and without the proposed rule amendments. Should Ecology not adopt the proposed rulemaking, administering water quality actions are determined by existing laws and rules discussed in further detail in the remainder of this chapter.[9] Specifically, the baseline for this rulemaking includes:

- Clean Water Act
- Water Pollution Control Act
- Impaired Waterbody Listing and Cleanup Plan
- State Surface Water Quality Standards
- Permitting Guidelines and Compliance

The reminder of this section discusses the baseline in greater detail.

2.2.1 Clean Water Act

Section 303(c)(2)(A) states, about surface water quality standards:

> "…Such standards shall be such as to protect the public health or welfare, enhance the quality of the water and serve the purposes of this Chapter. Such standards shall be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes and agricultural, industrial and other purposes and also taking into consideration their use and value for navigation."

On standards, Section 304(a) cites that states should:

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[9] Note again that we focus our attention predominantly on water quality actions related to temperature, DO and pH. That is because the proposed rule provides an option for these criteria to consider natural conditions through a performance-based approach. For all others, a site-specific study or UAA is needed, which will require a separate rulemaking and regulatory analysis.

(1) Establish numeric criteria values based on: 304(a) Guidance; 304(a) Guidance modified to reflect site-specific conditions; or other scientifically defensible methods.[10]

(2) Establish narrative criteria or criteria based upon biomonitoring methods where numerical criteria cannot be established or to supplement numerical criteria.

2.2.2 Water Pollution Control Act

RCW 90.48.010 states, about water quality standards:

> It is declared to be the public policy of the state of Washington **to maintain the highest possible standards to insure the purity of all waters of the state consistent with public health and public enjoyment thereof, the propagation and protection of wild life, birds, game, fish and other aquatic life, and the industrial development of the state,** and to that end require the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state of Washington. Consistent with this policy, the state of Washington will exercise its powers, as fully and as effectively as possible, to retain and secure high quality for all waters of the state. The state of Washington in recognition of the federal government's interest in the quality of the navigable waters of the United States, of which certain portions thereof are within the jurisdictional limits of this state, proclaims a public policy of working cooperatively with the federal government in a joint effort to extinguish the sources of water quality degradation, while at the same time preserving and vigorously exercising state powers to insure that present and future standards of water quality within the state shall be determined by the citizenry, through and by the efforts of state government, of the state of Washington.

RCW 90.48.035 states, about rule-making authority:

> The department shall have the authority to, and shall promulgate, amend, or rescind such rules and regulations as it shall deem necessary to carry out the provisions of this Chapter, including but not limited to rules and regulations relating to standards of quality for waters of the state and for substances discharged therein in order to maintain the highest possible standards of all waters of the state in accordance with the public policy as declared in RCW 90.48.010.

2.2.3 Impaired Waterbody Listing and Cleanup Plan

The CWA section 303(d) establishes a process to identify and clean up polluted waters. Every two years, all states are required to perform a water quality assessment of surface waters in

[10] Where other scientifically defensible methods include setting site-specific criteria equal to natural conditions (See https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf)

the state, including all the rivers, lakes, and marine waters where data are available. Ecology compiles its own water quality data and federal data and invites other groups to submit water quality data they have collected. All data submitted must be collected using appropriate scientific methods and follow an approved Quality Assurance Project Plan.[11] The assessed waters are placed in categories that describe the status of water quality. Once the assessment is complete, the public is given a chance to review and provide comments. The final assessment is formally submitted to the EPA for approval.

Waters with beneficial uses – such as aquatic habitat– that are impaired by pollutants are placed in the polluted water category in the water quality assessment 303(d) list. These water bodies fall short of state surface water quality standards and are not expected to improve within the next two years**.** , Waters placed on the 303(d) list require the preparation of a water cleanup plan (TMDL) or other approved water quality improvement project.[12] The improvement plan identifies how much pollution needs to be reduced or eliminated to achieve clean water and allocates that amount of required pollution reduction among the existing sources.

Ecology's assessment of which waters to place on the 303(d) list is guided by federal laws, state water quality standards, and the Policy on the Washington State Water Quality Assessment (Ecology 2023b). This policy describes how the standards are applied, requirements for the data used, and how to prioritize TMDLs, among other issues.[13] In addition, even before a TMDL is completed, the inclusion of a water body on the 303(d) list can reduce the amount of pollutants allowed to be released under permits issued by Ecology.

2.2.4 State Surface Water Quality Standards

State surface water quality standards form the initial basis for federal 303(d) listings and TMDLs described in section 2.2.2. Relevant rules that determine standards without this rulemaking include the following.[14]

Biologically based numeric criteria

Fresh water aquatic life designated uses and criteria WAC 173-201A-200, and marine water designated uses and criteria WAC 173-201A-210, establish Washington's biologically based numeric criteria for freshwater temperature, marine temperature, freshwater DO, saltwater

[11] See https://apps.ecology.wa.gov/publications/documents/2110032.pdf

[12] The term "TMDL" is often also applied to the process to determine a TMDL ("Ecology is doing a TMDL") and to the final documentation of the TMDL ("Ecology has submitted a TMDL").

[13] A TMDL is the sum of the Load Allocations and Wasteload Allocations, plus reserves for future growth and a margin of safety, which are equal to the Loading Capacity of the water body. This is a requirement of Section 303(d) of the federal Clean Water Act and is defined in 40 CFR 130.2(i). See https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Total-Maximum-Daily-Load-process for additional details on the TMDL process.

[14] Note that 90.48 RCW discussed above is the authorizing statute for opening WAC 173-201A discussed below.

DO, and freshwater pH—except for criteria applicable to specific waterbody segments found in Table 602 (173-201A-602).[15]

As discussed in Section 1.1.2, WAC 173-201A-260(1)(a), WAC 173-201A-200(1)(c)(i), -210(1)(c)(i)) and WAC 173-201A-200(1)(d)(i) -210(1)(d)(i) are not in effect for federal actions. This means that **without the proposed rulemaking, natural conditions cannot constitute water quality criteria for the purposes of federal actions, such as 303(d) listings and TMDLs.** Entities associated with water bodies that exceed numeric criteria in WAC 173-201A-200 & -210 for temperature, DO and pH will remain subject to numeric criteria.

Site-Specific Criteria and Use Attainability Analysis

Ecology can develop new site-specific criteria or change the designated use through a use attainability analysis (UAA). **Without the proposed rulemaking, natural conditions cannot form the basis for site-specific criteria, only biologically based numeric criteria determined from aquatic life species studies.[16]**

Currently, a private entity wishing to establish a site-specific criterion or to modify a use may evaluate, develop, and present the scientific support to Ecology for such an action. However, Ecology would carry out the full process of considering, proposing, and adoption through rulemaking.[17]

WAC 173-201A-430 states, about establishing site-specific criteria:

> (1) Where the attainable condition of existing and designated uses for the water body would be fully protected using an alternative criterion, site-specific criteria may be adopted. (a) The site-specific criterion must be consistent with the federal regulations on designating and protecting uses (currently 40 C.F.R. 131.10 and 131.11); and (b) The decision to approve a site-specific criterion must be subject to a public involvement and intergovernmental coordination process.
>
> (2) The site-specific analyses for the development of a new water quality criterion must be conducted in a manner that is scientifically justifiable and consistent with the assumptions and rationale in "Guidelines for Deriving National Water Quality Criteria for the Protection of Aquatic Organisms and their Uses," EPA 1985; and conducted in accordance with the procedures established in the "Water Quality Standards Handbook," EPA 1994, as revised.
>
> (3) The decision to approve the site-specific criterion must be based on a demonstration that it will protect the existing and attainable uses of the water body.

[15] Note that in addition to tables in 173-201A-200 and -210, 1 DADMax values and supplemental numeric spawning criteria described in subsequent subsections may also apply.
[16] Based on the scientific approach detailed in EPA (1985) guidelines.
[17] In this way, developing site-specific criteria or a UAA is a resource intensive process (Ecology, 2004). The need to balance resources with other water quality activities—such as permit management and TMDL work—means that site-specific criteria and UAA are taken on sparingly.

(4) Site-specific criteria are not in effect until they have been incorporated into this chapter and approved by the USEPA."

WAC 173-201A-440 states, about use attainability analysis:

(1) Removal of a designated use for a water body assigned in this chapter must be based on a use attainability analysis (UAA). A UAA is a structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological, and economic factors. A use can only be removed through a UAA if it is not existing or attainable.

(2) A UAA proposing to remove a designated use on a water body must be submitted to the department in writing and include sufficient information to demonstrate that the use is neither existing nor attainable.

(3) A UAA must be consistent with the federal regulations on designating and protecting uses (currently 40 C.F.R. 131.10).

(4) Subcategories of use protection that reflect the lower physical potential of the water body for protecting designated uses must be based upon federal regulations (currently 40 C.F.R. 131.10(c)).

(5) Allowing for seasonal uses where doing so would not harm existing or designated uses occurring in that or another season must be based upon federal regulations (currently 40 C.F.R. 131.10(f)).

(6) After receiving a proposed UAA, the department will respond within sixty days of receipt with a decision on whether to proceed toward rule making.

(7) The decision to approve a UAA is subject to a public involvement and intergovernmental coordination process, including tribal consultation.

(8) The department will maintain a list of federally recognized tribes in the state of Washington. During all stages of development and review of UAA proposals, the department will provide notice and consult with representatives of the interested affected Indian tribes on a government-to-government basis, and carefully consider their recommendations.

(9) The results of a UAA are not in effect until they have been incorporated into this chapter and approved by the USEPA. Any designated uses established through the UAA process are included in WAC 173-201A-602 and 173-201A-612.

2.2.5 Permitting Guidelines and Compliance

Permitting guidelines help determine how permit writers approach different permit scenarios. They assist permit writers in how to think through meeting water quality criteria for protection of aquatic life to permittee-specific requirements. While not a legal requirement, guidance informs how aquatic life criteria might impact permittees who discharge effluent to water bodies. Therefore, in describing the baseline for this analysis of the rule amendments, it is necessary to consider the permitting guidelines in the baseline and amended scenarios, as they will contribute to the cost and benefit estimates and the discussed impacts.

Ecology uses the Water Quality Program Permit Writer's Manual (Ecology, 2018) for technical guidance when developing wastewater discharge permits.[18] With respect to temperature, pH, and DO limits, permit writers would first determine if an applicable TMDL has been approved, or is in development before determining whether effluent will cause, or have reasonable potential to cause or contribute to, violation of water quality standards. If an approved TMDL exists, waste load allocations (WLA) described in the TMDL are used to determine appropriate water quality-based effluent limits.

If no TMDL exists, permit writers determine whether effluent will cause, or have reasonable potential to cause or contribute to, a violation of water quality standards. If so, then effluent limits are established using methods described in the permit writer's manual to meet biologically based numeric criteria.

Occasionally, the permit writer will have information that the receiving water concentration at the point of discharge during critical condition does not meet the aquatic life criteria and that the receiving water body is not listed on the 303(d) list.[19] In these cases, where the excursion is documented with data that meets the criteria for 303(d) listing, the permit writer should develop interim effluent limits based on existing performance (no increase in loading) to be placed in the permit.[20] The periodic Water Quality Assessment will evaluate the data and subsequently categorize the water body. If the water body is impaired, it will be put in Category 5 on the 303(d) list and prioritized for a TMDL.

Past or existing compliance

The baseline includes past or existing compliance behavior in response to federal and state laws, rules, permits, guidance, and policies. These include currently implemented TMDLs that set WLAs and other necessary actions to protect the natural conditions of the water, site-specific criteria, and criteria set through previous UAAs.[21] This behavior might include, but is not limited to, existing treatment technologies, production processes, and effluent volumes.

Future compliance

The baseline includes future compliance behavior without the proposed rulemaking. This includes response to in-development and future TMDL activity and permit actions related to temperature, DO and pH. In the absence of this proposed rulemaking, meeting temperature, pH, and DO on an impaired waterbody would eventually subject permits to a TMDL based on statewide numeric criteria (WAC 173-201A), criteria established under a biologically based site-specific study, or criteria established following a UAA.

[18] https://apps.ecology.wa.gov/publications/documents/92109.pdf

[19] Critical condition refers to 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.

[20] Where loading refers to the mass of a substance that passes particular point in a specified amount of time.

[21] Note that Washington has only performed one UAA, which is still with the EPA for review.

2.3 Proposed rule amendments

The proposed rule amendments consist of:

Proposed revisions to existing criteria:

- Updates to the natural conditions provision to limit use to aquatic life criteria.
- Updating allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when the natural conditions constitute the water quality criteria
- Updates to the site-specific criteria process for an allowance for natural conditions to be used as a basis for developing these criteria.

Other proposed changes:

- Adding definitions for the performance-based approach and local and regional sources of human-caused pollution.
- Adding a new section detailing the use of the performance-based approach and applicable aquatic life criteria.
- Adding a rule document referenced in the water quality standards that details the methodology of the performance-based approach.

Minor non-substantive edits:

- One update to reflect the latest and current revision for a referenced EPA document

2.4 Regulatory Impacts by Component

2.4.1 Updates to the natural conditions provision to limit use to aquatic life criteria

Baseline

State

On account of EPA's disapproval, there is no state baseline associated with natural conditions currently approved for federal actions (USEPA, 2021). Previous EPA-approved state regulations at WAC 173-201A-260(1)(a) states that:

"…portions of many water bodies cannot meet the assigned criteria due to the natural conditions of the water body. When a water body does not meet its assigned criteria due to natural climatic or landscape attributes, the natural conditions constitute the water quality criteria."

Federal

The EPA's interpretation of the Clean Water Act allows for site-specific criteria to be set to natural conditions (see 2015 guidance on site-specific conditions and EPA's Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions).[22,23]

Proposed

The proposed rule would:

- Change "assigned criteria" to "assigned aquatic life criteria" in WAC 173-201A-260(1)(a) to clarify that natural conditions apply only to aquatic life.
- Add WAC 173-201A-260(1)(a)(i) to provide information to determine natural conditions criteria values, which reflect EPA's requirement that there is a binding procedure in a state's WQS to determine natural background (Davies, 1997).[24]

Expected impact

This proposed amendment, in combination with others in this rulemaking, is expected to restore Ecology's ability to establish site-specific criteria equal to the natural conditions of a water body, in water quality standards. In particular, the proposed amendments will allow future TMDL studies and those currently under development to consider the natural conditions of a water body in the context of aquatic life.

Site-specific aquatic life criteria based on natural conditions are typically pursued when a water body does not meet statewide numeric criteria and the natural conditions of the water body are suspected of contributing to the failure to meet the water quality standard. In this rulemaking, applying natural conditions provisions to water bodies with insignificant human allowances, would provide protection for aquatic life while recognizing the characteristics and seasonal attributes unique to a specific water body. This likely constitutes a **benefit** because criteria set through natural conditions provisions will typically be more achievable by permittees than those based on numeric criteria.

Without the proposed rulemaking, permittees discharging to water bodies that exceed numeric criteria, but suspect exceedance is in part due to natural conditions, will be subject to the applicable numeric criteria unless a site-specific criterion or a UAA is adopted through rule making. Site-specific criteria or a UAA are rarely pursued by Ecology, but private entities may evaluate, develop, and present the science support to Ecology for such an action (see section 2.2.4). Independently conducted science must be evaluated by Ecology and the EPA and does not guarantee agreement or adoption. In this way, the proposed rulemaking constitutes an additional **benefit** to the degree that it would lessen the need for privately conducted scientific support of site-specific criteria or designated use changes and associated cost.

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[22] https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf
[23] https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf.
[24] Where natural background is defined as "background concentration due only to non-anthropogenic sources, i.e., non-manmade sources."

Note that the costs of TMDL studies and associated data collection, labor, and other resources are borne by Ecology. Therefore, amending the TMDL process through this rulemaking to include natural conditions provisions does not represent new costs to private entities.

Also note that biologically based numeric criteria, site-specific criteria, or criteria established based on natural conditions of a water body proposed in this rulemaking are fully protective of aquatic life. Thus, the proposed amendments are not expected to materially impact ecosystem services or cultural values otherwise associated with changes to aquatic life.

2.4.2 Updating allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when the natural conditions constitute the water quality criteria

Baseline

State

On account of EPA's disapproval, there is no state baseline associated with natural conditions currently approved for federal actions (EPA, 2021). The previously EPA-approved state laws regulating human impacts when the natural conditions constitute the water quality criteria are: WAC 173-201A-200(1)(c)(i), 173-201A-200(1)(d)(i), WAC 173-201A-210(1)(c)(i), WAC 173-201A-210(1)(d)(i) and for specific waterbody segments listed under 173-201A-602.

In the disapproved sections above, "human actions" considered cumulatively may not cause the DO of that water body to decrease [from natural conditions] more than 0.2 mg/L, or the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F) for both fresh waters and marine waters.

Federal

The EPA's interpretation of the Clean Water Act allows for site-specific criteria to be set equal to the natural conditions of a water body. EPA guidance further suggest adopting a provision that allows for human actions to cause insignificant decreases in DO or increases to temperature (see 2015 guidance on site-specific conditions, EPA's Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions).[25,26]

Proposed

(1) Change "human actions" to "local and regional sources of human-caused pollution".[27]

(2) Add that DO allowances may not cause the DO of that water body to decrease more than 10% or 0.2 mg/L below natural conditions, whichever decrease is smaller.

[25] https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf
[26] https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf.
[27] See proposed definition of "local and regional sources of human-caused pollution" below

(3) Insert “below natural condition” referring to DO allowances and “above natural condition” for temperature allowance, to clarify they are given from the natural conditions criteria.

Expected impact

This proposed amendment, in combination with others in this rulemaking, is expected to restore Ecology’s ability to establish site-specific criteria equal to the natural conditions of a water body, as amended, in water quality standards. In particular, the proposed amendments will allow future TMDL studies and those currently under development to consider protecting aquatic life by requiring actions that would allow the water to meet site-specific criteria set equal to the natural conditions of a water body.

The proposed change (1) to the human action allowances will provide Ecology with the tools to regulate insignificant allowances when natural conditions criteria apply to a water body without the cumulative human action allowance being partially or fully allocated to impacts that are outside of Ecology’s regulatory authority (e.g., point source discharges in upstream Canadian waters, global climate change impacts). Amending DO allowance (2) provides additional protections in hypoxic waters, as otherwise a 0.2 mg/L decrease when waters are <2 mg/L DO may cause harm to aquatic life. Proposed language in (3) is purely for clarification.

If compared to EPA-disapproved state language, proposed amendments in (1) would allow for more achievable water quality by permittees while remaining protective of aquatic life, thus representing a benefit. Amendment (2) would be more stringent in some instances representing a cost to permittees and benefit to society by improving aquatic life. Amendment 3 has no impact.

Note that these proposed amendments are only impactful in the context of Ecology re-establishing the use of natural conditions provisions in water quality standards (i.e. WAC 173-201A-260(1)(a)). From the current baseline, the proposed amendments in this section will provide **benefits** as part of the broader collection of amendments establishing natural condition described in section 2.4.1.

2.4.3 Updates to the site-specific criteria process for an allowance for natural conditions to be used as a basis for developing criteria

Baseline

State

WAC 173-201A-430(2) says, of developing a new site-specific criteria, that it must be consistent with assumptions and rationale in “Guidelines for Deriving National Water Quality Criteria for the Protection of Aquatic Organisms and their Uses” (USEPA, 1985).

The 1985 guidelines from the EPA were incorporated by reference and provide a mechanism for developing protective biologically based criteria, but these guidelines rule out the possibility of developing protective natural conditions criteria.

Federal

The EPA's interpretation of the CWA allows for site-specific criteria to be set equal to the natural conditions of a water body. Communication with the EPA guided Ecology to adopt 40 CFR 131.11 for simplicity and to cite federal regulations rather than guidance documents. This allowed Ecology to incorporate the ability to use the natural conditions of a water body as the basis for developing site-specific aquatic life criteria.

Proposed

To replace the 1985 EPA guidance references in WAC 173-201A-430(2) with 40 CFR 131.11.

Expected impact

This proposed amendment, in combination with others in this rulemaking, will restore Ecology's ability to establish site-specific criteria equal to the natural conditions of a water body, in water quality standards. This proposed amendment specifically allows the use of natural conditions as justification for site-specific criteria development. Adopting 40 CFR 131.11 broadens what approaches can be used to scientifically support site-specific criteria development. Under the proposed rulemaking, site-specific criteria development would become particularly useful when data, parameter, or site constraints prevent use of the performance-based approaches described elsewhere in this proposed rulemaking. On the margin where other approaches are not pursued (e.g. performance-based), and private entities wish to develop scientific support for site-specific criteria, the additional options and flexibility afforded by the proposed amendment likely translates to a **benefit*.***

As with other means of establishing WQ criteria, note that site-specific criteria pursued through this amendment are also expected to be fully protective of aquatic life and the designated uses of the water body. Thus, the proposed amendment is not expected to impact ecosystem services or cultural values associated with changes to aquatic life compared to the baseline.

2.4.4 Adding definitions for the performance-based approach and local and regional sources of human-caused pollution

Baseline

Proposed

Add the following definitions to WAC 173-201A-020:

"Performance-based Approach" means a water quality standard that is a transparent process (i.e., methodology) which is sufficiently detailed and has suitable safeguards that ensures predictable and repeatable outcomes, rather than a specific outcome (i.e., concentration limit for a pollutant), consistent with 40 C.F.R. 131.11 and 40 C.F.R. 131.13.

"Local and regional sources of human-caused pollution" means sources of pollution caused by human actions, and the pollution originates from: (1) within the boundaries of the State; or (2) within the boundaries of a U.S. jurisdiction abutting to the State that impacts surface waters of the State.

Expected impact

Definition. No direct impact outside of where the defined terms are used in the proposed rule, discussed above and below in this Section.

2.4.5 Adding a new section detailing the use of the performance-based approach and applicable aquatic life criteria

Baseline

Federal

The EPA's interpretation of the Clean Water Act allows for site-specific criteria to be set equal to the natural conditions of a water body. The EPA guidance has identified two general approaches states and authorized tribes can use when adopting site-specific water quality criteria: determining a specific outcome (i.e., concentration limit for a pollutant) through the development of an individual numeric criterion, and adopting a criteria derivation process through the performance-based approach (see USEPA, 2021, 2023).[28,29]

Proposed

Add a new section to the WAC (173-201A-470) detailing performance-based approach as a tool that Ecology can choose to use for implementing aquatic life criteria in its state and federal CWA actions. In this proposed rule, the performance-based approach applies to dissolved oxygen (fresh water and marine water), pH (fresh water), and temperature (fresh water and marine water) only. Ecology does not propose a requirement that the tool must be used.

Expected impact

This proposed amendment, in combination with others in this rulemaking, is expected to restore Ecology's ability to establish site-specific criteria equal to the natural conditions of a water body, as amended, in water quality standards. In particular, the proposed amendments will allow future TMDL studies and those currently under development to consider protecting aquatic life by requiring actions that would allow the water to meet site-specific criteria set equal to the natural conditions of a water body without additional rulemakings.

From the current baseline, the proposed amendment in this section is part of a broader natural condition provision that will **provide benefits** described above in section 2.4.1.

2.4.6 Adding a rule document referenced in the water quality standards that details the methodology of the performance-based approach

Baseline

Federal

[28] https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf
[29] https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf.

The EPA’s interpretation of the Clean Water Act allows for site-specific criteria to be set equal to the natural conditions of a water body The EPA guidance has identified two general approaches states and authorized tribes can use when adopting site-specific water quality criteria: determining a specific outcome (i.e., concentration limit for a pollutant) through the development of an individual numeric criterion, and adopting a criteria derivation process through the performance-based approach (see 2015 guidance on site-specific conditions and EPA’s Action on Revisions to the Washington State Department of Ecology’s Surface Water Quality Standards for Natural Conditions Provisions).[30,31]

Proposed

Due to the information required for the performance-based approach, we propose having a separate rule document, Ecology publication 24-10-017 ”A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington”, that provides details and requirements of the performance-based approach as noted in the proposed section WAC 173-201A-470(1)(b).

Expected impact

This proposed amendment, in combination with others in this rulemaking, will restore Ecology’s ability to establish site-specific criteria equal to the natural conditions of a water body, as amended, in water quality standards. In particular, the proposed amendments will allow future TMDL studies and those currently under development to protect aquatic life by considering required actions that would allow the water to meet site-specific criteria equal to the natural conditions of a water body without additional rulemakings.

From the current baseline the proposed amendment in this section is part of a broader natural condition provision that will provide **benefits** described above in section 2.4.1, along with operational clarity and understanding.

2.4.7 One update to reflect the latest and current revision for a referenced EPA document

Baseline

State

WAC 173-201A-430(2) cites “*Water Quality Standards Handbook*," EPA 1994, as revised.

Proposed

Update WAC 173-201A-430(2) to “*Water Quality Standards Handbook*," EPA 2023, as revised.

Expected impact

This revision is required by current state law. No impact.

[30] https://www.epa.gov/sites/default/files/2015-02/documents/natural-conditions-framework-2015.pdf
[31] https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf.

Chapter 3: Likely Costs of the Proposed Rule Amendments

3.1 Introduction

We analyzed the likely costs associated with the proposed rule amendments, as compared to the baseline. The proposed rule amendments and the baseline are discussed in detail in Chapter 2 of this document.

3.2 Cost analysis

As discussed in Chapter 2, the collective proposed rule amendments interact and work together to generate impacts. Given that the baseline has no federally-approved natural conditions provisions, it is not practical to analyze every component of the rulemaking individually. We proceed instead by describing the impacts of the following amendments on the behavior of affected parties **as implemented together** (e.g. restoring natural conditions, as amended, for the purposed of federal actions):

Proposed revisions to existing criteria:

- Updates to the natural conditions provision to limit use to aquatic life criteria.
- Updating allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when the natural conditions constitute the water quality criteria
- Updates to the site-specific criteria process for an allowance for natural conditions to be used as a basis for developing these criteria.

Other proposed changes:

- Adding definitions for the performance-based approach and local and regional sources of human-caused pollution.
- Adding a new section detailing the use of the performance-based approach and applicable aquatic life criteria.
- Adding a rule document referenced in the water quality standards that details the methodology of the performance-based approach.

Minor non-substantive edits:

- One update to reflect the latest and current revision for a referenced EPA document
- Update to reflect the latest and current revision for a referenced EPA document

3.2.1 Impacted Permits

The proposed rulemaking would primarily impact current and future permits associated with surface waters on the 303(d) list as currently impaired (Category 5) for temperature, pH, and/or DO. To illustrate the scope of potentially impacted permits, we queried proposed TMDL projects listed from Ecology's latest water quality assessment (Ecology, 2023a) that have the potential for natural conditions based on temperature, DO, and or pH.[32, 33]

Ecology ranks projects based on the severity of the pollution problem, risks to public health, risk to threatened and endangered species, and vulnerability of water bodies to degradation among other factors (2023a, 2023b). Projects fall under one of four priorities:

- High: projects that have already been vetted and are actively being worked on,
- Medium: projects that should begin in the next 1 to 5 years,
- Medium-Low: projects that should begin in the next 5 to 15 years, and,
- Low: Projects that do not warrant starting before the higher prioritized projects.

We narrowed our initial list to only high, medium, and medium-high priority TMDL projects to describe those that will likely be complete or nearly complete within the 20-year timeframe of this analysis. Through the filtering process, 42 TMDLs were identified across all four of Ecology's regions (Eastern, Central, Northwestern, and Southwestern) and the Puget Sound.[34]

Table 1 provides a description of the top 5 out of 18 affected permit categories associated with potentially affected TMDLs by listing criteria (see Table 3 in Appendix B for full permit list). Note that among 3,671 unique permits identified, any single permit can fall within a TMDL listed for one or multiple criteria. Therefore, permits described across columns in Table 1 are not mutually exclusive. An individual permit is for a specific discharger, while general permits cover multiple dischargers performing similar activities.

Table 1. Number of potentially impacted dischargers, Top 5 Potentially Impacted Permit Categories, by Criteria

Permit Type	Temp	DO	pH
Construction SW GP	2,263	2,549	1,163
Sand and Gravel GP	218	256	201
Industrial SW GP	182	258	176
Fruit Packer GP	70	54	54
Municipal NPDES IP	46	58	49
Total (Top 5)	**2,779**	**3,175**	**1,643**
Total Including bottom 11 (not shown)	**2,926**	**3,360**	**1,792**

[32] https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d
[33] Based on conversations with Ecology staff, 3-5 years is an average time period for completing most TMDL studies assuming current staff capacity and omitting extreme and unpredictable cases.
[34] TMDLS in this analysis typically represent a full or partial watershed with one or multiple rivers and its tributaries. Impacts of a TMDL also potentially include upstream reaches of listed segments.

Note: GP is “General Permit” and IP “Individual Permit”, SW is “Storm Water”

3.2.2 Potential Actions

From the prospective of a permittee, amendments taken collectively in this rulemaking would result in one of the following actions (behaviors):

1. Meet waste load allocations based on natural conditions criteria developed through the TMDL process using the performance-based approach,
2. Meet site-specific criteria based on natural conditions (supported by a separate Ecology rulemaking),
3. Meet site-specific criteria based on natural conditions (supported by permittee science, followed by a separate Ecology rulemaking).

Compared to an action that would take place without the proposed rule (baseline):

a) Meet waste load allocations based on numeric criteria through the TMDL process,

b) Meet site-specific criteria based on biological study (supported by a separate Ecology rulemaking)

c) Meet site-specific criteria based on biological study (supported by permittee science, followed by a separate Ecology rulemaking)

d) Meet criteria identified through a UAA (supported by a separate Ecology rulemaking)

e) Meet criteria identified through a UAA (supported by permittee science, followed by a separate Ecology rulemaking)

Costs from the proposed rule could originate from any actions taken by permittees to comply with procedures or conditions that generate new capital expenses (e.g. technology, engineering solutions or land acquisition), labor cost (e.g. source control and monitoring), or other miscellaneous activities (studies) compared to costs experienced under baseline conditions.[35] In the face of multiple potential outcomes from the rule and baseline scenarios, this amounts to the costs for any “action pair”, made up of a numbered (1, 2, or 3) potential action taken under the proposed rule, compared to a series of potential baseline states (a, b, c, d, or e) above. There are 3 × 5 = 15 such pairs.

Based on guidance and conversations with Ecology staff (Ecology, 2004), the most likely action pair is meeting waste load allocations based on natural conditions criteria developed through the TMDL process using the performance-based approach compared to a numeric criterion, or action pair 1a. This is because establishing site-specific criteria or a UAA (with or without permittee science) is a very resource intensive process. The need to balance these resources with other water quality activities—such as permit management and TMDL work—means that site-specific criteria and UAA are taken on sparingly, and if so, on significantly extended

[35] Recognizing that the new rule still carries a non-zero cost.

timelines.[36] Actions 2 and 3 under the proposed rule will require a separate rulemaking and regulatory analysis.

For these reasons, we narrow the following analysis to action pair 1a, and briefly discuss 1b-e for completeness.

3.2.3 Costs by Action Pair

Action Pair 1a

Action pair 1a (discussed in Section 3.2.2) would lead to meeting natural conditions criteria through the TMDL study process using a performance-based approach compared to the same process using statewide numeric criteria. From a practical perspective, Ecology would only use natural conditions provisions under the rulemaking for waters that already cannot meet numeric criteria, and suspect that natural conditions, among other things, may be the cause (e.g. waters represented in Table 1).

It is reasonable to assume that alternative criteria that consider local natural conditions and seasonal variation within these waters should be more easily met through fewer actions or investments. That is, there would be no new costs associated with meeting water quality requirements that allows for equal or higher temperature criteria, and/or equal or lower DO criteria (less dissolved oxygen required in the system) compared to the baseline. Since correcting pH up *or* down in effluent may require action, values set higher or lower (or both) than baseline to consider local natural conditions and seasonal variation should also by the same logic result in no new costs.

While the argument that no (new) costs would accrue from the proposed rule is logical, we cannot quantify potential costs of this rulemaking to permits in Table 1 directly because associated TMDL studies have not yet been performed. As a proxy for future TMDL development, Ecology reviewed 8 historical TMDLs developed to protect natural conditions of the water.[37] We summarize their general differences between natural and numeric criteria, the drivers of those differences, and their use in refining standards below.

- From **temperature** modeling scenarios in the reviewed TMDLs, a few degrees Celsius typically made up the difference between natural conditions targets and numeric criteria when applicable. Though it does not reflect the general trend of a few degrees, natural conditions ranged up to 13°C higher than numeric statewide criteria in outlier cases. Natural temperatures, higher than statewide standards, were commonly attributed to limits in vegetative growth, high air temperature, and naturally low flow periods. In most instances, temperature TMDLs were written in such a way that allowed for natural conditions of the system to constitute water quality criteria during parts of

[36] Only one UAA has been completed in Washington and is still under review by the EPA.
[37] Historical TMDLs natural conditions models vary widely by geographic scale (e.g. by stream segment within a watershed), time interval, and seasonal granularity. Modeling techniques also vary over time and space with technology, site access, and available historical data. This makes a systematic review impractical.

the year when exceedances were triggered, and the numeric criterion under naturally cooler periods, so long as they were determined to remain protective.[38]

- Among **DO** modeling scenarios, the difference between numeric criteria and natural DO conditions ranged from a fraction of a mg/L to over 3 mg/L. Natural levels of DO lower than numeric standards were commonly attributed to local rates of stream bank erosion, groundwater with low DO concentrations, aquatic vegetation such as algae and elodea, and storm events. Also note that higher water temperature can have indirect effects on DO through vegetation growth and other natural processes. Like temperature, numeric criteria and the natural conditions were commonly used to develop the TMDL in such a way that refined DO limits to reflect the naturally lower DO concentrations when and where appropriate.
- From **pH** modeling scenarios in the reviewed TMDLs, natural pH values varied as much as 1.5 standard units (SU) beyond the highest/lowest numeric standards.[39] Natural variances in pH were attributed to factors and processes similar to DO such as algal productivity and groundwater contributions. Also, like temperature and DO, pH criteria in these systems were set and allocated in such a way to meet natural conditions in the system.

In historical cases reviewed by the study team, allowing for natural conditions provided the flexibility necessary to avoid paradoxical situations in which permittees would need to improve the quality of the water they discharged to beyond what is achievable without any human influence. Criteria based on natural conditions would require fewer actions or technologies to achieve and maintain protective levels of water quality compared to this reality.

We note that because of this rulemaking, future natural conditions values could be calculated differently than the historical TMDLs reviewed above. Differences come primarily from amended human impact allowances (see Section 2.4.2) and the introduction of the performance-based approach (see Sections 2.4.5 and 2.4.6).

Natural conditions calculated through this process will make up the criteria for the entire duration of the year where data allow, rather than only during periods in which exceedances occurred (e.g., due to seasonal factors like flow and air temperature). If it were determined that for one part of the year natural conditions criteria are more stringent than the biologically based criteria (e.g. lower temperatures in winter months), permittees could face new cost during this period compared to baseline.

Data limitations prevent quantifying a forecast of how often this might occur and to what degree. Bear in mind that criteria set through natural conditions would be technically

[38] In historical TMDL reviewed in this section, the natural condition of temperature was approximated by the system potential through an evaluation of the combined effect of hypothetical natural conditions of site potential riparian vegetation, microclimate improvements, and improved channel widths. The modeling software QUAL2Kw was frequently used in these settings.

[39] Standard units are given on a logarithmic scale. Each number represents a 10-fold change in the acidity/basicness of the water, where 7 is neutral. For example, a pH of five is ten times more acidic than water having a pH of six.

achievable during these periods, while numeric criteria in other parts of the year may not have been without the proposed rulemaking. [40] Compared to zero allowance in the baseline, human allowance in the proposed rule would also work to reduce cost, as would limiting allowances to local and regional sources such that they would not be absorbed by global climate change and cross-border polluters.

Outside of these caveats, evidence suggests that this proposed rulemaking would **not likely impose new costs to potentially impacted permits.** Rather, it is likely that the rulemaking represents a **cost savings (benefit),** as described further below in Chapter 4.

Impacts to Aquatic Life

A material loss in aquatic life in a water body from the proposed rulemaking would constitute a loss of ecosystem services and cost to society. This is especially true for impacts to ESA listed species with uniquely high market and cultural value such as salmonoids. It is important to note that the proposed rulemaking is intended to refine water quality criteria, whilst remaining protective of aquatic life and endangered species. This means that so long as this holds true, there is no cost expected from the proposed rule compared to the baseline. Once adopted, both would be considered protective of aquatic life and designated uses.

To ensure this is the case, Ecology utilized information from previous ESA consultations, prior EPA biological evaluations, EPA memorandums, EPA guidance documents, exploration of how other states and tribes address natural conditions, and the latest scientific information to support the proposed rule (WAC 173-201A-470) (see *inter alia* USEPA 2003, 2005, 2007, 2009, 2015b, 2021, 2023; USFWS, 2008). From similar documentation and consultation with federal agencies, Ecology also ensured that other aspects of the proposed rulemaking, such as human allowances, are *de minimis*. For example:

- The EPA determined the allowable 0.3° C increase in temperature for fresh waters under natural condition scenarios is consistent with recommendations in EPA’s Temperature Guidance (EPA, 2003). This provision allows for an insignificant level of heat from human actions when natural conditions are the applicable criteria or where waters are exceeding the biologically based numeric criteria. The EPA has also noted that absent such a provision, no heat would be allowed from humans when the natural conditions criteria are the applicable criteria. The EPA believed that a 0.3° C or less temperature increase about the natural condition temperature is insignificant because monitoring measurement error for recording instruments typically used in field studies are approximately 0.2° C to 0.3°.
- The EPA determined the allowable 0.2 mg/L decrease of DO for fresh waters and lakes under natural condition scenarios are considered insignificant decreases. EPA noted that DO is a characteristic of the waterbody that can be affected by several parameters (e.g., temperature). Further, 0.2 mg/L is within the monitoring measurement error for

[40] Historical TMDLs typically focus on times of year where waters were impaired. On the extreme end, natural conditions criteria could be more stringent than numeric criteria at all times of the year. However, to our knowledge there is no historical evidence that this condition exists, or would exist in future TMDLs.

recording instruments typically used to monitor dissolved oxygen. Ecology's rule requires that a decrease in DO from natural conditions equal 10% of the water body's DO or 0.2 mg/L, whichever is lower. This amendment provides additional safeguards in naturally hypoxic waters (<2 mg/L of DO).

Action Pair 1b-c

Action pair 1b-c amounts to meeting natural conditions criteria through the TMDL study process using the performance-based approach, compared to criteria developed using biological data collected in site-specific studies.

Both alternatives in these action pairs are intended to allow for a departure from statewide numeric criteria based on local conditions. However, criteria in the baseline scenario, despite being site-specific, must still be biologically based. Like 1a, criteria considering natural conditions and seasonal variation within that system are likely to be more easily met by permittees through fewer actions or investments and present no new costs.

Beyond this general logic, to our knowledge there are no examples to draw from in which a site-specific study established biologically based criteria without natural conditions (a proxy for baseline action a); then later for the same water body, established natural conditions criteria through the TMDL process (proxy for action 1 in the proposed rule).

Because Ecology would carry out the full process of considering, proposing, and adopting site-specific criteria, there would be no administrative costs differences to permittees under 1b. If a permittee were to elect to privately fund science in support of the site-specific criteria (1c), the proposed rulemaking represents an avoided cost of such a study (i.e. a benefit, see Chapter 4).

Action Pair 1d-e

Action pair 1d-e amounts to meeting natural conditions criteria through the TMDL study process using the performance-based approach, compared to meeting a different designated use through UAA.

As with site-specific criteria discussed in 1b and 1c, there is insufficient historic data to analyze potential permittee behavior in terms of meeting natural conditions criteria, compared to meeting a different designated use through UAA.[41]

Because Ecology would carry out the full process of considering, proposing, and adopting criteria based on UAA, there would be no administrative costs differences to permittees under 1d. If a permittee were to elect to privately fund science in support of a UAA (1e), the proposed rulemaking represents an avoided cost of such a study (i.e. a benefit, see Chapter 4).

3.2.4 Cost Summary

In this section, we considered the likely costs associated with the proposed rule amendments as implemented together.

[41] Only one UAA has been completed in Washington and is still under review by the EPA.

We determined that the most likely action to occur because of this rulemaking—that would not require additional rulemaking—is meeting waste load allocations based on natural conditions criteria developed through the TMDL process using the performance-based approach compared to numeric temperature, DO, and / or pH criterion. After filtering future TMDL studies for these criteria, with potential for natural conditions, and prioritized in the next 20 years, we identified 3,671 associated permits (see Table 1).

We cannot quantify the costs of the proposed rulemaking to associated permits because future TMDL studies have not been performed yet. Historical TMDLs reviewed by the study team and the general logic of natural conditions provisions suggest that criteria considering local factors and seasonal variation would be more easily met through fewer actions or investments up to avoiding paradoxical situations in which permittees need to improve the quality of the water they discharged to beyond what is achievable without any human influence. In other words, the most likely actions, taken because of the proposed rulemaking, are **not likely to impose new costs.**[42] Rather, the proposed rulemaking likely represents a **cost savings (benefit),** as described further below in Chapter 4.

Meeting waste load allocations based on natural conditions criteria developed through the TMDL process compared to other, but unlikely, baseline scenarios such as developing site-specific criteria, or UAA, also likely carry no new costs.

The baseline conditions and proposed rulemaking (if adopted) would be considered protective of aquatic life and designated uses. Therefore, we do not expect new costs or benefits from a material change in related ecosystem services.

Chapter 4: Likely Benefits of the Proposed Rule Amendments

4.1 Introduction

We analyzed the likely benefits associated with the proposed rule amendments, as compared to the baseline. The proposed rule amendments and the baseline are discussed in detail in Chapter 2 of this document.

4.2 Benefits analysis

As discussed in Chapter 2, and reprinted from Chapter 3, the collective proposed rule amendments interact and work in tandem to generate impacts. Given that the baseline has no

[42] We note that if it were determined that for one part of the year natural conditions criteria are more stringent than the biologically based criteria (e.g. lower temperatures in winter months), permittees might face new cost during this period compared to baseline under the proposed rule. However, other aspects of the proposed rule like the human allowance and limiting allowances to local and regional sources, could mitigate these to an unknown degree. The net impact on costs would depend on the relative size of new costs and cost-savings. Ultimately, data limitations prevent us from quantifying a forecast of how often this might occur and the net cost if such a scenario.

federally-approved natural conditions provisions, it is not practical to analyze every component of the rulemaking individually. We proceed instead by describing the impacts of the following amendments on the behavior of affected parties **as implemented together** (e.g. restoring natural conditions, as amended, for the purposed of federal actions):

Proposed revisions to existing criteria:

- Updates to the natural conditions provision to limit use to aquatic life criteria.
- Updating allowances for human impacts to fresh and marine waters for dissolved oxygen and temperature when the natural conditions constitute the water quality criteria
- Updates to the site-specific criteria process for an allowance for natural conditions to be used as a basis for developing these criteria.

Other proposed changes:

- Adding definitions for the performance-based approach and local and regional sources of human-caused pollution.
- Adding a new section detailing the use of the performance-based approach and applicable aquatic life criteria.
- Adding a rule document referenced in the water quality standards that details the methodology of the performance-based approach.

Minor non-substantive edits:

- One update to reflect the latest and current revision for a referenced EPA document

4.2.1 Benefits by Action Pairs

Benefits from this rulemaking would be borne from avoiding the cost of compliance with baseline scenarios in the absence of the proposed rulemaking. This includes any additional capital expenses (e.g. technology, engineering solutions or land acquisition), labor cost (e.g. source control and monitoring), or other miscellaneous activities (e.g. scientific study) required compared to those expected under the proposed rule. Table 1 in Chapter 3 summarizes permits potentially affected by this rulemaking. Various outcomes of the proposed rulemaking and baseline alternatives, or "action pairs", can be reviewed in Section 3.2.1.

Action Pair 1a

As noted in Section 3, action pair 1a—meeting natural conditions criteria developed through the TMDL study process using the performance-based approach compared to the same process using statewide numeric criteria—is the most likely action in this analysis and would apply in some fashion to most permits in Table 1.

Based on the general logic and intent of natural conditions criteria to refine criteria values, and Ecology's review of historical TMDLs, this scenario is likely to generate benefits.

1. Because natural conditions are suspected to be part of the driving force behind permits exceeding numeric criteria in Table 1, it is reasonable to assume that considering local variation in temperate, DO and pH would result in fewer actions and investments required to comply with refined criteria limits.
2. Almost all historical TMDLs that develop WLA based on natural conditions (see Section 3.2.3) reviewed by the study team allowed some flexibility to permittee compliance. This amounted to small allowances for higher temperature (e.g. a couple degrees Celsius), DO (e.g. a fraction of a mg/L), and pH variation (e.g. fraction of a standard unit) in parts of the year for some segments of a water body, compared to their statewide numerical equivalents.
3. In other historic TMDLs that develop WLA based on natural conditions, naturally occurring temperature, DO, and pH, varied from numeric criteria by as much as 13°C, 3 mg/L, and 1.5 standard units respectively. To the degree that similar or larger differences exist in future TMDLs, permittees in Table 1 could face a paradoxical situation under the baseline in which they must improve the quality of the water they discharged to well beyond what is achievable, even without human influence. The proposed rulemaking could prevent major engineering solutions otherwise needed to remain in compliance, or at the extreme end, prevent ceasing operations for part of the year or all together.

Outside of likely being non-zero, we are unable to identify the exact magnitude of these benefits (avoided costs) by potentially affected permittees (Table 1). This is because WLAs under the baseline or proposed rulemaking for these are currently unknown. In addition behavior would depend on a wide variety of facility types, with potentially multiple discharges, all taking different actions in response to compliance.

Benefits – Temperature

To illustrate just one select benefit pathway, we provide a stylized example of a small adjustment to effluent temperature required in the absence of the proposed rule (i.e. a benefit of this action pair under proposed rulemaking).

In this example, we only consider permits in the top 5 permit types likely impacted to be conservative in our assessment of benefits (see Table 1). From the highest to lowest number of impacted permittees, this includes 2,263 Construction Stormwater general permittees, 218 Sand and Gravel general permittees, 182 Industrial Stormwater general permittees, 70 Fruit Packing general permittees, and 46 municipal wastewater treatment plants.

We assume that all affected permits, regardless of type, would be required to cool their discharge by at least 1 degree Fahrenheit (0.56 Celsius) for at least part of the year to meet numeric standards in the absence of the proposed rulemaking. We recognize that several of these permit types, such as construction stormwater and sand and gravel, are not commonly responsible for raising the temperature of water, nor are commonly required to cool effluent. But in a hypothetical waterbody for this analysis, it is the fact that site conditions are naturally higher (hotter) than numeric criteria that would lead all associated permits under the TMDL to be responsible for lowering effluent temperature.

The cost of a thermal reduction to surface water from effluent can vary greatly depending on application and volume. Table 2 contains a non-exhaustive list of methods recommended to decrease the temperature impacts to surface water. Values in Table 2 are presented as industrial or water treatment plant solutions, broken out by component in such a way that allows for generalization to other applications (Jenkins, 2007).

Table 2. Common Surface Water Cooling Techniques and Costs

Effluent Cooling Modifications	Description	Cost
Clarifier Covers	This method provides shade over clarifiers to reduce the amount of solar radiation reaching the wastewater before discharge.	Approximately $180,000 for a 50' diameter clarifier
Seasonal Storage	Holding treated effluent in a reservoir until stream temperature has decreased.	$0.18 to $2.60 per cubic foot of storage volume
Move Discharge Location	Discharging effluent to a different portion of the stream or to a different surface water body altogether.	$180 - $1800 per linear foot of pipeline
Multiple Port Diffusers	Releasing effluent through multi-port diffuser systems in several locations simultaneously into the receiving water.	$370 - $2800 per foot of diffuser
Effluent Blending	Mixing treated effluent with cooler groundwater or surface water prior to discharge.	$140 - $275 per foot for a well or $180 - $275 per lineal foot for a pipeline
Unlined Ponds	Contain treated effluent and allow it to percolate into the subsurface.	$0.45 - $0.90 per gallon of storage
Riparian Shading	Establishing streamside forests to provide shade over receiving water.	Example cost: Property purchase = $36,750 per acre, Plant starts = $4.60 per plant, Density = 2,614 plants per acre
Cooling Ponds	A shallow reservoir designed to receive warm water and discharge cool water, relying on evaporative and radiative heat loss.	$0.18 to $0.40 per cubic foot of storage volume

Effluent Cooling Modifications	Description	Cost
Cooling Towers	An evaporative cooling method used to dissipate heat from process water.	Example cost: $237,150 for a 0.05 MGD plant
Chillers	Devices that employ an evaporator, compressor, condenser, and refrigerant to remove heat from a liquid.	$46,000 - $110,300 per MGD per degree Fahrenheit and an additional $9,200 - $18,400 per MGD per degree Fahrenheit per year in operating costs

Note: Values in table range from 2001 to 2005 dollars depending on technology.

For construction stormwater, sand and gravel, and fruit packer general permits we estimated the price to install a small cooling pond as a low-cost option to comply to the baseline scenario. These shallow reservoirs are designed to receive warm water and discharge cool water through evaporative and radiative heat loss. Note in Table 2 that ponds may double as holding tanks for effluent until stream temperature has decreased. We assume an average engineered cooling pond, with the ability to hold 40,000 cubic feet of water, can be constructed for a fixed cost of $14,946 in 2024 dollars.[43]

Industrial stormwater general permits include air and seaports, large manufacturing facilities, refineries, and commercial food processors, with the potential of treating and discharging millions of gallons of effluent per day. Together with municipal wastewater treatment permits, more sophisticated methods of cooling would likely be required for these facilities to meet marginal cooling requirements necessary without the proposed rule. To estimate the cost of cooling effluent in these facilities, we assumed the need for more advanced technology such as cooling towers or chillers. Using information from Jenkins (2007) we estimated the cost to a mid-sized 3 million gallons per day (MGD) system using these technologies to lower effluent temperatures 1 degree Fahrenheit is $686,923 in capital costs and $114,591 per year in operating and maintenance (O&M) in 2024 dollars.[44,45]

Benefits described above will not accrue all at once upon the adoption of this rulemaking; rather, they would be staggered across time depending on TMDL priority and where the receiving permit is within its 5-year renewal cycle. To calculate the net present value over a 20-

[43] Adjusted upward from initial estimates of $7,200 from 2005 data in Jenkins, 2007. Adjustments were made using Producer Price Index by Commodity: Machinery and Equipment: Domestic Water Systems (https://fred.stlouisfed.org/series/WPU11411311). Does not include the cost of any land acquisition that, if avoided under the proposed rule, would increase this benefit.

[44] Note that in many cases these estimates are conservative with respect to facility size. For example, very large water treatment plants (upwards of 90 MGD), could require as much as $10 million in infrastructure alone and $1.6 million per year in O&M for a single plant to cool effluent by 1 degree Fahrenheit.

[45] Adjusted upward from initial capital and O&M estimates of $330,900 and $114,591 from 2005 data in Jenkins, 2007. Adjustments were made using Producer Price Index by Commodity: Machinery and Equipment: Domestic Water Systems (https://fred.stlouisfed.org/series/WPU11411311)

year period, we consider again Ecology's TMDL priority rankings (discussed in Section 3.2.1) and add 5 years to the latest date that the TMDL might begin to allow for research time and idiosyncratic lags in permit renewal. That is:

- Permittees under high priority TMDLs for temperature (1,299) receive benefits 5 years after adoption.
- Permittees under medium priority TMDLs for temperature (1,197) would begin receiving benefits 10 years after adoption.
- Permittees under medium-low priority TMDLs for temperature (283) would begin receiving benefits 20 years after adoption.

Conditional on assumptions discussed above in this exercise (e.g. a 1 degree Fahrenheit reduction, required by all permittees in the top 5 permit in the next 20 years) the total net present value of benefits from the proposed rule over a 20 year horizon would be just over $356 million.[46,47]

Benefit – DO

When high levels of nutrients fuel excessive marine plant life, such as algae, oxygen is consumed when plants later die and decompose. Nutrient removal is therefore one of the main, and potentially costly, strategies used when mitigating dissolved oxygen depletion in fresh and marine water.

We emphasize that the proposed rulemaking would not absolve impacted permittees from treating nutrients in their effluent. However, any marginal refinements to DO criteria based on natural conditions provisions could provide financial relief to facilities otherwise facing the need for additional technologies to meet numeric standards. In this way, setting DO criteria values based on natural conditions represents a potential benefit under the proposed rule.

Reiterated from above, it is not possible to know how natural conditions criteria will differ from numeric DO criteria for permits in Table 1, or how those differences would translate to nutrient requirements in TMDL waste load allocations. Available data on nutrient treatment costs are also not commonly presented in marginal units of removed nutrients (e.g. a dollar amount for every unit of nitrogen or phosphorus), making such an analysis additionally impractical.

Under these caveats, the most conservative assumption we can make with available data is that the lowest known facility cost of treatment would be sufficient to satisfy an arbitrary difference between numeric based DO requirements in the baseline and natural conditions provisions under the proposed rule. As another illustrative example, this time focused on nutrient

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[46] Discounted at 0.9%, the 20-year average of fixed real annual rates. Fixed rate of return to inflation-indexed I-Bonds by US Treasury Department (https://www.treasurydirect.gov/savings-bonds/i-bonds/i-bonds-interest-rates/).

[47] Without considering modifications by construction permits, this estimate is just under $325 million (after making assumptions discussed elsewhere in this section such as a 1 degree Fahrenheit reduction, required by all remaining permittees in the next 20 years).

removal, we apply these arbitrary facility and operational changes to permits in the top 5 likely impacted permit types (see Table 1).

Considering impacts wastewater treatment, we assume again an average municipal treatment facility size of 3 MGD. In 2011, Ecology produced a technical report identifying cost estimates for a suite of wastewater treatment technologies to achieve a range of different effluent quality performance targets with respect to nutrients (Ecology, 2011). This report, as summarized by the EPA (2015a), finds constructed or retrofitted treatment technologies for removing nutrients, such as inorganic nitrogen, come at a capital cost ranging from $0.1/MGD/year to nearly $100/MGD/year, with typical costs cited as averaging $25/MGD/year. Annual O&M for these systems ranged from $0.01/MGD/year to $1.85/MGD/year.[48,49] Applying $0.1/MGD and $0.01/MGD for capital and O&M cost, and adjusting to current price levels, the estimated cost to remove an arbitrarily small amount of nitrogen is $488,790 per facility in capital costs, and $48,879 in annual O&M.[50]

For the treatment of nutrients in industrial and agricultural applications the USEPA (2015a) points to publications that primarily draw from foodstuffs, beverages, livestock, and agricultural producers. Technologies used in these industries include enhanced aeration, modified Ludzack-Ettinger process, and chemical treatment that would apply to Fruit Packer general permits, and generalizable to many other large-footprint facilities found in Industrial stormwater general permits not directly included in the aforementioned industries. While unable to recover unit costs, the minimum estimated total cost for these technologies used to achieve a reduction in nutrients at the facility level was $241,570 in upfront capital and $119,164 annually for O&M in 2024 dollars.

Potential costs borne by construction wastewater and sand and gravel permits are even less clear. For the purposes of this exercise, we assume that complying with a small arbitrary reduction in nutrients would include moving materials such as fertilizers and landscaping material out of the path of stormwater, ensuring proper operation and maintenance of any treatments already installed, and updating plans to minimize unnecessary land disturbance. Assuming 40 hours of labor per year for these activities by existing staff, and the Bureau of Labor Statistics median pay for Environmental Engineering Technicians, ($24.51 per hour), we estimated $980.04 annually (BLS, 2023).

As with temperature, we applied benefits at the permit level over time based on permit type and TMDL priority over a 20-year horizon. We again limit this analysis to the top 5 affected permit categories described in Table 1 to be consistent and additionally conservative.

[48] Employed technologies range from activated sludge, lagoons, membrane bioreactors, rotating biological contactors, sequencing batch reactors, and trickling filters.

[49] 2012 dollars.

[50] Adjustments made using Producer Price Index by Commodity: Machinery and Equipment: Domestic Water Systems (https://fred.stlouisfed.org/series/WPU11411311).

Conditional on assumptions discussed above (e.g. an arbitrary reduction in nutrients, required by all permittees in the top 5 permit categories over 20 years), the net present value of this stream of benefits is estimated to be just over $319 million.

Benefit – pH

As with Temperature and DO requirements, benefits of avoided compliance cost with numeric pH criteria, compared to those based on an applicable natural condition criterion, would likely be positive. Due to a lack of publicly available data on the cost of pH neutralization, the study team is currently unable to illustrate these benefits quantitatively.

Action Pair 1b-c

Action pair 1b-c amounts to meeting natural conditions criteria through the TMDL study process using the performance-based approach, compared to criteria developed using biological data collected in site-specific studies.

Both alternatives in the action pair are intended to allow for a departure from statewide numeric criteria based on local conditions. However, criteria in the baseline scenario, despite being site-specific, must still be biologically based. Like in action 1a, criteria considering natural conditions and seasonal variation within that system are likely to be more easily met by permittees through fewer actions or investments, representing an avoided cost (benefit).

If a permittee were to elect to privately fund science in support of the site-specific criteria (action 1c), the proposed rulemaking represents an additional benefit in the form of avoided costs of such a study. The benefit of this avoided study component could range from tens to hundreds of thousands of dollars depending on the size, complexity, and detail needed to effectively substantiate site-specific criteria .

Action Pair 1d-e

Action pair 1d-e amounts to meeting natural conditions criteria through the TMDL study process using the performance-based approach, compared to meeting a different designated use through UAA.

There is insufficient historic data to analyze potential permittee behavior in terms of meeting natural conditions criteria, compared to meeting a different designated use through UAA. If a permittee were to elect to privately fund science in support of a UAA (1e), the proposed rulemaking represents an additional benefit in the form of avoided costs of such a study. However, there is very little data to estimate a range quantitatively. [51]

4.2.2 Benefits Summary

In this section, we considered the likely benefits associated with the proposed rule amendments as implemented together.

[51] Only one UAA has been completed in Washington and is still under review by the EPA.

As described in Section 3, we assumed that the most likely action to occur because of this rulemaking—that would not undergo additional rulemaking—is meeting waste load allocations based on natural conditions criteria developed through the TMDL process using the performance-based approach compared to a numeric temperature, DO, and or pH criterion.

Based on historical TMDLs reviewed by the study team, and the general logic of natural conditions provisions, we expect a potentially wide range of benefits associated with the proposed rule amendments. For many, criteria considering local factors and seasonal variation under this proposed rulemaking will be more easily met through fewer actions or investments on the margin. For others, benefits would include avoiding the need to eliminate discharge and associated economic activity completely for all or part of the year completely to avoid paradoxical situations in which permittees must improve the quality of the water they discharged to beyond what is achievable without any human influence.

We cannot fully quantify the extent of potential benefits of the proposed rulemaking because future TMDL studies have not been performed yet. However, through a pair of illustrative examples, we applied a small and arbitrary temperature and DO criteria change to potentially impacted permits—akin to just one scenario when meeting natural conditions under the proposed rulemaking. We estimated a total 20-year present value benefit of $675 million through this exercise, but stress that this represents partial benefits and should be considered a conservative lower bound.

Additional, but unquantified, benefits include avoided costs of meeting numeric criteria for freshwater pH compared to a natural condition based criteria, and any avoided cost of independent science by permittees in support of Ecology performing site-specific criteria and UAA in the baseline.

The baseline conditions and proposed rulemaking (if adopted) would be considered protective of aquatic life and designated uses. Therefore, we do not expect new costs or benefits from a material change in related ecosystem services.

Chapter 5: Cost-Benefit Comparison and Conclusions

5.1 Summary of costs and benefits of the proposed rule amendments

Due to data limitations, we cannot quantify the costs of the proposed rulemaking to associated permits (see Section 3.2). However, the most likely actions taken because of the proposed rulemaking are not likely to impose new costs, but rather produce benefits in the form of avoided costs. Historical TMDLs reviewed by the study team and the general logic of natural conditions provisions suggest that criteria considering local factors and seasonal variation would be more easily met through fewer actions or investments—up to avoiding paradoxical situations in which permittees need to improve the quality of the water they discharged to beyond what is achievable without any human influence. In this way, the proposed rulemaking is not likely to impose new costs, but rater cost savings (benefit).

Due to data limitations, we cannot fully quantify the extent of potential benefits of the proposed rulemaking. However, through a pair of illustrative examples, we applied a small and arbitrary temperature and DO criteria change to a selection of potentially impacted permits—akin to just one scenario when meeting natural conditions under the proposed rulemaking. Through this exercise, we estimated a total 20-year present value benefit of $675 million, but stress that this represents partial benefits and should be considered a conservative lower bound. Additional, but unquantified, benefits include avoided costs of meeting numeric criteria for freshwater pH compared to a natural condition based criteria, and any avoided cost of independent science by permittees in support of Ecology performing site-specific criteria and UAA in the baseline.

The baseline conditions and proposed rulemaking (if adopted) would be considered protective of aquatic life and designated uses. Therefore, we do not expect new costs or benefits from a material change in related ecosystem services.

5.2 Conclusion

We conclude, based on a reasonable understanding of the quantified and qualitative costs and benefits likely to arise from the proposed rule amendments, as compared to the baseline, that the benefits of the proposed rule amendments are greater than the costs.

Chapter 6: Least-Burdensome Alternative Analysis

6.1 Introduction

RCW 34.05.328(1)(c) requires Ecology to "…[d]etermine, after considering alternative versions of the rule and the analysis required under (b), (c), and (d) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection." The referenced subsections are:

> (a) Clearly state in detail the general goals and specific objectives of the statute that the rule implements;
>
> (b) Determine that the rule is needed to achieve the general goals and specific objectives stated under (a) of this subsection, and analyze alternatives to rule making and the consequences of not adopting the rule;
>
> (c) Provide notification in the notice of proposed rulemaking under RCW 34.05.320 that a preliminary cost-benefit analysis is available. The preliminary cost-benefit analysis must fulfill the requirements of the cost-benefit analysis under (d) of this subsection. If the agency files a supplemental notice under RCW 34.05.340, the supplemental notice must include notification that a revised preliminary cost-benefit analysis is available. A final cost-benefit analysis must be available when the rule is adopted under RCW 34.05.360;
>
> (d) Determine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented.

In other words, to be able to adopt the rule, we must determine that the requirements of the rule are the least burdensome set of requirements that achieve the goals and objectives of the authorizing statute(s).

We assessed alternative proposed rule content and determined whether they met the goals and objectives of the authorizing statute(s). Of those that would meet the goals and objectives, we determined whether those chosen for inclusion in the proposed rule amendments were the least burdensome to those required to comply with them.

6.2 Goals and objectives of the authorizing statute

The authorizing statute for this rule is Chapter 90.48 RCW, Water Pollution Control. Its goals and objectives include the state of Washington's policy of maintaining the highest possible standards to ensure the purity of all waters of the state consistent with public health, public enjoyment, the protection of wildlife, and the industrial development of the state. This requires the use of all known available and reasonable methods to prevent and control the pollution of the waters of the state of Washington.

RCW 90.48.035, Rule-making authority, specifically authorizes Ecology to promulgate, amend, or rescind rules and regulations as deemed necessary to maintain the highest possible standards of all waters in the state. Its goals and objectives include but are not limited to rules relating to standards of quality of waters of the state and regulating substances discharged into them.

6.3 Alternatives considered and why they were excluded

We considered the following alternative rule requirements and did not include them in the proposed rule amendments. This list includes alternatives that were suggested by the public during development of the rule, with the intent of mitigating negative impacts, including environmental harms, on vulnerable populations and overburdened communities, and equitably distributing benefits. Each section below explains why we did not include these alternatives.

- Updating human allowance and natural condition provisions only (i.e., no performance-based approach).
- Updating natural condition provision only (i.e., no human allowance or performance-based approach).
- No natural condition updates

6.3.1 Updating human allowance and natural condition provisions only

We considered updating only the human allowance and natural conditions provisions in the proposed rule, but not including a performance-based approach. This alternative would potentially be more burdensome for permittees. If a water is not meeting biologically based numeric criteria, and that is due in part to natural conditions, then there would only be two pathways for determining protective criteria based on natural conditions: a use change through a Use Attainability Analysis (which could result in different criteria values); or criteria change through site-specific criteria development. Both approaches would require separate WQ Standards rulemaking and would need to undergo EPA review (including any ESA consultation with NOAA NMFS and USFWS) and approval prior to being in effect for CWA purposes.

6.3.2 Updating natural condition provision only

We considered updating only the natural condition provision in the proposed rule, but not including the human allowance or the performance-based approach. This alternative would potentially be more burdensome for permittees. If a water is not meeting biologically based numeric criteria, and that is due in part to natural conditions, then there would only be two pathways for determining protective criteria based on natural conditions if no performance-based approach exists: a use change through a Use Attainability Analysis (which could result in different criteria values); or criteria change through site-specific criteria development. Both approaches would require separate WQ Standards rulemaking and would need to undergo EPA review (including any ESA consultation with NOAA and USFWS) and approval prior to being in effect for CWA purposes.

In addition, if no human allowance is provided in rule, then when natural conditions are the applicable criteria, NO degradation for temperature or DO would be allowed. This would be unnecessary for protection of aquatic life and unnecessarily costly. See rulemaking Technical Support Document for further details.

6.3.3 No Rulemaking

We considered not doing this rulemaking. Without natural conditions criteria, the applicable biologically based numeric criteria would apply and must be met to protect existing and designated aquatic life uses. Some waters during some periods of the year may not be able to meet these criteria due to natural and seasonal variations. This could be the case even if all human impact was reversed and removed from this determination. Thus, it would be more burdensome to covered parties as applicable criteria would not be able to be met regardless of any actions taken (See Appendix A(B)(2) for additional details).

6.6.4 Alternative DO Allowance 1

We considered an alternative DO allowance that states when natural conditions constitute the water quality criteria for a site, local and regional sources of human-caused pollution considered cumulatively may not decrease DO more than 0.2 mg/L.

We excluded this possibility as we determined it would not be protective of aquatic life when waters were naturally low in DO (i.e., <2 mg/L), and therefore does not meet goals and objectives. For instance, if waters were naturally 1.0 mg/L for DO Concentration, a 0.2 mg/L decrease to 0.8 mg/L would have negative impact on aquatic life; therefore, this would not be protective and would not represent a de minimis amount of degradation.

6.6.5 Alternative DO Allowance 2

We considered an alternative DO allowance that states when natural conditions constitute the water quality criteria for a site, local and regional sources of human-caused pollution considered cumulatively may not decrease DO more than 0.2 mg/L only if the natural condition criteria of the water is > or = 2.0 mg/L. Otherwise, no further degradation of the waters are allowed.

We excluded this possibility because it would be unnecessarily stringent, and thus overly burdensome for permittees, compared to what is needed for protection of aquatic life (see EPA's 2007 Biological Evaluation regarding 0.2 mg/L for fresh water systems). Additionally, because we may be using water quality models to estimate natural condition values, there will inherently be some error associated with estimation. Trying to meet no degradation (i.e., 0) is difficult when you must account for associated model error. Thus, no allowance in this alternative prevents accounting for natural condition estimation error in our modeling process in TMDLs.

6.4 Conclusion

After considering alternatives, within the context of the goals and objectives of the authorizing statute, we determined that the proposed rule represents the least-burdensome alternative of possible rule requirements meeting the goals and objectives.

Chapter 7: Regulatory Fairness Act Compliance

We analyzed the compliance costs of the proposed rule amendments in Chapter 3 of this document. We conclude that the proposed rule amendments are not likely to result in compliance costs for any businesses. The proposed rule is likely to result only in cost-savings for dischargers, as compared to the baseline. Based on this analysis, Ecology is exempt from performing additional analyses under the Regulatory Fairness Act, under RCW 19.85.025(4) which states that, "This chapter does not apply to the adoption of a rule if an agency is able to demonstrate that the proposed rule does not affect small businesses." Moreover, by not imposing compliance costs, the proposed rule amendments do not meet the RFA applicability standard under RCW 19.85.030(1)(a).

References

RCW 34.05.272 requires Ecology to categorize sources of information used in significant agency actions made in the Water Quality Program.

Independent peer review

Review is overseen by an independent third party.

n/a

Internal peer review

Review by staff internal to Ecology.

Jenkins, Pam. 2007. Methods to Reduce or Avoid Thermal Impacts to Surface Water (Publication 07-10-088). Available at: https://apps.ecology.wa.gov/publications/SummaryPages/0710088.html

External peer review

Review by persons that are external to and selected by Ecology.

n/a

Open review

Documented open public review process that is not limited to invited organizations or individuals.

n/a

Legal and policy documents

Documents related to the legal framework for the significant agency action, including but not limited to: federal and state statutes, court and hearings board decisions, federal and state administrative rules and regulations, and policy and regulatory documents adopted by local governments.

40 CFR Section 131.

Chapter 90.48 RCW: Water Pollution Control.

Chapter 173-201A WAC: Water quality standards for surface waters of the state of Washington.

Davies, Tudor T. 1997. Establishing Site Specific Aquatic Life Criteria Equal to Natural Background. Memorandum to Water Management Division Directors, EPA Regions 1-10, and State and Tribal Water Quality Management Program Directors. Dated 5 November 1997. Office of Water, Office of Science and Technology. Washington, D.C. Available at: http://water.epa.gov/scitech/swguidance/standards/upload/2009_01_29_criteria_naturalback.pdf

Opalski, Daniel. 2021. EPA's Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions. Water Division, USEPA Region 10, Seattle, Washington. Available at: https://fortress.wa.gov/ecy/ezshare/wq/standards/EPA_ActionsNCC_Nov192021.pdf.

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United States Environmental Protection Agency (USEPA). 2003. EPA Region 10 Guidance For Pacific Northwest State and Tribal Temperature Water Quality Standards. Region 10, Office of Water, Seattle, Washington. EPA 910-B-03-002.

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n/a

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Appendix A: Administrative Procedure Act (RCW 34.05.328) Determinations

A. RCW 34.05.328(1)(a) – Clearly state in detail the general goals and specific objectives of the statute that this rule implements.

See Chapter 6.

B. RCW 34.05.328(1)(b) –

1. Determine that the rule is needed to achieve the general goals and specific objectives of the statute.

See chapters 1 and 2.

2. Analyze alternatives to rulemaking and the consequences of not adopting this rule.

A rulemaking is the only way to adopt natural conditions provisions and criteria. If we do not adopt this rule, then waters would need to meet applicable biologically based numeric aquatic life criteria. As some waters cannot meet these aquatic life numeric criteria due to natural or seasonal variations, then without this rule, these waters would not meet applicable water quality standards and may be considered impaired, even if fully protecting all existing and designated uses. In addition, if natural conditions are the sole cause of a violation of the applicable biologically based aquatic life criteria, then listing these waters as impaired would go against the intent of the legislature (RCW 90.48.570(3)).

If we do not adopt a performance-based approach during this rulemaking, then any site-specific criteria development for determining natural conditions criteria would need to go through rulemaking, including EPA review, prior to being used for state and federal Clean Water Act purposes. A consequence of such approach would be a possibly lengthy delay between developing a protective site-specific criterion based on natural conditions of the water body and the ability to use such criterion in a Clean Water Act action (e.g., TMDLs).

If we do not adopt human-use allowances for temperature and dissolved oxygen, then when natural conditions constitute the criteria for a water, there would be no allowance for any degradation by human actions. EPA has previously determined, and Ecology agrees, that such approach would be unnecessary for the protection of existing and designated uses and would be unnecessarily costly for entities with stake in those waters.

Please see the Least Burdensome Alternative Analysis, Chapter 6 of this document, for discussion of alternative rule content considered.

C. RCW 34.05.328(1)(c) - A preliminary cost-benefit analysis was made available.

When filing a rule proposal (CR-102) under RCW 34.05.320, Ecology provides notice that a preliminary cost-benefit analysis is available. At adoption (CR-103 filing) under RCW 34.05.360, Ecology provides notice of the availability of the final cost-benefit analysis.

D. RCW 34.05.328(1)(d) – Determine that probable benefits of this rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs and the specific directives of the statute being implemented.

See Chapters 1 – 5.

E. RCW 34.05.328 (1)(e) - Determine, after considering alternative versions of the analysis required under RCW 34.05.328 (b), (c) and (d) that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated in Chapter 6.

Please see Chapter 6.

F. RCW 34.05.328(1)(f) - Determine that the rule does not require those to whom it applies to take an action that violates requirements of another federal or state law.

Under the Federal Clean Water Act, states are required to adopt water quality standards that consist of designated uses, water quality criteria that protect those uses, and an antidegradation policy. These standards must protect the public health or welfare, enhance the quality of the water, and serve the purposes of the Act. States must adopt water quality criteria that protect designated uses. States adopt EPA recommended CWA Section 304(a) criteria, modified CWA Section 304(a) criteria that reflect site-specific conditions, or other criteria so long as they are based on sound scientific rationale and protect the designated uses of the water (40 CFR 131.11).

EPA's policy on natural conditions states that site-specific numeric aquatic life criteria can be set equal to natural background, where natural background is defined as "background concentration due only to non-anthropogenic sources, i.e., non-manmade sources." States that wish to set criteria equal to natural background must include, at minimum, in their water quality standards: (a) a definition of natural background; (b) a provision that allows setting site-specific criteria equal to natural background; and (c) a binding procedure for determining natural background.

Ecology amended and introduced new natural conditions provisions and criteria in 2003 and 2006 to be consistent with federal requirements for use of natural conditions in effect at the time. Since then, certain natural condition provisions have been reconsidered by EPA and disapproved. Any new or updated natural conditions criteria will be consistent with current federal requirements and policy for use of natural conditions, and these criteria and associated provisions are reviewed and approved by EPA before becoming effective for Clean Water Act actions.

G. RCW 34.05.328 (1)(g) - Determine that the rule does not impose more stringent performance requirements on private entities than on public entities unless required to do so by federal or state law.

No. The rule does not impose more stringent performance requirements on private entities than on public entities. Any entity, private or public, must adhere to the rules protecting water quality in the state of Washington.

H. RCW 34.05.328 (1)(h) Determine if the rule differs from any federal regulation or statute applicable to the same activity or subject matter.

No.

- If **yes**, the difference is justified because of the following:

☐ (i) A state statute explicitly allows Ecology to differ from federal standards.

☐ (ii) Substantial evidence that the difference is necessary to achieve the general goals and specific objectives stated in Chapter 6.

I. RCW 34.05.328 (1)(i) – Coordinate the rule, to the maximum extent practicable, with other federal, state, and local laws applicable to the same subject matter.

We will work with EPA to ensure that the proposed rules are approvable.

Appendix B: Additional Tables and Figures

Table 3. Potentially Impacted Permit Categories, by Criteria

Permit Type	Temp	DO	pH
Construction SW GP	2,263	2,549	1,163
Sand and Gravel GP	218	256	201
Industrial SW GP	182	258	176
Fruit Packer GP	70	54	54
Municipal NPDES IP	46	58	49
Industrial (IU) to POTW/PRIVATE SWDP IP	30	45	36
Industrial NPDES IP	22	25	24
Bridge Washing GP	16	15	11
Upland Fish Hatchery GP	15	17	13
Industrial to ground SWDP IP	14	20	17
Municipal to ground SWDP IP	11	16	18
AP Irrigation System Aquatic Weed Control GP	10	14	14
Water Treatment Plant GP	8	8	6
Puget Sound Nutrient GP	6	9	3
Boatyard GP	5	6	1
Net Pens NPDES IP	3	3	0
Reclaimed Water IP	3	3	2
Winery GP	3	3	3
Total	2,926	3,360	1,792

Note: GP is "General Permit" and IP "Individual Permit"

Washington State's Marine Dissolved Oxygen (DO) Criteria: Application to Nutrients

Bryson Finch

Watershed Management Unit

Water Quality Program

DEPARTMENT OF ECOLOGY

State of Washington

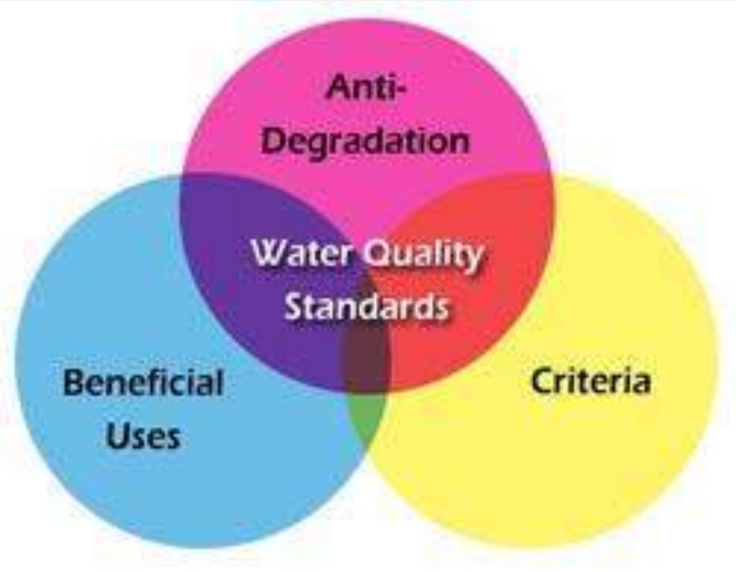
Overview

- Water Quality Standards
  - Numeric DO Criteria
  - Aesthetic Narrative Criteria
  - Anthropogenic Allowance
- History and Rationale for Marine DO Criteria
- Nutrient Criteria Alternatives
- Application of Marine DO Criteria
  - Water Column
  - Site Specific Locations
  - Anthropogenic Allowance

Water Quality Standards

Water Quality Standards

- The water quality standards set limits on pollution in our lakes, rivers and marine waters in order to protect beneficial uses, such as aquatic life and swimming.



DO Criteria

- DO criteria in the water quality standards are intended to set levels that protect healthy, robust aquatic communities, including the most sensitive species

- Assumption: if numeric criteria are met for the most sensitive organisms of each habitat, then the waterbody will protect all other species

- Criteria: **magnitude, duration,** & **frequency** component

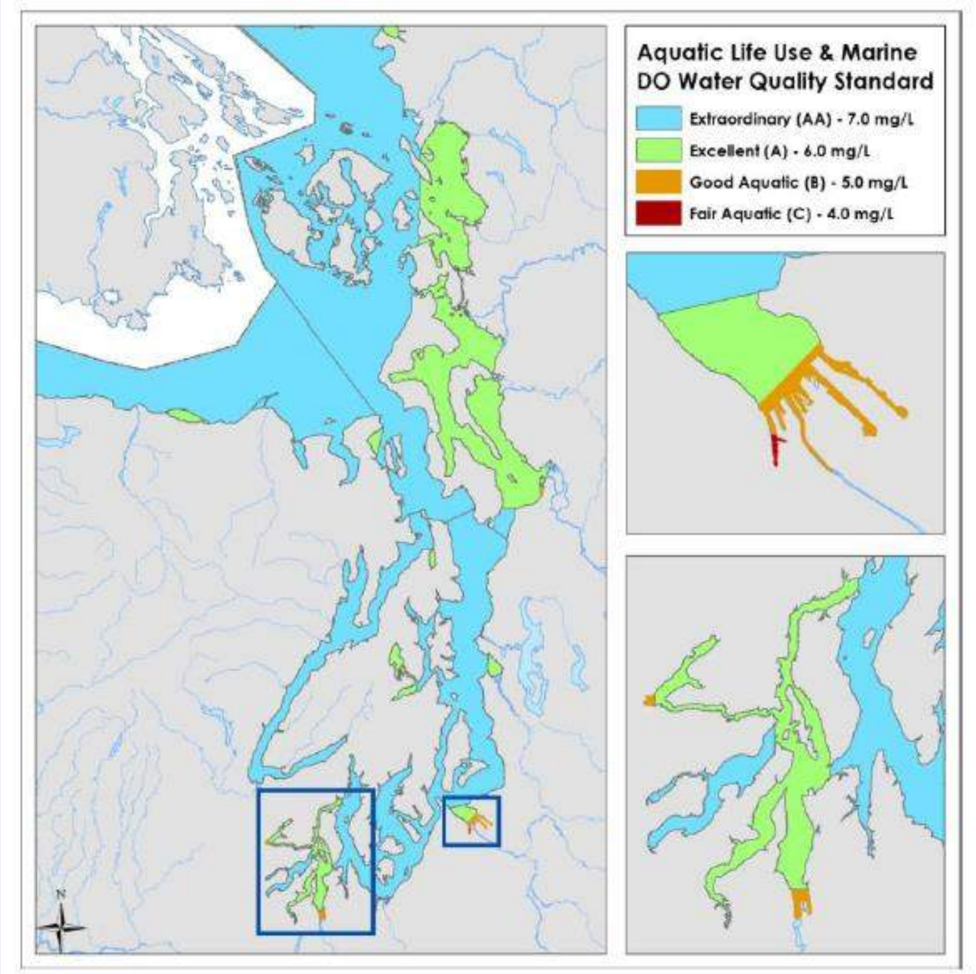
DO Numeric Criteria

Aquatic Life Use	DO Criteria (1-day min.)	General Description
Extraordinary quality	7.0 mg/L	Extraordinary quality 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.
Excellent quality	6.0 mg/L	Excellent quality 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.
Good quality	5.0 mg/L	Good quality salmonid migration and rearing; 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.
Fair quality	4.0 mg/L	Fair quality salmonid and other fish migration.

Criteria exceedances may occur once every ten years on average.

WQ Dissolved Oxygen Standards in Puget Sound

- **7.0** mg/L - most of Puget Sound and the Straits
- **6.0** mg/L – Bellingham Bay, Samish Bay, Skagit Bay, around Whidbey, other inlets/bays
- **5.0** mg/L - Commencement Bay, Budd Inlet, and portions of some inlets
- **4.0** mg/L –finger of Commencement Bay



Aesthetics Criteria

- Aesthetic values must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of light, smell, touch, or taste.
  - Used when numeric criteria are insufficient



Anthropogenic Allowance

- Allowance: 0.2 mg/L DO

- Based on concept of a measurable change
  - Measurable change: change in physical, chemical, or biological quality of the water to determine that a lowering of water quality occurred

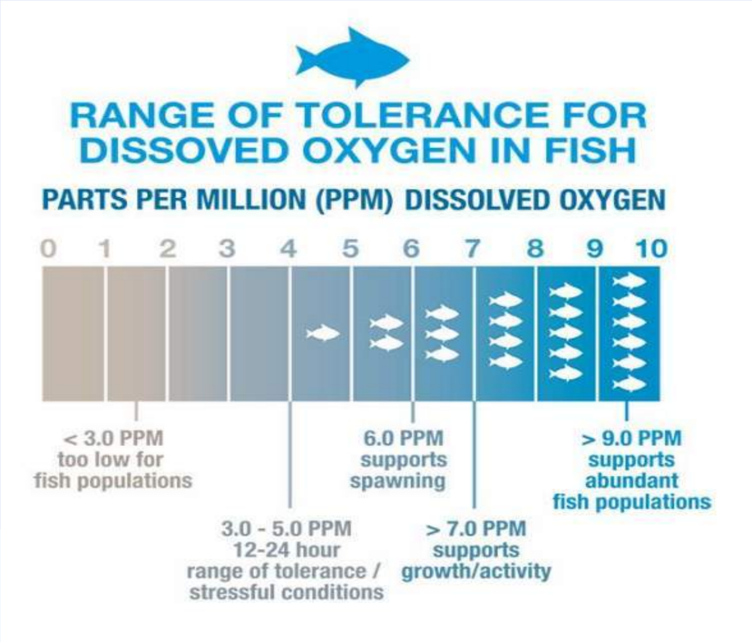
  - Represents a detectable change in water quality based on precision of the instrument

  - **Not a biologically derived value**

Marine DO Criteria Rationale

History of Marine DO Criteria

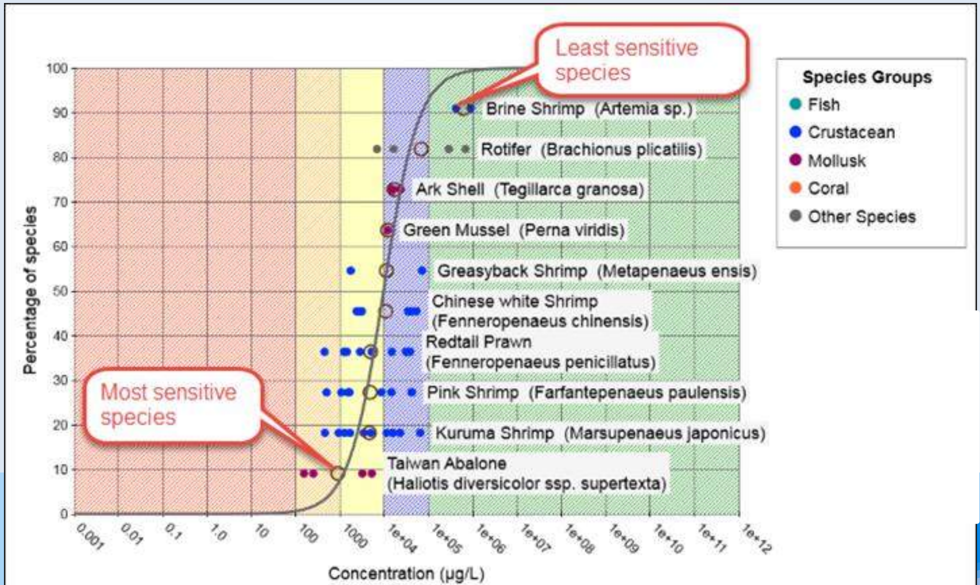
- 1968 Dept. of Interior recommendations:
  - DO levels between **5 and 8 mg/L** protect survival and growth of fish
  - Coastal wasters shall not be <5.0 mg/L
  - Estuaries & tidal tributaries shall not be <4.0 mg/L



Supporting Scientific Data

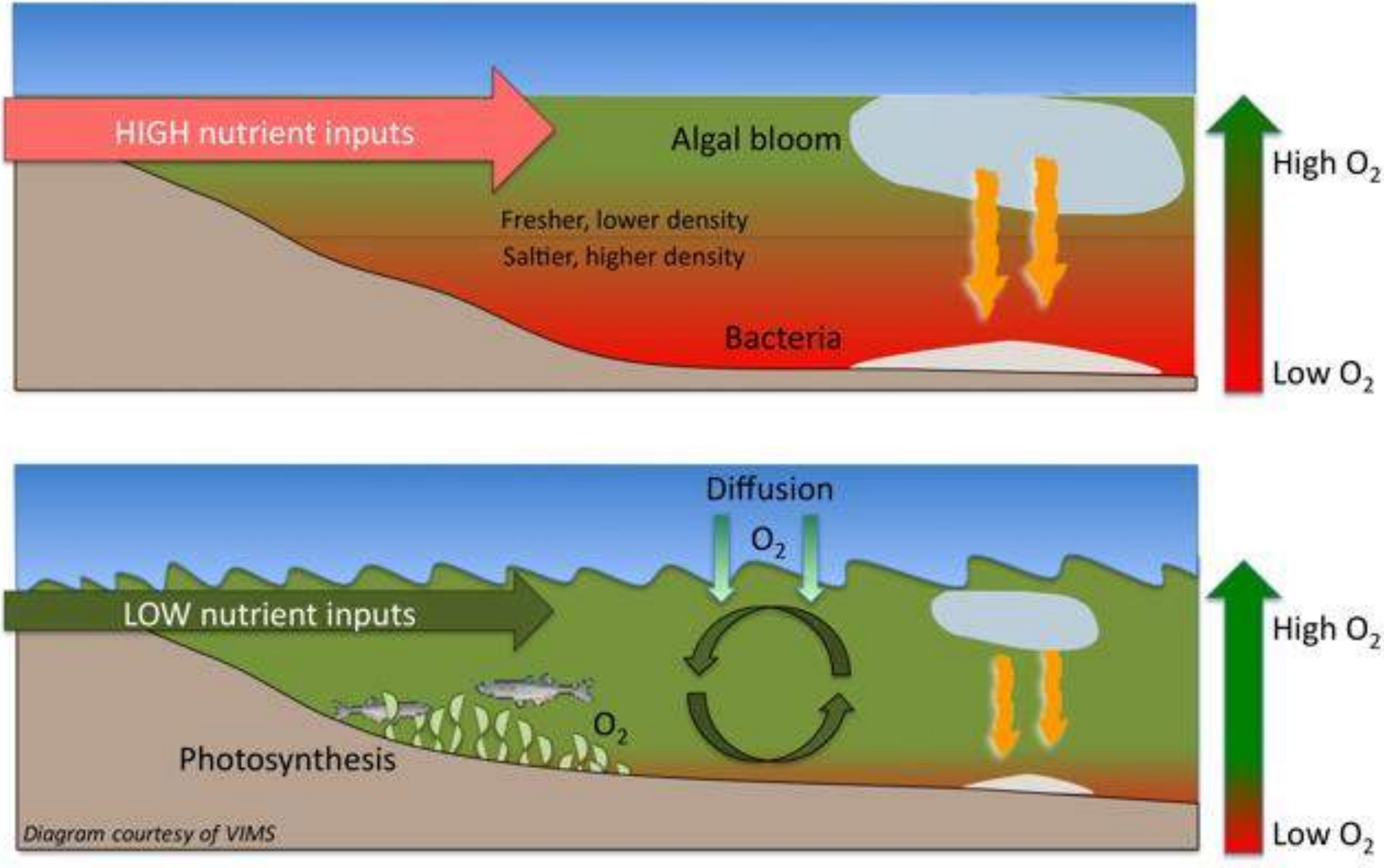
- Vaquer-Sunyer & Duarte (2008):
  - Reviewed 872 experiments spanning 206 species
    - 4.6 mg/L DO: maintain most populations & biodiversity
    - 5.0 mg/L DO: protective of sub-lethal effects for most species
      - 4.6 and 5.0 mg/L values represent 90th percentile of LC50s
      - Most sensitive species not protected at these levels

- Conclusion:
  - Full protection >>>5.0 mg/L DO



Nutrient Criteria Alternatives

DO : Nutrient Dynamics



Translating Numeric Criteria to Nutrients

<u>Dissolved Oxygen</u>

- Interrelationships between DO and nutrients
- Variations in DO can be associated with excessive nutrient inputs
- Marine models used to demonstrate relationships
  - Develop nutrient reduction volumes to achieve goals
  - Initiate actions to protect aquatic life

Translating Narrative Criteria to Nutrients

- Aesthetics narrative applies to effects of presence or offense to senses (light, smell, touch, taste)

- Various measures:
  - Percent oxygen saturation
  - Chlorophyll levels
  - Photographic evidence of algal mats/blooms
  - Others…

- Relationships between nutrient over-enrichment and aesthetics can be established

Application of DO Criteria

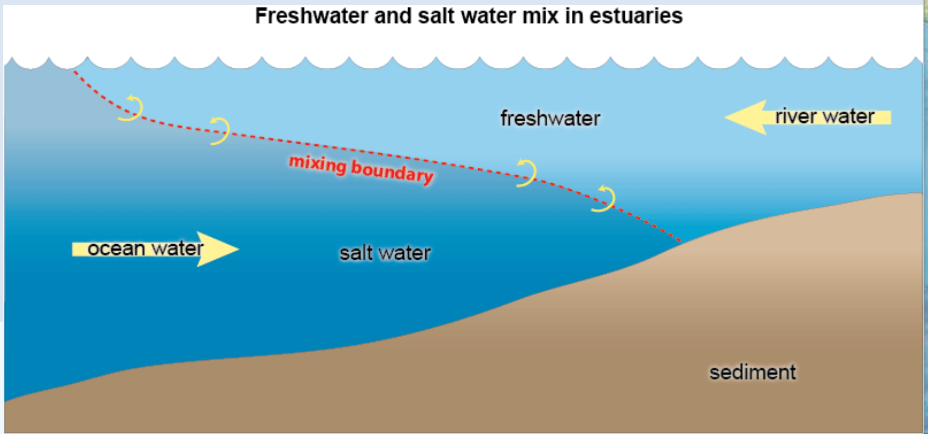
Application of DO Criteria:
Water Column

- DO measurements should represent the dominant aquatic habitat of the monitoring site
  - Samples should not be collected from shallow stagnant backwater areas, within isolated thermal refuges, at the surface or at the water's edge

- Deep waters:
  - Water samples should be assessed within:
    - Relatively <u>homogenous conditions</u> (e.g. euphotic zone; below or above the pycnocline; bottom waters)
    - Various <u>dominant aquatic habitat</u> of communities (e.g. benthic, fish, phytoplankton, zooplankton communities)

Application of DO Criteria:
Site-Specific Locations

- Water boundaries are established in the water quality standards
- Surface waters are required to be in compliance year-round at all assessment sites
- Fresh/marine water boundaries are determined by salinity measurements



Application of DO Criteria: Anthropogenic Allowance

- Human actions considered cumulatively may not cause DO concentrations to decrease by >0.2 mg/L
  - Does not apply if water body is in compliance
- Based on <u>1-day minimum</u> concentrations
- <u>Applies year-round at all locations</u> unless otherwise noted in WAC 173-201A

Nutrient Criteria

- EPA provides national strategies for developing nutrient criteria
  - Nationally recommended numeric criteria <u>not available</u>
  - Chesapeake Bay guidance document for various refugia
    - Serves as a good template when robust data is available

- WA has elected to use water quality responses for excessive nutrients to protect aquatic life

Questions?

- <u>Contact Information</u>:

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Puget Sound Wastewater Service Affordability Analysis: Implications for Implementation Strategies

2022 CRITICAL ANALYSIS SUMMARY REPORT

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May 17, 2023

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Lastly, we want to highlight the efforts of two student interns, Audrey Barber and Nate Jo. They made this study possible as we could not have compiled the large amount of data needed to complete the study without them. Their efforts, diligence and good humor in combing the web for data and managing US Census Bureau data tools are deeply appreciated. Any errors or misrepresentations are solely the fault of S. Burke and A. Kinney.

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EXECUTIVE SUMMARY

Background and Objectives

In 2018, regional nutrient management efforts were initiated in response to monitoring data that revealed worrisome trends in Puget Sound's water quality. Wastewater treatment plants (WWTPs) are the largest anthropogenic source of nutrients to Puget Sound and were therefore an early focus of both nutrient management efforts. Puget Sound National Estuary Program Marine Water Quality Implementation Strategy (MWQ IS) planning efforts identified current funding levels as a barrier to reducing wastewater nutrient loads and recommended development of a funding pathway to identify new/expanded sources of local, state, and federal funding. In 2021, the Department of Ecology issued a Puget Sound Nutrient General Permit (PSNGP) requiring operators of facilities that discharge into Puget Sound marine waters to begin long-term planning for upgrades that would be needed to comply with total inorganic nitrogen (TIN) numeric effluent limits expected in future PSNGP cycles.

This analysis was initiated because participants in the MWQ IS development process expressed concerns about the impact of costly upgrades on their ratepayers. Since nutrient reduction upgrades have the potential to exacerbate existing affordability issues, additional data collection/analysis was recommended.

Research Questions

This report answers the following research questions as to whether current and PSNGP-adjusted sewer service costs:

1. Raise affordability concerns for Puget Sound households that are connected to sewer utilities? Affordability is measured using two indices, sewer bills as a percent of median household income (%MHI) and sewer bills as a percent of lowest quintile income (%LQI).
2. Contribute to equity and efficiency concerns of the MWQ IS if current and future sewer bills constitute a larger percentage of income of low-income households than high-income households?

And if the answer to these questions is yes, then can the data for this study help:

- Calculate the amount of federal and state monies needed to maintain %MHI or %LQI indices below a specified affordability threshold for individual Puget Sound utilities.
- Improve the equity outcomes when prioritizing the distribution of grant funds.

Study Methods

This analysis utilizes publicly available data to estimate the current annual household sewer bills and potential future nutrient-adjusted sewer bills for 80 Puget Sound regional sewer utilities.[1] Data compilation and analysis steps are listed below. The full database is available open access via UW libraries (Barber et al. 2022).

- Current sewer rates were obtained from utilities web pages to estimate current (2022) sewer bills.
- Nutrient-adjusted sewer bills were estimated for two different nutrient removal objectives; total inorganic nitrogen (TIN) < 8 mg/L seasonally and TIN < 3 mg/L and total phosphorus (TP) < 0.1mg/L year-round. These two objectives bookend the estimated costs of regulatory standards that were reported by the Washington Department of Ecology (Ecology) and Tetra Tech in the June 2011, *Technical Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities*.
- Household income data was obtained from the U.S. Census Bureau American Community Survey (ACS). The lowest geographic unit for which household income by quintile and population data is available is the Census Tract.
- Census tracts were corresponded to sewer district boundaries or city boundaries where utilities are operated by municipalities. This allowed us to estimate a population-weighted income for each of the 80 local wastewater service providers in the study.

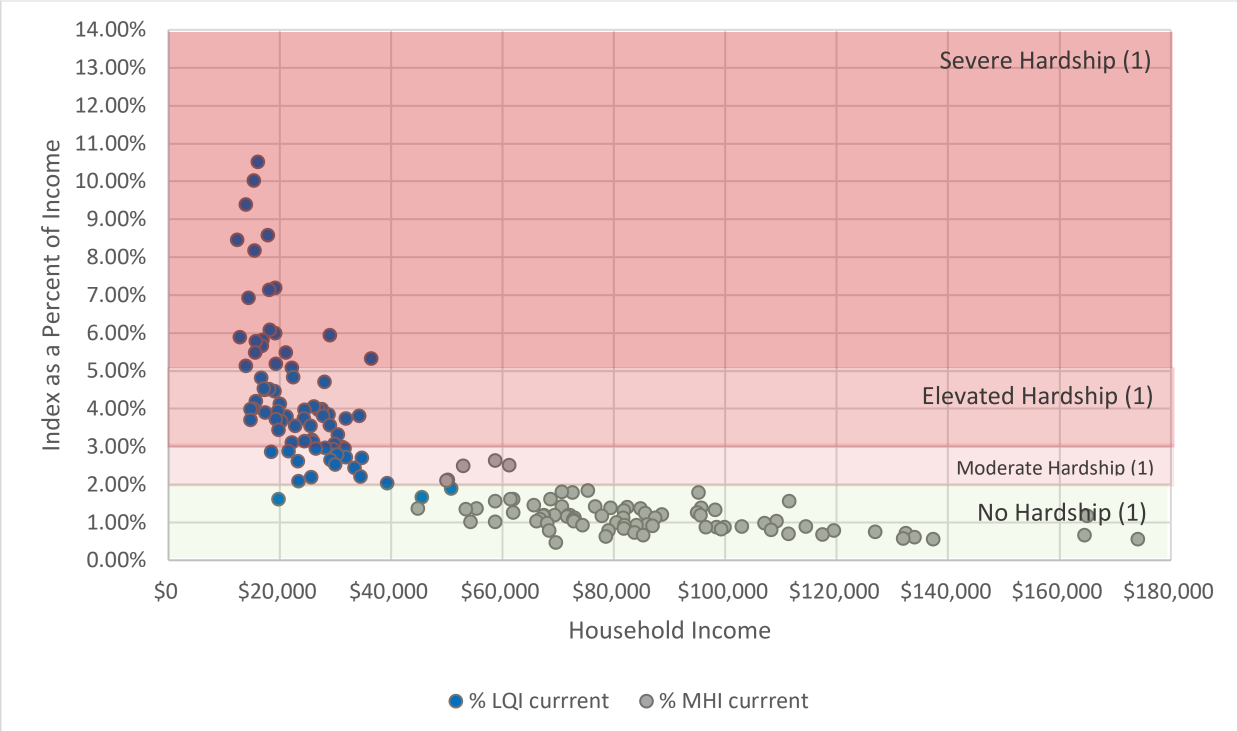
Summary Results

Current monthly sewer bills range from $27 to $161. Estimated PSNGP-adjusted monthly sewer bills ranged from $44 to $196, depending on the utility and the nutrient-reduction scenario. Estimated household income ranges widely across the region. MHI ranges from $174,078 to $44,844. LQI ranges from $50,831 to $12,425 and is, on average, 28% of MHI.

As shown in Figure ES-1, affordability metric results indicate that current sewer rates are likely:

- Not creating affordability concerns for households earning the median household income (MHI). Sewer bills were generally below 2 percent of MHI (%MHI).
- **Creating affordability concerns for households earning the lowest quintile income (LQI).** Sewer bills were often above 2 percent of LQI (%LQI), ranging between 1.61 percent of lowest quintile income (LQI) to 10.5 percent of LQI, with an average of 4.38 percent of LQI. For reference, the US Economic Research Service reports that in 2021, U.S. households spent an average of 10.3 percent of their disposable personal income on food, so on average sewer bills are a little less than half a lower quintile households' food budget.

[1] Wastewater/sewage services in the region are provided by a mix of county or municipal governments, Special Purpose Districts, and Public Utility Districts. For simplicity, we call all these local wastewater service providers utilities. Some of these utilities operate WWTPs and are PSNGP permittees, and the others are wholesale customers of those WWTP operators.

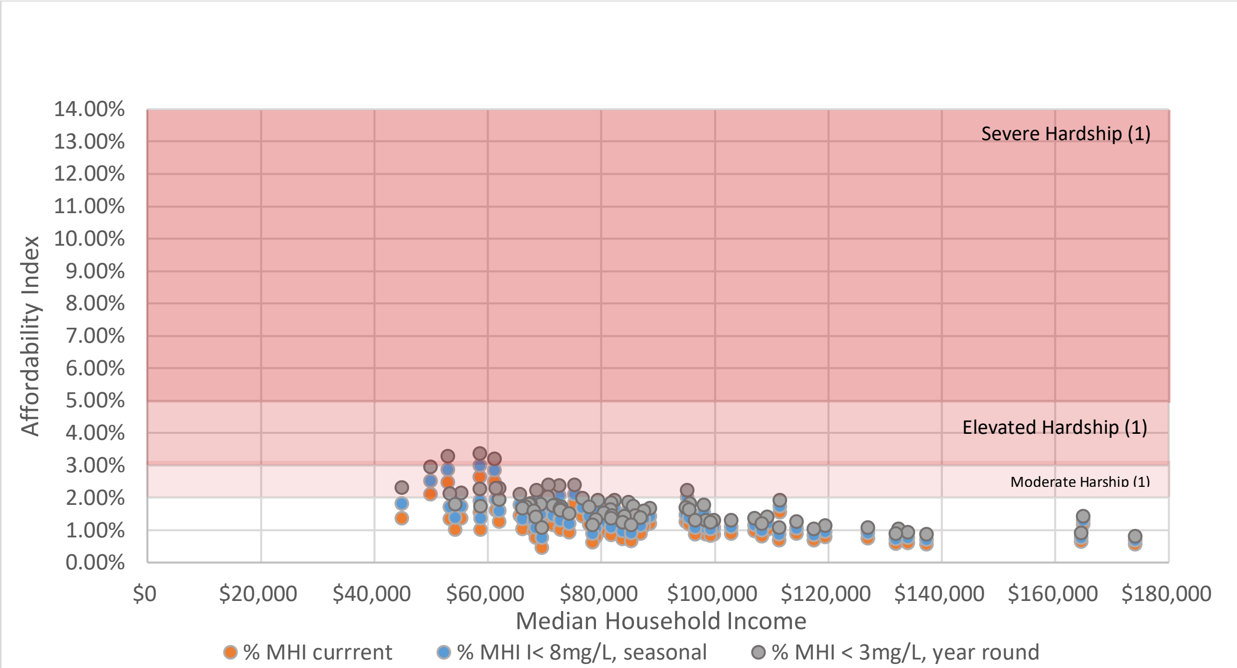


(1) Hardship categories taken from WAC 173-98-300 and apply to MHI% but not LQI%.

Figure ES-1. %MHI and %LQI Values of Estimated Current Sewer Rates for 80 Puget Sound Sewer Utilities, 2020 dollars

However, as shown in Figure ES-2, the estimated PSNGP-adjusted rates could result in sewer bills that:

- **Create affordability concerns for households earning the MHI and served by between 7 and 17** of the utilities in the study, depending on the nutrient-removal objective, e.g., %MHI values greater than 2 percent (Figure ES-2).
- **Continue to create hardship for households earning the lowest quintile income (LQI),** e.g., above 2 percent of LQI (%LQI), %LQI values greater than 2 percent for all 80 utilities ranging from 2.1 percent of LQI to 13.14 percent of LQI (Figure ES-3).



(1) Hardship categories taken from WAC 173-98-300.

Figure ES-2. Estimated current and nutrient-adjusted utility-district specific %MHI

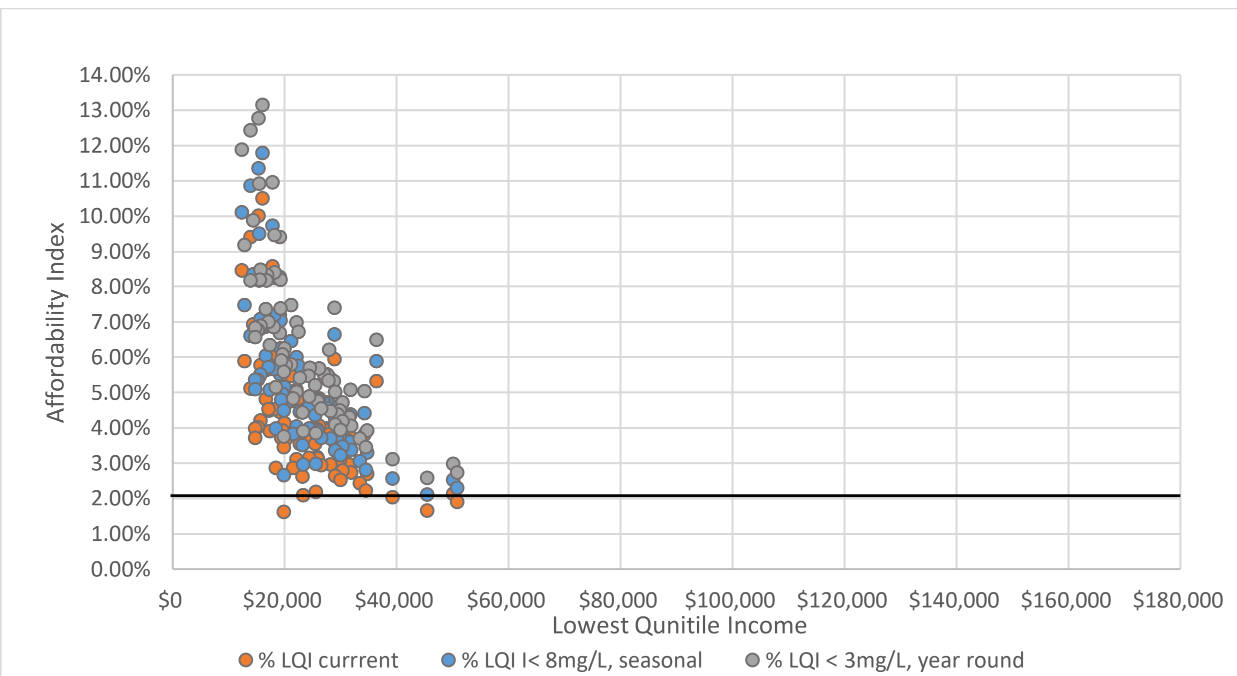


Figure ES-3. Estimated current and nutrient-adjusted utility-district specific %LQI

The range of the index values for both MHI and LQI vary widely in part because both income levels and sewer rates vary widely among the 80 utilities in the study.

With a high degree of variability in incomes and sewer bills, neither relatively high sewer bills, nor relatively low income alone predict the districts that have the highest impact index values. Rather, the %MHI and/or %LQI provides more information about the greatest need for grant funds than simply looking at the MHI levels (Figure ES-6). The correlation of both %MHI index value and %LHI index value to MHI is relatively low (R^2 of 0.2746 for %MHI and R^2 of 0.205 for %LQI). This low correlation suggests that MHI does predict the utilities that have the highest index values and therefore potentially households with the greatest need.

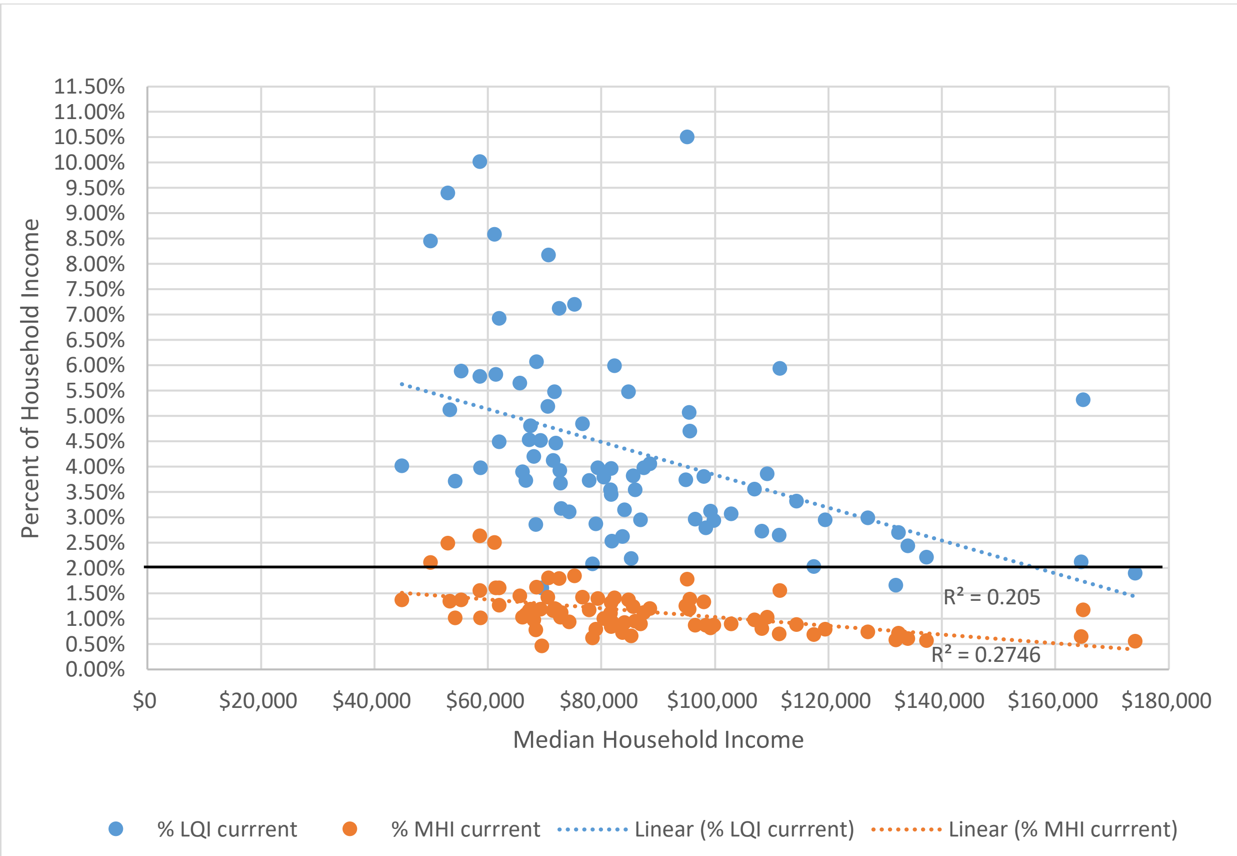


Figure ES-4. Correlation of %MHI and %LQI values to MHI

Recommendations

Our recommendations focus on identifying steps to take toward an equitable and efficient funding pathway for the MWQ IS reduce wastewater nutrient loads strategy. Non-utility public funding can contribute to the provision of a public good, in this case clean water, and help keep utility %MHI values within Ecology's "no hardship" range (below 2 percent of MHI). As funding is limited, this research helps direct available funding towards the places where it is needed most and may be used as efficiently as possible.

Four recommendations that might improve both efficiency and equity outcomes for the available grant and loans monies are:

- Utilize the data from this study to estimate the amount of federal and state capital grant monies would be needed to maintain %MHI or %LQI indices below a specified affordability threshold for individual Puget Sound utilities.
- Investigate the possibility of using the %MHI or %LQI metric in addition to other metrics used to determine financial hardship in Ecology's Grants and Loans Programs.
- Study the feasibility of a regional or state-wide low-income assistance program to aid those with the greatest need. In contrast to providing federal and state monies to pay for nutrient-related capital improvements, which could lower rates for all rate payers, a low-income assistance program would target funds to those households in greatest need of assistance.
- Consider funding a feasibility study to assess the potential benefits of restructuring rates following the model developed by the US Water Alliance's report, *A Promising Water Pricing Model for Equity and Financial Resilience* (Hara and Take 2022).

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LIST OF ABBREVIATIONS

CCWP	Centennial Clean Water Program
CWSRF	Clean Water State Revolving Fund
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FCA	EPA's Financial Capability Assessment
HEAL Act	Healthy Environments for All Act
IS	Implementation Strategy
LQI	Lowest Quintile Household Income
MHI	Median Household Income
MSRC	Municipal Research and Services Center
MWQ	Marine Water Quality
NPDES	National Pollutant Discharge Elimination System
PSNGP	Puget Sound Nutrient General Permit
PSP	Puget Sound Partnership
TIN	Total Inorganic Nitrogen
WAC	Washington Administrative Code
WWTP	Wastewater Treatment Plant

1. INTRODUCTION

This summary report describes methods, reports results, and discusses implications of a wastewater service affordability analysis conducted in support of Puget Sound National Estuary Program Marine Water Quality Implementation Strategy planning efforts. Associated data files and a data description with detailed metadata can be viewed in the companion *Puget Sound Wastewater Service Affordability Analysis Data Collection* (Barber et al. 2022), available at https://digital.lib.washington.edu/researchworks/handle/1773/49467.

Eutrophication is a process that occurs when anthropogenic nutrient inputs promote excessive growth of phytoplankton and macroalgae in water bodies, which can then cascade into other physical, chemical, and biological changes. Symptoms of eutrophication—low dissolved oxygen, loss of submerged aquatic vegetation, changes in nutrient ratios that alter planktonic species composition, and blooms of algae that produce harmful biotoxins—can intensify as the process progresses (Bricker et al. 2007).

In 2018, two regional nutrient management efforts were initiated in response to monitoring data that revealed worrisome trends in Puget Sound's water quality:

- Reporting for the Puget Sound Partnership's (PSP) "Marine Water Quality Vital Sign" implied a progression of eutrophication symptoms.[2] These findings led to development of a Marine Water Quality Implementation Strategy (MWQ IS) to provide a ***non-regulatory*** road map intended to align nutrient management efforts across agencies and programs. It was created using a collaborative process developed by PSP and is being implemented by the Stormwater Strategic Initiative.

- The Washington Department of Ecology's (Ecology) Water Quality Assessment identified 102 waterbody segments in Puget Sound that don't meet marine dissolved oxygen Water Quality Standards (i.e., they were placed on the 303(d) list of impaired waterbodies). As a result, Ecology began the Puget Sound Nutrient Reduction Project as a ***regulatory*** process to quantify needed pollutant reductions and identify management actions necessary to bring impaired waters back into compliance with the state's legally enforceable water quality standards.

Wastewater treatment plants (WWTPs) are the largest anthropogenic source of nutrients to Puget Sound and were therefore an early focus of both nutrient management efforts. Since most WWTPs in the region do not currently utilize advanced nutrient removal technologies, without facility upgrades nitrogen loading will continue to increase as the region's population grows. In 2021, Ecology issued a Puget Sound Nutrient General Permit (PSNGP) requiring operators of facilities that discharge into Puget Sound marine waters to begin long-term planning for upgrades that would be needed to comply with total inorganic nitrogen (TIN) numeric effluent limits expected in future PSNGP cycles.

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[2] See PSP (2020) for the latest update on this recently replaced set of metrics.

WWTP upgrades needed to reduce TIN loading as population grows will be expensive. Capital costs associated with adding advanced nutrient removal technologies to all the municipal WWTPs subject to the PSNGP are likely to exceed $2 billion, based on a preliminary economic evaluation of potential nutrient limits by Ecology and Tetra Tech (2011) escalated to 2022 dollars. The MWQ IS identified current funding levels as a barrier to WWTP upgrades and recommended development of a funding pathway strategy to encourage alignment of federal, state, and local funding sources.

1.1 Critical Analysis Purpose

Critical analyses are a component of the Puget Sound National Estuary Program's implementation strategies (IS) framework. During development of these strategies, participants identify uncertainties that limit understanding of problems and potential solutions related to regional recovery targets. These uncertainties are catalogued by Puget Sound Institute. Each year some Environmental Protection Agency (EPA) and PSP implementation strategy assistance agreement funding is allocated for "critical analysis" to answer key questions with a targeted data collection and analysis effort.

This critical analysis was initiated because participants in the IS development process expressed concerns about the impact of costly upgrades on ratepayers. Northern Economics (2019) similarly raised questions about equitable distribution of nutrient reduction costs, and potential political implications if a subset of the region's population is to bear a disproportionate share of costs needed to achieve public benefits enjoyed by all residents. In addition, Kinney et al. (2021) and Kinney et al. (2023) had documented existing water utility service affordability challenges in the region. Since nutrient reduction upgrades have the potential to exacerbate existing affordability issues, additional data collection/analysis was recommended.

Results of this analysis are intended to inform and contribute to the discussion of how to "develop a funding pathway" strategy in the MWQ IS. Choices made about how the region is to pay for WWTP upgrades may have implications for growth management as well as equity outcomes receiving greater attention due to the White House's Justice40 Initiative and Washington's Healthy Environment for All (HEAL) Act. We hope this analysis can support development of funding strategies that improve water quality while minimizing unintended consequences for other elements of Puget Sound's socioecological system.

1.2 Critical Analysis Approach

We approach the analysis in two steps. First, we estimate and analyze the financial impact that sewer bills have on Puget Sound communities and households with municipal sewer service. Second, we discuss ways the impact analysis results could be used to develop a funding pathway strategy for the MWQ IS, specifically focused on the potential to improve economic efficiency and equity outcomes.

Sewer Bill Impact Analysis

The impact analysis answers two questions:

- How affordable are current sewer service costs in the Puget Sound region?
- How does affordability change when projected rate increases attributable to PSNGP-required upgrades are added to current service costs?

We assessed **"affordability"** by calculating sewer service costs for single family residential households as a percentage of Median Household Income (MHI) and Lowest Quintile Income (LQI). There is no single universally accepted threshold for water utility affordability, but consistent with existing literature and practice we flag results above 2% as relatively less affordable. **A %MHI value exceeding 2% begins to raise concerns at the utility/community scale and a %LQI value exceeding 2% is a potential red flag for individual households.** These generalizations were derived from two sources:

- EPA Financial Capability Assessment Guidance considers %MHI in combination with other factors when determining implementation schedules for control measures needed to meet Clean Water Act regulatory obligations.[3] Past EPA (2014) guidance suggested that wastewater costs exceeding 2% of MHI have a **"high impact"** on residents. Reliance on MHI as a measure of affordability was criticized because it understates financial impacts to low-income households (Congressional Research Service 2017, Teodoro 2018). EPA (2022a) responded by proposing new indicator metrics that incorporate LQI in their revised financial capability assessment guidance.
- WAC 173-98-300 4(b) and WAC 173-98-320 delineate three categories of **"hardship"** for Ecology to use when determining interest rates and forgivable principal eligibility for clean water loans. Moderate hardship occurs when %MHI is above <2% but less than 3%; elevated hardship is defined as %MHI between 3% and 5%; and severe hardship occurs when %MHI is above 5%.

Funding Strategy Discussion

Next, we discuss how the sewer bill impact analysis data and results could contribute to the development of a funding strategy for the MWQ IS. There is little debate that the needed nutrient-related capital infrastructure upgrades are costly and the demands for capital funds, whether from local, state, or federal sources, are limited. We focus our discussion on how the results of the impact analysis could help maximize the efficiency of state grant and loan

[3] EPA points out that their Financial Capability Assessment "is not a methodology for defining water affordability." **In this report we use the umbrella term "affordability" to encompass the general idea that water rates may be a financial burden on some households and utilities may face hardship when some of their ratepayers are unable to pay their bills.** As EPA points out, we do not intend to infer that the rates are unreasonable for the level of environmental protection that they offer.

spending, where efficiency is measured as prioritizing financial assistance to utilities and/or households with the greatest need.

The funding strategy discussion includes a brief background on the history of federal investment in water infrastructure and continues with a description of the state's grant and loan programs, specifically focused on prioritization methods. The prioritization discussion provides a basis to consider using the results of this study to improve the efficiency and equity of future grant funding.

Specifically, two potential equity issues are:

- Concerns over a subset of the region's population incurring a large portion of the expenditures needed to achieve broad public benefits.

- Whether increasing sewer rates cause lower income households to pay a disproportionate share of their incomes on sewer bills.

At the conclusion of the funding strategy discussion, we list recommendations and potential next steps.

2. SEWER BILL IMPACT ANALYSIS

The impact analysis describes the methods used to estimate the utility-specific %MHI and %LQI metrics for current and potential PSNGP-related sewer bills as well as data limitations we encountered during the analysis. We conclude the impact analysis with a description of the results. Additional information about data sources and analysis methodology can be found in the study's data collection (Barber et al. 2022).

2.1 Methods

Here we summarize the data compilation and analysis steps taken to estimate current and PSNGP-adjusted annual sewer service costs and income metrics used to calculate %MHI and %LQI.

2.1.1 Utilities Impacted by Puget Sound Nutrient General Permit

The first step was to identify all utilities[4] directly and indirectly affected by PSNGP requirements. The list of WWTP operators covered by the permit (the permittees) was obtained from Ecology (2021a and 2021b). Forty utilities operate 58 municipal WWTPs that discharge directly to Puget Sound marine waters. These utilities are directly impacted by the PSGNP because they operate the facilities that will need to be upgraded to comply with expected future TIN effluent limits.

Several permittees are wholesale providers of treatment services to neighboring utilities that do not own and operate a WWTP. The permittee charges wholesale customers a uniform rate to cover treatment costs (capital, operations, maintenance). The wholesale customer is also a retailer that bills their customers for the wholesaler's services plus the cost to operate their local collection systems (e.g., pipelines and pump stations) and convey wastewater to the wholesaler's system. These 43 utilities are impacted indirectly by the PSNGP, as they do not have to invest in treatment options, however the contract rates they pay for treatment services will likely increase. The total number of utilities that will be affected by the PSNGP is nearly twice the number of permittees.

King County is an example of a regional entity that owns/operates WWTPs and contracts treatment services to 29 local utilities. King County does not bill individual property owners; each of the 29 local utilities that King County provides services are the entities that bill individual customers. Because each of these local utilities have a unique rate structure and set their individual rates, this study calculated %MHI and %LQI for each of the local utilities.

[4] Wastewater/sewage services in the region are provided by a mix of county or municipal governments, Special Purpose Districts, and Public Utility Districts. For simplicity, we call all these different types of service providers sewer utilities.

In total this study estimated sewer bills and utility-specific household incomes for 80 Puget Sound municipal sewer utilities.[5] State agency permittees (Department of Corrections, Washington State Parks) and non-municipal customers (Washington State Ferries, Puget Sound Naval Shipyard, Ft. Warden, Manchester Naval Fuel Depot, and Tribes) were excluded from the study. Appendix A lists the permitee and the utility district to which they provide treatment services.

2.1.2 Monthly Sewer Service Cost

CURRENT COST

We estimated monthly sewer bills for 80 utilities in Puget Sound. Rate data was obtained from the utilities' webpages. Two assumptions were used to estimate the monthly sewer bills for each utility. First, the rates are based on a ¾" residential pipe size. Second, where a variable rate was charged based on water usage, the usage was assumed to be a constant 5.5 ccf per household per month across all utilities. Assuming a constant usage rate allows for comparisons across rates that are solely based on the variable rate and not a difference in water usage. For a detailed description of the calculations see Barber et al. (2022).

The project team emailed utilities that utilize a variable rate structure, where bills are based entirely or partially on the volume of water used, to verify the estimated rates. Of 26 utilities contacted, we received responses from 12 (46% response rate). Minor corrections to our initial estimates were made where errors were identified by utilities.

PSNGP-ADJUSTED COST

In addition to estimating the current sewer bills, we also estimated potential sewer rates once PSNGP-required upgrades are added to current sewer rates. We added estimates of the nutrient-related increase in sewer rates (Table 1), published in *Technical and Economic Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities,* (Ecology and Tetra Tech 2011) to our estimates of current sewer rates to arrive at these PSNGP-adjusted sewer costs.

Ecology and Tetra Tech (2011) show the estimated increase in monthly sewer rates for 4 different potential nitrogen effluent limits in 2010 dollars, which are displayed in Table 1. We choose to project costs for the most (<3 mg/L TIN year-round) and least (<8mg/L dry-season) stringent limits, which coincide with the most and least expensive upgrade scenarios, to provide an idea of the full range of potential impacts on sewer bills. We adjusted the estimates to 2022 dollars using the US Producer Price Index for Construction Materials.[6]

[5] We identified 89 municipal sewer utilities the discharge into Puget Sound marine waters, however only 80 are included in the study because we were unable to find service area maps or sewer rates for 9 utilities.

[6] Federal Reserve Bank of St. Louis, Economic Research, [PPI by Commodity: Special Indexes: Construction Materials](#).

It bears mentioning that the PSNGP-adjusted sewer rates assume utilities will pay the full amount of the necessary upgrades without state or federal grants.[7] Thus, the nutrient adjusted sewer rates may be overstated if significant grant funding is made available. At the same time, the estimated upgrade costs may be understated. The expected accuracy range of the estimated monthly rate increases was +100 percent to – 50 Percent (Tetra Tech, 2011). Additionally, our PSNGP-adjusted sewer rates do not account for any other increases in service costs required for any other type of planned upgrades, for example to replace aging infrastructure. Actual future sewer costs will be even higher than our PSNGP-adjusted rates. A reminder that this analysis, the first of its kind, is intended to estimate the potential magnitude of impacts the PSNGP may have on Puget Sound utilities and households in the absence of significant new sources of state or federal funding.

Table 1. Estimated Monthly Household Sewer Rate Increase For Nutrient Removal of Puget Sound Water Resource Inventory Areas, Adjusted to 2022 dollars.

	TIN <8mg/L year-round	TIN <3 mg/L year-round	TIN <8 mg/L dry season	TIN <3 mg/L dry season
2010 (a)	$ 16.00	$ 19.48	$ 9.43	$ 11.41
2022 (b)	$ 29.05	$ 35.36	$ 17.12	$ 20.71

Sources: (a) Table ES-3 in *Technical and Economic Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities* (Ecology and Tetra Tech 2011) (b) Costs adjusted by factor of 182 percent based on PPI by Commodity: Special Indexes, Construction Materials.

2.1.3 Household Income

Household income and population data was obtained from the 2019 U.S. Census Bureau American Community Survey (ACS). The lowest geographic unit for which household income by quintile and population data is available is the Census Tract. We downloaded data associated with 941 unique census tracts for the twelve Puget Sound counties.

Census tracts were corresponded to sewer district boundaries or city boundaries where utilities are operated by municipalities. This allowed us to estimate a population-weighted income for each of the 80 local wastewater service providers in the study. The full database is available open access via UW libraries (see Barber et al. 2022).

[7] This assumption is based on the methodology described in Tetra Tech and Ecology’s 2010 report entitled Technical Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities, 2011. See Section 17.2 that describes how the weighted average monthly household sewer rate increase for nutrient removal upgrades was calculated.

2.1.4 Affordability Metrics

Using the numerators (estimated sewer bills) and denominators (estimated utility-specific household income) generated in the previous steps, we calculated six affordability metrics for each of the 80 utilities in the study:

- Current annual sewer service cost as a percent of MHI
- Current annual sewer service cost as a percent of LQI
- Annual cost of sewer service with a year-round 3 mg/L TIN limit as a percent of MHI
- Annual cost of sewer service with a year-round 3 mg/L TIN limit as a percent of LQI
- Annual cost of sewer service with a seasonal 8 mg/L TIN limit as a percent of MHI
- Annual cost of sewer service with a seasonal 8 mg/L TIN limit as a percent of LQI

Results were evaluated based on their value relative to the commonly applied 2% benchmark.

2.2 Data Limitations

The geographic scale of this evaluation is broader than an individual utility would undertake for a financial capability assessment. Results represent a snapshot in time and are intended to inform development of a regional-scale funding strategy. Here we provide a list of potential sources of error that should be considered when using this data and/or our analysis results. A more detailed description of the assumptions and the impacts that these assumptions had on our estimates can be found in Barber et al. (2022).

- Not all Puget Sound region households are included in the study. PSNGP-impacted utilities discharge directly to Puget Sound marine waters. WWTPs that discharge to rivers that flow into Puget Sound are not included. Likewise, on-site sewage treatment (septic systems) and utilities that discharge via groundwater are not included. Multifamily households were excluded from the analysis due to the differences in the ways utilities and building managers sub-meter and bill individual units.
- Corresponding the census tracts to utility district service areas required several assumptions that resulted in a lower level of confidence about than we would have liked.
- Households that use on-site sewage treatment (septic systems) but are located within the service area boundaries of a wastewater utilities were not excluded when calculating the Median Household Income and Lowest Quintile Income for those utilities.
- Our 5.5 ccf/month (4,114 gallons) water usage assumption does not explicitly include consideration of household size and seasonal variation. We decided to calculate service costs based on a standardized usage, rather that collecting data on actual usage, so that cost estimates were normalized to enable direct comparison. The standardized usage we

selected is based on a commonly applied estimate of average winter quarter usage in the region (D. Thompson, City of Tacoma Wastewater Operations Division Manager, pers. comm.). Using a rainy season average excludes outdoor/irrigation use thereby more closely approximating the generally accepted "basic use" estimate of 50 gallons per capita per day (gpcd) (approximately 6.6 ccf). Several utilities contacted to verify our service cost calculations responded that their actual annual average household usage volume was higher than 5.5 ccf/month.

- Some service providers incorporate state and local utility taxes into their rates, and some do not. We used published rates and did not account for inclusion/exclusion of taxes.
- More recent estimates of potential PSNGP compliance costs (e.g., Brown and Caldwell 2020) indicate that cost estimates provided in Ecology and Tetra Tech (2011) are very low, even adjusted to 2022 dollars.

2.3 Results

2.3.1 Utilities Impacted by the PSNGP

See Appendix A for a list of the sewer utilities included in the study. The list includes 85 utilities, 80 of which were included in the study. Five utilities were excluded because we were unable to locate a detailed map of the provider's service area or the district's web page did not report sewer rates. Two utilities, King County and LOTT, are exclusively wholesalers that do not bill any households for sewer treatment services.

2.3.2 Monthly Sewer Service Cost

Figure 1 shows our estimates for current monthly sewer bills of 80 local sewer providers. Current estimated monthly sewer cost ranges from $26.55 per month to $161.21 per month. The average across all 80 utilities was $78.36 per month with a standard deviation of $23.91. As discussed in Section 2.1.2, these costs assume 5.5 ccf of water usage for the 25 utilities with rates based on volume of water used. The remaining 55 utilities utilize a flat rate structure.

Figure 2 shows our estimates for potential future PSNGP-related sewer bills of 80 local sewer districts. The two PSNGP-related sewer bills were calculated by adding $17.12 (8mg/L seasonal scenario) and $35.36 (3mg/L year-round scenario) to estimated current sewer bills. Potential future PSNGP-adjusted monthly sewer bills associated with the 8mg/L seasonal scenario range from $43.76 per month to $178.33 per month. Potential future PSNGP-adjusted monthly sewer bills associated with the 3mg/L year-round scenario range from $62.01 per month to $196.57 per month.

This large range of estimated monthly sewer bills was curious but beyond the scope of this study to attempt to explain. A possible future study could attempt to correlate costs to factors such as number of connections, topography, underlying geology, length of pipes, number of pump stations, location (e.g., island), existing removal nutrient technology, etc.

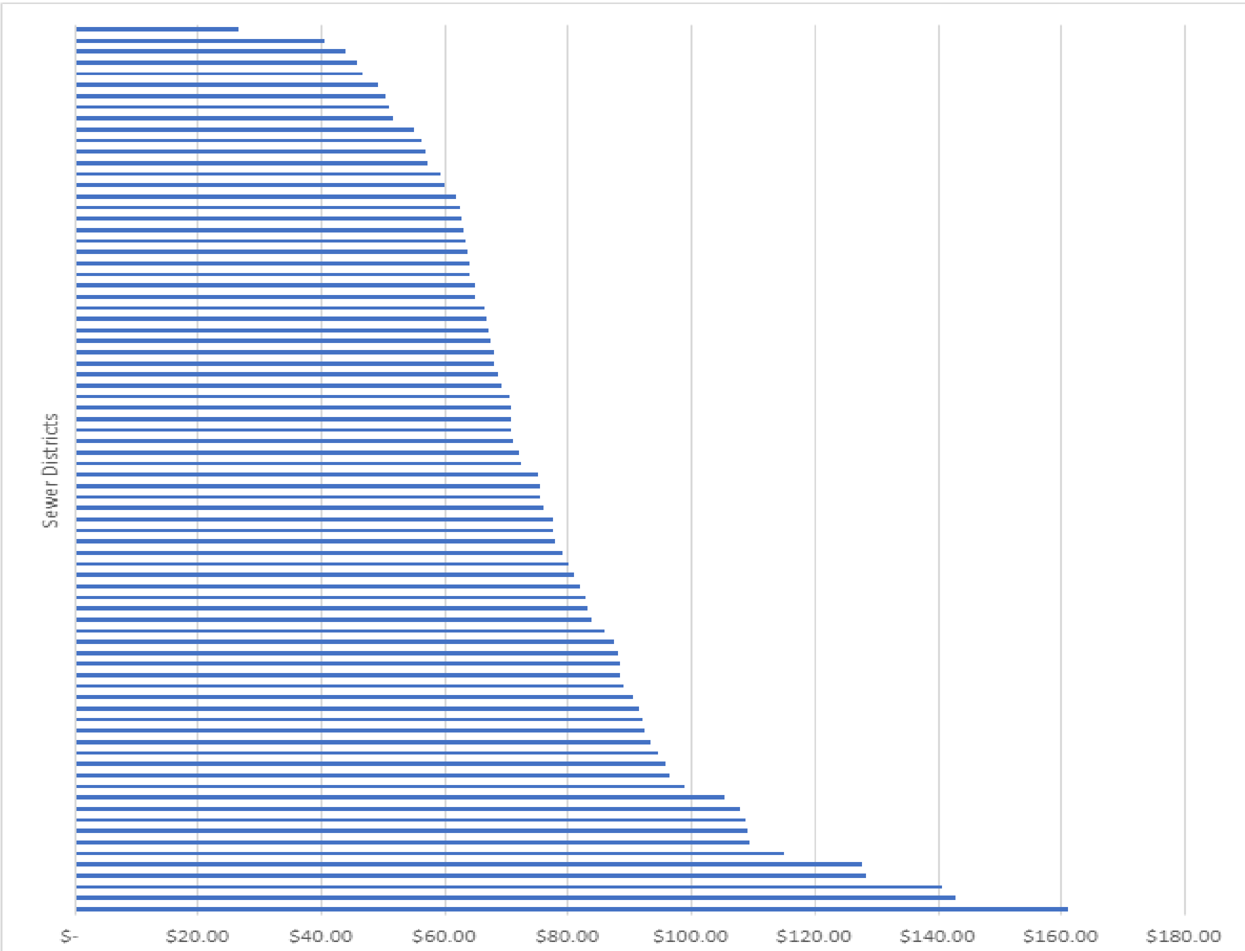


Figure 1. Estimated Current Monthly Sewer Service Costs, 80 Puget Sound Utilities

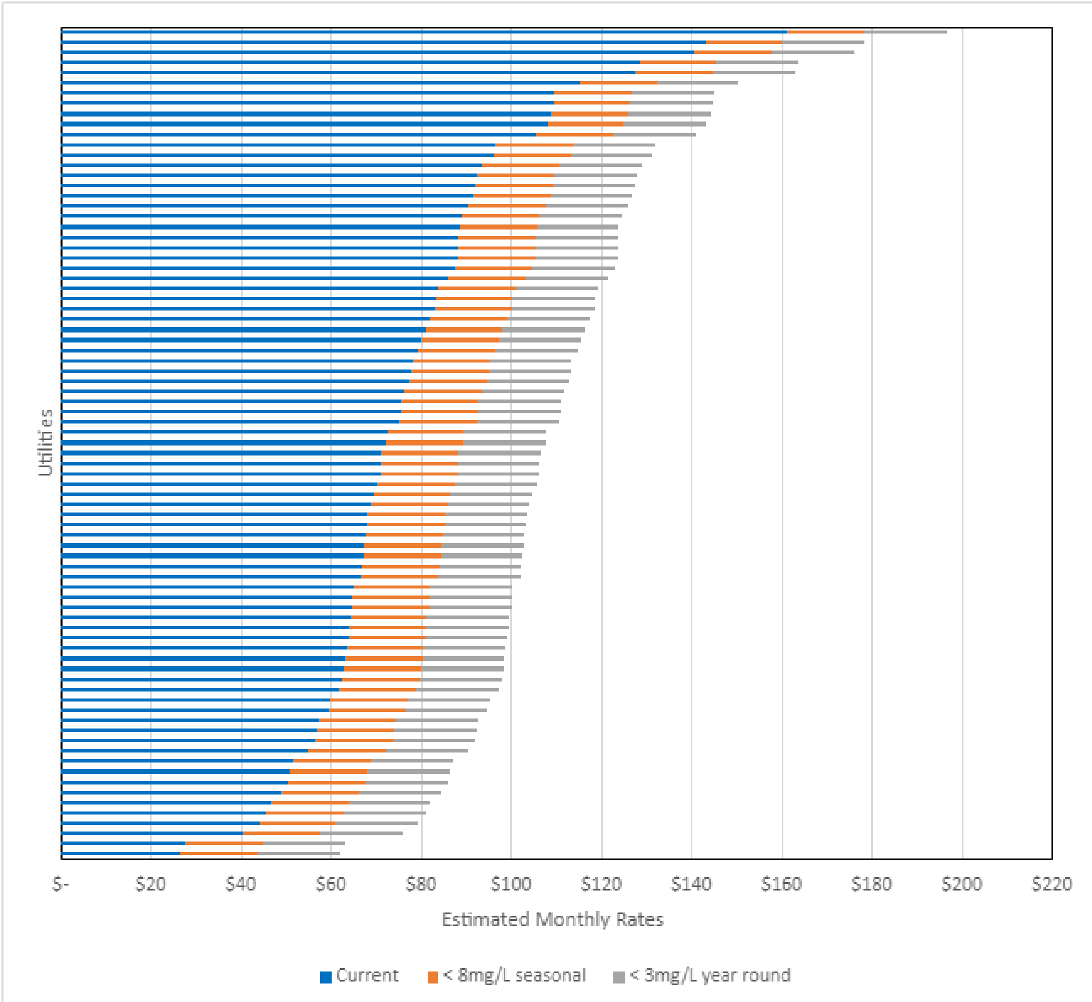


Figure 2. Estimated PSNGP-Related Monthly Sewer Service Costs, 80 Puget Sound Utilities

2.3.3 Household Income

Figure 3 shows estimated MHI and LQI in the service areas of 80 local wastewater providers. MHI ranges from a low of $44,844/year to a high of $174,078/year, with an average of $86,323/year. The estimated LQI ranges from a low of $12,425/year to a high of $50,831/year, with an average of $23,953/year. In general, the LQI is approximately 30 percent of the MHI, illustrating the extent of income disparity in the Puget Sound region (Figure 4).

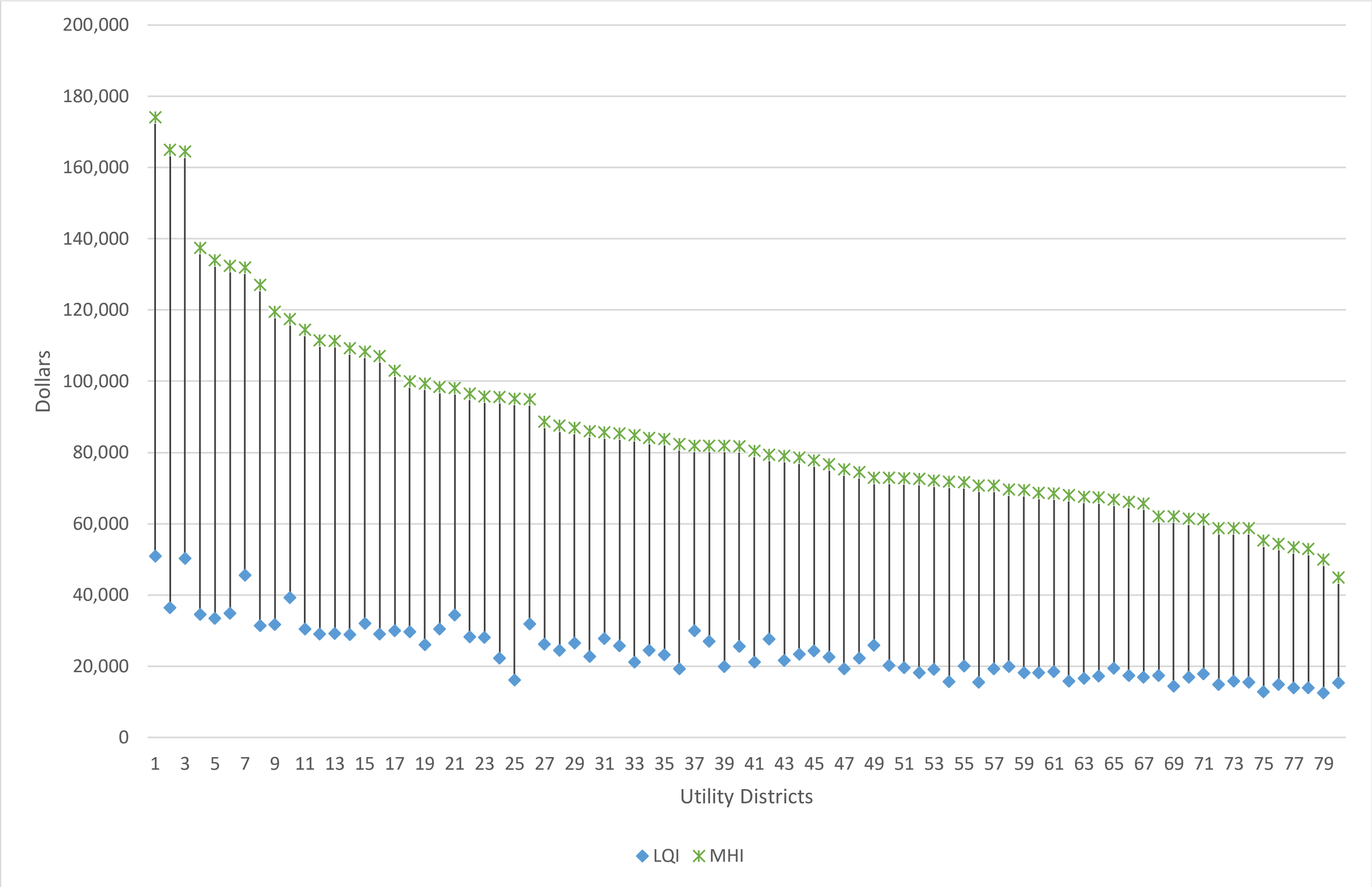


Figure 3. Estimated Household Income for 80 Puget Sound Sewer Utilities, 2020 dollars

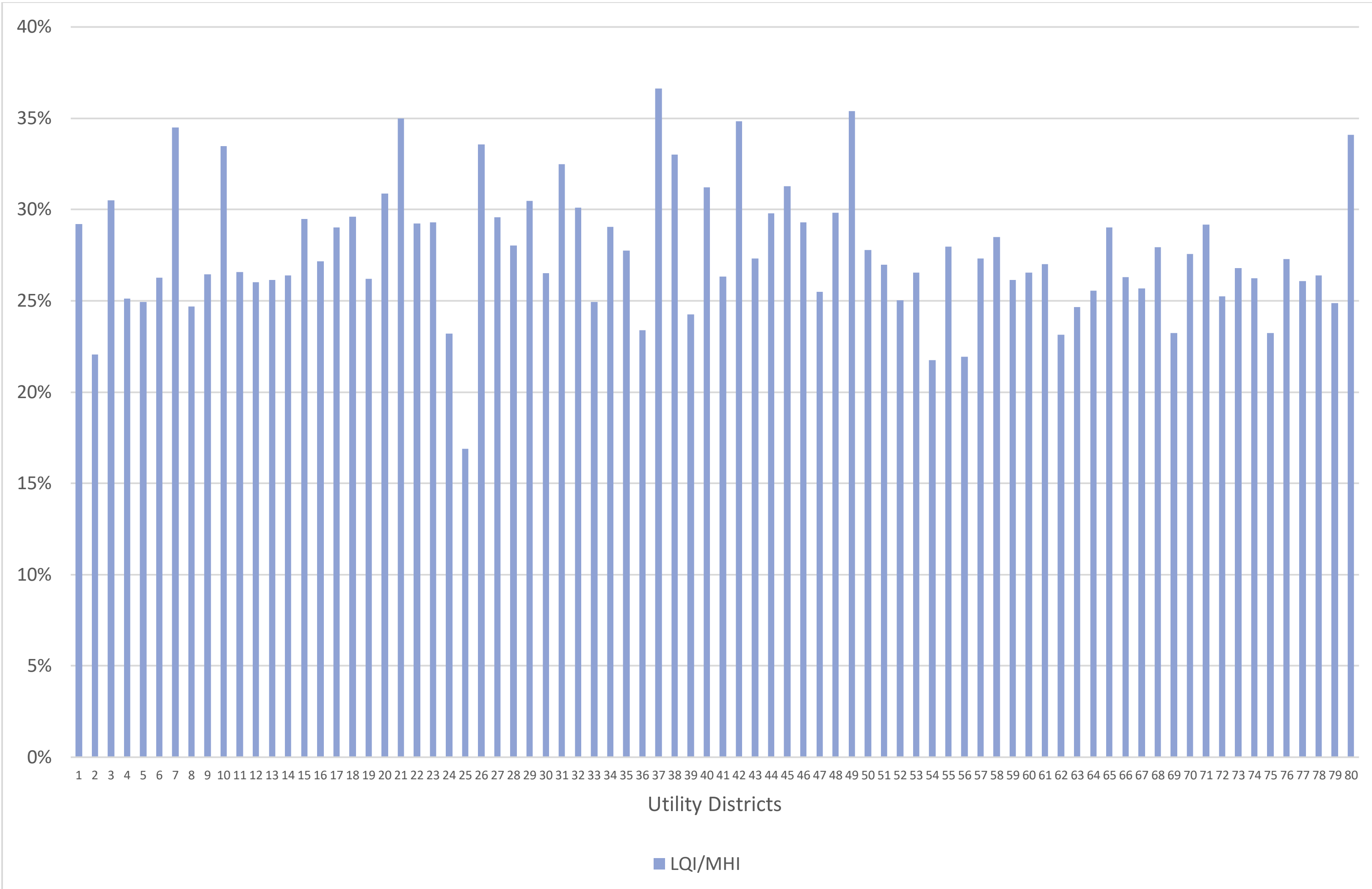


Figure 4. Lowest Quintile Income as a Percent of Median Household Income for 80 Puget Sound Sewer Utilities, 2020 dollars

2.3.4 Indicators of "Affordability"

The %MHI and %LQI results were calculated by dividing the estimated sewer costs by the utility specific MHI and LQI, respectively. Two sets of %MHI values and %LQI values were estimated, one set for current sewer costs and a second set for PSNGP-adjusted sewer costs.

Estimated %MHI and %LQI results for current sewer costs are shown in Figure 5. Values range from 0.5 %MHI to 2.6 %MHI, averaging 1.2 %MHI. These values suggest current rates are reasonably affordable when calculated using MHI. However, the %LQI results indicate sewer service costs are burdening low-income households. %LQI values range from 1.6 %LQI to 10.5 %LQI. This wide disparity in index values demonstrates one reason EPA's FCA guidance document includes utilizing LQI in some metrics. For reference, the US Economic Research Service reports that in 2021, U.S. consumers spent an average of 10.3 percent of their disposable personal income on food.

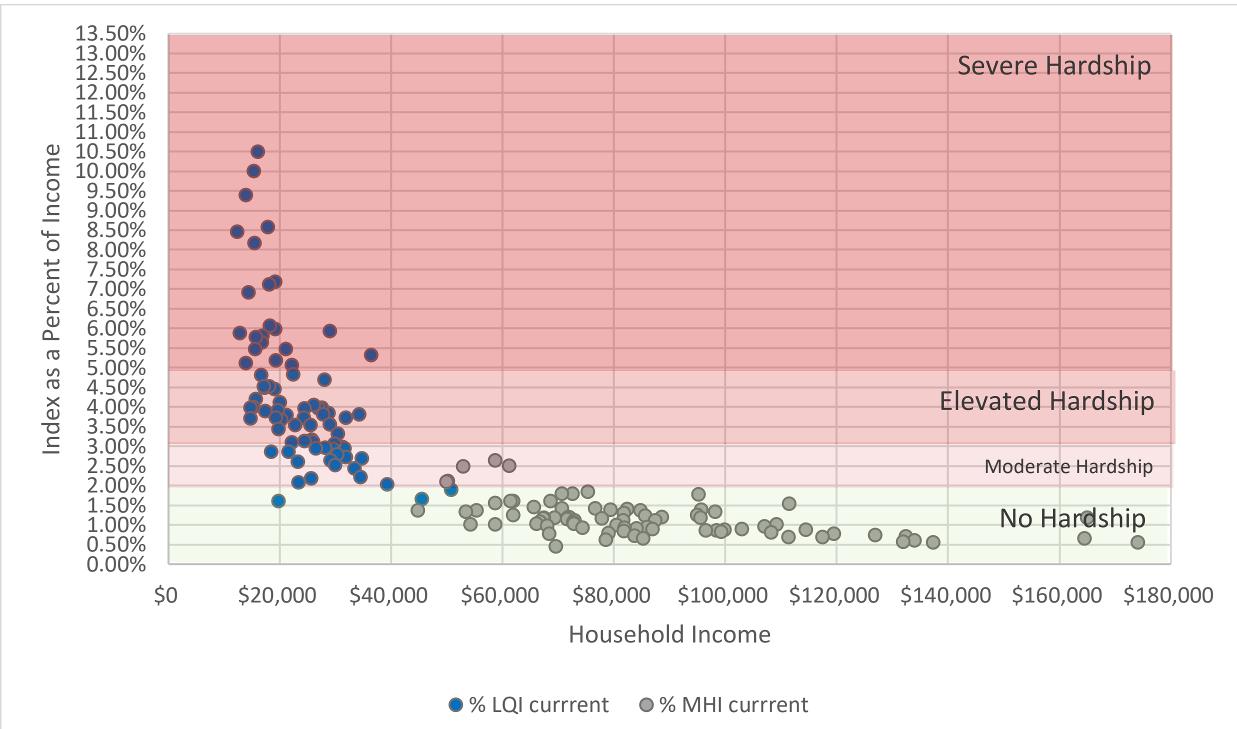


Figure 5. %MHI and %LQI Values Using Estimated Current Sewer Costs for 80 Puget Sound Sewer Utilities, 2020 dollars

The summary information presented in Figure 5 demonstrates several areas of potential concern. First, the scatter plot demonstrates the income disparity in Puget Sound, even between MHI and LQI. Where MHI ranges from approximately $40,000 to a high of $180,000. Whereas LQI range is much narrower, with the majority of households around $20,000 LQI. Second, current sewer rates may not have a high impact on Puget Sounds' household's budget using MHI, however sewer bills do have a relatively high impact, or create hardship, on low-income households. The next question to address is how might PSNGP-adjusted sewer rates impact households? This question and a detailed description of the both sets of indices (the %MHI and the %LQI) using both current and nutrient-adjusted sewer rates are discussed below.

CURRENT AND PSNGP-ADJUSTED COSTS AS A PERCENT OF MHI

The utility-specific %MHI values using current sewer rates are less than two percent in 76 of the 80 Puget Sound sewer utilities included in the analysis (Table 2). The %MHI values range between 0.46 percent of MHI and 2.63 percent of MHI, with an average of 1.16 percent of MHI, and a standard deviation of 0.44. These results indicate that for most utilities in the region current sewer costs are not high impact or causing hardship as defined by EPA and Washington State, respectively.

However, estimated %MHI values using PSNGP-adjusted sewer rates suggest that over 20 percent of Puget Sound utilities' sewer bills would cause hardship to their rate payers, absent federal or state investment in nutrient reduction upgrades (Table 2). %MHI values were estimated for two potential regulatory scenarios: <8.0mg/L TIN during dry season-only, and <3.0mg/L TIN year-round. These two scenarios bookend the potential sewer rates increases, representing both the least expensive (<8.0mg/L TIN) and most (<3.0mg/L TIN) expensive approaches to nutrient reduction.

Under the 8.0mg/L TIN scenario, 8 utilities (10%) have %MHI values greater than two percent and less than 3 percent of MHI. This %MHI range is defined by Ecology as "moderate hardship." EPA considers %MHI above 2.0 percent as high impact. The %MHI values range from 0.67 percent of MHI to 2.98 percent of MHI.

Under the 3.0mg/L effluent limit scenario, 18 utilities (23%) exceed the 2% affordability benchmark. Three of those utilities have %MHI values in the "elevated hardship" range. The %MHI values range from 0.80 %MHI to 3.35 %MHI.

In summary, the range of %MHI values indicate that current sewer bills cause moderate hardship on households served by 4 (5% of the total) Puget Sound utilities. Absent additional state or federal funding, PSNGP-required upgrades could cause moderate to severe hardship for 18 of the 80 Puget Sound sewer utilities.

Table 2. Summary of Current and PSNGP-Adjusted %MHI Values

Metric	Current	PSNGP-Adjusted (a)	
		< 8.0mg/L TIN dry season	< 3.0mg/L TIN year round
Total number of districts/utilities	80	80	80
Moderate Hardship, (e.g. index > 2.0 % and < 3%)			
Number of utilities	4	8	15
Percent of utilities	5.0%	10%	19%
Elevated Hardship, (e.g. index > 3.0 % and < 5%)			
Number of utilities	0	0	3
Percent of utilities	0.0%	0.0%	4.0%
Severe Hardship, (e.g. index > 5.0 %)			
Number of utilities	0	0	0
Percent of utilities	0.0%	0.0%	0.0%
Minimum %MHI value	0.46%	0.67%	0.80%
Maximum %MHI value	2.63%	2.98%	3.35%
Average %MHI value	1.16%	1.41%	1.69%
Std Deviation	0.44%	0.49%	0.54%

(a) **Nutrient-adjusted rates estimated using data from Technical and Economic Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities. Publication 11-10-060, WA Dept of Ecology and Tetra Tech, 2011.**

(b) **See the Data Limitations section of the analysis for a discussion on the limitations of the population data**

Source: Barber, A., K. Bogue, S. Burke, N. Jo, and A. Kinney. 2022. Puget Sound Wastewater Service Affordability Analysis Data Collection [Data files]. 1st Version. Prepared by College of Business and Economics, Western Washington University; ECO Resources Group; and Puget Sound Institute, University of Washington Tacoma. Distributed by ResearchWorks, University of Washington Libraries.

Figure 6. presents a scatter plot of current and estimated nutrient-adjusted %MHI values and delineates the 2.0 percent benchmark for EPA's high impact and Ecology's hardship metric. The %MHI values are plotted against household income for all 80 utilities in the study, showing a correlation between higher income households and lower %MHI values (i.e., there are more utilities with higher %MHI at the low end of the MHI axis). However, the correlation is not as strong as might have been expected. For example, there are utility districts below $60,000 MHI and that still have %MHI values below 2.0% and there are utility districts above $60,000 MHI that have %MHI values above 2.0 percent. This suggests that using an MHI metric to prioritize grant funds may provide money to districts that need it less than another district with a higher %MHI value. This finding is addressed in more depth in Section 5, Implications for MWQ IS.

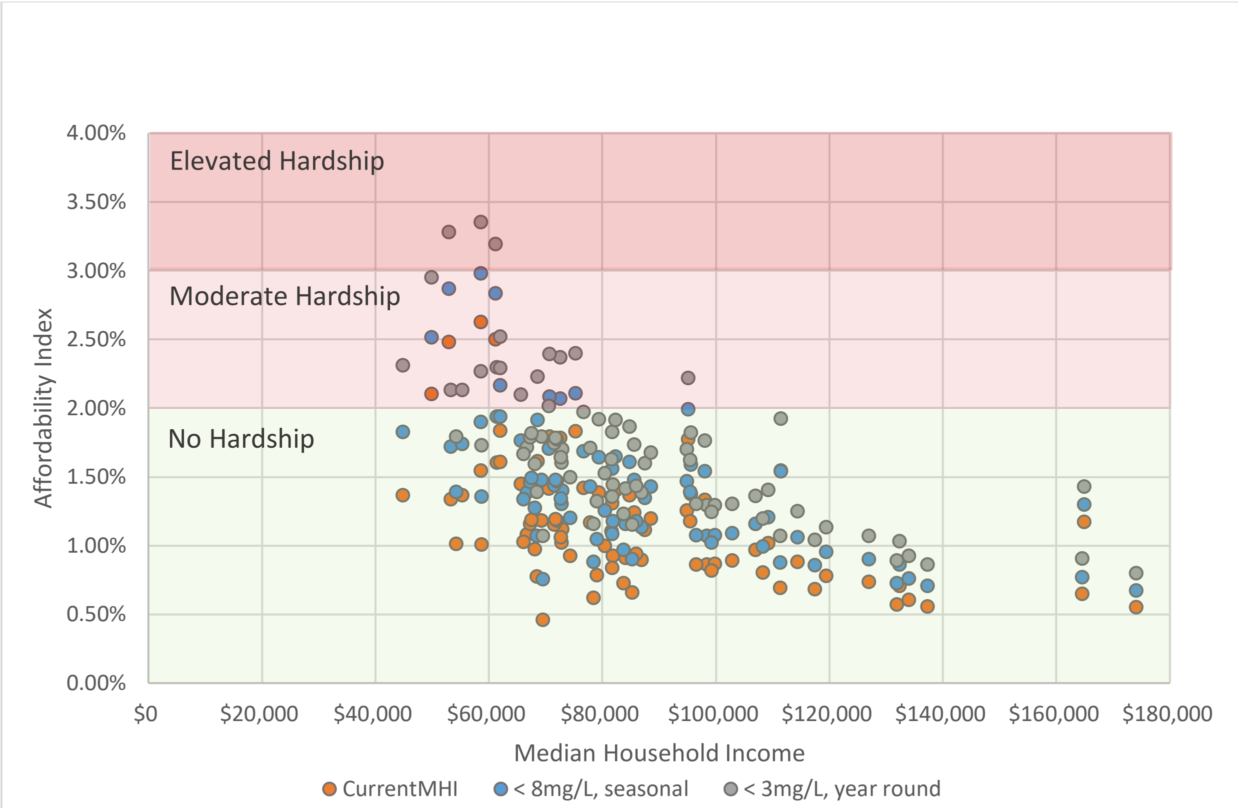


Figure 6. Estimated current and nutrient-adjusted utility-district specific %MHI

CURRENT AND PSNGP-ADJUSTED COSTS AS A PERCENT OF LQI

77 of the 80 Puget Sound sewer utilities had values exceeding 2%LQI (Table 3). 19 utilities' %LQI values were between 2% and 3%; 35 utilities' %LQI values were between 3% and 5%; and 23 utilities' %LQI values were above 5%. Current %LQI values range from 1.97% LQI to a high of 10.5% LQI, with an average of 4.4%LQI and a standard deviation of 1.97.

These estimated %LQI values suggest that approximately twenty percent of Puget Sound households served by a sewer utility are paying on average approximately 4.4% of their income on sewer bills. The lowest quintile of households in this study may spend almost half of a households' estimated food budget (per ERS 2021) on sewer bills.

Table 3. Summary of Current and PSNGP-Adjusted %LQI Values

Metric	Current	PSNGP-Adjusted (a)	
		< 8.0mg/L TIN dry season	< 3.0mg/L TIN year round
Total number of districts/utilities	80	80	80
Index > 2.0 % and < 3%			
Number of utilities	19	8	3
Percent of utilities	24.0%	10%	4%
Index > 3.0 % and < 5%			
Number of utilities	35	37	23
Percent of utilities	44.0%	46.0%	29.0%
Index > 5.0 %			
Number of utilities	23	35	54
Percent of utilities	29.0%	44.0%	68.0%
Minimum %LQI value	1.61%	2.80%	3.44%
Maximum %LQI value	10.50%	11.78%	13.14%
Average %LQI value	4.38%	5.47%	6.52%
Std Deviation	1.86%	2.05%	2.27%

(a) **Nutrient-adjusted rates estimated using data from Technical and Economic Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities. Publication 11-10-060, WA Dept of Ecology and Tetra Tech, 2011.**

(b) **See the Data Limitations section of the analysis for a discussion on the limitations of the population data**

Source: Barber, A., K. Bogue, S. Burke, N. Jo, and A. Kinney. 2022. Puget Sound Wastewater Service Affordability Analysis Data Collection [Data files]. 1st Version. Prepared by College of Business and Economics, Western Washington University; ECO Resources Group; and Puget Sound Institute, University of Washington Tacoma. Distributed by ResearchWorks, University of Washington Libraries.

All PSNGP-adjusted costs had %LQI values above 2.0%. Under the 8.0 mg/L scenario, 8 utilities' %LQI values are between 2 percent and 3 percent of LQI; 37 utilities' %LQI values are between 3 percent and 5 percent; and 35 utilities' %LQI values are above 5 percent of LQI. Under the 3.0mg/L scenario, 3 utilities' %LQI values are between 2 percent and 3 percent of LQI; 37 utilities' %LQI values are between 3 percent and 5 percent; and 54 utilities' %LQI values are above 5 percent of LQI.

For the 8.0mg/L scenario, %LQI values range between 2.8 percent of LQI and 11.8 percent of LQI with an average of 5.47 percent of LQI. Under the 3.0mg/L scenario, %LQI values range from 3.4 percent of LQI to 13.1 percent of LQI, with an average %LQI of 6.5 percent of LQI.

Figure 7 presents a scatter plot of current and PSNGP-adjusted %LQI values. The %LQI values are plotted against household income for all 80 utilities in the study, showing a correlation between higher income households and lower %LQIs, e.g. there are more utilities with higher %LQIs at the low end of the LQI axis.

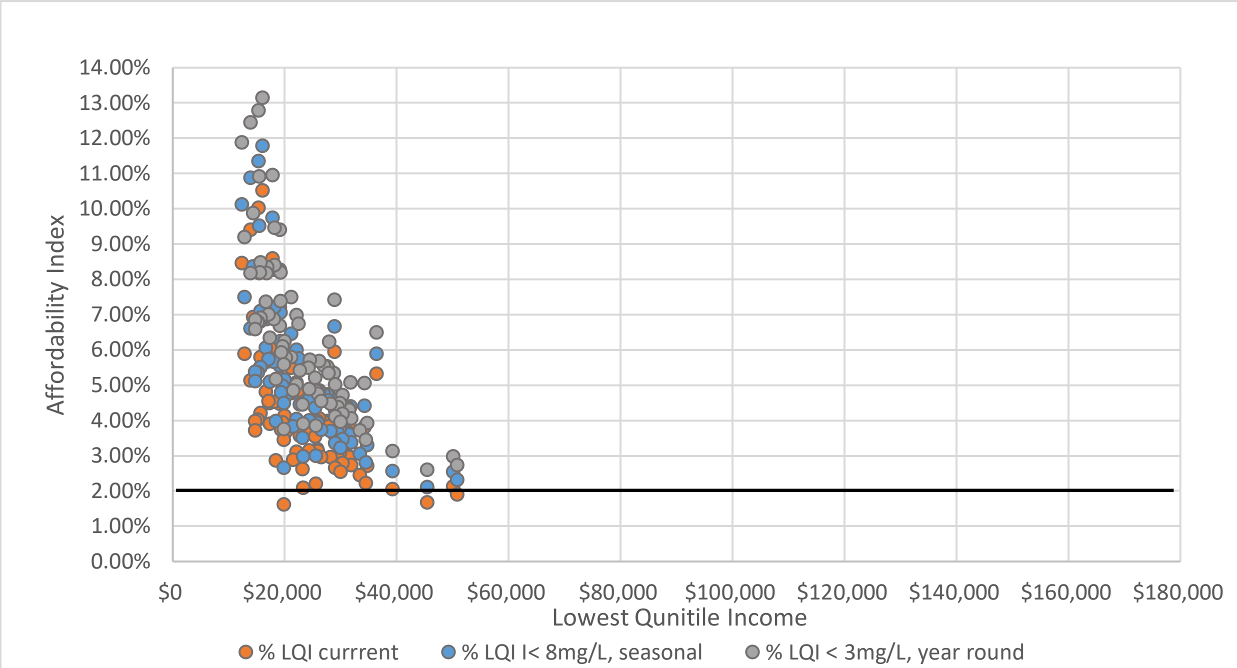


Figure 7. PSNGP-adjusted service cost as %LQI

3. FUNDING STRATEGY DISCUSSION

The findings of the impact analysis may help inform policy in in two areas:

- **Funding of public benefits**: Some industry experts and resource managers argue that sewer services provide a public benefit. We discuss this concept and the potential concern over a subset of the region's population incurring a large portion of the expenditures needed to achieve those public benefits.

- **Environmental justice/equity consequences**: Utility bills are regressive in nature and cause lower income households to pay a disproportionate share of their incomes on sewer bills. We discuss this issue using the findings of the impact analysis.

Both potential concerns are well described by the US Water Alliance in a recent publication (Hara and Take 2022) which states (emphasis added):

> For every community in our country, the availability of **wastewater services is a precondition for public health and prosperity. It is in our collective national interest** that everyone has access to clean water and sanitation. Yet, the reality is that maintaining and operating water systems is incredibly costly, **and both people who cannot pay water bills and utilities who cannot cover costs** can face severe consequences…

Lastly, we close with a discussion of implications this study has for the MWQ IS funding strategy and potentially for the Land Development and Cover IS.

3.1 Funding the Public Benefit of Sewer Services

Sewer Services as a Public Good

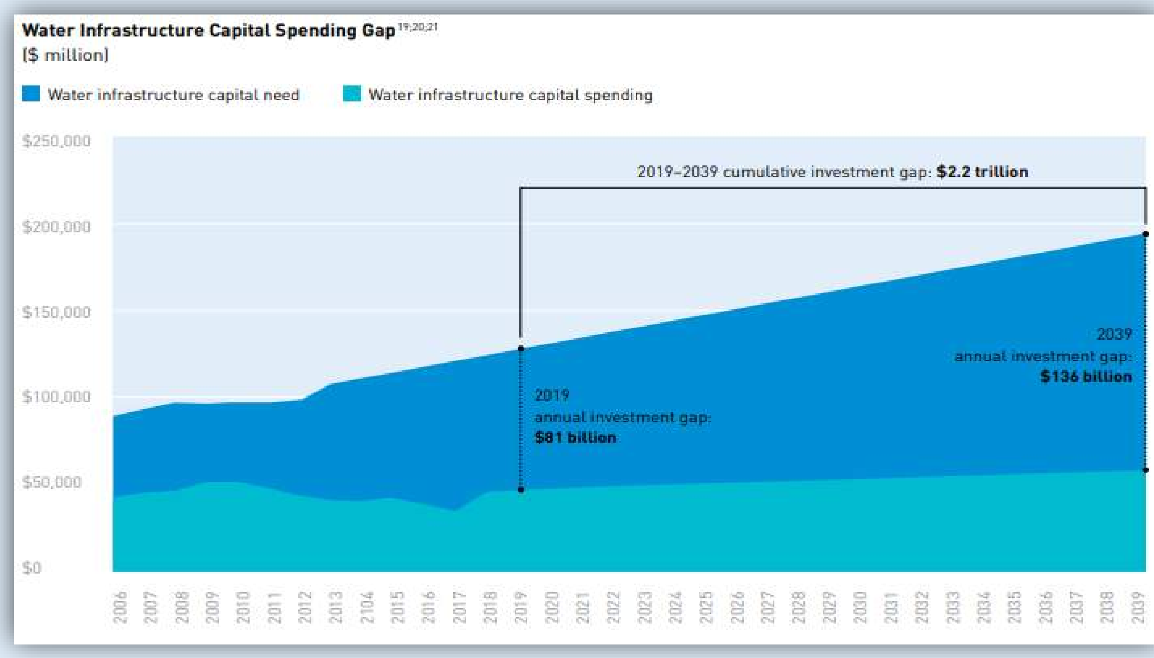
Some categories of public goods, like public education systems are funded in ways that aim to accrue and distribute the benefits of those goods to all people. For example, higher education, for which the student pays a portion of the cost, is subsidized through student loans, acknowledging the benefit to society of a well-educated population. To the extent that some of the benefits of wastewater services accrue to the public, an argument can be made for public funding for a portion of the costs of providing those services.

When public benefits do not receive appropriate levels of public funding the consequences can be under production of the public good, in this case clean water. And public funding for water infrastructure has been complicated by the fact that the federal government's funding has not kept pace with the need. The US Water Alliance estimates that, at the national level, in 2019 the gap between spending from all sources and investment needs as $81 billion (US Water Alliance, undated). This gap in federal funding places added pressure on local and state governments to bridge the gap and increases the urgency to distribute available funds to utilities with the greatest need and equity concerns (see Box 1). And the standard locally reliant utility revenue model is a precarious way to fund essential public goods that benefits more than just rate payers (Beecher, 2020).

Another consequence of a gap of public funding is the negative equity outcomes that occur if a subset of the region's households bears the greatest responsibility for paying for nutrient-related infrastructure investments. Questions have been raised about the equitable cost distribution associated with a subset of the region's population incurring a large portion of the expenditures needed to achieve public benefits (Northern Economics, 2019). Those expenditures come from households when they pay their sewer bills. Households with on-site sewage systems (septic) do not pay monthly sewage bills.

Box 1
The Economic Benefits of Investing in Water infrastructure
US Water Alliance National Water Infrastructure Spending Gap

"Meeting the drinking water and wastewater capital needs for communities across the United States will require coordinated investment at the federal, state, and local levels. Despite the growing need for water infrastructure, the federal government's share of capital investment has fallen from 31 percent in 1977 to a mere four percent in 2017. ... As federal support for water infrastructure capital needs has declined, local and state spending has provided a much greater share. Across the country, water rates are climbing to meet the costs of upgrading, expanding, and replacing water infrastructure. As costs, however, continue to rise, many communities will struggle to cover them through local rates and fees." (Page 14)



Source: US Water Alliance, The Economic Benefits of Investing in Water infrastructure, undated.

ABILITY TO PAY

A second potential unintended equity outcome of over-reliance on sewer ratepayers to fund wastewater treatment involves the potential for lower income households to either pay a disproportionate share of their income on sewer bills or be unable to pay those bills. Utility bills are regressive—they take a relatively larger share of low-income households' budgets compared to middle- and high-income households' budgets—and are therefore a form of structural inequity (Beecher 2020).

Our findings suggest that currently only three Puget Sound utilities' sewer rates result in sewer bills less than 2.0 percent of LQI. PSNGP-adjusted rates resulted in %LQI values ranging between 2.64 percent of LQI and 12.76 percent of LQI. These relatively high values indicate that sewer bills exacerbate the already regressive nature of Washington State's tax structure.

Box 2. Sewer Utilities' Income-Based Assistance Programs

Discounted utilities rates for low-income senior citizens or disabled residents are offered by many Puget Sound utilities districts. However, utility-based programs that offer low-income households - other than seniors or disabled citizens - have not been widely adopted. Furthermore, previous studies indicates that enrollment levels tend to be low compared to eligible populations (Kinney, 2022). Multiple challenges administering these programs, such as imprecise eligibility rules; extensive time and effort required for customers to apply; and a lack of trust to share income information are common (Pierce et al. 2021, Teodoro 2021).

Additional research on the effectiveness of customer assistance programs, as well as legal constraints related to such programs in Washington may be warranted (see footnote 6). For a thorough exposition of Washington State's grant, loan and assistance programs see the Marine Water Quality Base Program Analysis (Kinney and Wright, 2022). For examples of how utilities in other states are approaching these equity-based challenges see the US Water Alliance's recent study, A Promising Water Pricing Model for Equity and Financial Resilience (Hara and Take, 2023).

Although customer assistance programs for low-income households exist in Washington,[8] utility managers note that these programs are undersubscribed in their districts (see Box 2). This result is borne out in research on low-income assistance programs nationwide (Pierce, et.al, 2021 and Teodoro, 2021). Multiple challenges to administering these programs include: imprecise eligibility rules, extensive time and effort required for customers to apply, and a lack of trust to share income information.

This concern—overburdening disadvantaged or low-income households—is addressed in the Washington State Environmental Justice (EJ) Task Force Recommendations for Prioritizing EJ in Washington State Government. The recommendations of the task force resulted in the adoption of Chapter 70A.02 RCW which states, "an equitable distribution means a fair and just, but not necessarily equal, allocation intended to mitigate disparities in benefits and burdens". Washington State's concern over these equity issues is well justified, as the State ranks highest

[8] RCW 35.92.020 and RCW 35.67.020 confer authority to construct systems and *fix rates and charges* to Counties and Cities, respectively stating "the rates charged shall be uniform for the same class of customers or service" where the "factors" used to classify customers do not include low-income households. However, both RCWs do allow *assistance to aid* low-income persons in connection with services. RCW 57.08.014 provides authority to adjust or delay rates for low-income persons provided that "information on cost shifts caused by establishment of the special rates or charges shall be included in the notification of same." RCW 74.38.070 further discusses reducing rates for low-income senior citizens and other low-income citizens provided that the definitions of same are defined by appropriate ordinance or resolution adopted by the governing body of the county, city, town, public utility district or other municipal corporation. For example, Edmonds has adopted rate reductions for low-income citizens utilizing the definition of low-income established in RCW 84.36.381(5)(b)(i), Property tax exemptions, which includes a statement that to qualify individuals must be 61 years or older or disabled.

in the Tax Inequality Index (ITEP, 2018), which measures the regressive nature of states' tax structures.

Demonstrating similar concern about overburdening low-income households, EPA (2022b) instructed states to review, refine and improve as necessary their CWSRF affordability criteria to ensure that criteria are reflective of current affordability issues in the state. This instruction is an opportunity to incorporate newer thinking regarding use of LQI versus MHI in prioritizing funding decisions. These affordability metrics influence a utilities' access to grants and loans.

In addition to federal and State concerns of overburdening low-income households the industry also writes about these concerns. The US Water Alliance recently commented on the impact that the user-fee based funding structure has more broadly on communities and the environment, noting:

> *"This type of funding model exposes both individuals and communities to health and economic risks. Households that cannot pay their water bills face consequences like service shutoffs, property tax liens, and additional penalties and fees. This can push struggling customers into deeper debt, making it even harder to get current on bills. Meanwhile, utilities that cannot collect adequate revenue from rates run the risk of financial instability, putting vital operations and system maintenance at risk. Utilities that struggle financially may not be able to secure loans with favorable terms, which raises costs, leads to deferred maintenance, and drives the need for further rate increases to maintain quality levels of service. Utilities' financial dependence on customers makes them highly vulnerable to economic crises and growing income inequality." (Hara, 2022 for the US Water Alliance)*

3.2 Implications for the Land Development and Cover Implementation Strategy

The work is also relevant to the Land Cover and Development Implementation Strategy and 2022-2026 Action Agenda Strategy #1 (Advance smart development and protect intact habitats and processes by channeling population growth into attractive, transit-oriented centers with easy access to natural spaces). The high cost of living in urban centers, relative to rural communities, has been identified as a barrier to the regional goal of directing population growth into urban centers. Residents of these urban areas fund clean water services through Stormwater Utility Fees and sewer bills, while rural residents on septic systems in areas without NPDES Municipal Stormwater Permit coverage do not. This is likely one component of the "rural cost subsidy" described in the Land Cover and Development Implementation Strategy.

4. RECOMMENDATIONS

Our recommendations combine the findings of the impact analysis with the funding strategy discussion to help identify steps to take toward an efficient funding pathway for the MWQ IS. Public (i.e., non-utility) funding is required if resource managers agree that sewer services provide a public good. Additional public funding would also be required if resource managers set a target to keep utilities' %MHI values within Ecology's "no hardship" range (below 2 percent of MHI). The %MHI values of between 8 and 18 individual utilities were in either the moderate hardship range or the elevated hardship range when using the PSNGP-adjusted sewer rates. And over half the %LQI values exceeded 5%, indicating a significant impact on low-income households.

Demand for public funding, whether state or federal, frequently exceeds the supply of funding. Public funding is a finite resource. As such, developing a plan to utilize the available funding as efficiently as possible is an admirable goal. In the following four subsections, we provide recommendations that might improve both efficiency and equity outcomes for the available grant and loans monies. They are:

- Use the data collected for this study, plus newer estimates of PSNGP-related capital costs currently being developed as a PSNGP requirement, to calculate a Capital Investment Gap metric. The gap would be the amount of state/federal funding needed to maintain %MHI indices values below a specified percentage and/or the funding needed for low-income assistance programs to ensure households don't pay more for sewer service than a specified percentage of their income (Section 4.1).
- Investigate the possibility of using the %MHI or %LQI metric in addition to other metrics used to determine financial hardship in Ecology's Grants and Loans Programs (Section 4.2).
- Consider development of a regional or state-wide low-income assistance program for sewer utilities (Section 4.3).
- Consider funding a study to assess the potential equity benefits of restructuring wastewater rates using the Resilient Rate Structure model developed by the US Water Alliance (Section 4.4).

4.1 Estimate the Capital Investment Gap to maintain index values below target levels

Ecology and Tetra Tech's (2011) initial estimates of the total capital investment required to upgrade all Puget Sound WWTP for nitrogen and phosphorus removal was estimated to be between $1.4 billion and $5.9 billion depending on the level of nitrogen removal required.[9] Current estimates being completed by individual utilities are higher, but the exact amount of capital investment required to meet regulatory requirements cannot be known until nutrient effluent limits are determined by Ecology. While the final capital cost estimates are being completed by each utility, we recommend developing a methodological approach for distributing federal or state grant funds (assuming such grant funding is available) to maximize the equity outcomes and efficiency of those investments.

[9] See Tables ES-3 and Table ES-4 of the 2011 Technical and Economic Evaluation of Nitrogen and Phosphorus Removal at Municipal Wastewater Treatment Facilities, WA Dept of Ecology and Tetra Tech, adjusted for 2022 dollars.

We propose developing a Capital Investment Gap metric as shown in green on the bar chart in Figure 8. Assume for this hypothetical example that the State and/or Puget Sound regional recovery partners set a target of a 2%MHI for all Puget Sound utilities and endeavors to provide grant funds to utilities that would exceed that target due to PSNGP-required upgrades. The first bar shows a current (before nutrient removal upgrades are implemented) index value. The second bar shows how the index value would change assuming that the utility receives no state or federal grant funding and increases rates to pay for all PSNGP-required upgrade costs. The third bar shows a local share up to 2 percent, with the green stripped area above 2 percent indicating the hypothetical state or federal contribution needed to keep the %MHI index below the 2 percent threshold.

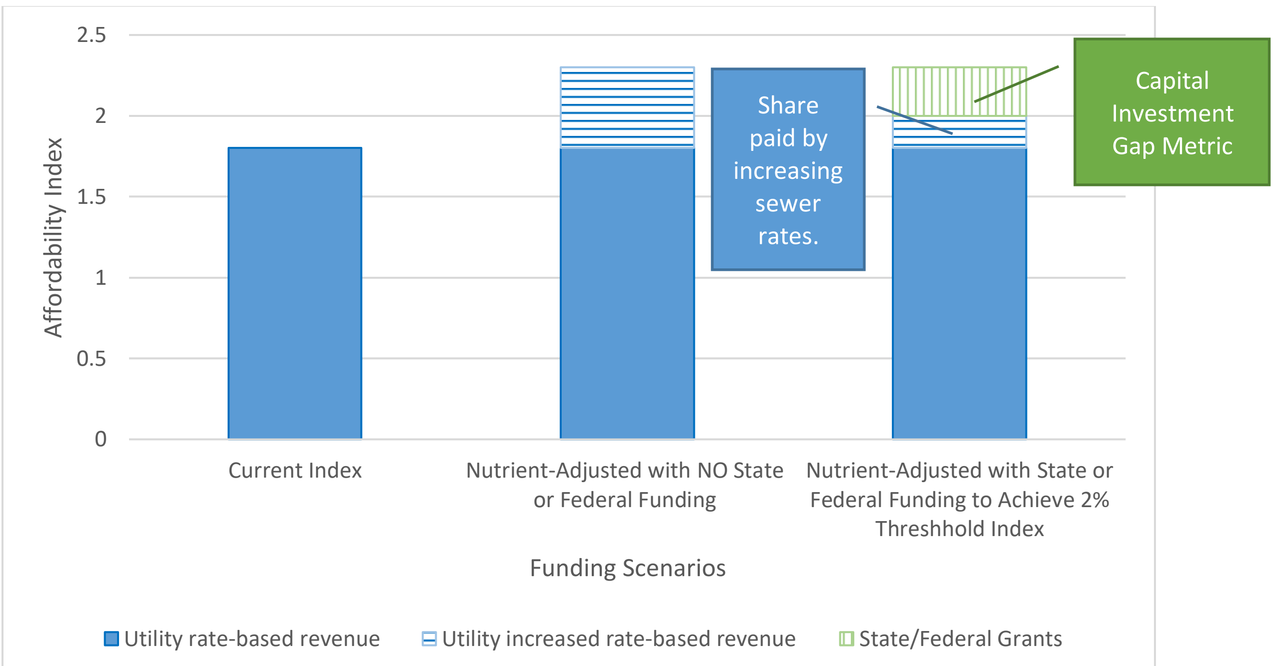


Figure 8. Proposed method to derive a Capital Investment Gap metric for quantifying state and federal funding requests to support PSNGP-required upgrades

This method would help estimate the amount of state/federal funding that could keep sewer bills below a target threshold. In this example the threshold was 2% but results could be calculated for other thresholds, such as other state hardship benchmarks like 3% and 5%. Note that this method assumes that utilities raise rates to pay for the difference between the index value under current rates and the rates up to the selected threshold. The funding need above that threshold would provide a target for state and federal funding requests.

Using utility-specific index thresholds to prioritize grant funding would help increase the economic efficiency of grant distribution. Additionally using utility specific index thresholds would help estimate how much grant money might be needed to fill the gap between what utilities can pay at a 2 percent index threshold and how much grant money might be needed to keep indices below that threshold level. In other words, utilities that have index values below 2 percent, even after the nutrient upgrades would receive a lower priority for grant funds. Instead, scarce grant funds would be prioritized to those utilities to close a gap and maintain a 2 percent index threshold.

Applying this same method using %LQI instead of %MHI could be used to estimate the annual budget needed to implement a regional low-income assistance program. Ideally, a customer assistance program would be sufficiently funded to ensure households don't pay more for sewer service than a specified percentage of their income.

Using this method to estimate the gap in capital spending, the annual budget for a low-income assistance program, or a combination of the two would help the advance the MWQ IS funding pathway strategy and increase understanding of the magnitude of the funding challenge associated with adding advanced nutrient reduction technologies to WWTPs in the region.

4.2 Utilize %MHI or %LQI in place of MHI when allocating grant/loan funding

Ecology manages grants and loans under both the Water Quality Combined Funding Programs[10] as well as the Puget Sound nutrient reduction grants program. Each of the funding programs described in Table 4 uses either %MHI or MHI as part of the prioritization process. The Ecology Water Combined Funding program, which oversees the Centennial Clean Water Program (CCWP) and the Clean Water State Revolving Fund (CWSRF), utilizes %MHI for its hardship determination. The 2022 Puget Sound Nutrient Reduction Grant Program (PSNRGP) included consideration for the average MHI of permitees.

If one of goals of a grants and loan program includes reducing hardship on those households most affected, incorporating %LQI in the hardship determination could potentially increase the efficiency and equity of the programs. However, if MHI (used for the PSNGP grant program) and %MHI (used for the CWSRF and the CCWP) values are close proxies for %LQI values then a program change would not be warranted.

[10] See Ecology's Grants and Loans web page.

Table 4. Washington State Grant and Loan Programs Available for Wastewater Infrastructure Improvements in Puget Sound

Program Name	Phase	Eligible Utilities	Current Hardship/Prioritization Metrics
Clean Water State Revolving Fund (a)	Pre-construction	All	• The existing residential population of the service area for the proposed project is 25,000 or less at the time of application. • The MHI for the proposed service area is less than 80 percent of the state MHI.
	Construction	All	• The existing residential population of the service area for the proposed project is 25,000 or less at the time of application. • Financing the project without subsidy would cause existing residential sewer fees to be two percent or more of the MHI for the service area. Hardship categories: Moderate 2% < RI < 3%; elevated 3% < RI < 5%; severe RI >5%
Centennial Clean Water Program (a)	Pre-construction & construction	All	• Managed in accordance to Chapter 70A.135RCW and Chapter 173-95A WAC where: • 70A.135 RCW give preference to Puget Sound partners (defined in 90.71.010 RCW as an entity that has been recognized by the partnership as having consistently achieved outstanding progress in implementing the 2020 action agenda • 173-95A WAC define hardship (in WAC 173-98-300) as MHI > 2%, categories as listed above under CWSRF.
Puget Sound Nutrient Reduction Grant Program (b)	Planning	43 utilities that own and operate the 58 WWTPs discharging to Puget Sound	From page 1, from legislative language for the $9M of the 2021-23 biennium: • Location of wastewater treatment facility, prioritizing facilities that are not located within a city with a population of 760,000 or more, • Age of wastewater treatment facility, prioritizing the oldest eligible facilities; and • Immediacy of need for grant funding to avoid system failure and higher magnitude of contamination. From page 3, under prioritization factors all of the above and: • Economic Status: Facilities serving populations with lower Median Household Incomes receiving higher priority.

Sources: (a) Washington State Department of Ecology, 2022. State Fiscal Year 2024 Funding Guidelines Water Quality Combined Funding Program, Pub 22-10-016 (b) Washington State Department of Ecology, 2021. 2021-2023 Puget Sound Nutrient Reduction Program Funding Guidelines, Pub 21-10-042

Figure 9 shows the correlation between MHI and %MHI values and %LQI values. The correlation between either index and MHI is moderate at best. Meaning, MHI may not be a good proxy for hardship. This demonstrates that the MHI does not identify the utilities with the highest %MHI values or %LQI values. The reason that MHI is not strongly correlated with hardship is due to the wide variability of sewer rates (Figure 1). The information suggests that, at a minimum incorporating the %MHI index into the hardship determination for the PSNRGP would increase equity outcomes significantly.

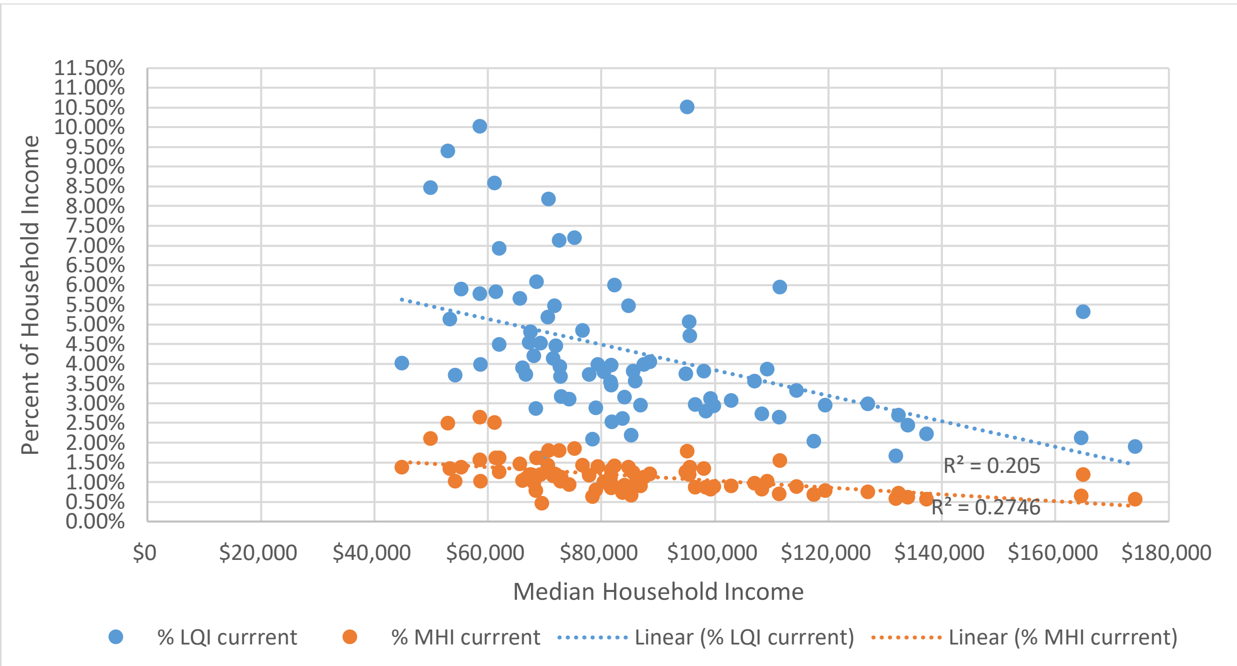


Figure 9. Correlation of %MHI and %LQI values to MHI

Figure 10 shows the correlation between %LQI values and %MHI values. Here the correlation is strong. Meaning, %MHI value may be a good proxy for hardship. There would be room for an equity improvement if %LQI was used in place of %MHI in determining hardship, but the improvement may be relatively small. The reason that %MHI values are correlated with hardship is because %MHI incorporates variability in sewer rates. The information suggests that, incorporating the %LQI value into the hardship determination for the CWSRF and CCWP may increase equity outcomes slightly.

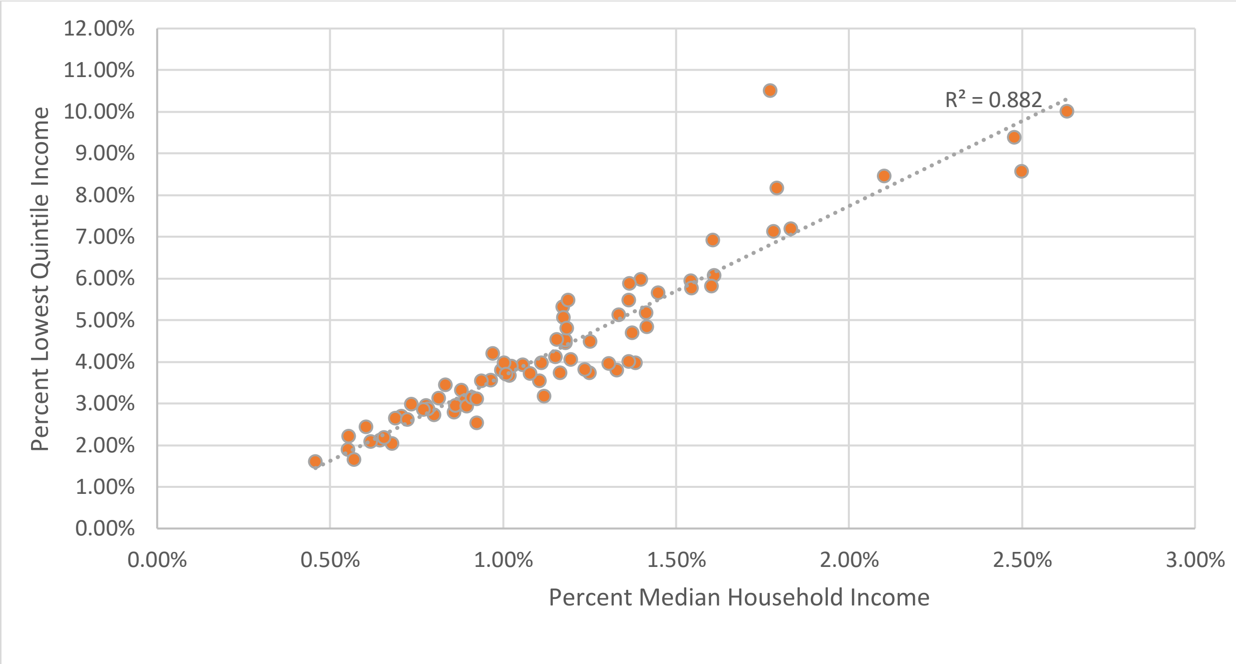


Figure 10. Correlation of %LQI to %MHI

4.3 Consider developing a regional or statewide low-income assistance program

The results of this study show that our conservatively low PSNGP-adjusted sewer service cost estimates would exceed 2% LQI for 76 of the utilities included in the study and pose a financial risk to both people who cannot pay water bills and utilities who cannot cover costs if bills are not paid. One possible improvement to equity outcomes of state grant programs would be development of a statewide or region wide low-income assistance program. Developing this program at a state or region level would lower the financial risk and administrative burden that utilities face in developing a low-income assistance program. In addition, a state-wide or region-wide program may reduce some impacts of Washington State's regressive tax system.

Several of Washington's codes provide authority for utilities to develop low-income assistance programs/rates (see footnote 6). However low-income assistance programs have not been widely adopted by utilities, except for programs for seniors and disabled individuals (see Box 2). The US Water Alliance observes this phenomenon among utilities nationwide. Utilities facing administrative burdens and legal ambiguities have errored on the side of caution with regard to low-income rates. The Municipal Research and Services Center (MRSC) describes how utilities could define eligibility on a utility-by-utility basis, emphasis added:[11]

> *Eligibility requirements for low-income and senior* ***low-income assistance are not defined by statute,*** *so agencies are free to define these as they see fit. Some only*

[11] MRSC's website at: https://mrsc.org/explore-topics/public-works/general-utility-topics/senior-and-low-income-utility-rate-discounts.

> *provide these assistance programs to low-income seniors, while others include persons with disabilities as well, generally defining people with disabilities to be those people who qualify for special parking privileges under chapter 46.19 RCW (formerly RCW 46.16.381) and people who are blind as defined in RCW 74.18.020.*
>
> *However,* ***there are a range of definitions****. Some jurisdictions may include individuals with developmental disabilities and mental illnesses, while others require proof of disability from the Social Security Administration. Some may even exempt all low-income individuals.*
>
> *In some cases, the utility requires that qualified persons be the head of household, while in other cases there may be a restriction on the income level of any co-tenant. To ensure that* ***eligibility determinations are made fairly and uniformly****, the utility's legislative body should establish, by ordinance or resolution, policies or programs for utility staff to follow.*

This description provides an example of some of the administrative challenges that an individual utility may face in developing a low-income rate. Seeing similar challenges nationwide the US Water Alliance recommends:

- Establish affordability criteria to better target state funding.
- Remove legal barriers to affordability solutions.
- Create a statewide program for water bill assistance for low-income residents, citing California's programs.

A program to aid low-income sewer rate payers could be modeled after existing programs like Washington Low Income Home Energy Assistance Program (LIHEAP) (See Box 3). Additionally, a program may be able to be created with a modification to the existing Low Income Household Water Assistance Program (LIHWAP). The LIHWAP provides assistance to low-income households with water and wastewater bills that are disconnected or are in imminent threat of disconnection. A modification to the program that includes payment of monthly sewer bills may want to be considered in order to offset unintended equity outcomes that may arise from the needed investment in nutrient reduction infrastructure.

Box 3. Low Income Assistance Programs

Washington Low Income Home Energy Assistance Program (LIHEAP) (see https://www.benefits.gov/benefit/1586) Washington Low Income Home Energy Assistance Program (LIHEAP) services are provided to the public through a network of 26 local community-based nonprofit organizations and local municipalities. Services include energy assistance, client conservation education, furnace repair and replacement, and weatherization. Energy assistance benefits are paid directly to energy providers and are based on a portion of a household's annual home heating costs.

Low Income Household Water Assistance Program (LIHWAP) (see https://www.commerce.wa.gov/growing-the-economy/energy/low-income-home-energy-assistance/lihwap/) LIHWAP provides emergency assistance to low-income households who are disconnected or are in imminent threat of disconnection. LIHWAP provides water assistance to households in Washington through the same network of community action agencies and local partners that provide the Low-Income Home Energy Assistance Program (LIHEAP). These local organizations will help you determine if you're eligible and how much assistance you might receive. If you qualify, your local agency will send a payment directly to your water utility on behalf of your household. Households eligible for water assistance are also qualified for the Low-Income Home Energy Assistance Program.

4.4 Consider the feasibility of the Resilient Rate Structure

The US Water Alliance's recent publication, *Pricing Water for Public Health and Financial Resilience: An Applied Modeling Pilot, Project Description* (US Water Alliance, 2021) proposes an alternative type of rate structure to address shortcomings of a usage-only based rate structures, enhance revenue stability, and integrate equity considerations. Models of this Resilient Rate Structure are already being developed in Minnesota and Cincinnati for water bills. From the paper:

> *The water sector and community advocates need to reimagine the utility revenue model and available pricing structures to reflect water's fundamental role in a thriving society and the true costs and value of providing safe, reliable water and wastewater service. Of course, federal funding is crucial and should contribute a larger share of utility revenue than it presently does. However, utilities can use the tools at hand to begin* ***billing for water in a more sensible, equitable way while advocating for change at the federal level****. The time is right to develop innovative new ways to price and fund water that supports system sustainability, equity, and public health.*

The outcome of the feasibility study would suggest whether innovative pricing models could make sewer bills more affordable and equitable while preserving utility revenue. The resilient rate structure model would seek to allow certain amounts of costs and an associated level of sewer service for all residents to be paid for by property taxes or some other similar property-based cost recovery mechanism.

5. NEXT STEPS

When developing a funding strategy for WWTP upgrades, we encourage policy makers to consider tradeoffs between water quality and other regional recovery goals. Choices made about how the region is to pay for WWTP upgrades may have implications for growth management as well as equity outcomes receiving greater attention due to the White House's Justice40 Initiative and Washington's Healthy Environment for All (HEAL) Act. We hope this analysis can support development of funding strategies that improve water quality while minimizing unintended consequences of Puget Sound's socioecological system.

Possible next steps for this research beyond the recommendations described in the preceding section could include:

- **Addressing know data gaps and challenges**. For example: improve the accuracy of the correspondence table that links the income data (at the census tract level) with the utility district boundaries. Improving the correspondence table would not only increase the certainty of the individual utilities' households' MHI and LQI but also increase our confidence about stating the number of households effected within each income quintile. Another known data challenge is the method with which we averaged LQI. We utilized a population weighting, which does not accurately estimate the median value of the lowest quintile income. For a complete list of know data challenges see Barber et.al (2022).

- **Explore the usefulness of making the household income data easily available to Puget Sound utilities and Ecology**. While this study was done at a relatively coarse scale, the data is useful in identifying potential hardships faced by utility providers. However, this data can become quickly outdated as data on incomes is updated at least annually. Should utilities and Ecology find this data useful it could be updated annually for very little cost. If the database proved useful, updating it could become an annual exercise for student interns under the supervision of a senior researcher. For example, the income data that was gathered for this study was collected using student interns located at the Center for Business and Economic Research at Western Washington University. The cost of data collection was low and the students received invaluable work experience, that ultimately lead to permanent employment in the consulting and public sectors.

- **Explore implications of the extremely wide variation in what Puget Sound residents pay to treat a gallon of sewage**. More research is needed to characterize the distribution of clean water costs and benefits across the region's population. This effort could include analyzing the proportionality of costs among utility ratepayers in neighboring jurisdictions as well as compared to on-site sewage system users who incur sewage treatment costs on a different timeframe (i.e., system maintenance or replacement costs are usually not paid monthly).

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APPENDIX: DATA TABLES

Table A-1 lists all 89 local wastewater service providers directly and indirectly affected by the PSNGP. Those on the left are directly impacted by the PSNGP because they operate WWTPs covered by the permit. Those on the right include additional utilities indirectly impacted by the permit because they retail wastewater treatment services provided by permittees.

Table A-2 provides individual sewer cost, MHI, LQI, %MHI, and %LQI results for the 80 service providers included in the study.

Table A-3 provides summary statistics for the 80 service providers included in the study.

All data is from Barber et al. (2022).

Table A-1. Local Wastewater Service Providers Direct and Indirectly Affected by the PSNGP

WWTP Operator / PSNGP Permittee	Utility District Billing Individual Property Owners	Included in study?
Alderwood Water District	Alderwood Water District	Yes
	Silver Lake Water & Sewer District	Yes
Anacortes, City Of	Anacortes, City of	Yes
Bainbridge Island City of	Bainbridge Island City of	Yes
Bellingham-Water Division City of	Bellingham-Water Division City of	Yes
	Lake Whatcom Water and Sewer District	Yes
Birch Bay Water & Sewer District	Birch Bay Water & Sewer District	Yes
Blaine City of	Blaine City of	Yes
Bremerton City of	Bremerton City of	Yes
Clallam Bay Sekiu (Clallam County PUD)	Clallam Bay Sekiu (Clallam County PUD)	Yes
Coupeville Town of	Coupeville Town of	Yes
Eastsound Sewer and Water District	Eastsound Sewer and Water District	Yes
Edmonds, City of	Edmonds, City of	Yes
	Mountlake Terrace, City of	Yes
Everett Public Works Dept. City of	Everett Public Works Dept. City of	Yes
Fisherman Bay Water Association	Fisherman Bay Water Association	Yes
Friday Harbor Town of	Friday Harbor Town of	Yes
Gig Harbor Sanitary Sewer	Gig Harbor Sanitary Sewer	Yes
King County	King County Does Not Bill Individual Property Owners	No (1)
	Algona Water Dept	Yes
	Auburn, City of	Yes
	Bellevue City of	Yes
	Black Diamond Water Dept	Yes
	Bothell Water City of	Yes

WWTP Operator / PSNGP Permittee	Utility District Billing Individual Property Owners	Included in study?
	Brier, City of	Yes
	Cedar River Water & Sewer District	Yes
	Coal Creek Utility District	Yes
	Cross Valley Water District	Yes
	Issaquah Water System	Yes
	Kent Water Department	Yes
	Kirkland, City of	Yes
	Lake Forest Park Water District	Yes
	Lakehaven Water and Sewer District	Yes
	Mercer Island City of	Yes
	NE Sammamish Sewer & Water District	Yes
	Northshore Utility District	Yes
	Olympic View Water & Sewer District	Yes
	Pacific, City of	Yes
	Redmond Water System City of	Yes
	Renton City of	Yes
	Sammamish Plateau Water & Sewer	Yes
	Seattle Public Utilities	Yes
	Shoreline Waste Water, City of	Yes
	Skyway Water & Sewer	Yes
	Soos Creek Water & Sewer District	Yes
	Tukwila Water Department	Yes
	Valley View Sewer District	Yes
	Woodinville Water District	Yes
	Highlands Sewer District	No (2)
	Vashon Sewer District	No (2)
Kitsap County	Kitsap County	Yes
	Poulsbo City of	Yes
Kitsap County Sewer District #7	Kitsap County Sewer District #7	Yes
La Conner Water Dept	La Conner Water Dept	Yes
Lake Stevens Sewer District	Lake Stevens Sewer District	Yes
Langley City of	Langley City of	Yes
LOTT	LOTT Does Not Bill Individual Property Owners	No (1)
	Lacey Water Department	Yes
	Olympia City of	Yes
	Tumwater City of	Yes
Lynnwood, City of	Lynnwood, City of	Yes
Marysville Utilities	Marysville Utilities	Yes
Mason County	Mason County	Yes
Midway Sewer District	Midway Sewer District	Yes

WWTP Operator / PSNGP Permittee	Utility District Billing Individual Property Owners	Included in study?
Mount Vernon, City of	Mount Vernon, City of	No (2)
Mukilteo Water & Wastewater District	Mukilteo Water & Wastewater District	Yes
Oak Harbor City of	Oak Harbor City of	Yes
Penn Cove Water and Sewer District	Penn Cove Water and Sewer District	No (2)
Pierce County	Pierce County	Yes
	Steilacoom Town of	Yes
Port Angeles City of	Port Angeles City of	Yes
Port Townsend City of	Port Townsend City of	Yes
Sequim City of	Sequim City of	Yes
Shelton City of	Shelton City of	Yes
Skagit County Sewer District #2	Skagit County Sewer District #2	No (2)
Snohomish, City of	Snohomish, City of	Yes
Stanwood Water Dept City of	Stanwood Water Dept City of	Yes
SW Suburban Sewer District	SW Suburban Sewer District	Yes
Tacoma Water	Tacoma Water	Yes
	Fife Dept of Public Works	Yes
	Fircrest City of	Yes
	Ruston, City of	Yes
Thurston County	Thurston County Boston Harbor	Yes
	Thurston County Tamoshan	Yes
West Sound Utility District	West Sound Utility District	Yes

(1) King County and LOTT do not provide retail services to households, therefore do not have retail rates, and as such %MHI and %LQI cannot be calculated

(2) Barber et al. (2022) were unable to locate a detailed map of the provider's service area or the district's web page did not report sewer rates

Table A-2. Individual Results for 80 Puget Sound Wastewater Service Provider

Permitee Serving	Utility Name	Est Annual Sewer Bill	Est. Utility District Income Metric		%MHI Index			%LQI Index		
			MHI	LQI	Current	< 8mg/L, seasonal	< 3mg/L, year round	Current	< 8mg/L, seasonal	< 3mg/L, year round
Alderwood Water District	Alderwood Water District	$866	$99,925	$29,596	0.87%	1.07%	1.29%	2.93%	3.62%	4.36%
Alderwood Water District	Silver Lake Water & Sewer District	$797	$117,439	$39,324	0.68%	0.85%	1.04%	2.03%	2.55%	3.11%
Anacortes, City of	Anacortes, City of	$742	$72,862	$20,246	1.02%	1.30%	1.60%	3.67%	4.68%	5.76%
Bainbridge Island, City of	Bainbridge Island, City of	$1,007	$114,451	$30,415	0.88%	1.06%	1.25%	3.31%	3.99%	4.71%
Bellingham Water Division	Bellingham Water Division	$589	$58,703	$14,826	1.00%	1.35%	1.73%	3.97%	5.36%	6.84%
Bellingham Water Division	Lake Whatcom Water and Sewer District	$1,069	$81,832	$27,023	1.31%	1.56%	1.82%	3.95%	4.72%	5.53%
Birch Bay Sewage Treatment Plant (STP)	Birch Bay Water & Sewer District	$319	$69,617	$19,839	0.46%	0.75%	1.07%	1.61%	2.64%	3.74%
Blaine, City of	Blaine, City of	$1,381	$75,356	$19,208	1.83%	2.11%	2.40%	7.19%	8.26%	9.40%
Bremerton, City of	Bremerton, City of	$777	$62,011	$17,332	1.25%	1.58%	1.94%	4.48%	5.67%	6.93%
Clallam Bay PUD	Clallam Bay Sekiu (Clallam County PUD)	$612	$44,844	$15,291	1.36%	1.82%	2.31%	4.00%	5.35%	6.78%
Coupeville, Town of	Coupeville, Town of	$661	$68,102	$15,759	0.97%	1.27%	1.59%	4.19%	5.50%	6.89%
Eastsound Sewer and Water District	Eastsound Sewer and Water District	$756	$55,350	$12,858	1.37%	1.74%	2.13%	5.88%	7.48%	9.18%
Edmonds, City of	Edmonds, City of	$606	$83,751	$23,236	0.72%	0.97%	1.23%	2.61%	3.49%	4.44%
Edmonds, City of	Mountlake Terrace, City of	$766	$84,112	$24,426	0.91%	1.16%	1.42%	3.14%	3.98%	4.87%
Everett Public Works Dept., City of	Everett Public Works Dept., City of	$999	$70,649	$19,293	1.41%	1.70%	2.01%	5.18%	6.24%	7.38%
Fisherman Bay Water Assoc	Fisherman Bay Water Assoc	$996	$62,008	$14,400	1.61%	1.94%	2.29%	6.92%	8.34%	9.86%
Friday Harbor, Town of	Friday Harbor, Town of	$1,542	$58,690	$15,405	2.63%	2.98%	3.35%	10.01%	11.34%	12.76%
Gig Harbor Sanitary Sewer	Gig Harbor Sanitary Sewer	$810	$99,284	$26,004	0.82%	1.02%	1.24%	3.11%	3.90%	4.75%
King County	Algona Water Dept	$816	$72,942	$25,804	1.12%	1.40%	1.70%	3.16%	3.96%	4.81%
King County	Auburn, City of	$903	$81,719	$25,517	1.11%	1.36%	1.62%	3.54%	4.34%	5.20%

Permitee Serving	Utility Name	Est Annual Sewer Bill	Est. Utility District Income Metric		%MHI Index			%LQI Index		
			MHI	LQI	Current	< 8mg/L, seasonal	< 3mg/L, year round	Current	< 8mg/L, seasonal	< 3mg/L, year round
King County	Bellevue, City of	$934	$126,996	$31,343	**0.74%**	**0.90%**	**1.07%**	**2.98%**	**3.64%**	**4.33%**
King County	Black Diamond Water Dept	$868	$108,333	$31,932	**0.80%**	**0.99%**	**1.19%**	**2.72%**	**3.36%**	**4.05%**
King County	Bothell Water City of	$1,033	$107,072	$29,071	**0.96%**	**1.16%**	**1.36%**	**3.55%**	**4.26%**	**5.01%**
King County	Brier, City of	$683	$81,817	$19,841	**0.83%**	**1.09%**	**1.35%**	**3.44%**	**4.48%**	**5.58%**
King County	Cedar River Water & Sewer District	$915	$102,967	$29,889	**0.89%**	**1.09%**	**1.30%**	**3.06%**	**3.75%**	**4.48%**
King County	Coal Creek Utility District	$1,721	$111,493	$29,005	**1.54%**	**1.54%**	**1.92%**	**5.93%**	**5.92%**	**7.40%**
King County	Cross Valley Water District	$1,109	$109,257	$28,839	**1.02%**	**1.20%**	**1.40%**	**3.85%**	**4.56%**	**5.32%**
King County	Issaquah Water System	$812	$134,035	$33,442	**0.61%**	**0.76%**	**0.92%**	**2.43%**	**3.04%**	**3.70%**
King County	Kent Water Dept	$907	$77,856	$24,343	**1.16%**	**1.43%**	**1.71%**	**3.73%**	**4.57%**	**5.47%**
King County	Kirkland, City of	$931	$119,490	$31,621	**0.78%**	**0.95%**	**1.13%**	**2.94%**	**3.59%**	**4.29%**
King County	Lake Forest Park Water District	$833	$96,555	$28,221	**0.86%**	**1.08%**	**1.30%**	**2.95%**	**3.68%**	**4.46%**
King County	Lakehaven Water & Sewer District	$486	$78,554	$23,401	**0.62%**	**0.88%**	**1.16%**	**2.08%**	**2.95%**	**3.89%**
King County	Mercer Island, City of	$1,935	$165,001	$36,417	**1.17%**	**1.30%**	**1.43%**	**5.31%**	**5.88%**	**6.48%**
King County	NE Sammamish Sewer & Water District	$962	$174,078	$50,831	**0.55%**	**0.67%**	**0.80%**	**1.89%**	**2.30%**	**2.73%**
King County	Northshore Utility District	$768	$111,384	$29,127	**0.69%**	**0.87%**	**1.07%**	**2.64%**	**3.34%**	**4.09%**
King County	Olympic View Water & Sewer District	$1,061	$88,612	$26,206	**1.20%**	**1.43%**	**1.68%**	**4.05%**	**4.83%**	**5.67%**
King County	Pacific, City of	$1,099	$79,412	$27,652	**1.38%**	**1.64%**	**1.92%**	**3.97%**	**4.72%**	**5.51%**
King County	Redmond Water System, City of	$761	$137,373	$34,494	**0.55%**	**0.70%**	**0.86%**	**2.21%**	**2.80%**	**3.44%**
King County	Renton, City of	$972	$87,494	$24,511	**1.11%**	**1.35%**	**1.60%**	**3.97%**	**4.80%**	**5.70%**
King County	Sammamish Plateau Water & Sewer	$1,063	$164,576	$50,206	**0.65%**	**0.77%**	**0.90%**	**2.12%**	**2.53%**	**2.96%**
King County	Seattle Public Utilities	$1,123	$95,537	$22,177	**1.18%**	**1.39%**	**1.62%**	**5.06%**	**5.99%**	**6.98%**
King County	Shoreline Waste Water, City of	$807	$85,987	$22,798	**0.94%**	**1.18%**	**1.43%**	**3.54%**	**4.44%**	**5.40%**

Permitee Serving	Utility Name	Est Annual Sewer Bill	Est. Utility District Income Metric		%MHI Index			%LQI Index		
			MHI	LQI	Current	< 8mg/L, seasonal	< 3mg/L, year round	Current	< 8mg/L, seasonal	< 3mg/L, year round
King County	Skyway Water & Sewer	$1,295	$72,635	$18,186	1.78%	2.07%	2.37%	7.12%	8.25%	9.45%
King County	Soos Creek Water & Sewer District	$846	$98,460	$30,392	0.86%	1.07%	1.29%	2.78%	3.46%	4.18%
King County	Tukwila Water Dept	$951	$65,657	$16,851	1.45%	1.76%	2.10%	5.65%	6.86%	8.16%
King County	Valley View Sewer District	$984	$61,420	$16,922	1.60%	1.94%	2.29%	5.82%	7.03%	8.32%
King County	Woodinville Water District	$937	$132,419	$34,770	0.71%	0.86%	1.03%	2.69%	3.29%	3.91%
Kitsap County	Kitsap County	$1,059	$85,655	$27,823	1.24%	1.48%	1.73%	3.81%	4.55%	5.33%
Kitsap County Sewer Dist #7	Kitsap County Sewer Dist #7	$751	$131,979	$45,527	0.57%	0.72%	0.89%	1.65%	2.10%	2.58%
Kitsap County	Poulsbo, City of	$852	$72,083	$19,131	1.18%	1.47%	1.77%	4.45%	5.53%	6.67%
La Conner Water Dept	La Conner Water Dept	$800	$67,518	$16,657	1.19%	1.49%	1.81%	4.80%	6.04%	7.35%
Lake Stevens Sewer District	Lake Stevens Sewer District	$1,188	$94,973	$31,866	1.25%	1.47%	1.70%	3.73%	4.37%	5.06%
Langley, City of	Langley, City of	$854	$71,835	$15,624	1.19%	1.48%	1.78%	5.47%	6.78%	8.18%
LOTT	Lacey Water Dept	$825	$71,606	$20,026	1.15%	1.44%	1.74%	4.12%	5.14%	6.24%
LOTT	Olympia, City of	$819	$69,385	$18,139	1.18%	1.48%	1.79%	4.51%	5.65%	6.85%
LOTT	Thurston County Boston Harbor	$1,315	$95,664	$28,023	1.37%	1.59%	1.82%	4.69%	5.43%	6.21%
LOTT	Thurston County Olympic View	$1,266	$70,695	$15,502	1.79%	2.08%	2.39%	8.17%	9.49%	10.91%
LOTT	Tumwater City of	$770	$72,769	$19,640	1.06%	1.34%	1.64%	3.92%	4.96%	6.08%
Lynnwood, City of	Lynnwood, City of	$619	$79,032	$21,602	0.78%	1.04%	1.32%	2.87%	3.82%	4.83%
Marysville Utilities	Marysville Utilities	$560	$85,294	$25,673	0.66%	0.90%	1.15%	2.18%	2.98%	3.83%
Rustlewood, North Bay/Case Inlet, Belfair WR/Sewer	Mason County	$1,306	$98,169	$34,349	1.33%	1.54%	1.76%	3.80%	4.40%	5.04%
Midway Sewer District	Midway Sewer District	$720	$66,787	$19,372	1.08%	1.39%	1.71%	3.72%	4.78%	5.91%
Mukilteo Water & Wastewater Distr	Mukilteo Water & Wastewater Dist	$779	$86,968	$26,510	0.90%	1.13%	1.38%	2.94%	3.71%	4.54%
OAK HARBOR City of	Oak Harbor, City of	$1,532	$61,278	$17,872	2.50%	2.84%	3.19%	8.57%	9.72%	10.95%

Permitee Serving	Utility Name	Est Annual Sewer Bill	Est. Utility District Income Metric		%MHI Index			%LQI Index		
			MHI	LQI	Current	< 8mg/L, seasonal	< 3mg/L, year round	Current	< 8mg/L, seasonal	< 3mg/L, year round
Pierce County Chambers Creek Regional WWTP	Pierce County	$688	$74,435	$22,197	**0.92%**	**1.20%**	**1.49%**	**3.10%**	**4.03%**	**5.01%**
Pierce County Chambers Creek Regional WWTP	Steilacoom, Town of	$757	$81,915	$29,994	**0.92%**	**1.18%**	**1.44%**	**2.52%**	**3.21%**	**3.94%**
Port Angeles, City of	Port Angeles, City of	$1,050	$49,965	$12,425	**2.10%**	**2.51%**	**2.95%**	**8.45%**	**10.10%**	**11.87%**
Port Townsend, City of	Port Townsend, City of	$549	$54,320	$14,818	**1.01%**	**1.39%**	**1.79%**	**3.70%**	**5.09%**	**6.57%**
Sequim City of	Sequim City of	$713	$53,400	$13,928	**1.33%**	**1.72%**	**2.13%**	**5.12%**	**6.59%**	**8.16%**
Shelton City of	Shelton, City of	$1,312	$52,947	$13,978	**2.48%**	**2.87%**	**3.28%**	**9.39%**	**10.86%**	**12.42%**
Snohomish, City of	Snohomish, City of	$803	$80,539	$21,203	**1.00%**	**1.25%**	**1.52%**	**3.79%**	**4.76%**	**5.79%**
Stanwood Water Dept	Stanwood Water Dept	$1,152	$82,394	$19,269	**1.40%**	**1.65%**	**1.91%**	**5.98%**	**7.04%**	**8.18%**
SW Suburban Sewer District	SW Suburban Sewer District	$528	$68,471	$18,501	**0.77%**	**1.07%**	**1.39%**	**2.85%**	**3.96%**	**5.15%**
Tacoma Water	Fife Dept of Public Works	$1,087	$76,735	$22,490	**1.42%**	**1.68%**	**1.97%**	**4.83%**	**5.75%**	**6.72%**
Tacoma Water	Fircrest, City of	$907	$58,694	$15,722	**1.55%**	**1.90%**	**2.27%**	**5.77%**	**7.08%**	**8.47%**
Tacoma Water	Ruston, City of	$1,157	$84,868	$21,158	**1.36%**	**1.61%**	**1.86%**	**5.47%**	**6.44%**	**7.47%**
Tacoma Water	Tacoma Water	$678	$66,183	$17,410	**1.02%**	**1.33%**	**1.67%**	**3.89%**	**5.07%**	**6.33%**
Thurston County	Thurston County Ground Mound	$1,106	$68,631	$18,227	**1.61%**	**1.91%**	**2.23%**	**6.07%**	**7.19%**	**8.39%**
Thurston County	Thurston County Tamoshan	$1,688	$95,188	$16,074	**1.77%**	**1.99%**	**2.22%**	**10.50%**	**11.78%**	**13.14%**
West Sound Utility District (South Kitsap WRF)	West Sound Utility District	$779	$67,388	$17,211	**1.16%**	**1.46%**	**1.79%**	**4.53%**	**5.72%**	**6.99%**

Color Codes:

Income Metric
Lowest
Midpoint

Annual Sewer Bill
Highest
Midpoint
Lowest

Indices
Severe hardship (greater than 5%)
Elevated hardship (greater than 3% and less than 5%)
Moderate hardship (greater than 2% and less than 3%)
No hardship (less than 2%)

Table A-3. Summary Statistics for 80 Puget Sound Wastewater Service Providers

Summary Statistics:	Population weighted MHI	Population weighted LQI	%MHI Current	%MHI 8mg/L, seasonal	%MHI 3mg/L, year-round	%LQI Current	%LQI 8mg/L, seasonal	%LQI 3mg/L, year-round
Total number of utilities	80	80	80	80	80	80	80	80
utilities with index > 2% and < 3%, e.g., moderate hardship			4	7	14	19	8	3
% Utilities with index > 2% and < 3%			*5%*	*9%*	*18%*	*24%*	*10%*	*4%*
utilities with index > 3% and < 5% e.g., elevated hardship			0	0	3	35	37	23
% Utilities with index > 3% and < 5%			*0%*	*0%*	*4%*	*44%*	*46%*	*29%*
utilities with index > 5% e.g., severe hardship			0	0	0	22	35	54
% Utilities with index > 5			*0%*	*0%*	*0%*	*29%*	*44%*	*68%*
Total utilities with index > 2%						77	80	80
Minimum	$44,844	$12,425	0.46%	0.67%	0.80%	1.61%	2.10%	2.58%
Maximum	$174,078	$50,831	2.63%	2.98%	3.35%	10.50%	11.78%	13.14%
Average	$86,324	$23,953	1.16%	1.42%	1.69%	4.31%	5.25%	6.27%
Correlation to MHI			-0.5316			-0.4613		
Correlation to %MHI			NA			0.9399		

rental rights should it conclude the Department has not adequately explored a viable guardianship option.

¶48 Here, a Department caseworker testified that a guardianship was not a viable alternative to termination because the children were thriving in their current placement, and a guardianship would keep them "in limbo" with negative "consequences." The children's guardian ad litem also testified about her opinion on "guardianship versus adoption." She concluded that "adoption would be in their best interest" because of the children's ages and the "lack of stability for seven years." She reiterated that R.B. did not see his children for five of those years, has no relationship or bond with them, and has shown no "ability to parent." And the current caregiver to both children testified that her family "discussed the potential for guardianship or adoption with the Department." She said that her family preferred adoption and that their home had already "been approved for adoption." Substantial evidence supports the trial court's findings that the children's caregivers were "not interested" in being guardians and that a guardianship would diminish the children's integration into a stable and permanent home.

¶49 Because the trial court did not err when it allowed R.B. to proceed pro se and substantial evidence supports the court's findings, we affirm termination of his parental rights to G.C.B. and M.J.B.-L.

WE CONCUR:

Hazelrigg, A.C.J.

Dwyer, J.

CITY OF TACOMA, Birch Bay Water and Sewer District, Kitsap County, Southwest Suburban Sewer District, and Alderwood Water & Wastewater District, Municipal Corporations and Political Subdivisions of the State of Washington Respondents,

v.

State of Washington, DEPARTMENT OF ECOLOGY, Appellant.

No. 39494-8-III

Court of Appeals of Washington, Division 3.

Filed September 14, 2023

Background: City, along with other local governments and special purpose districts that owned or operated public sewer systems and associated wastewater treatment plants, filed petition for judicial review of two documents issued by Department of Ecology recommending and committing to action to regulate nitrogen discharges into Puget Sound, contending that documents improperly adopted three new rules in violation of rulemaking procedures under Administrative Procedure Act (APA). The Superior Court, Thurston County, Sharonda D. Amamilo, J., granted petition. Ecology appealed.

Holdings: The Court of Appeals, Lawrence-Berrey, J., held that:

(1) judicial deference to Ecology's statutory interpretation concerning its authority to promulgate rules was unwarranted;

(2) portion of water quality report discussing portions of waterway that did not meet dissolved oxygen (DO) standard did not constitute "rule" under APA;

(3) pages in report discussing human causes of DO depletion did not constitute "rule" under APA;

(4) Ecology's commitments to certain actions to reduce nitrogen discharges from wastewater treatment plants

were "of general applicability" within meaning of APA's definition of "rule";

(5) Ecology's internal directive to its staff to include new requirements for National Pollutant Discharge Elimination System (NPDES) permits constituted "directive" within meaning of APA's definition of "rule"; and

(6) new nitrogen-discharge limitations for NPDES permittees altered qualifications or requirements relating to enjoyment of privileges conferred by law.

Affirmed in part and reversed in part.

1. Environmental Law ⚷708

Whether certain provisions of documents issued by Department of Ecology discussing nitrogen pollution constituted "rules" as defined by Washington Administrative Procedure Act (APA) presented questions of statutory interpretation which Court of Appeals would review de novo. Wash. Rev. Code Ann. § 34.05.010(16).

2. Administrative Law and Procedure ⚷2288

Environmental Law ⚷708

In determining whether provisions of report issued by Department of Ecology relating to dissolved oxygen (DO) testing and sampling, as well as new limitations Ecology allegedly placed on National Pollutant Discharge Elimination System (NPDES) permits, constituted "rules" within meaning of Administrative Procedure Act (APA), such that Ecology could not adopt such provisions and limitations without going through formal rulemaking procedures, Court of Appeals would not defer to Ecology's interpretation of statutes at issue, even though Ecology was agency designated to regulate water pollution; Court of Appeals was tasked with determining scope of Ecology's authority to promulgate rules, which was improper subject for judicial deference. Wash. Rev. Code Ann. §§ 34.05.010(16), 34.05.570.

3. Administrative Law and Procedure ⚷1842

Courts do not defer to an agency the power to determine the scope of its own authority.

4. Administrative Law and Procedure ⚷1164

The label that an agency assigns to its activities does not determine whether those activities constitute rulemaking under the Administrative Procedure Act (APA). Wash. Rev. Code Ann. §§ 34.05.010(16), 34.05.570.

5. Administrative Law and Procedure ⚷1162, 1167

In order to determine whether an agency's statement or other activity constitutes a "rule" within the meaning of the Administrative Procedure Act (APA), a court first determines whether the purported rule is an "order, directive, or regulation of general applicability," and second, the court determines whether the purported rule falls into one of the five categories enumerated in the APA provision defining "rule"; if the purported rule fails the first part of the inquiry, the court need not address whether it falls within one of the enumerated categories in satisfaction of the second element. Wash. Rev. Code Ann. § 34.05.010(16).

6. Administrative Law and Procedure ⚷1162

Licenses ⚷3

Although an action is "of general applicability" if applied uniformly to all members of a class, for purposes of determining whether the action is a "rule" under the Administrative Procedure Act (APA), it is a logical fallacy to imply that an action is not of general applicability if not applied uniformly to all members of a class; implying this logical fallacy would make it easy for an agency to skirt the rulemaking requirements of the APA simply by imposing incremental standards on members of a class, such as permittees, rather than a single standard. Wash. Rev. Code Ann. §§ 34.05.010(16), 34.05.570.

7. Statutes ⚷1123, 1181

Undefined terms in statutes are given their ordinary dictionary definition.

8. Environmental Law ⚷217

Portion of water quality report issued by Department of Ecology depicting regions of Puget Sound that did not meet dissolved oxygen (DO) standard at certain levels of water column did not constitute "directive," as necessary to constitute "rule" subject to rulemaking requirements of Administrative Procedure Act (APA); portion of report only explained how report's authors reported their results and did not impel anyone to act, and there was no indication that Ecology planned to use anything other than existing rule for measuring DO levels or for deciding whether wastewater treatment plants (WWTPs) were in violation of applicable National Pollutant Discharge Elimination System (NPDES) permits. Wash. Rev. Code Ann. §§ 34.05.010(16), 34.05.570(2)(c); Wash. Admin. Code 173.201(1).

9. Environmental Law ⚷217

Pages of water quality report issued by Department of Ecology which stated that predictive computer model projected every basin but one in Puget Sound had at least one layer in water column that failed to meet dissolved oxygen (DO) standards, discussed human causes of DO depletion, and represented Puget Sound's DO levels at reference levels without human influence and at existing levels did not state any directive, and thus, did not constitute "rule" subject to Administrative Procedure Act (APA) rulemaking requirements, even if report identified noncompliant areas beyond those already subject to more stringent National Pollutant Discharge Elimination System (NPDES) permit requirements under federal law; such pages merely stated authors' conclusions and did not impel anyone to act. Federal Water Pollution Control Act § 303, 33 U.S.C.A. § 1313(d); Wash. Rev. Code Ann. §§ 34.05.010(16), 34.05.570(2)(c).

10. Environmental Law ⚷217

Department of Ecology's commitments in letter denying rulemaking request, namely that Ecology would set nutrient loading limits at current levels for all National Pollutant Discharge Elimination System (NPDES) permittees, require NPDES permittees to initiate planning efforts to evaluate different effluent nutrient reduction targets, and require reissued NPDES permits for wastewater treatment plants to reflect plants' treatment efficiency, were of general applicability, as necessary for such commitments to constitute "rules" that Ecology could only promulgate through rulemaking procedures of Administrative Procedure Act (APA); commitments applied to all wastewater treatment plants. Wash. Rev. Code Ann. §§ 34.05.010(16), 34.05.570(2)(c).

11. Administrative Law and Procedure ⚷1162

Where a party challenges an administrative policy applicable to all participants in a program, not its implementation under a single contract or assessment of individual benefits, the action is one of general applicability, within the Administrative Procedure Act's (APA) definition of a "rule." Wash. Rev. Code Ann. § 34.05.010(16).

12. Administrative Law and Procedure ⚷1162

A "directive," within the meaning of the Administrative Procedure Act (APA) provision defining a "rule" as an "order, directive, or regulation of general applicability" that falls within one of five enumerated categories, is something that impels action. Wash. Rev. Code Ann. § 34.05.010(16).

See publication Words and Phrases for other judicial constructions and definitions.

13. Environmental Law ⚷217

Department of Ecology's internal instruction to its staff to impose certain new restrictions on reissued individual permits and newly-created general permit under National Pollutant Discharge Elimination System (NPDES) with goal of reducing total inorganic nitrogen (TIN) discharged into Puget Sound by wastewater treatment plants constituted "directive" within meaning of Administrative Procedure Act's (APA) definition of "rule" as "order, directive, or regulation of general applicability" falling into one of five statutory categories; internal directive to add new terms for reissuing permits was nondiscretionary and had same effect as a promulgated rule governing terms of permit renewal, and Ecology could not bypass APA's rulemaking requirements by adopting renewal criteria internally. Wash. Rev. Code Ann. §§ 34.05.010(16), 34.05.570(2)(c).

See publication Words and Phrases for other judicial constructions and definitions.

14. Courts ⚷92

Statements in a case that do not relate to an issue before the court and are unnecessary to decide the case constitute "obiter dictum" and need not be followed.

See publication Words and Phrases for other judicial constructions and definitions.

15. Environmental Law ⚷217

New nitrogen-discharge limitations that Department of Ecology committed to imposing as requirement for National Pollutant Discharge Elimination System (NPDES) permits issued to wastewater treatment plants in Puget Sound, as Ecology stated in letter and implemented when renewing two individual permits and creating new general permit, altered qualifications or requirements relating to the enjoyment of benefits or privileges conferred by law, as necessary for limitations to constitute "rule" subject to rulemaking procedures of Administrative Procedure Act (APA); issuance of NPDES permit was privilege conferred by law, discharging any substance into Puget Sound was prohibited without permit, and existing water quality standards did not directly regulate nitrogen, whereas new limitations did. Wash. Rev. Code Ann. §§ 34.05.010(16), 34.05.570(2)(c), 90.48.160, 90.48.162.

See publication Words and Phrases for other judicial constructions and definitions.

16. Environmental Law ⚷708

On Department of Ecology's appeal from superior court's grant of city's petition for judicial review of certain statements and actions taken by Ecology, which city contended constituted "rules" that Ecology was required to adopt through rulemaking procedures of Administrative Procedure Act (APA), Court of Appeals would decline to consider whether city had standing to file petition in superior court, where issue was solely raised by amici curiae. Wash. Rev. Code Ann. §§ 34.05.010(16), 34.05.570(2)(c).

Appeal from Thurston Superior Court, Docket No:20-2-02539-6, Honorable Sharonda Amamilo, Judge.

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Wyatt Foster Golding, Ziontz Chestnut, 2101 4th Avenue, Suite 1230, Seattle, WA, 98121-2323, Brian Cammiade Gruber, Ziontz Chestnut, 2101 4th Ave., Ste. 1230, Seattle, WA, 98121-2331, for Amicus Curiae on behalf of Washington Environmental Council.

Amalia R. Walton, Squaxin Island Tribe Legal Department, 3711 Se Old Olympic Hwy., Shelton, WA, 98584-7734, for Amicus Curiae on behalf of Squaxin Island Tribe.

Kendra Amber Martinez, Attorney at Law, P.O. Box 498, Suquamish, WA, 98392-0498, Jane Garrett Steadman, Kanji & Katzen PLLC, 811 1st Ave., Ste. 630, Seattle, WA, 98104-1426, for Amicus Curiae on behalf of Suquamish Tribe.

PUBLISHED OPINION

Lawrence-Berrey, J.

¶ 1 Respondents are all either local governments or special purpose districts that own and operate public sewer systems and associated wastewater treatment plants

(WWTPs) discharging into Puget Sound (Sound). In 2019, the Department of Ecology (Ecology) generated two documents discussing nitrogen pollution in Puget Sound. One document recommended action to regulate nitrogen discharges to the Sound and the other committed to doing so.

¶ 2 The respondents (hereafter Tacoma) sued to block regulation of their nitrogen discharges by arguing that these two documents improperly adopted three new rules in violation of the rulemaking provisions of chapter 34.05 RCW, the Administrative Procedure Act (APA). The superior court agreed with Tacoma. Ecology appeals.

¶ 3 We clarify the APA's definition of "rule" and conclude that "directive," for purposes of one APA component of "rule," includes an agency's directive to its staff to include new terms in permits. We conclude that the first and second purported rules are not "rules" within the APA's definition, but we conclude that the third purported rule is.

¶ 4 We affirm in part and reverse in part.

FACTS

¶ 5 The waters of Puget Sound extend from Olympia and the inside of the Olympic Peninsula north through the San Juan Islands up to Bellingham. Puget Sound is itself part of a greater body of water, known as the Salish Sea. The Salish Sea extends from the northern tip of Vancouver Island in British Columbia, south through the Strait of Georgia and the Strait of Juan de Fuca, continuing through the entirety of Puget Sound along the inside of the Olympic Peninsula. Some maps extend the Salish Sea further south along the Oregon Coast and include the mouth of the Columbia River.

¶ 6 Puget Sound and the Salish Sea are polluted. Some pollution is naturally caused. Other pollution is anthropogenic (i.e., human caused). Some of the human-caused sources of water pollution include shipping, fishing, fisheries, other forms of aquaculture, agricultural runoff, stormwater runoff, industrial waste, medical waste, garbage, oil and gas production, and discharges from WWTPs. This case concerns attempts to control pollution from WWTPs.

¶ 7 Since enactment of the Federal Water Pollution Control Act of 1972 (Clean Water Act or CWA), 33 U.S.C. § 1251 et seq., the United States has attempted to mitigate human-caused water pollution. Some of the mitigation tools adopted by the CWA, its amendments, and implementing regulations were monitoring and limiting discharges of biological oxygen-demanding pollutants, suspended solids, fecal coliform, pH (hydrogen ion concentration) impairing pollutants, and thermal impairing pollutants. *See* 33 U.S.C. § 1314(a). Another tool was requiring point source emitters of pollution to obtain a permit for the continued right to discharge pollutants into the waters of the United States. *See* 33 U.S.C. § 1342. These permits are known as "National Pollutant Discharge Elimination System (NPDES)" permits. Another tool was requiring industrial polluters to adopt "pretreatment" and requiring WWTPs to adopt "secondary treatment." *See* 33 U.S.C. § 1317(b), § 1311(b)(1)(B). Pretreatment seeks to reduce or eliminate nonstandard pollutants prior to the pollutant entering a WWTP.[1] 40 C.F.R. § 403.3(s). Secondary treatment typically consists of activated sludge, trickling filters, and/or biological contactors intended to remove biodegradable organic pollutants. Primary treatment typically consists of screening, skimming, and settling to remove large solids that sink, and oils and lighter solids that float to the surface. Wastewater treatment also typically includes some form of disinfection, such as application of chlorine, ozone, or ultraviolet light.

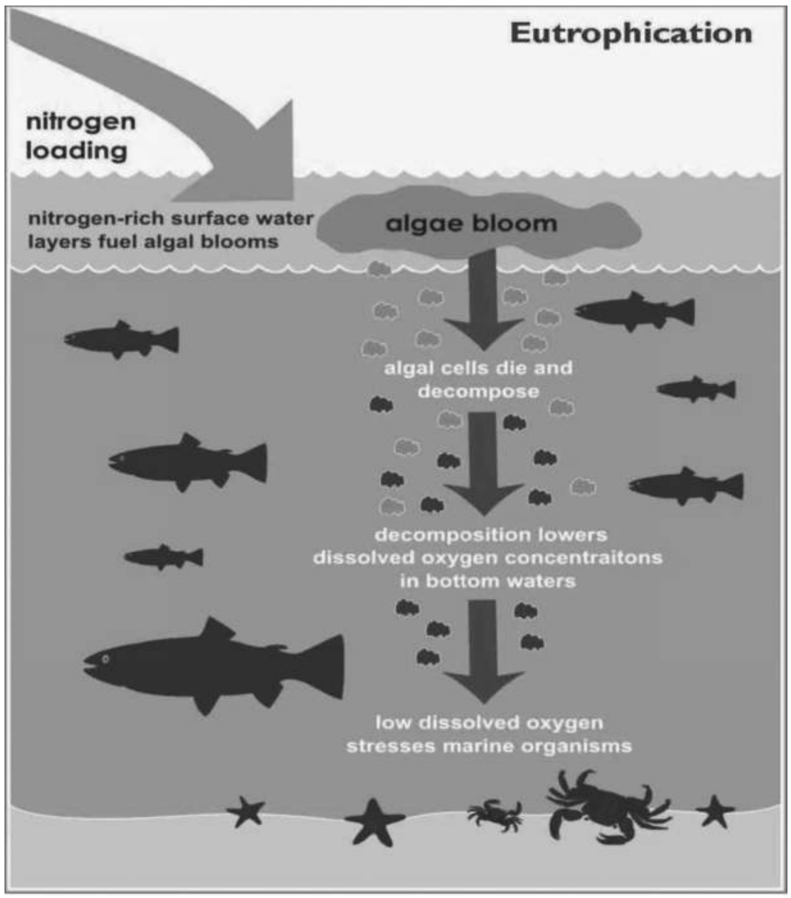
¶ 8 Despite all these forms of treatment, many pollutants still remain in wastewater discharged into the waters of the United States. As technology and scientific knowledge have continued to advance, additional forms of treatment have emerged. Additional treatment is often referred to as tertiary treatment, final treatment, or advanced secondary treatment. This additional treatment may refer to technology and agents that

1. Most WWTPs were originally designed to handle typical household and light commercial waste.

remove pharmaceutical waste, micropollutants such as plastics, phosphorus, nitrogen, or any other remaining unwanted substance. In this case, tertiary treatment is used to refer to nitrogen removal.

¶ 9 Some WWTPs in Washington already incorporate nitrogen removal, such as the Spokane Regional Water Reclamation Facility and the Budd Inlet Treatment Plant. Despite having been technologically feasible for several decades, tertiary treatment is not yet required for all WWTPs.

¶ 10 One of the primary impediments to wider adoption of tertiary treatment is cost. In 2017, the Chambers Creek Regional Wastewater Treatment Plant in Pierce County finished installation of a nitrogen removal system at a cost of $342 million. Individual plants may also be impeded by a lack of available land on which to construct new infrastructure or insufficient access to additional electricity. Other impediments are gaps in our knowledge.



¶ 11 Nitrogen, while commonly thought of as a beneficial nutrient, is also a pollutant. Simplified, excess nitrogen results in excess algal growth. Algae generate organic carbon. When carbon decomposes, it consumes oxygen. Depleted oxygen, or eutrophication, can render water incapable of supporting many forms of aquatic life.

¶ 12 Puget Sound contains many areas with low levels of dissolved oxygen (DO) as a result of excess nitrogen. More specifically, Puget Sound contains low oxygen in the strata where aquatic life has historically thrived.

¶ 13 What is unknown, at least within Puget Sound, is to what extent excess nitrogen in these strata is due to WWTPs. The Pacific Ocean is the largest source of nitrogen entering Puget Sound. The Pacific is believed to account for about 88 percent of the total nitrogen entering Puget Sound. Just because the Pacific is the largest source of nitrogen does not mean that it is the largest driver of oxygen depletion in the life-sustaining layers of the Sound.

¶ 14 Oceans and seas are complex ecosystems. The tides, water temperature, geography, and other variables impact flow and mixing among bodies of water. Most of the nitrogen that enters Puget Sound via the Pacific also flows back out. But the nitrogen entering Puget Sound from the Pacific is unlikely to have a significant negative impact on oxygen levels because water entering from the Pacific is usually colder, meaning it is denser than the water already in the Sound, causing the water from the Pacific to sink below the water already in the Sound. The negative impacts of excess nitrogen occur closer to the surface, in the euphotic zone, where the sun's light allows for photosynthesis to occur. The euphotic zone is also where most marine life is found.

¶ 15 WWTPs emit significant amounts of nitrogen. Yet it is unknown to what extent this nitrogen causes DO impairment in Puget Sound. Nitrogen at the point of discharge can be measured, but one cannot determine where this nitrogen goes once the wastewater gets carried away on the currents and mixes with the rest of the Sound. Without this information, it is not possible to reasonably regulate nitrogen discharges from WWTPs. This is because anthropogenic pollutant discharges only violate Washington's clean water standard if it can be shown that human actions "cause the D.O. of that water body to decrease more than 0.2 mg/L." WAC 173-201A-210(1)(d)(1).

Development of the Salish Sea Model

¶ 16 To fill this knowledge gap, Ecology and the Pacific Northwest National Laboratory (PNNL) spent years developing the Salish Sea Model (SSM). The SSM is a predictive computer model that lets Ecology isolate and test water quality variables based on actual water quality data and predict water quality in areas where we do not currently have actual water quality measurements. It takes months to prepare the data to run a single scenario, days to run it through the SSM on one of PNNL's high powered computers, and additional time to interpret and report the data.

¶ 17 Some of the questions the SSM helps to answer are:

- "Are human sources of nutrients in and around the Salish Sea significantly impacting water quality now? How bad might it get in the future?"
- "Where are the areas that are most sensitive to human impacts? When are those effects the most harmful?"
- "How much do we need to reduce human sources of nutrients to protect water quality in the Salish Sea?"

Administrative Record (AR) at 104. The model also allows Ecology to predict where and by how much DO levels would improve based on hypothetical nitrogen reductions. The model also allows Ecology to test and quantify its hypothesis that DO levels are most impaired in Puget Sound's remote inlets and basins due to poor circulation resulting in pollutants accumulating and spending more time in those areas.

¶ 18 Despite its immense power, the SSM does have limits. While the SSM can account for human-caused sources of pollution, the model cannot isolate the effect of individual WWTPs. However, Ecology hopes to further refine the SSM "to define discharger-specific nutrient loading limits based on localized and far-field impacts." Clerk's Papers (CP) at 127.

¶ 19 Professors Gordon Holtgrieve and Mark Scheuerell from the University of Washington, scientists working with the regulated stakeholders, have also expressed concern that Ecology is overconfident in the SSM's predictive power. Every predictive model has levels of uncertainty, often reported as confidence intervals. In lay terms, these scientists worry that the SSM is not yet ready for prime time because it appears to lack sufficient sensitivity to confidently determine which segments of Puget Sound violate the DO standard in WAC 173-201A-210 as a result of human-caused pollution. The SSM's predictive accuracy is particularly important because many areas of Puget Sound are on the edge of the state's DO water quality standard. These scientists are also concerned that Ecology has not publicly shared sufficient information for others to independently verify Ecology's interpretation of the results.

¶ 20 To be clear, this appeal is not about whether Ecology should be using the SSM to inform regulation or whether it is accurate and reliable. This appeal is about whether Ecology violated the APA by adopting rules without allowing for public comment during its efforts to investigate and respond to human causes of DO depletion in Puget Sound.

¶ 21 In January 2019, Ecology published the results of its first three scenarios using the SSM. The report, referred to as the Bounding Scenarios Report (BSR), modeled "a range of climate and ocean conditions" from 2006, 2008, and 2014. CP at 34. The report looked at current levels of pollution during those years and what would happen if nitrogen and carbon discharges were reduced at all WWTPs, only midsize and large WWTPs, and only large WWTPs. There are 79 WWTPs in the United States' portion of the Salish Sea.

¶ 22 The report's authors found that approximately 20 percent of Puget Sound did not meet Washington's DO water quality standards during each of the reference years. The modeling used in the BSR suggested that reducing nitrogen and carbon discharges from WWTPs using "seasonal biological nitrogen removal (BNR) technology" would improve DO compliance by approximately 50 percent, meaning only about 10 percent of Puget Sound would continue to not meet DO standards. CP at 37. The report's authors also found DO noncompliant areas within all of Puget Sound's basins, except Admiralty Inlet. The authors also found "[a]ll areas not meeting the water quality standard have depleted levels of DO in the water column as a result of human loadings from Washington State." CP at 36. While the SSM cannot yet quantify the effects of individual WWTPs, the model confirmed that discharges have both a near- and a far-field effect, meaning that discharges into one part of Puget Sound contribute to DO depletion in other parts of the Sound as the discharged water mixes and travels along the currents.

Northwest Environmental Advocates (NWEA) Rulemaking Petition

¶ 23 For years, Ecology has kept stakeholders updated on the development of the SSM and other water quality efforts through the Puget Sound Nutrient Forum. The forum also presented stakeholders with preliminary results from the SSM. Shortly before the official publication of the BSR, NWEA—an active participant in the Nutrient Forum—filed a petition with Ecology "to propose and adopt a rule establishing technology-based effluent limits for the discharge of nutrients and toxics from municipal wastewater treatment facilities that discharge to Puget Sound and its tributaries." AR at 231. Specifically, NWEA wanted a rule designating tertiary treatment of wastewater as "AKART." AR at 231.

¶ 24 AKART stands for "All Known, Available, and Reasonable Treatment." WAC 173-201A-020. AKART represents "the most current methodology that can be reasonably required for preventing, controlling, or abating the pollutants associated with a discharge." *Id.* Under RCW 90.52.040, Ecology is required to adopt rules requiring "wastes to be provided with all known, available, and reasonable methods of treatment prior to their discharge or entry into waters of the state." Such treatment is required regardless of whether the water quality is pristine, impaired, or anywhere in between. RCW 90.52.040. In addition to implementing state law, AKART standards also mirror parallel provisions of the Clean Water Act requiring NPDES permittees to adopt the best available technology economically achievable for eliminating the discharge of pollutants. *See* 33 U.S.C. §§ 1311, 1314. Thus, if tertiary treatment meets the definition of AKART, Ecology is obligated by statute to make tertiary treatment a precondition to issuance/reissuance of NPDES permits.

¶ 25 On January 11, 2019, Ecology sent NWEA a concise letter denying the rulemaking petition. Under the APA, Ecology had 60 days to either initiate rulemaking or issue a denial explaining the reasons for denial and "where appropriate" the alternative means Ecology would use to address NWEA's concerns. RCW 34.05.330(1). Ecology denied rulemaking because AKART technologies must be economically feasible and Ecology believed that tertiary treatment was cost prohibitive. While it may be economically feasible for some WWTPs, NWEA's petition wanted tertiary treatment mandated for all 79 Puget Sound WWTPs, regardless of any one plant's size and impact on Puget Sound. Ecology also denied rulemaking because the SSM needed further refinements before Ecology had sufficient data to craft discharger-specific limits for individual NPDES permittees.

¶ 26 Although Ecology denied rulemaking, Ecology shares NWEA's concerns and ultimate goals. It is the policy of this state

> to maintain the highest possible standards to insure the purity of all waters of the state consistent with public health and public enjoyment thereof, the propagation and protection of wild life, birds, game, fish and other aquatic life, and the industrial development of the state, and to that end require the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state of Washington.

RCW 90.48.010. In the denial letter, Ecology announced the alternative actions it would take:

> Ecology remains committed to [working with stakeholders to solve the DO problem in Puget Sound]. While this work is progressing, Ecology *will* through the individual permitting process:
>
> 1. Set nutrient loading limits at current levels from all permitted dischargers in Puget Sound and its key tributaries to prevent increases in loading that would continue to contribute to Puget Sound's impaired status.
> 2. Require permittees to initiate planning efforts to evaluate different effluent nutrient reduction targets.
> 3. For treatment plants that already use a nutrient removal process, require reissued discharge permits to reflect the treatment efficiency of the existing plant by implementing numeric effluent limits used as design parameters in facility specific engineering reports.

CP at 127 (emphasis added). Ecology also stated that it would explore development of a general permit to regulate "nutrient loading" (i.e., nitrogen discharges) into Puget Sound. CP at 127. A general permit that covers multiple discharging entities is an alternative to issuing individual NPDES permits. WAC 173-226-020, -050.

¶ 27 Unhappy with the denial of its rulemaking petition, NWEA sought judicial review. Division Two of this court affirmed Ecology's denial of the rulemaking petition. *See generally Nw. Env't Advocs. v. Dep't of Ecology*, No. 54810-1-II, 18 Wash.App.2d 1005, 2021 WL 2556573 (Wash. Ct. App. June 22, 2021) (unpublished), http://www/courts.wa.gov/opinions/pdf/548101_unp.pdf).

NPDES Permits and the Puget Sound Nutrient General Permit

¶ 28 Ecology started adding new terms to individual NPDES permits as those permits came up for renewal, requiring nitrogen discharge limits and nitrogen reduction planning. Ecology also worked to develop a general permit. The final version of the general permit went into effect January 1, 2022. It placed a limit on how many pounds of nitrogen each large and midsize WWTP could discharge per year and required all WWTPs to create nitrogen reduction plans. Any WWTP that exceeds its annual limit must spend the next year studying what caused it to exceed its limit and what corrective action it can take to not exceed its limit. If a WWTP exceeds its limit two years in a row, it must begin taking that corrective action. The validity of the general permit is currently in litigation at the Pollution Control Hearings Board. That litigation is stayed pending the resolution of this appeal.

Concerns Raised by the Regulated Community

¶ 29 The findings of the BSR, the rulemaking denial letter, and the prospect of a general permit all happened within a fairly short time frame. The commitments made in the denial letter especially alarmed the regulated community.

¶ 30 In the denial letter, Ecology promised that as each NPDES came up for renewal, it would "[s]et nutrient loading limits at current levels ... to prevent increases in loading that would continue to contribute to Puget Sound's impaired status." CP at 127. The short-term effect of freezing nutrient loading limits impairs development because development increases demand on WWTPs. But, it is not possible to significantly reduce nitrogen in the short term. Significant nitrogen reduction requires long-term capital improvements. Immediately, the city of Tacoma (City) started putting caveats in building permits allowing the City to "rescind the permit" in the event Ecology limited the City's treatment capacity by capping nitrogen discharges. CP at 991. This put several major projects in limbo, including multifamily housing developments, a behavioral health hospital, and an expansion at Bates Technical College Medical School.

¶ 31 An internal legal memo authored by counsel for the City concisely lays out its concerns:

> The costs of such full-scale improvements are estimated to range from $250 million to over $750 million and would likely take at least six years or longer to fund, plan for and implement. In the interim, implementation of the TIN [total inorganic nitrogen] load cap would have the unintended consequence of halting development, in effect a de facto moratorium. Projects could not be approved because sewer capacity would not be available. The City will be exposed to substantial risk if it does not qualify all sewer availability notices with the right to rescind the assurance of sewer availability in the event Ecology's permit caps sewer capacity. Adding this condition will impair lending and effectively halt most development, including affordable housing, shelters, and accessory dwelling units. Further, funding of capital improvements needed to meet the new permit requirements has the potential to more than double or triple sewer rates, disproportionately affecting low-income populations.

AR at 620.

¶ 32 There were also concerns that capping nitrogen discharges at current levels, without allowing leeway for development to continue, would unintentionally force growth into rural areas. This would be in areas where septic is allowed due to a lack of sewer service. The unintended consequence of this could make matters worse, causing leaky and untreated septic waste to enter the Puget Sound.

Petition for Judicial Review

¶ 33 To prevent Ecology from limiting WWTP discharges, the City and the other respondents filed a joint petition for judicial review under RCW 34.05.570. The City alleged Ecology violated the APA by adopting three "rules" outside of the APA's rulemaking process. Two of the purported rules were in the BSR and the third purported rule was in the denial letter. The City refers to the first purported rule as the DO standard rule, the second as the DO impairment rule, and the third as the TIN cap rule.[2]

¶ 34 The City alleged the DO standard rule appeared on page 20 of the BSR, that the DO impairment rule could be found on pages 12, 60, 61, and 62 of the BSR when read together, and that the TIN cap rule could be found in the three commitments Ecology made in the denial letter.

¶ 35 With respect to the DO standard rule, the City alleged the BSR effectively amended WAC 173-201A-210(1)(d)(iii), which covers DO testing and sampling procedures. With respect to the DO impairment rule, the City alleged the BSR effectively amended the state's 303(d) list[3] of impaired water segments when the BSR reported the SSM's findings of areas not meeting Washington's DO water quality standard. With respect to the TIN cap rule, the City alleged that Ecology placed new limits in NPDES permits.

2. The phrase "total inorganic nitrogen" does not appear in the denial letter. The reason the City refers to it as the TIN cap rule is because TIN is the parameter that Ecology settled on for implementing the commitments in its letter.

3. The 303(d) list is a reference to the list states are required to periodically submit to the Environmental Protection Agency under 33 U.S.C. § 1313(d). Entities that discharge into waterways on the 303(d) list are subject to more stringent requirements in their NPDES permits.

¶ 36 In addition to arguing that the three alleged rules violated RCW 34.05.570 by not going through the rulemaking process, the City also alleged that they were arbitrary and capricious and exceeded Ecology's statutory authority.

¶ 37 The trial court agreed with the City on all grounds and remanded the matter "to Ecology for consideration of the immediate adoption of temporary emergency rules while regular rule-making proceeds." CP at 1483. Ecology appeals.

ANALYSIS

¶ 38 In its briefing to this court, the City abandoned its prior claims that Ecology's purported rules are arbitrary and capricious and exceeded Ecology's statutory authority. Accordingly, the only substantive issue is whether the three purported rules are "rules" as defined by RCW 34.05.010(16) and were therefore required to be adopted through formal rulemaking.

A. Standard of Review

[1] ¶ 39 Whether any of the three purported rules adopted by Ecology are "rules" as defined by Washington's APA are questions of statutory interpretation, the court reviews de novo. *Nw. Pulp & Paper Ass'n v. Dep't of Ecology*, 200 Wash.2d 666, 672, 520 P.3d 985 (2022).

[2, 3] ¶ 40 Ecology argues that because it is the agency designated to regulate water pollution, we should defer to its interpretation of the laws it administers. *See City of Redmond v. Cent. Puget Sound Growth Mgmt. Hr'gs Bd.*, 136 Wash.2d 38, 46, 959 P.2d 1091 (1998) (this court defers to an agency's interpretation of the law it administers). We agree with the legal principle cited by Ecology, but disagree it applies here. We are tasked here with determining the scope of Ecology's *authority* to promulgate purported rules. " '[W]e do not defer to an agency the power to determine the scope of its own authority.' " *Ass'n of Wash. Bus. v. Dep't of Ecology*, 195 Wash.2d 1, 10, 455 P.3d 1126 (2020) (internal quotation marks omitted) (quoting *Lenander v. Dep't of Ret. Sys.*, 186 Wash.2d 393, 409, 377 P.3d 199 (2016)).

B. The Purported Rules

¶ 41 The APA defines "rule" as

> any agency order, directive, or regulation of general applicability (a) the violation of which subjects a person to a penalty or administrative sanction; (b) which establishes, alters, or revokes any procedure, practice, or requirement relating to agency hearings; (c) which establishes, alters, or revokes any qualification or requirement relating to the enjoyment of benefits or privileges conferred by law; (d) which establishes, alters, or revokes any qualifications or standards for the issuance, suspension, or revocation of licenses to pursue any commercial activity, trade, or profession; or (e) which establishes, alters, or revokes any mandatory standards for any product or material which must be met before distribution or sale.

RCW 34.05.010(16).

[4] ¶ 42 No agency subject to Washington's APA may adopt a rule outside of the rulemaking process established in chapter 34.05 RCW, §§ .310-.395. RCW 34.05.570(2)(c). The label that an agency assigns to its activities does not determine whether those activities constitute rulemaking under the APA. *McGee Guest Home, Inc. v. Dep't of Soc. & Health Servs.*, 142 Wash.2d 316, 322, 12 P.3d 144 (2000).

[5] ¶ 43 The APA definition of "rule" implies a two-step inquiry. First, the court determines whether the purported rule is an " 'order, directive, or regulation of general applicability.' " *Nw. Pulp*, 200 Wash.2d at 672, 520 P.3d 985 (quoting RCW 34.05.010(16)). Second, the court determines whether the purported rule "fall[s] into one of the five enumerated categories" in RCW 34.05.010(16). *Id.* at 672-73, 520 P.3d 985. If the purported rule fails the first part of the inquiry, "we need not address whether [it] falls within one of the enumerated categories in satisfaction of the second element." *Id.* at 676, 520 P.3d 985.

¶ 44 For the first inquiry, the City argues that each of Ecology's purported rules are directives of general applicability. For the second inquiry, the City argues that each of the purported rules fit within RCW 34.05.010(16) categories (a) and (c).[4]

1. *The DO standard described on page 20 of the BSR is not a rule*

[6] ¶ 45 This court's first step is to determine whether page 20 of the BSR states a directive of general applicability. The APA does not define "directive" or "general applicability." However, the Supreme Court has previously defined the latter term: "[W]here the challenge is to a policy applicable to all participants in a program, not its implementation under a single contract or assessment of individual benefits, the action is of general applicability within the definition of a rule." *Failor's Pharm. v. Dep't of Soc. & Health Servs.*, 125 Wash.2d 488, 495, 886 P.2d 147 (1994) (citing *Simpson Tacoma Kraft Co. v. Dep't of Ecology*, 119 Wash.2d 640, 648, 835 P.2d 1030 (1992)).[5]

[7] ¶ 46 While the Supreme Court has defined "general applicability," it has not defined the term "directive" as used in the APA. Undefined terms in statutes are given their ordinary dictionary definition. *Am. Legion Post No. 32 v. City of Walla Walla*, 116 Wash.2d 1, 8, 802 P.2d 784 (1991). Webster's defines "directive" in its noun form as "something that serves to direct, guide, and usu. impel toward an action, attainment, or goal." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY 641 (1993).

[8] ¶ 47 Applying this definition, page 20 of the BSR does not contain a directive of general applicability. Page 20 of the BSR states, in relevant part:

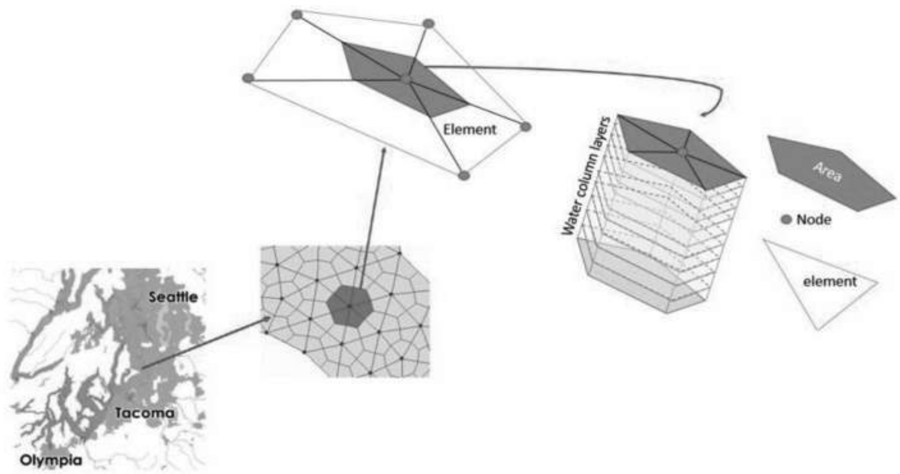
> Regions of Puget Sound that do not meet the DO standard are expressed in terms of area (e.g., acres or km2). Since the model is three dimensional, each vertical column of water is represented by ten layered grid cells. Area, in this context, refers to the surface area of the vertical column (which is equivalent to the area represented by the grid cell in Figure 4). If DO levels in one or more layers in the water column does not meet the DO standard, the surface area of that water column is counted towards the total noncompliant area.

CP at 44. Following is a graphic from the BSR depicting the SSM's water column layering.

4. In its first amended petition for judicial review, the City alleged categories (c) and (d), but not (a). Ecology argues that the City's failure to plead RCW 34.05.010(16)(a) in its petition for judicial review precludes consideration of that category. To support its argument, Ecology cites RCW 34.05.546(7). That subsection requires the petitioner to set forth in its petition for review its "reasons for believing that relief should be granted."

RCW 34.05.546(7) does not describe the required level of specificity. On its face, it might require citation only to RCW 34.05.010(16) or it might require citation to one or more of subsection 16's five categories. Because Ecology does not cite any authority to support its argument or attempt to show what level of specificity the legislature intended, we decline to consider the argument. *Holland v. City of Tacoma*, 90 Wash. App. 533, 537-38, 954 P.2d 290 (1998) (passing treatment of an issue or lack of reasoned argument is insufficient to merit judicial consideration).

5. Various cases additionally state, "[a]n action is of general applicability if applied uniformly to all members of a class." *See, e.g., Failor's Pharm.*, 125 Wash.2d at 495, 886 P.2d 147. Trial courts should not commit the logical fallacy of implying the converse; that is, by implying that an action is *not* of general applicability if *not* applied uniformly to all members of a class. Implying this logical fallacy would make it easy for an agency to skirt the rulemaking requirements of the APA simply by imposing incremental standards on permittees rather than a single standard.



CP at 45 (Fig. 4).

¶ 48 This portion of the BSR simply explains how the BSR's authors reported their results. As defined above, a directive is something that impels toward an action. Because the DO standard does not impel anyone to act, it is not a "directive" and it therefore is not a "rule" under the APA.

¶ 49 Yet the BSR report promises to "supply information [to Ecology to] design management strategies for anthropogenic nutrient inputs affecting DO" and "will be used to inform and develop the nutrient management strategy for Puget Sound." CP at 45-46. The City argues that these and other comments within the report show that the BSR approach for measuring DO will be used for determining whether they are in violation of applicable DO standards. We are unpersuaded.

¶ 50 The BSR is a tool that Ecology will use to better measure and control DO levels. There is no indication from the report or elsewhere that Ecology plans to use anything other than the existing rule, WAC 173-201A-210(1), for measuring DO levels for deciding whether any WWTP is in violation of its individual permit or a general permit.

¶ 51 Because the first purported rule does not state a "directive," this court does not address whether it meets either categories (a) or (c) of the second element.

2. *The description of DO impairment on pages 12 and 60-62 of the BSR is not a rule*

¶ 52 Page 12 of the BSR states in relevant part:

> We found the following when applying [Washington's DO] standards to the model results:
>
> - The total area of greater Puget Sound waters not meeting the marine DO standard was estimated to be around 151,000 acres (612 km2) in 2006, 132,000 acres (536 km2) in 2008, and 126,000 acres (511 km2) in 2014. These areas correspond roughly to about 23%, 20%, and 19% of greater Puget Sound in each year, respectively, excluding the intertidal zone.
> - Noncompliant areas are located within all Puget Sound basins except Admiralty Inlet. All areas not meeting the water quality standard have depleted levels of DO in the water column as a result of human loadings from Washington State. Model computations take into account multiple oceanographic, hydrographic, and climatological drivers, so that depletions due to human activity alone can be computed by excluding other influences, such as that of the Pacific Ocean.

CP at 36.

¶ 53 The above comments show that the modeling scenarios run using the SSM projected that every single basin in Puget Sound, except Admiralty, had at least one water column layer that failed to meet DO standards. As argued by Professors Holtgrieve and Scheuerell, many of these noncompliant layers might actually be compliant due to limitations in the SSM's sensitivity. For purposes of the BSR, the report's authors classified these areas as DO-impaired.

¶ 54 BSR pages 60-62 discuss the SSM's results concerning DO depletion due to human causes. Page 60 states, in relevant part:

> The cumulative impact of all human activities causes DO concentrations to decrease by more than 0.2 mg/L at multiple locations in Puget Sound. Figure 25 shows the spatial distribution of minimum water column DO for both existing and reference conditions, along with the difference between the two, for 2006, 2008, and 2014. Spatial patterns in minimum DO under the reference scenario closely resemble the existing condition patterns. The difference plot shows that maximum DO depletions (depletions below the reference condition DO levels) are predicted to occur in inlets where flushing is relatively poor compared to the main channel . . . .

CP at 84.

¶ 55 Page 61 (right) is Figure 25, a graphic representation of Puget Sound's DO levels at reference levels without human influence, at existing levels, and the difference between the two, as predicted by the SSM.

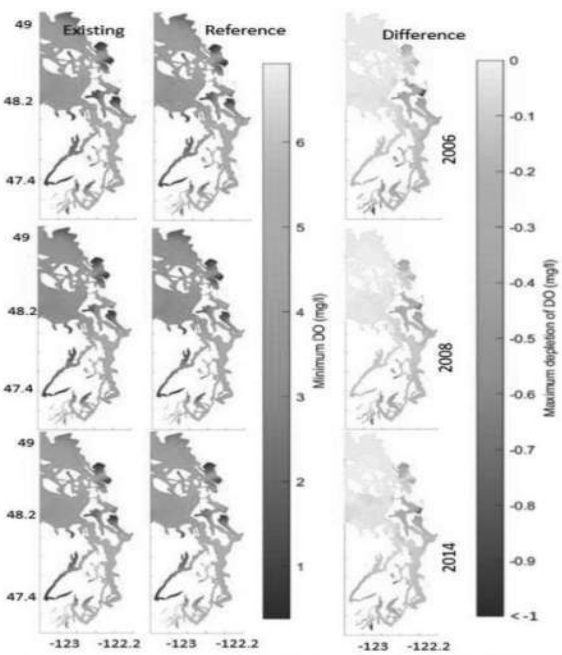


Figure 25. Comparison of the spatial distribution of predicted 2006, 2008, and 2014 minimum dissolved oxygen (DO) concentrations, corresponding reference condition scenarios, and the difference between them.
Areas that are green to blue are most sensitive to DO depletion from all human sources in Washington.

¶ 56 Page 62 reiterates the findings summarized in the abstract from page 12, but with more detail on duration and degree of DO noncompliance.

¶ 57 The City argued that when read together, the pages conclude "that all municipal WWTPs discharging to Puget Sound are causing or contributing to the alleged impairment, effectively expanding the existing list of 'impaired' or CWA 303(d) water bodies in Washington to include all of Puget Sound." CP at 1204.

[9] ¶ 58 During oral argument, the City withdrew this assignment of error.[6] We accept this concession. Similar to our conclu-

6. Wash. Court of Appeals oral argument, *City of Tacoma v. Dep't of Ecology*, No. 39494-8-III (June 7, 2023), at 40 min., 40 sec., *video recording by* TVW, Washington State's Public Affairs Network, https://tvw.org/video/division-3-court-of-appeals-2023061095/?eventID=2023061095.

sion in the previous section, BSR pages 12, 60, 61, and 62 do not state a directive. That is, they do not impel one to act. Rather, these pages state the authors' conclusions.

3. *Ecology's commitments in the denial letter and subsequent actions show it has adopted rules in violation of the APA*

¶ 59 In the abstract, it is difficult to discern whether Ecology's commitments to NWEA in the denial letter constitute a rule under the APA. It therefore is necessary to consider how Ecology has implemented its commitments.

¶ 60 We previously outlined how Ecology began implementing some of its commitments through the issuance of renewed individual permits while in the process of formulating a general permit. We now provide greater detail on this process.

The new general permit

¶ 61 Beginning in April 2018, Ecology convened meetings of the Puget Sound Nutrient Forum for the purpose of developing a nutrient reduction plan for Puget Sound. At the first meeting, Ecology outlined to stakeholders some options to address nutrient sources and some nutrient reduction strategies being used in other parts of the country. At the March 2019 meeting, representatives from around the country discussed their use of general permits to regulate nutrient pollution in their respective areas. Following these presentations, stakeholders expressed interest in a general permit that would address Puget Sound nutrient pollution. Pursuant to WAC 173-226-060, in August 2019, Ecology issued a preliminary determination to develop a general permit, and provided a 60-day comment period.

¶ 62 Ecology convened a Puget Sound Nutrient General Permit advisory committee to advise it in drafting permit requirements to reduce nutrient loads discharged into Puget Sound by WWTPs. The advisory committee represented diverse stakeholders, including WWTPs, environmental organizations, and state and federal agencies. The City was a member of the committee.

¶ 63 After several monthly meetings, Ecology developed a preliminary draft general permit and solicited public comment from January 27, 2021 through March 15, 2021. Ecology used the comments it received to develop a formal draft general permit, which it released for another round of public comment on June 16, 2021. Ecology issued the general permit on December 1, 2021.

¶ 64 The general permit categorizes permittees as dominant, moderate, or small—based on the amount of TIN they annually discharge into Puget Sound. Dominant and moderate loaders have TIN action levels that Ecology calculated to reflect the pounds of TIN each facility discharges each year. Dominant and moderate loaders are required to implement a nutrient optimization plan to maximize nitrogen removal by their existing treatment facility and submit a nutrient reduction evaluation to Ecology by December 31, 2025.

¶ 65 If a dominant loader exceeds its action level, it must submit a report with a proposed approach to reduce its annual TIN load by 10 percent but it does not need to implement the proposed approach unless it exceeds its action level two years in a row or three years during the five-year permit term.

¶ 66 If a moderate loader exceeds its action level, it must submit a report with a proposed approach to reduce its annual TIN load below its action level but does not need to implement the proposed approach unless it exceeds its action level two years in a row or three years during the five-year permit term.

¶ 67 Small loaders do not have any caps on nutrient discharges but must implement a nutrient optimization plan to maximize nitrogen removal by their existing treatment facility and submit an AKART analysis to Ecology by December 31, 2025.

¶ 68 The impact of these changes goes further than requiring the WWTPs to comply with existing water quality standards. As noted previously, these changes actually freeze existing nutrient loading limits because the action level is based on each permittee's prior year TIN load rather than existing water quality standards.

Renewal of individual permits

¶ 69 While Ecology was in the process of formulating the general permit, it imposed restrictions similar to those described in the individual permits for Birch Bay and the Big Lake WWTPs. Those individual permits became effective March 1, 2021, and do not expire until 2026.

The practical effect of the denial letter creates rules

¶ 70 Ecology argues that the denial letter cannot be a rule within the meaning of the APA because it does not direct, order, or require anything. We disagree. As explained below, it directs its own staff to impose new restrictions within NPDES permits.

First inquiry: Directive of general applicability

[10, 11] ¶ 71 The first inquiry is whether the purported rule is an order, directive, or regulation of general applicability. *Nw. Pulp*, 200 Wash.2d at 672, 520 P.3d 985. "[W]here the challenge is to a policy applicable to all participants in a program, not its implementation under a single contract or assessment of individual benefits, the action is of general applicability within the definition of a rule." *Failor's Pharm.*, 125 Wash.2d at 495, 886 P.2d 147 (citing *Simpson*, 119 Wash.2d at 648, 835 P.2d 1030). Here, Ecology's commitments in the denial letter are of general applicability because they apply to all WWTPs.

[12] ¶ 72 The parties, however, dispute whether the action is a "directive." As previously defined, a directive is something that impels action. The precise issue presented in this appeal is whether a directive can be an internal directive, e.g., a commitment by Ecology that its own staff will impose new requirements on permittees.

[13] ¶ 73 Ecology argues that including an internal directive within the APA definition of directive is inconsistent with *Sudar v. Department of Fish and Wildlife Commission*, 187 Wash. App. 22, 31-33, 347 P.3d 1090 (2015). We question some of the broad language used by the *Sudar* court.

¶ 74 We begin first by discussing *Simpson*. In *Simpson*, Ecology determined that the state's existing water quality standard required all NPDES permits issued to pulp and paper mills to limit dioxin discharges to no more than 0.13 parts per quadrillion because that was the level at which dioxin " 'may . . . adversely affect public health.' " 119 Wash.2d at 643, 835 P.2d 1030. "Ecology arrived at this numeric standard by using federal guidance and federal data, but without going through rule-making procedures." *Id.* at 643-44, 835 P.2d 1030. Ecology's staff included the new standard in all pulp and paper mills' NPDES permits. *Id.* at 644, 835 P.2d 1030.

¶ 75 The pulp and paper mills sued. They argued that this new numeric standard that Ecology's staff required in all renewed permits needed to be adopted through the rule-making process. The Supreme Court agreed. It noted that the nature of a rule is " 'it [must] apply to individuals only as members of a class.' " *Id.* at 648, 835 P.2d 1030 (quoting William R. Andersen, *The 1988 Washington Administrative Procedure Act—An Introduction*, 64 WASH. L. REV. 781, 790 (1989)). The high court concluded that the numeric standard was a directive of general applicability because it applied "uniformly to the entire class of entities which discharges dioxin into the state's waters . . . ." *Id.* It also concluded that the violation would subject the respondents to punishment if they did not comply with the new standard. *Id.* at 647, 835 P.2d 1030. Because the two inquiries for what constitute a rule were satisfied, the court concluded that the rule was invalid because Ecology failed to satisfy the APA requirements for rulemaking. *Id.* at 648-49, 835 P.2d 1030. *Simpson* stands for the proposition that "directive" includes an agency's internal directive to its staff for issuing permits.

¶ 76 In *Sudar*, the Fish and Wildlife Commission adopted Policy C-3620. The policy set "guiding principles and a series of actions it may follow to improve the management of salmon in the Columbia River Basin." 187 Wash. App. at 27, 347 P.3d 1090. The policy "outline[d] a number of objectives, including phasing out the use of nonselective gill nets in nontribal commercial fisheries . . . and the transition of gill net use to off-channel areas." *Id.* The *Sudar* court held that the policy was not a rule under the APA and distinguished *Simpson* on the basis that the policy was "unenforceable until and unless the Department promulgates rules that can be enforced on violators." *Id.* at 32, 347 P.3d 1090. This is not an apt distinction. In *Simpson*, the directive to the agency employees was not a promulgated rule. Rather, the agency's employees were directed to include a new standard in all renewed permits and, by doing so, the permitees were subject to punishment if they violated the new standard.

¶ 77 Ecology argues that construing directive as including an internal directive is inconsistent with *Northwest Pulp*. We conclude that the language relied on by Ecology is nonbinding dicta.

¶ 78 In *Northwest Pulp*, our Supreme Court reviewed a challenge to Ecology's adoption, in its manual, of two new methods for identifying the source of polychlorinated biphenyls (PCBs) in water, Methods 1668C and 8082A. 200 Wash.2d at 670, 520 P.3d 985. There, permit writers were required to use Method 608.3 to determine compliance with PCB limits but had discretion whether to use data collected by Methods 1668C and 8082A when evaluating the source of PCBs. *Id.* at 670-71, 520 P.3d 985. There, the court agreed with the lower appellate court's distillation of what characterizes a rule of general applicability: an agency action is not a rule when it " '(1) allows staff to exercise discretion, (2) provides for case-by-case analysis of variables rather than uniform application of a standard, and (3) is not binding on the regulated community . . . .' " *Id.* at 673, 520 P.3d 985 (quoting *Nw. Pulp & Paper Ass'n v. Dep't of Ecology*, 20 Wash. App. 2d 533, 500 P.3d 231 (2021), *aff'd*, 200 Wash.2d 666, 520 P.3d 985). Applying those standards, the court concluded that the challenged methods were not rules because permit writers had discretion to choose the best method for measuring PCB sources on a case-by-case basis. *Id.* at 674, 520 P.3d 985.

[14] ¶ 79 Admittedly, later in the opinion, the court noted that Ecology's internal manual had no independent regulatory effect. *Id.* at 676, 520 P.3d 985. This is the comment Ecology relies on for implying that only regulations can be a rule. We disagree for two reasons. First, there is no functional difference between a promulgated rule that adds new terms for renewing a permit and a directive to staff to add new terms for reissuing a permit. Second, the *Northwest Pulp* court's comment was surplusage and, taken literally, would have overruled *Simpson*. It is well established that statements in a case that do not relate to an issue before the court and are unnecessary to decide the case constitute obiter dictum and need not be followed. *Malted Mousse, Inc. v. Steinmetz*, 150 Wash.2d 518, 531, 79 P.3d 1154 (2003). If the court's passing comment was intended to change precedent, agencies could adopt rules internally without the rulemaking process simply by directing staff to include the new rules in every renewed permit. This would render the APA's requirement for rulemaking meaningless.

¶ 80 Here, unlike *Northwest Pulp*, Ecology directed its staff to include new requirements in both the individual permits and the general permit. The record indicates these requirements were nondiscretionary and were part and parcel of the commitments Ecology made to NWEA.

Second inquiry: *The action establishes, alters, or revokes any qualification or requirement relating to the enjoyment of benefits or privileges conferred by law*

¶ 81 To prove that the denial letter established a "rule" under RCW 34.05.010(16)(c), the City relies heavily on *Failor's Pharmacy* and *Hillis v. Department of Ecology*, 131 Wash.2d 373, 932 P.2d 139 (1997).

¶ 82 In *Failor's Pharmacy*, the Department of Social and Health Services (DSHS) issued policy memoranda changing the way DSHS calculated Medicaid pharmacy reimbursement rates. 125 Wash.2d at 491-92, 886 P.2d 147.[7] The policy memoranda established

7. *Failor's Pharmacy* was decided under a prior version of the APA when it was codified under chapter 34.04 RCW; however, the definition of "rule" and its five categories were the same then as today.

reimbursement tiers based on a pharmacy's business volume. *Id.* After several years operating under these new rate calculations, multiple pharmacies sued. *Id.* at 492, 886 P.2d 147.[8]

¶ 83 The pharmacies argued that the policy memoranda instituted invalid rules because they were orders/directives/regulations of general applicability that established, altered, or revoked a qualification or requirement relating to the enjoyment of benefits or privileges conferred by law. *Id.* at 494, 886 P.2d 147. DSHS responded that the policy memoranda did not " 'relat[e] to the enjoyment of benefits or privileges conferred by law' " under former RCW 34.04.010(2)(c) (1988) because pharmacies have "neither statutory nor contractual rights to payment until performance and can withdraw from the program at any time ...." *Id.* at 496, 886 P.2d 147. DSHS additionally responded that Medicaid participation was voluntary and the pharmacies were free to accept or reject Medicaid clients. *Id.*

¶ 84 The Supreme Court disagreed with DSHS by focusing on Medicaid patients. While federal case law suggested that Medicaid participation was not a benefit or a privilege conferred by law to Medicaid providers, Medicaid was a benefit conferred to Medicaid patients. *Id.* at 496-97, 886 P.2d 147. In holding that the policy memoranda instituted invalid rules, the court stated:

> [T]he inclusion of the reimbursement schedules in a unilateral contract does not preclude their status as a rule. ... The benefit of the Medicaid program runs to the Medicaid patient, RCW 74.09.200, and its enjoyment is altered by the change in reimbursement rates. By insulating reimbursement schedule changes from rulemaking requirements Defendant denied notice and comment to those intended beneficiaries of the program.

Id. at 497, 886 P.2d 147 (citations omitted).

[15] ¶ 85 *Failor's Pharmacy* directly supports the City's argument. The challenged portion of the denial letter promised that Ecology's permit writers would alter the qualifications and requirements for NPDES permits. A letter mandating that new performative language be included in all NPDES permits is indistinguishable from the memoranda in *Failor's Pharmacy* mandating new price terms in Medicaid reimbursement contracts. Furthermore, issuance of an NPDES permit is a privilege conferred by law because without an NPDES permit, no person or entity may discharge any substance into Puget Sound. RCW 90.48.160, .162.

¶ 86 Ecology attempts to distinguish *Failor's Pharmacy* by arguing that the new requirements in the permits are mandated by WAC 173-201A-510, which prohibits WWTPs from violating existing water quality standards. We disagree that the new permit requirements merely require the WWTPs to comply with existing water quality standards. Existing water quality standards set numeric levels for DO in Puget Sound but do not regulate or set numeric levels for nitrogen discharges. While nitrogen is one of several causes of DO impairment, it has never been subject to direct regulation until now.

¶ 87 We conclude that the City has satisfied both parts of the two-part inquiry and that the commitments in the denial letter are "rules," as defined by the APA. We further conclude that the new requirements in the individual permits and the general permit are unlawful. If Ecology desires to keep its commitments to NWEA, it must do so through the rulemaking procedures of the APA.

[16] ¶ 88 Affirm in part; reverse in part.[9]

8. Similar to this case, the pharmacies were affected by the agency's policy memorandum only indirectly, by the agency requiring its staff to include the new terms in its Medicaid reimbursement contracts. An additional similarity is the presence of a tiered system based on volume rather than a uniform requirement.

9. Amici raise the question of whether the City had standing to file suit in superior court. Ecology did not raise standing as an issue before this court. We generally decline to address issues raised solely by amici. *State v. J.W.M.*, 1 Wash.3d 58, 74 n.4, 524 P.3d 596 (2023); *State v. Hirschfelder*, 170 Wash.2d 536,552, 242 P.3d 876 (2010); *Teamsters Local 839* v. *Benton County*, 15 Wash. App. 2d 335, 352, 475 P.3d 984 (2020). For this reason, we decline to address the issue of standing.

WE CONCUR:

Fearing, C.J.

Pennell, J.

WASHINGTON STATE NURSES ASSOCIATION, UFCW 3000 and SEIU Healthcare 1199NW on behalf of certain of the employees they represent, Respondent,

v.

MULTICARE HEALTH SYSTEM, Appellant.

No. 84660-4-I

Court of Appeals of Washington, Division 1.

Filed September 18, 2023

Background: Unions representing employees sued employer that unilaterally recouped overpayments to employees, alleging that employer violated regulation allowing it to unilaterally recoup "inadvertent" and "infrequent" overpayments, and sought injunctive and declaratory relief. Employer removed the action, asserting that the claims were preempted by federal law. The United States District Court for the Western District of Washington, Lauren King, J., 2022 WL 3042013, disagreed and granted union's request to remand on question of whether adjustments complied with regulation. On remand, the Superior Court, King County, Douglass A. North, J., granted summary judgment in favor of unions. Employer appealed.

Holdings: In a case of first impression, the Court of Appeals, Diaz, J., held that:

(1) genuine issue of material fact existed as to whether employer's overpayments were "rare," so as to be "infrequent";

(2) genuine issue of material fact existed as to whether overpayments were "unintentional," so as to be "inadvertent";

(3) genuine issue of material fact existed as to whether overpayments were not deliberately done, so as to be "inadvertent";

(4) unions were not judicially estopped from raising claim that employer violated regulation; and

(5) unions' claims were not preempted by the National Labor Relations Act (NLRA).

Reversed and remanded.

1. Summary Judgment ⇨78

If the moving party does not satisfy its initial burden of proof to show by uncontroverted facts that there is no genuine issue of material fact, summary judgment should not be granted, regardless of whether the nonmoving party has submitted affidavits or other evidence in opposition to the motion.

2. Summary Judgment ⇨50

Summary judgment should be granted only if, from all the evidence, a reasonable person could reach only one conclusion.

3. Administrative Law and Procedure ⇨1241

Regulations are interpreted similarly to statutes.

4. Administrative Law and Procedure ⇨1245

In interpreting a regulation, the court construes the act as a whole, giving effect to all of the language used.

5. Administrative Law and Procedure ⇨1243

If a regulation is unambiguous, intent can be determined from the language alone, and the court will not look beyond the plain meaning of the words of the regulation.

6. Labor and Employment ⇨62, 2191

Under the Industrial Insurance Act, the State Department of Labor and Industries (L&I) has the authority to supervise, administer, and enforce all laws pertaining to em-

Elements of a Comprehensive Puget Sound Nutrients Program

Michael Connor, Ph.D., [1] and William Stelle[2]

A. Introduction

Continuing and projected human population growth and development in western Washington is generating a variety of water quality problems that threaten the health and aquatic productivity of Puget Sound, undercutting our efforts to recover salmon, the orca, and other aquatic life. These include the "conventional" pollutants like excess water temperatures in certain rivers and estuarine areas, low levels of dissolved oxygen in certain shallow embayments, and an array of "toxics" from runoff, spills and a variety of other sources. The Department of Ecology (DOE) has worked diligently over the last decade to examine whether excess nutrients are choking the system, and last fall proposed a new "general permit" to address an important component of the problem – increasing amounts of nutrients and other related pollutants from sewage treatment plants discharging directly into the Sound. DOE has invited public comments on its proposed permit, which as a general matter provides a good and creative framework from which to work. Below we offer both organizational and technical refinements to advance an approach that is designed to bolster the financial capability and a decision-making and science apparatus to do it effectively and efficiently. We also offer in part D a set of technical observations which dive deeper into the science and modeling issues which underscore the design and execution of an effective nutrients strategy. We see this as a generational opportunity to help rebuild the productivity of Puget Sound if we can get the details right. The most important ingredient for success will be the active leadership of both the regulatory community -- led by DOE and EPA -- and the water utilities which will shoulder a significant share of its funding and implementation.

B. Objectives

We write to recommend modernizing the conventional water quality regulatory machinery that builds upon the innovations which have occurred in several of the major estuaries around the coastal United States over the last two decades, including Chesapeake Bay, San Francisco Bay, the Gulf of Mexico and Massachusetts Bay. The approach embraces several objectives:

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[1] Mike Connor has worked for 45 years on coastal eutrophication issues as an academic (WHOI/MIT Ph.D. and Harvard School of Public Health post-doc), POTW manager (Boston Harbor Clean-up chief scientist for MWRA and GM of East Bay Dischargers Authority), NGO environmental manager (San Francisco Estuary Institute General Manager and New England Aquarium VP), and government regulator (founding EPA staffer for three New England National Estuary Programs and EPA consultant to John Armstrong when he started the Puget Sound Estuary Program at EPA10). He is a frequent Olympic Peninsula tourist and a recent retiree hoping to relocate there.

[2] Will Stelle has been deeply involved with salmon recovery in the Pacific northwest and California for years. He is currently the President of the Washington Water Trust Board and is a former two-term Regional Administrator of NOAA Fisheries during the Clinton and Obama administrations, where he managed the listings of multiple salmon populations in the Pacific northwest and California and implemented the first stages of ESA salmon recovery efforts, emphasizing reforms in the four "H's" of harvest, hatcheries, hydropower and habitat. He has also been heavily involved with Puget Sound conservation, serving as co-chair of its Federal Caucus during his second tour of NOAA duty. The views expressed here are personal and do not reflect the Washington Water Trust or other organizations with whom he is affiliated.

1. Adopting a comprehensive approach that addresses the major sources of nutrients into the watershed, both from pipeline discharges[3] *and other sources*;

2. Embracing multiple geographic scales that gets at the big picture by designing local strategies tailored to the local ecology;

3. Designing a phased implementation approach that starts immediately on those actions which can be taken with current capabilities while planning and building the needed improvements which will take years;

4. Providing the financial capacity to do the job effectively and efficiently, funding the necessary planning, implementation, compliance and effectiveness monitoring and continuing to invest in new science to steer the effort; and

5. Embracing other necessary imperatives including the use of "green infrastructure" where possible, reducing greenhouse gas emissions and accounting for other climate change adaptations; reflecting social equity and fairness imperatives, and honoring Tribal Treaty rights and obligations.

C. Key Elements

Our approach recognizes that the challenges in tackling nutrients and DO problems successfully go far beyond the normal permit-by-permit, pipeline-by-pipeline approach, which is how the permitting machinery typically works. It presents a wonderful opportunity to strengthen the way that regional water quality improvements are planned, permitted, and implemented, and potentially tied into other riverine/estuarine habitat objectives that are vital to salmon recovery. Because Puget Sound is not nearly as impacted as the other major national estuaries, we've got time to develop a new framework for managing these challenges under the umbrella of a new general permit, which should include the following:

1. A new, invigorated collaboration for developing and implementing the strategy which includes the Department of Ecology, other government regulators, Tribal sovereigns, the local entities representing the major sources of nutrients, and other essential stakeholders. The recent engagements around nutrients have unfortunately been far too polarized, with the various "camps" seemingly talking past one another rather than addressing the significant unresolved issues. We need to change the dynamic and spend less time arguing positions and more time resolving issues successfully, steered by clear-eyed science about what we know and don't know about how things work. DOE has provided in its proposal a good platform from which to advance which opens the door to creative solutions, but we seem to be defaulting into hardened "positions" as we advance;

2. A new consortium of municipal sewage agencies to serve as the permit holder and shoulder the responsibility for coordinated planning, implementation, monitoring, information-sharing and adaptation on a collective basis;

3. An expert science institution to provide independent analysis, modeling, monitoring, information sharing, and performance tracking capabilities to verify if we are achieving the desired outcomes and enable us to adjust as needed;

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[3] We encourage including under the general permit both pipeline discharges into marine waters and also discharges into the rivers upstream which flow into the Salish Sea.

4. Increased funding for modeling and monitoring provided by new nutrient discharge permit fees tied to nutrient loading levels and coupled with state matching grant support to help fund the institutional capacity to do the work and provide immediate and direct financial incentives to reduce loadings;

5. Consistent planning for potential nutrient discharge upgrades across large and small dischargers to ensure shared access to good information, local ownership and timely implementation; and

6. Updating science-based water quality goals that are based on now-outdated decades-old framing of oxygen standards to be reflective of the hypoxia area-time framework used by Long Island Sound, the Gulf of Mexico, and the Chesapeake Bay.

D. More Specific Comments on the Draft Nutrients General Permit

We include below more technical background and specifics for the general ideas expressed above.

1. **Puget Sound's eutrophication problem is slowly progressing.** Puget Sound's oxygen status has been measurably declining for more than 60 years. The declines have proceeded slowly, and the specific actions to most cost-effectively solve the problems are not yet clear. DOE and the region overall has time to get the science and policy right. In the interim, DOE's plans for freezing loads and encouraging optimization as an important first step are well-supported.

   DOE emphasizes the comparison to other estuaries around the US that have faced the same issue. While comparisons are difficult since different agencies use slightly different assumptions, a rough comparison of the nitrogen loading to the Sound to other major US estuaries[4] with active nutrient management programs suggests that Puget Sound has a number of qualities in its favor. These characteristics have mitigated the impact of its discharges and need to be better understood so as to gauge the effectiveness of any particular regulatory strategy. The ratio of Puget Sound's population to its water area suggests it is in slightly better shape than the other estuaries, and Puget Sound has two other advantages that allow the region and DOE time to respond:
   a. Its average depth is much deeper than the other urban coastal areas giving it a significantly reduced load of nitrogen per volume of water. Because the load is diluted

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[4] This comparison builds on an approach by Kelly (2008) https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1046&context=usepapapers and adds some data from Puget Sound (https://apps.ecology.wa.gov/publications/SummaryPages/1203049.html) and SF Bay (loadings only include POTW discharges, not rivers like the SSM). The Boston Harbor data are from before the Boston Harbor Project that moved the outfall offshore. The data should be considered illustrative of the overall points being made. They are very rough estimates with variability of at least 30-40% even including such parameters as area and volume. The comparison does point out the importance of understanding the zone of impact of deep discharges of nutrients and the exchange with surface waters that would allow light to reach enriched waters and grow phytoplankton.

over a much larger volume, the overall nitrogen concentration contributed by POTWs is reduced.

b. Puget Sound also differs significantly from these estuaries in that the import of nitrogen from deep offshore coastal waters dominates its nutrient loads.[5] As a result, reducing loadings from pipeline discharges across-the-board are less certain to achieve results than locally-tailored strategies.[6]

Estuary	Population	Area	Volume	Depth	Residence Time	Annual N load	Load per volume	Concentration
Units	Millions	sq.mi	Tr gal	(avg ft)	months	million lbs	uM/m3-yr	uM Nitrogen
N. Gulf of Mexico	18	7700	158	100	6	4004	217	108
Chesapeake	16	4480	18	21	7.6	250	156	99
Long Island Sound	15	1320	22	78	6	186	1770	37
SF Bay	8	550	3	14	0.8	40	317	21
Puget Sound	4	1020	44	450	2	104	49	12
old Boston Harbor	2.5	50	0.2	17	0.27	31	3927	87

2. **An integrated nutrient strategy needs to include all POTWs discharging into or upstream of Puget Sound, and needs to be based upon an overall nitrogen budget which encompasses all sources of nutrients -- both pipeline discharges and other "non-point" sources.** The proposed permit's focus on POTWs directly discharging into Puget Sound fails to recognize the importance of other "direct dischargers" of nitrogen upstream of Puget Sound. Moreover, an overall nitrogen budget for Puget Sound is crucial to making a convincing argument that the actions proposed by DOE will have measurable impacts and result in the intended outcomes..

   The draft permit indicates that the nutrient loads that POTWs are discharging into the rivers upstream are only 15-20% less than those being discharging directly into Puget Sound, yet riverine POTW discharges are not proposed to be covered by the general permit. DOE states that only deep water, POTW-derived, summertime nitrogen loads need consideration. Some of the assumptions about the interaction and seasonality of POTW and riverine discharges are illustrated by virtual dye models, but the assumptions would be much more compelling if they were documented by the Salish Sea Model (SSM) outputs for eutrophication. A detailed look at this issue by Banas et., 2015[7] concluded that biological parameters such as bacteria and nutrients have much less long-distance transport than standard salinity measures. Besides just tracking the movement of dye particles, the SSM should use its capacity to determine what the percentage contribution of distant sources to local sources for the areas of concern. Since the problems in the Sound are correlated with long residence times of 100-200 days, this assumption needs validation by a model—consider the counter example of the agricultural runoff to the Mississippi River causing the Gulf of Mexico dead zone.

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[5] Mackas and Harrison (1997) estimate the nutrient loads exchanging through the Juan de Fuca and Admiralty Straits to be about 6-8 times greater than the wastewater load (https://apps.ecology.wa.gov/publications/documents/1103057.pdf).

[6] Even zeroing out all anthropogenic loads from the rivers and the POTWs is predicted by DOD to have a small cumulative effect on algal biomass (~5.4%) and Sediment Oxygen Demand (~17%) (https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2017JC013650).

[7] https://www.jstor.org/stable/44851502?seq=1

Finally, back to the big picture, much of the human-derived load input originates from Canada from their POTWs and Frasier River discharges. These are obviously not under DOE's jurisdiction, but they suggest that a parallel effort to secure a bilateral commitment from our northern neighbors to stabilize and reduce these loads will be important for success..

3. **Name a regional consortium as the permit lead.** The permit recognizes that regulating nutrients requires an estuary-wide approach. Rather than having 50+ individual agencies providing contrasting information using different assumptions, it should allow compliance through a new consortium of the POTWs, and commit to using more than half of the $9 million provided by the legislature to fund this organization's start-up. The consortium would be charged with providing annual reports that summarize agency data collection, integration of those data to become regional information, development of consistent agency optimization plans, tracking implementation and effectiveness of those optimization activities, and an evaluation of the costs of implementing further nutrient reduction.[8] Charging the consortium to develop the framework of optimization plans for its agencies would allow more rapid development of a consistent set of the most cost-efficient solutions possible. While optimization plans need to be tailored to individual facilities, there are a standard set of tools that agencies can use.

4. **Long-term wastewater planning is not effective dealing with single issues**. A strict limit on one item (3 ppm of total nitrogen) may not be effective for maximizing the productivity of Puget Sound. Other wastewater treatment issues--e.g. control of Combined Sewer Overflows or Sanitary System Overflows, maximizing the use of recycled water, maximizing freshwater stream flow, treating first-flush stormwater, minimizing toxics discharges-- may be more cost-effective. . A 3-ppm nitrogen goal is certainly not consistent with minimizing the carbon footprint.[9] The permit should encourage the integration of long-term nutrient reductions into overall, long-term wastewater plans for the wastewater utilities. These plans should be updated every permit cycle and reflected in each utility's individual capital plans. Finally, the permit should encourage these long-term plans to consider "green engineering" designs such as increased recycling, wetlands discharges, or sea level rise protections, etc. These "green" solutions would be things the wastewater utilities and the broader Puget Sound community would embrace. POTW capital plans are multi-decade commitments. A "trade" that allows flat nitrogen loads for XX years with implementation of a "green" engineering solution would encourage action.

5. **Charge the POTW consortium with developing a plan to reduce hypoxic zones in the Sound**. Besides nutrient loads, there are several other early actions that may be quicker to implement and more cost-effective (e.g., summertime nitrification; receiving water aeration; effluent aeration; effluent diversion for irrigation; integrating stormwater first flush treatment; wet

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[8] A pertinent example is the San Francisco Bay Area nutrient general permit (https://www.waterboards.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2019/R2-2019-0017.pdf) which uses the Bay Area Clean Water Agency (BACWA), a joint powers agency that represents the 40+ wastewater agencies to compile monitoring data, funding for monitoring and modeling of the Bay for eutrophication, development of regional strategies for the area's POTWs to reach different nutrient load targets, and summarizing regional implementation of load reduction efforts.

[9] The higher carbon footprint required by a 3-ppm goal (due to the required addition of methanol or other carbon sources and much higher energy usage for pumping and aeration) was documented in DOE's November 13, 2020 forum.

weather controls for minimizing DO impacts). Some of these actions could be tested in the early stages of permit implementation.

6. **Use incentives to increase early adoption.** Given the newness of the nutrient general permit, the permit "sticks" for exceeding action limits should be delayed until the next cycle and replaced by "carrots" of assuring agencies that meet the action limits for these five years (or even better performance) shall have the same action levels in the next permit cycle. The major challenge in the SF Bay nutrient permit has been how to encourage early implementation. What we've found is that given the challenges of capital accumulation, spending, and permitting, the major thing the agencies need is time**.** Two permit terms would give them the planning certainty to incorporate into their capital planning. For example, the costs of "sidestream" treatment would be easier to absorb if they allowed compliance with the nutrient permit for 20 years.

7. **Consider nutrient fees**. Nutrient discharge fees have been used successfully in Long Island Sound and the North Sea to develop the most cost-effective solutions for nutrient removal. Both regions have found that ~$6 per pound of nitrogen becomes an efficient trace-off for maximizing nutrient reduction. Charging a nutrient discharge fee (similar to carbon pricing) is probably the most cost-efficient method for providing regional equity. Adopting a small fee (e.g. $.05-.10 per pound of nitrogen discharged) early would enable funding of the consortium's regional planning study, an independent model evaluation group, or cost-sharing for implementing any nitrogen optimization plans proposed by member POTWs. Such fees also provide a structure for additional Clean Water funding provided by the state by showing serious POTW agency intent.

8. **One Sound, One Science.**[10] The multi-billion capital costs that may result from the permit requires an open Puget Sound science community that works together to build a common body of scientific knowledge. Puget Sound has many different agencies providing information about the Sound that needs to be summarized regularly to ensure the regulatory and conservation agenda is driven by a process that tries to reach consensus on the science of the Sound. This open science community will have the capacity to adapt and inform future water, societal, and environmental decisions across multiple organizations and programs. "One Sound, One Science" will accelerate the discovery of facts and innovation within the open science community by exploring genuine differences in scientific opinion and addressing them in a transparent manner. Ver significant costs of managing nutrient discharges to the Sound will be (and should be) borne by public wastewater utilities, who will then pass those costs along to all of us. They deserve a role in the governance of how to ensure collaboration and communication among Sound scientists, agencies, and stakeholders that may have independent scientific missions to fulfill. An open science community that is well-connected with the policy and management community and other users of science has the capacity to inform decisions, adapt to change, and improve the existing science infrastructure.

   Of most importance to this "One Sound, One Science" principle is independent peer review of the Salish Sea Model (SSM), as undertaken for the Chesapeake Bay, Long Island Sound, Great Lakes, and Massachusetts Bay models. While the model results have passed a limited peer

[10] This concept appears in many regions of the country, The slogan is borrowed from the Sacramento delta.

review appropriate for scientific publication[11], its multi-billion dollar impact on the nutrient management strategy selection requires a more extensive review by an independent Model Evaluation Group (MEG). The review needs to extend to estimate the model's uncertainty in its prediction of management scenarios. As good as the model is, it is significantly limited by a paucity of data for biological transformation processes that are crucial to its conclusions -- as is very well recognized by its authors. It is quite simplistic in its handling of primary production, sediment diagenesis, zooplankton grazing, light penetration, and it uses settling velocities of carbon five times higher than normal to reproduce the hypoxic zone in Hood Canal and the southern Sound to match with one year of data. Eutrophication models are extraordinarily sensitive to light-limitation and grazing-limitation , which can overwhelm the benefits of nutrient control measures. The existing model outputs make it hard to evaluate this issue.

9. **Make DOE's DO Standard more relevant to estuarine eutrophication.** Before capital planning by the POTWs is finalized, DOE needs to develop a much more sophisticated approach to its DO standards to ensure that money spent on improving Puget Sound's productivity is more intelligently spent. The driver for reducing nitrogen loading is to comply with the state standard of preventing a decline of 0.2 ppm from baseline when water quality standards are violated. As a driver, this standard has two limitations: 1. It is not tied to a specific biological impact; and 2. It is beyond the predicted confidence level of even very sophisticated models. EPA's water quality standards are based on data from exposing organisms to different concentrations of parameters of concern, determining the actual level of impact, and incorporating a safety factor. Estuarine scientists in the Chesapeake, Long Island Sound, or Gulf of Mexico have developed a more advanced approach to consider the time and volume of water that is within certain ranges of percent saturation or absolute concentrations based on effects to local species. The general permit also presents hypoxic zones in the Sound, and it would be easy to adapt the new nutrient goals to address the size and timing of hypoxic zones. This characteristic is much more amenable to monitoring and modeling. Most scientists would argue that large scale estuarine DO models are hard-pressed to characterize DO to 0.5 ppm.[12] Often diurnal changes can vary DO by several parts per million and seasonal changes by twice that. The most obvious alternative to the DOE approach would be to use the same TMDL approach it uses for every other contaminant and use the SSM to calculate what nitrogen loads will allow Puget Sound to meet its DO standard. Such an approach would also give the POTW community clear guidance for their future capital plans.

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[11] https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2017JC013650

[12] See DOE's model's Table 2 in https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2017JC013650)

Final Treatment Plant Financial Capability Assessment Guidance Puget Sound Nutrient General Permit

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[1] www.ecology.wa.gov/contact

Department of Ecology's Regional Offices

Map of Counties Served

Region	Counties served	Mailing Address	Phone
Southwest	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	P.O. Box 47775 Olympia, WA 98504	360-407-6300
Northwest	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	P.O. Box 330316 Shoreline, WA 98133	206-594-0000
Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 West Alder Street Union Gap, WA 98903	509-575-2490
Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 North Monroe Spokane, WA 99205	509-329-3400
Headquarters	Statewide	P.O. Box 46700 Olympia, WA 98504	360-407-6000

Final Financial Capability Assessment Guidance

Puget Sound Nutrient General Permit

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DEPARTMENT OF
ECOLOGY
State of Washington

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Abbreviations and Acronyms

ACS	American Community Survey
AWC	Association of Washington Cities
AKART	All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment
BLS	Bureau of Labor Statistics
CAP	Consumer Assistance Program
CDP	Census Designated Place
CPH	Pollution Control Cost per Household
CWA	Clean Water Act
CWSRF	Clean Water State Revolving Fund
EPA	US Environmental Protection Agency
FAA	Financial Alternatives Analysis
FCA	Financial Capability Assessment
FPL	Federal Poverty Level
LQI	Lowest Quintile of Income
LQPI	Lowest Quintile Poverty Indicator
MHI	Median Household Income
PSNGP	Puget Sound Nutrient General Permit
RCW	Revised Code of Washington
TIN	Total Inorganic Nitrogen
WWTP	Waste Water Treatment Plants
WQS	Water Quality Standards

1. The Purpose of Ecology's Guidance

The Washington State Department of Ecology (Ecology) issued the Puget Sound Nutrient General Permit (Nutrient Permit) on December 1, 2021. The Nutrient Permit requires 58 publicly owned domestic wastewater treatment plants (WWTPs) that discharge wastewater into Puget Sound, to prepare and submit a report to Ecology that identifies reasonable treatment alternatives as part of a required AKART (all known, available, and reasonable methods of prevention control and treatment) analysis for reducing nutrient discharges. The Puget Sound Nutrient General Permit has assigned a category of small, moderate, or dominant to each WWTP based on their percentage of the total inorganic nitrogen (TIN) load currently discharged to Puget Sound.

Wastewater Treatment Plants with Dominant or Moderate TIN loads are required to prepare a Nutrient Reduction Evaluation, which includes an AKART analysis and an Economic Evaluation of reasonable treatment alternatives. For WWTPs with Dominant or Moderate TIN loads, permittees must develop reasonable treatment alternatives for achieving two different levels of treatment: (1.) AKART for nitrogen removal (annual basis) and (2.) 3 mg/L TIN (or equivalent load), as a seasonal average (April through October).

Wastewater Treatment Plants with Small TIN loads are required to prepare an AKART analysis and an Economic Evaluation of reasonable treatment alternatives to maintain an annual TIN average of < 10 mg/L.

For all the WWTPs regulated by the Nutrient Permit, an Economic Evaluation of reasonable treatment alternatives includes completion of an affordability assessment to help identify an economically reasonable level of treatment in the context of AKART.

As referenced on Ecology's website and in the 2022 Fact Sheet, Ecology has used the US Environmental Protection Agency's (EPA) Financial Capability Assessment (FCA) guidance when looking at options for assessing financial capabilities of municipal WWTPs to implement requirements under the Clean Water Act.[2] Specifically, the EPA assessment helps identify the feasibility of permittees to take on the financial costs of an upgrade or municipal wastewater capital improvement reducing nutrients in wastewater effluent by considering factors such as debt capacity of a community, affordability of wastewater utility rate increases to impacted households, and disproportionate impacts to low income and impoverished populations.

Background

In February 2023, the EPA updated its Clean Water Act Financial Capability Assessment Guidance (2023 EPA guidance) to supplement and describe the following: 1995 Interim Economic Guidance for Water Quality Standards (1995 EPA guidance from here on) and 1997 Combined Sewer overflows Guidance for Financial Capability Assessment and Schedule

2 https://ecology.wa.gov/regulations-permits/permits-certifications/nutrient-permit#:~:text=The%20Nutrient%20General%20Permit%20applies,the%20WWTPs'%20existing%20individual%20permits.

Development (1997 EPA guidance from here on).[3,4,5] The largest additions to otherwise similar calculations across both historical guidance approaches is the Lowest Quintile Poverty Indicator (LQPI) that defines disadvantaged households within a community, and the "Expanded Economic Impacts Matrix" that combines the LPQI with previous measures of financial health.

Refining calculations: While Ecology recommends continued use of EPA's FCA guidance, the release of the February 2023 version (revised March 2024) and an updated EPA spreadsheet tool created an opportunity to review and improve its usefulness for evaluating public project impacts in the context of state-specific data.

For example, at the time of this writing, EPA's FCA spreadsheet tool provides calculations necessary to evaluate wastewater treatment projects under "Alternative 1" in the 2023 EPA guidance. However, Alternative 1 (based on 1997 FCA guidance) is intended for schedule development and negotiation, and Section 3 (based on 1995 Water Quality Standards (WQS) guidance) is intended to guide states in evaluating the economic impact of water quality decisions (2023 EPA guidance pg. 34). Despite the former approach garnishing an outsized level of detail and support in EPA's 2023 guidance document and spreadsheet tool, the context of the latter is more applicable to requirements of the Nutrient Permit. In addition, the EPA's LQPI leverages national baselines in its calculation and reports impacts in total (i.e. existing and project impact together) that could limit fair and robust evaluation in the Washington state context. [6]

To be consistent with EPA's 2023 guidance and available tools, whilst better assisting Washington public sector wastewater entities, Ecology developed an amended EPA FCA spreadsheet tool (hereafter referenced as Ecology's spreadsheet tool, located on Ecology's Puget Sound Nutrient General Permit web page). Ecology's spreadsheet tool aligns calculations with Section 3 of EPA's 2023 guidance "economic impact analysis for WQS decisions for the public sector." To this, Ecology's spreadsheet tool also reports total impacts and non-project baselines, state-regional level baselines, and alternative measures like costs as a percent of lowest quintile of income (LQI).

No new data inputs are needed to complete Ecology's spreadsheet tool beyond what was already required in EPA's configuration. Ecology's spreadsheet tool also fully maintains EPA's original Alternative 1 results and overall layout to the degree that they are useful for other federal or state consultation.

The purpose of this guidance document is to:

[3] https://www.epa.gov/system/files/documents/2023-01/cwa-financial-capability-assessment-guidance.pdf
[4] https://www.epa.gov/system/files/documents/2024-01/interim-economic-guidance-water-quality-standards-workbook-1995.pdf
[5] https://www3.epa.gov/npdes/pubs/csofc.pdf
[6] Note that other versions and vintages, reflecting adjustments to the EPA's FCA calculator may be in use elsewhere throughout state government, including Ecology. If completing an FCA for a use outside of Nutrient Permit purposes, be sure to consult with appropriate contacts.

- Provide tips for completing Ecology's spreadsheet and steps for submitting materials to Ecology (Section 2),
- Describe Ecology's motivation in amending EPA guidance (Section3), and
- Give updated information on funding opportunities for public wastewater treatment plants in Washington state (Section 4).

Environmental justice considerations

> Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies (**RCW** **70A.02.005**).

Ecology supports state and local government evaluation of environmental justice impacts of permitted actions on rate payers and vulnerable populations and corresponding efforts to mitigate negative impacts for communities that have the greatest environmental and health burdens.

This FCA guidance and the assessment results are not intended to be an absolute or comprehensive picture of the environmental justice impacts from municipal wastewater management, including any nutrient reduction actions to comply with the Nutrient Permit. Permittees are required to assess environmental justice broadly and identify strategies to mitigate harms and amplify benefits for people experiencing the greatest environmental and health burdens in the Nutrient Permit (page 18).[7]

In this FCA guidance, Ecology provides tools to understand the *financial* impacts of anticipated permitted actions. These financial impacts include economic justice considerations such as, income inequality, poverty, and income-based food assistance among other measures. Permittees should incorporate the recommended justice considerations within their FCA, particularly the lowest quintile of income (LQPI), with the broader environmental justice review in the Nutrient Permit to develop a fuller understanding of the equity considerations of each permitted project.

2. Analytical Steps and Deliverables

Governments have the authority to levy taxes and distribute pollution control costs among households and businesses according to the tax base. Similarly, sewage authorities charge for services, and thus can recover pollution control costs through user fees. Whether or not the community faces substantial impacts from the Nutrient Permit depend on existing pollution control burdens, the cost of new pollution control projects, the financial health of the community, and its socioeconomic vulnerability, among other factors.

[7] https://apps.ecology.wa.gov/paris/DownloadDocument.aspx?Id=390719

To provide a standardized categorization of these impacts, **we recommend the following steps outlined in Ecology's FCA spreadsheet tool (tab references in red below), and related analytical sections of the 2023 EPA FCA guidance**.[8] This multistep approach includes:

1. Identifying your affected community (**Instructions_Demographic, Inputs_Demographic**),
2. Calculating pollution control cost per household as a percent of median household income (%MHI) and upper limit of the lowest quintile income (%LQI) (**Instructions_RI, Inputs_RI**),
3. Determining initial financial capability through a combination of %MHI and an index of six socioeconomic, debt, and financial indicators (**Instructions_FCI, Inputs_FCI**),
4. Calculating the Lowest Quintile Poverty Indicator (LQPI) score (**Instructions_Results_LQPI, Results_LQPI**),
5. Combining the results of the Initial Economic Impact and the LQPI score to determine the Expanded Economic Impact (**Results_FCA_ECY**),
6. Performing a Financial Alternatives Analysis (FAA) (**Instructions_Checklist_FAAs , Checklist_FAA**),
7. Iterating step 1-6 as needed with any updates resulting from the financial alternative analysis and related research.

Upon completion, we recommend permittees submit, at a minimum, the following materials to Ecology's Water Quality Permitting Portal (WQWebPortal):

1. The Ecology FCA spreadsheet tool, filled out with required information. This includes providing links or citations for non-automatically generated data inputs (in comments and sources columns, where applicable). Please attach documentation if an internal source is used. The WWTP should provide this information for chosen treatment alternatives. Permittees may also include in materials for context additional instances of the tool, related to the consideration of other options (please clearly mark as non-chosen alternatives).
2. A document discussing results of the Expanded Financial Capability Assessment (Results_FCA_ECY). This should include, but is not limited to:
    - Screenshot(s) of the expanded FCA matrix with and without project(s), along with intermediate statistics such as %MHI and %LQI.

[8] Caveats and additions to note when comparing EPA's current online FCA spreadsheet tool and Ecology's spreadsheet tool are discussed in greater detail in Section 2.2.

- Project and community details that may drive (or attenuate) impacts.
- Other key inputs and unique characteristics of the affected community that the permittee feels are not fully captured by the analysis (an example could include a community that imposes restrictions on property taxes).
- Summaries of similar relevant analysis performed by, or known to, the permittee. This could include data, presentations, local rate studies, surveys, or interviews.

3. A completed FAA. This can be printed from the completed Ecology FCA spreadsheet tool (Checklist_FAA), or a word document if room for additional discussion and formatting is desired.[9, 10]
4. Supplemental material as needed.

When preparing materials, keep in mind that break points between categories in the FCA analysis are not, nor are intended to be, an absolute or comprehensive demarcation of financial capability.

Identifying overburdened communities and barriers to affordability do not relieve jurisdictions from meeting Water Quality Standards. On one hand, low-income households may pay a higher percentage of their total income for basic services and clean water, but on the other, if water quality standards of a community remain lower, overburdened and/or low-income neighborhoods will likely continue to suffer impacts to human health and use of the state's waters for activities such as swimming, and fishing. In short, if one of the intended goals of the permit is to address impacts to residents, allowing lower water quality may have the opposite effect by increasing pollution in the neighborhoods where they live, recreate, or consume local fish and shellfish.

While the Financial Alternatives Analysis (FAA) provides permittees, Ecology, and the public, information about mitigating efforts, where high impacts are found, it is especially critical that communities develop a solution that accommodates the need to protect the receiving water while also providing a level of service to all residents within their community. In these instances, Ecology encourages permittees to evaluate, or re-evaluate, tiered or other alternative rate structures to offset adverse effects to the lowest income populations within the sewer service area or other innovative measures (e.g., fixed vs. variable charges, efficiency-

[9] We highly recommend first reviewing Chapter 4 of this guidance for funding and rate assistance options, and Appendix C of EPA's 2023 FCA Guidance for additional details and resources associated with FAA question.

[10] See EPA compendium of Drinking Water and Wastewater Customer Assistance Programs that describes the benefits, implementation, and examples of customer assistance programs (CAPs) throughout the country (https://www.epa.gov/waterfinancecenter/compendium-drinking-water-and-wastewater-customer-assistance-programs). EPA's financial leadership guidance offers additional discussion on several themes found in the FAA (https://www.epa.gov/waterfinancecenter/water-infrastructure-financial-leadership).

oriented rate design, or usage based rates) that ensure affordability when adopting a new rate structure to support treatment upgrades.

The Association of Washington Cities (AWC) 2018 Utility Rate Survey is an excellent resource for sewer rates and examples.[11] These data allow permittees to compare utility rates, rate structures, number of connections, and other characteristics for up to three cities at a time (note there are no counties or special purpose districts included in the AWC data). Out of 295 communities Ecology surveyed in 2016, 116 offered a discounted rate based on criteria determined by the billing entity or city ordinance.[12]

2.1 Notes on Identifying the Affected Community

It is important to first define the affected community prior to completing other steps in the FCA. This is to ensure that fiscal and socioeconomic data is appropriately described throughout the analysis. For the purposes of the FCA, the "affected community" is typically made up of households at the city, town, or Census designated place (CDP) level, in a utility or water-sewer district service area responsible for paying the compliance costs of water treatment (see 57 RCW for water-sewer district definitions). We reference "city" hereafter for simplicity.

In the simple case (Case A), water-sewer districts generally line up with the jurisdictional boundaries of a single city, while in more complex cases, others may serve just portions of a city, multiple cities, or some combination of cities and portions of cities.

- **Case A (Simple):** When all households in a single city pay compliance costs of water treatment, the city is the affected community.

  Case B. When all households in two or more cities pay compliance costs of water treatment, multiple cities make up the affected community.

- **Case C**. One or more cities with partial service can make up the affected community if a predominant share of households within each are responsible for paying the compliance costs of water treatment.

  What constitutes a "predominant share" should be dependent on several factors. Generally, at least 75% of all households in the city should be responsible for paying the compliance costs of water treatment. More importantly, households that are not in the service area but included by way of city level reporting should not skew fiscal and social information in a material way. Permittees should provide, to the extent possible, quantitative or qualitative information about the balance of these households including but not limited to income, average assessed property value, and unemployment rates. Documented plans to connect

[11] https://datadatadata-awcnet.opendata.arcgis.com/pages/utrs2018
[12] Summary report: https://apps.ecology.wa.gov/publications/documents/1710024.pdf . Data available at: https://data.wa.gov/Natural-Resources-Environment/2016-Residential-Sewer-Rate-Survey/sibs-5k6j/data

the balance of households to services in the foreseeable future may be another justification for including otherwise partially served cities as the affected community.[13]

- Any combination of **Case B** and **Case C** can make up the affected community
- **Case D**. If only a portion of a single city is served (e.g., less than 75% of households served in a small special district), and limited in reporting standard fiscal and socioeconomic data, you may consider the city as the affected community. As with **Case C** above, permittees should take efforts to consider whether socioeconomic information at the city level would misrepresent the subset of households responsible for compliance cost. If so, describe to the best of your ability how, or contact Ecology for additional guidance.

A Note on Tribal Service Agreements

Permittees may have agreements with Tribes to provide wastewater services on Tribal reservation lands. Therefore, we encourage permittees to consider the following questions for each Tribe impacted by this permit:

1. Do you have a wastewater service agreement with neighboring Tribe(s)?
2. What is your relationship with the Tribal government?
3. Is the Tribe (Tribal government) aware that you will report social and economic data to Ecology for this permit?

Before collecting any Tribal information, permittees should discuss the data required by the FCA with the Tribes included in their wastewater service agreements. These discussions should describe the purpose of the PSNGP and the FCA and whether publicly available data accurately describes the portion of the Tribe affected by the service agreement.

Ecology recommends breaking these communications into two categories:

1) Household level data from the US Census Bureau,

The FCA requires collection of household demographic data. Census data at the city, town, or CDP level, may not accurately represent data for households on the Tribal reservation. One way to incorporate this Tribal data into Residential indicators (RI) and Lowest Quintile

[13] For complex service areas, electronic Geographic Information System (GIS) shapefiles can be analyzed with census electronic shapefiles, allowing a more precise characterization. This includes but is not limited to intersecting parcel maps with permittee service areas. Ultimately, it is the applicant's responsibility to describe these data, and their limitations. We recommend including any service maps, Census data, and files/code used in this step with materials submitted to Ecology.

Poverty Indicator (LQPI) scores, is to rely on data from the US Census at the “American Indian Area” level.[14, 15]

However, if a Tribe or permittee feels that the “American Indian Area” level misrepresent households within the service area, the Tribe or permittee may provide alternative data. An example is if service agreements do not extend to an entire “American Indian Area” level but Census data is not available below the reservation level. In this instance, the Tribe could provide more localized data, or a Tribe could confirm that alternate publicly available data is a good proxy for the portion of the reservation receiving services.

2) Government level finances

Financial obligations of a Tribe that are shared with the local government responsible for running the permittee’s facility should be reflected in the permittee’s certified annual financial reports, local governments assessor’s office records, or other standard budgeting and accounting materials. This is similar to overlapping debt with non-Tribal local governments with service agreements (see Instructions_FCI tab in Ecology’s spreadsheet tool for additional details) and might include debt held by a Tribe for public services that are partially chargeable to the permittee’s non-Tribal government annually for their use, such as a local park or law enforcement.

We encourage permittees and Tribes to discuss and coordinate on how to report shared financial agreements. If using Ecology’s spreadsheet tool, overlapping debt shares can be itemized on the “Inputs_FCI” tab.

2.2 Notes on Project Costs

Permittees shall provide project costs at the Class 5 level of estimates as established by the Association for the Advancement of Cost Engineering International (**Inputs_RI**).

[14] To find data on Tribal geographies, navigate to https://data.census.gov/, select “All Geographies” on the left hand side pane, and then “American Indian Areas”. After selecting relevant Tribal areas, data tables can be searched for in the Census website’s search bar. See the “Census Bureau Data” table on the “Inputs Demographic” tab of Ecology’s spreadsheet tool for exact table numbers. Permittees will need to paste (hardcode) these data into Ecology’s spreadsheet because only CDPs, towns, or cities are currently available as an auto-populate features in the Census Bureau Demographic Data Generator (see Inputs_Demographic tab).

[15] If unemployment rates are not available from the BLS in Tribal areas, consider 5-year ACS data on unemployment rate for populations 16 years and over, in the civilian labor force on table DP03 for American Indian Area geographies.

3. Ecology Additions and Motivation

The following subsections describe Ecology's amendments to EPA's 2023 guidance and online FCA spreadsheet tool (as of 09/2024) in more detail. Note that these amendments are automatically incorporated into the results of Ecology's FCA spreadsheet tool in tab "Results_FCA_ECY" and require no new input or calculation on the permittee's part beyond what is already required by the EPA's original tool.

3.1 Puget Sound Regional Baselines

State level baselines for some calculations are recommended by EPA's 2023 guidance when calculating public sector impacts, as opposed to national baselines (see Section 3). It is also the only substantive statistical difference between "Alternative 1" and "Section 3" results in EPA's guidance beyond naming conventions and terminology.[16]

Ecology's guidance and spreadsheet tool makes an additional baseline distinction within the state between the Puget Sound, and other regions such as western Washington non-Puget sound, and eastern Washington. For the purposes of Ecology's FCA spreadsheet tool, the Puget Sound baseline is made up of counties defined by the University of Washington's Puget Sound Institute and the United States Geologic Survey (USGS), excluding Lewis County.[17, 18] Other state-regional baselines, such as Western Washington non-Puget Sound and Eastern Washington are available in Ecology's spreadsheet tool and may be considered for non-PSNGP applications.

[16] See Section 1(3)(b) of EPA's 2023 guidance for additional discussion.
[17] https://www.eopugetsound.org/terms/85
18 Lewis County is hydrologically linked to the Puget Sound through drainages and therefor in the watershed, however it does not contain PSNGPs which are defined as direct dischargers into the Sound. It is also absent of some economic features that characterize counties directly adjacent to the Puget sound such as ports, water views, and direct recreational access.

Figure 1. Counties in the Puget Sound Regional Baseline

Ecology’s spreadsheet tool retains Alternative 1 labeling and references throughout the calculator for consistency with other helpful portions of EPA's guidance, such as robust technical appendices describing Alternative 1 calculations and data sources. Ecology’s spreadsheet tool also provides a separate section producing all results using national baselines.

3.1.1 Household Income Baseline

Comparing service area income to broader conditions in the Puget Sound region is a practically important feature. Considering that median household income in the Puget Sound region was $102,551 in 2022 (Figure 2), or over 30% higher than the broader US ($75,149).[19] In this way, Puget Sound communities would appear arbitrarily strong against national or statewide baselines when calculating components of the FCI. But because of unique regional characteristics—chief among them a higher cost of living—results would not accurately capture local hardship.

In consultation with the EPA, and response to feedback from stakeholders during public comment, Ecology’s amended spreadsheet tool calculates relevant FCI results from the Puget Sound regional baseline (with alternative options for Western Washington Non-Puget Sound, and Eastern Washington baselines, if relevant). [20]

[19] Using 2022 ACS 5-year estimates https://data.census.gov/table?q=b19013.
[20] Regional baseline statistics are summarized from county level ACS 5-year estimates, weighted by the proportion of households each county represents in the region.

Figure 2. Median Household Income by Region

3.1.2 Lowest Quintile Poverty Indicator Baselines

The Lowest Quintile Poverty Indicator (LQPI) aids in assessing the severity and prevalence of poverty in the affected community. In EPA's original formulation, the weighted index is made up of 6 measures, which take on a 1, 2, or 3 to describe poverty conditions, mid-range, or strong (good) conditions respectively after comparing the affected community with national averages. Inputs into the LQPI (other than "Trend in Household Growth") are evaluated using a ±25% benchmark to national figures.[21] This bracketing methodology is commonly used to characterize outliers on either end of the data distribution. Using a ±25% benchmark closely aligns with the middle quintile of data for the parameter, which can characterize the "middle class."

As with concerns over household income in FCI calculation above, comparing LQPI measures in Washington to a national baseline may misrepresent local hardship. For example, the Percentage of Population with Income Below 200% of the Federal Poverty Level (FPL) in the US is 28.8% (2022 ACS 5-year estimates), while in parts of Washington State, such as the Puget Sound region, is only 20%.[22] Again, this differential does not necessarily suggest households in

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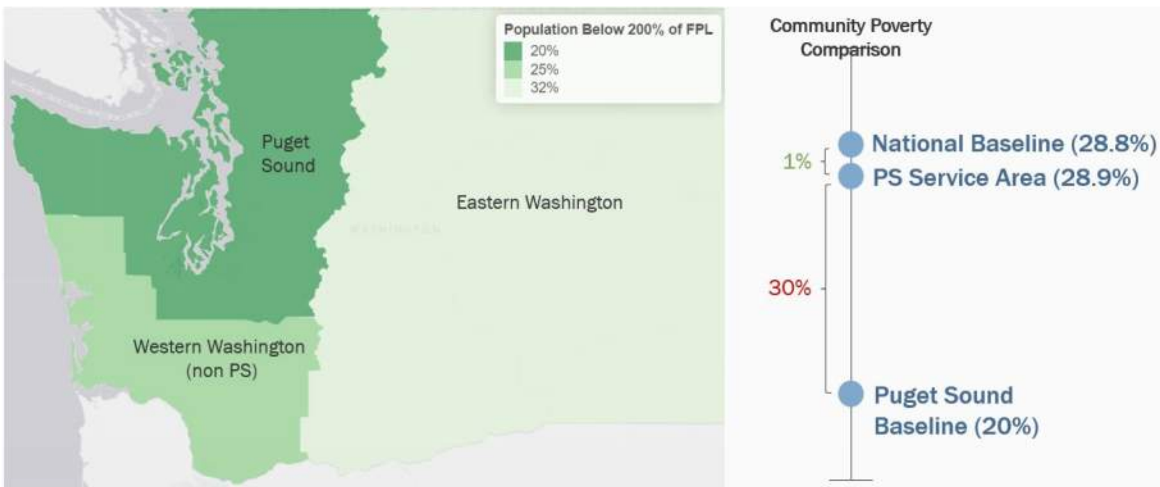
[21] Note that "Trend in Household Growth," the fifth indicator, is based on 5-year Geometric Average Growth Rates instead of quintiles. $5\ Year\ Geometric\ Growth\ Rate = (1 + (HH_n - HH_{n-5})/\ HH_{n-5})^{1/5} - 1$; where HH is the number of occupied housing units, and n is most recent Census data year. For example, if a community had 15,500 occupied housing units in the most recent census data year and had 15,000 occupied units five census data years prior, the 5-year average geometric growth rate would be 0.66% = $(1 + (15{,}500 - 15{,}000)/\ 15{,}000)^{1/5} - 1$.

[22] Table S1701 (https://data.census.gov/table/ACSST5Y2022.S1701?q=S1701&g=040XX00US53). Note that outside of Alaska and Hawaii, the threshold establishing federal poverty is the same for all states.

the Puget Sound are better off financially than other parts of the state or country. Rather, it partially reflects the cost of living in the region, the income necessary to support basic needs, and the fact the federal poverty levels are fixed for all contiguous states.

Consider a single Puget Sound community as a service area. Here, the Census reported that 28.9% of its population fell below 200% of FPL in 2022 (ACS 5-year estimate). Since that statistic is almost identical to the national average (1% lower), the service area would fall into the LQPI's "mid-range" using the standard EPA formula (Figure 3). Conversely, when compared to its state-regional peers, poverty in this community is shown to be 30% higher, and therefore would fall into the LQPI's "weak" (high poverty) category.

Figure 3. Percent of Population Below 200% of FPL and Baseline Comparison



In consultation with the EPA, and response to feedback from stakeholders during public comment, Ecology's amended spreadsheet tool calculates relevant LQPI results from the Puget Sound regional baseline (with alternative options for Western Washington Non-Puget Sound, and Eastern Washington baselines, if relevant). [23]

3.2 Impacts of Wastewater Treatment With and without Project

Capturing baseline impacts of wastewater treatment in a community is critical when comparing to the same community with the proposed project(s). Ecology's spreadsheet tool presents a side-by-side comparison simultaneously which aids permittees and Ecology in understanding the impacts of permit requirements, and their potential contribution to cumulative burden on ratepayers.

[23] Regional baseline statistics are summarized from county level ACS 5-year estimates, weighted by the proportion of households each county represents in the region.

3.3 Costs in Terms of Percent of Upper Limit of Lowest Quintile Income

While the upper limit of the lowest quintile of income (LQI) is incorporated into results through baseline comparisons in the LQPI, we calculate and report existing and new treatment costs as a percentage of LQI as a standalone statistic. This isolates additional information about impacts beyond median income households, impact disparities, and changes in disparity across treatment alternatives when compared with %MHI.

4. Assistance and Funding Sources to Consider

Ecology's water quality financial management section (FMS) provides technical assistance, in coordination with the EPA, Rural Community Assistance Corporation (RCAC), Evergreen Rural Water of Washington (ERWoW), and the Washington State Department of Commerce's Small Communities Initiative (SCI). With a single application to Water Quality Combined Fund, Ecology can identify water quality-related opportunities, that best match the financial needs of project applicants.[24] This coordinated effort offers a wide variety of resources for supporting communities in accessing funds, and identifying support for managing and implementing infrastructure improvements.[25] Particularly relevant loans and grants administered through the Combined Fund:

- Puget Sound nutrient reduction grants program. In the 2021-23 biennial budget, the state Legislature appropriated $9 million for the to help municipalities prepare and plan for future treatment facility upgrades and implement operational modifications necessary to maximize nutrient removal from existing treatment processes. Ecology is currently working on the next phase of funds in the form of a budget request for the next biennium (beginning August 2025). If funds are approved, eligible applicants are the 42 municipalities that operate the 58 wastewater treatment plants that discharge to Puget Sound and are covered by the permit.[26]
- The Clean Water State Revolving Fund (CWSRF) which provides low-interest and forgivable principal loan funding for wastewater treatment construction projects, eligible nonpoint source pollution control projects, and eligible "green" projects. Established by the federal Clean Water Act (CWA), the CWSRF is funded through an annual EPA capitalization grant, state matching funds, and principal and interest repayments on past program loans.
- Income and need based programs, including the Centennial Clean Water Program, that provides wastewater treatment construction projects for financially distressed communities.

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[24] https://ecology.wa.gov/water-shorelines/water-quality/water-quality-grants-and-loans
[25] For this permit, technical assistance can be requested by contacting Stephanie Allen (sall461@ecy.wa.gov).
[26] https://ecology.wa.gov/About-us/Payments-contracts-grants/Grants-loans/Find-a-grant-or-loan/Puget-Sound-Nutrient-Reduction[27] Active and available at the time of this writing.

In addition to State, federal technical assistance is also available, largely from the EPA.[27] These include, but are not limited to:

- EPA's Environmental Finance Centers, which deliver targeted technical assistance to local governments, states, tribes, and non-governmental organizations to protect public health, safeguard the environment, and mitigate environmental justice concerns.[28] The EFCs serve an important role in helping to ensure that communities that have difficulty in securing public funding receive the help they need to access resources to support infrastructure improvements. Requests for technical assistance can be made through EPA's Water Technical Assistance Program or by emailing WaterTA@epa.gov
- EPA's Training and Technical Assistance for Small Systems Funding provides technical assistance through national providers via grant funding to support small drinking water and wastewater systems that serve small and rural communities.[29] EPA is committed to helping communities across America upgrade and maintain water infrastructure that is essential to public health and environmental protection.
- EPA's Environmental Justice Small Grants Program, which supports and empowers communities working on solutions to local environmental and public health issues.[30] The program is designed to help communities understand and address exposure to multiple environmental harms and risks.
- EPA resources associated with the Bipartisan Infrastructure Law (BIL), including Closing America's Wastewater Access Gap Community Initiative.[31,32]

Federal and private water infrastructure funding, active and available at the time of this writing including but not limited to:

- Water Infrastructure Finance and Innovation Act (WIFIA): https://www.epa.gov/wifia
- The Environmental Justice Collaborative Problem-Solving (CPS) Cooperative Agreement Program: https://www.epa.gov/environmental-justice/environmental-justice-collaborative-problem-solving-cooperative-agreement
- Source Reduction Assistance (SRA) Grant Program: https://www.epa.gov/p2/source-reduction-assistance-grants
- CoBank's Rural Water and Wastewater Lending: https://www.cobank.com/corporate/industry/water

[27] Active and available at the time of this writing.
[28] https://www.epa.gov/waterfinancecenter/efcn
[29] https://www.epa.gov/dwcapacity/training-and-technical-assistance-small-systems-funding
[30]https://www.epa.gov/environmentaljustice/environmental-justice-small-grants-program[31] https://www.epa.gov/infrastructure
[31] https://www.epa.gov/infrastructure
[32] https://www.epa.gov/water-infrastructure/closing-americas-wastewater-access-gap

- National Rural Water Association (NRWA)'s Rural Water Loan Fund: https://nrwa.org/members/products-services-portfolio/rural-water-loan-fund/
- U.S. Department of Agriculture (USDA)'s Water and Waste Disposal Guaranteed Loan Program: https://www.rd.usda.gov/programs-services/water-waste-disposal-loan-guarantees
- USDA's Water & Environmental Programs (WEP): https://www.rd.usda.gov/programs-services/all-programs/water-environmental-programs
- USDA's Water & Wastewater Projects Revolving Fund Program: https://www.rd.usda.gov/programs-services/revolving-funds-for-financing-water-and-wastewater-projects
- USDA's Water & Waste Disposal Loan & Grant Program: https://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program
- USDA's Water & Waste Disposal Predevelopment Planning Grants: https://www.rd.usda.gov/programs-services/water-waste-disposal-predevelopment-planning-grants
- U.S. Department of Commerce – Economic Development Administration (EDA)'s funding and technical assistance: https://www.eda.gov/funding/programs
- U.S. Department of Health and Human Services – Indian Health Service (IHS)'s Sanitation Facilities Construction (SFC) Program: https://www.ihs.gov/dsfc/
- U.S. Department of Housing and Urban Development (HUD)'s Community Development Block Grant (CDBG) Program: https://www.hud.gov/program_offices/comm_planning/communitydevelopment
- HUD's Section 108 Loan Guarantee Program: https://www.hudexchange.info/programs/section-108/
- Others, including private funding, can be

Bipartisan Infrastructure Law (BIL) Resources

- Overview BIL: https://www.epa.gov/infrastructure
- Closing America's Wastewater Access Gap Community Initiative: https://www.epa.gov/water-infrastructure/closing-americas-wastewater-access-gap-community-initiative
- Bipartisan Infrastructure Law SRF Memorandum: https://www.epa.gov/dwsrf/bipartisan-infrastructure-law-srf-memorandum

- Frequent Questions about BIL State Revolving Funds: https://www.epa.gov/system/files/documents/2024-10/bil-srf-qs-and-as-10-01-2024_1.pdf

SEPA[1] Environmental Checklist

Purpose of checklist

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization, or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. **You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown.** You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to **all parts of your proposal**, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for lead agencies

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B, plus the Supplemental Sheet for Nonproject Actions (Part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in "Part B: Environmental Elements" that do not contribute meaningfully to the analysis of the proposal.

[1] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/Checklist-guidance

A.Background

Find help answering background questions[2]

1. **Name of proposed project, if applicable:**

   Rulemaking – Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington (Natural Conditions)

2. **Name of applicant:**

   Washington State Department of Ecology (Ecology), Water Quality Program

3. **Address and phone number of applicant and contact person:**

   Vince McGowan, Water Quality Program Manager

   Department of Ecology

   PO Box 47600

   Olympia, WA 98504-7600

   Marla Koberstein, Rulemaking Lead

   swqs@ecy.wa.gov

   360-628-6376

4. **Date checklist prepared:**

   March 28, 2024

5. **Agency requesting checklist:**

   N/A – Nonproject SEPA for rulemaking

6. **Proposed timing of schedule (including phasing, if applicable):**

September 27, 2022	Announce start of rulemaking (file CR-101)
May 9, 2024	Propose formal draft rule (file CR-102)
July 12, 2024	End public comment period
Fall 2024	Make decision on rule adoption (file CR-103)

7. **Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.**

   No.

8. **List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.**

[2] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-A-Background

Supporting documents for the proposed rule can be found on the rulemaking webpage[3] and includes:

- Draft Technical Support Document
- Preliminary Regulatory Analysis
- Draft Rule Implementation Plan
- Citation List

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No.

10. List any government approvals or permits that will be needed for your proposal, if known.

The U.S. Environmental Protection Agency must approve any state water quality standards that have been adopted before they can be used for Clean Water Act purposes.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

Ecology is proposing revisions to chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington. We are proposing the following revisions in this rulemaking:

- WAC 173-201A-020, Definitions: adding a definition for a performance-based approach method and adding a definition for local and regional sources of human-caused pollution.
- WAC 173-201A-200(1)(c), Aquatic life temperature criteria, subsection (i): updating the allowable insignificant changes to freshwater temperature criteria when natural conditions are the applicable criteria.
- WAC 173-201A-200(1)(d), Aquatic life dissolved oxygen (D.O.) criteria, subsection (i): updating the allowable insignificant changes to freshwater dissolved oxygen criteria when natural conditions are the applicable criteria.
- WAC 173-201A-210(1)(c), Aquatic life temperature criteria, subsection (i) updating the allowable insignificant changes to marine water temperature when natural conditions are the applicable criteria.
- WAC 173-201A-210(1)(d), Aquatic life dissolved oxygen (D.O.), subsection (i): updating the allowable insignificant changes to marine water dissolved oxygen when natural conditions are the applicable criteria.

[3] https://ecology.wa.gov/regulations-permits/laws-rules-rulemaking/rulemaking/wac-173-201a-natural-conditions

- WAC 173-201A-260(1), Natural and irreversible human conditions: updating the natural conditions criteria language and describing methods for determining natural conditions criteria values.
- WAC 173-201A-430(2), Site-specific criteria: updating how analyses must be conducted.
- WAC 173-201A-470, Performance-based approach: adding this new section to describe and reference the methodology to determine natural conditions criteria values.
- Ecology publication 24-10-017, A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington, a separate rule document that provides the methodology to determine natural conditions criteria values.
- Minor non-substantive edits to rule language in WAC 173-201A-430(2) to reflect the latest version of referenced documents.

We are proposing revisions to natural conditions provisions in our surface water quality standards to provide water quality protection for aquatic life organisms and to establish possible methods for deriving those protective values. As part of this rule proposal, we:

- Evaluated the latest scientific data, methods, modeling tools, and approaches to update the natural conditions provisions necessary for refining aquatic life protection.
- Considered the U.S. Environmental Protection Agency's recommend approaches for natural conditions in water quality standards, including a performance-based approach for determining protective natural conditions criteria.
- Considered the U.S. Environmental Protection Agency's draft, deliberative, and Washington-specific recommendations for the performance-based approach methodology.

12. **Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.**

The proposed revisions to the water quality standards will apply to all waterbodies in the state of Washington. In addition, some of the proposed revisions can be applied on a site-by-site basis when the underlying requirements are met.

B.Environmental Elements

This is a nonproject SEPA that involves a rulemaking for the Washington State surface water quality standards. The rulemaking, if concluded, will revise natural conditions provisions for the protection of aquatic species. The environmental elements are not applicable because the rulemaking action being considered will not result in any physical changes to any waters of the state where the new rules will apply.

C.Signature

Find help about who should sign[4]

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

5/1/2024

X Kalman Bugica

Signed by: Bugica, Kalman (ECY)

Type name of signee: Kalman Bugica

Position and agency/organization: Water Quality Standards, Washington State Department of Ecology.

Date submitted: May 10, 2024

D.Supplemental sheet for nonproject actions

Find help for the nonproject actions worksheet[5]

Do not use this section for project actions.

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. **How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?**

   The proposal will not increase any of the above-mentioned environmental impacts. The rulemaking proposal will not cause or result in any physical changes to any water of the state where the new rules will apply.

[4] https://ecology.wa.gov/Regulations-Permits/SEPA/Environmental-review/SEPA-guidance/SEPA-checklist-guidance/SEPA-Checklist-Section-C-Signature

[5] https://ecology.wa.gov/regulations-permits/sepa/environmental-review/sepa-guidance/sepa-checklist-guidance/sepa-checklist-section-d-non-project-actions

- **Proposed measures to avoid or reduce such increases are:**

Not applicable.

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

The proposal will not adversely affect plants, animals, fish, or marine life. The proposal is intended to provide water quality and habitat protection for all aquatic life.

The protection is reflected by revising natural conditions provisions, which recognize that conditions in some surface waters during some seasons and in some areas naturally do not meet biologically based numeric criteria. For example, a naturally low-flowing stream in a natural prairie without any human alteration or human-caused pollution may have seasonally higher temperatures than the limit set to protect fish. These inconsistencies may be due to natural processes or seasonal conditions that prevent a waterbody from meeting the applicable aquatic life criteria. Our proposed revisions refine the natural conditions provisions to protect characteristics inherent and unique to a specific water.

- **Proposed measures to protect or conserve plants, animals, fish, or marine life are:**

No additional measures are needed as a result of this rulemaking. The proposed rule revisions are designed to provide protection for endangered species and their populations. These protections align with EPA policy for protecting aquatic life using the natural condition of a water.

3. How would the proposal be likely to deplete energy or natural resources?

The proposal will not deplete energy or natural resources.

- **Proposed measures to protect or conserve energy and natural resources are:**

Not applicable.

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection, such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Not applicable.

- **Proposed measures to protect such resources or to avoid or reduce impacts are:**

Not applicable.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Not applicable.

- **Proposed measures to avoid or reduce shoreline and land use impacts are:**

Not applicable.

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

The proposal will not result in increased demands on transportation or public services and utilities.

- **Proposed measures to reduce or respond to such demand(s) are:**

Not applicable.

7. **Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.**

The proposal will not conflict with local, state, or federal laws or requirements since the Washington State Department of Ecology is the sole agency responsible for developing water quality standards under the Federal Clean Water Act. The final rule, once adopted, will need to receive federal approval from the U.S. Environmental Protection Agency before it can be used for Clean Water Act purposes.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101

WATER
DIVISION

November 19, 2021

Mr. Vince McGowan
Water Quality Program Manager
Washington State Department of Ecology
PO Box 47600
Olympia, Washington 98504-7600

Re: EPA's Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions

Dear Mr. McGowan:

The U.S. Environmental Protection Agency (EPA) has completed the review and reconsideration of Washington's natural conditions provisions (WAC 173-201A-200(1)(c)(i), 173-201A-210(1)(c)(i), 173-201A-200(1)(c)(v), 173-201A-200(1)(d)(i), 173-201A-210(1)(d)(i), 173-201A-200(1)(d)(ii), and 173-201A-260(1)(a)), which were submitted to EPA by the Washington Department of Ecology in 2003 and 2006. Under section 303(c) of the Clean Water Act (CWA), 33 U.S.C. § 1313(c), states must submit new and revised water quality standards to EPA for review and action, and EPA approves those water quality standards if they meet the requirements of the CWA and EPA's implementing regulations. EPA's review and reconsideration is outlined below and further described in the enclosed Technical Support Document.

As you are aware, on February 10, 2014, the Northwest Environmental Advocates filed a complaint in U.S. District Court for the Western District of Washington (Case No. 2:14-cv-0196-RSM) challenging, in part, EPA's February 11, 2008 CWA section 303(c) approval of the natural conditions provisions identified above. On October 17, 2018, the Court issued an Order Granting a Stay (Dkt. 95) pending EPA's reconsideration of its prior determinations. The Court subsequently granted an extension for EPA to complete its reconsideration by November 19, 2021 (Dkt. 118).

EPA's CWA section 303(c) action applies only to waters in the State of Washington and does not apply to waters that are within Indian Country, as defined in 18 U.S.C. § 1151. Nothing in the enclosed decision document shall constitute an approval or disapproval of a water quality standard that applies to waters within Indian Country. EPA, or authorized Indian Tribes, as appropriate, will retain responsibilities for water quality standards for waters within Indian Country.

Summary of EPA's Action

EPA has completed its reconsideration, as contemplated by the Court's Order, and is not changing its February 11, 2008 approval of the revisions to the following sections of WAC Chapter 173-201A.

- WAC 173-201A-200(1)(c)(v): Natural condition narrative aquatic life temperature criteria for lakes

- WAC 173-201A-200(1)(d)(ii): Natural condition narrative aquatic life dissolved oxygen criteria for lakes

Because EPA is not changing its earlier approval, it is taking no new action with respect to those provisions.

EPA has completed its reconsideration, as contemplated by the Court's Order, and is disapproving revisions to the following sections of WAC Chapter 173-201A pursuant to its authority under section 303(c)(3) of the CWA, 33 U.S.C. § 1313(c)(3), and 40 CFR Part 131:

- WAC 173-201A-260(1)(a): Natural and irreversible human conditions
- WAC 173-201A-200(1)(c)(i) and WAC 173-201A-210(1)(c)(i): Allowable human contribution to natural conditions provisions for aquatic life temperature (fresh water and marine water, respectively)
- WAC 173-201A-200(1)(d)(i) and WAC 173-201A-210(1)(d)(i): Allowable human contribution to natural conditions provisions for aquatic life dissolved oxygen (fresh water and marine water, respectively)

EPA appreciates Ecology's commitment and ongoing work to update Washington's water quality standards. We also appreciate the collaboration by your staff to address the complexities associated with criteria revisions. If you have any questions regarding this letter, please contact me at (206) 553-1855 or Lindsay Guzzo, EPA staff lead, at (206) 553-0268 or Guzzo.Lindsay@epa.gov.

Sincerely,

DANIEL OPALSKI

Digitally signed by DANIEL OPALSKI
Date: 2021.11.19 09:38:35 -08'00'

Daniel D. Opalski
Director

Enclosure: Technical Support Document

cc (e-Copy): Ms. Melissa Gildersleeve, Water Quality Management Section Manager, Ecology
Mr. Chad Brown, Water Quality Management Unit Supervisor, Ecology

Technical Support Document

EPA's Clean Water Act Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions

November 19, 2021

I. Clean Water Act Requirements for Water Quality Standards

The objective of the Clean Water Act (CWA) is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters with an interim goal, where attainable, to achieve water quality that provides for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water. Under section 303(c) of the CWA and federal implementing regulations at 40 CFR § 131.4, states (and authorized tribes) have the primary responsibility for reviewing, establishing, and revising water quality standards (WQS). These standards include the designated uses of a waterbody or waterbody segment, the water quality criteria that protect those designated uses, and an antidegradation policy. This statutory and regulatory framework allows states to work with local communities to adopt appropriate designated uses (as required at 40 CFR § 131.10(a)) and to adopt criteria to protect those designated uses (as required at 40 CFR § 131.11(a)).

States are required to hold public hearings for the purpose of reviewing applicable WQS periodically but at least once every three years and, as appropriate, modify and adopt these standards (40 CFR § 131.20). Each state must follow applicable legal procedures for revising or adopting such standards (40 CFR § 131.5(a)(6)) and submit certification by the state's attorney general, or other appropriate legal authority within the state, that the WQS were duly adopted pursuant to state law (40 CFR §131.6(e)). The U.S. Environmental Protection Agency's (EPA) review authority and the minimum requirements for state WQS submittals are described at 40 CFR § 131.5 and 131.6, respectively.

States are required by 40 CFR § 131.11(a) to adopt water quality criteria that protect their designated uses. In adopting such criteria, states should establish numeric values based on one of the following:

(1) CWA section 304(a) guidance;
(2) CWA section 304(a) guidance modified to reflect site-specific conditions; or,
(3) Other scientifically defensible methods (40 CFR § 131.11(b)(1)).

In addition, states should establish narrative criteria where numeric criteria cannot be established or to supplement numeric criteria (see 40 CFR § 131.11(b)(2)).

Section 303(c) of the CWA requires states to submit new or revised WQS to EPA for review and action. EPA reviews these changes and approves the WQS if they meet the requirements of the CWA and EPA's implementing regulations.

EPA considers four questions (described below) when evaluating whether a particular provision is a new or revised WQS. If all four questions are answered "yes" then the provision would likely constitute a new or revised WQS that EPA has the authority and duty to approve or disapprove under CWA § 303(c)(3).[1]

1. Is it a legally binding provision adopted or established pursuant to state or tribal law?
2. Does the provision address designated uses, water quality criteria (narrative or numeric) to protect designated uses, and/or antidegradation requirements for waters of the United States?

[1] *What is a New or Revised Water Quality Standard under 303(c)(3)? Frequently Asked Questions*, EPA No. 820F12017 (Oct. 2012). Available at https://www.epa.gov/sites/production/files/2014-11/documents/cwa303faq.pdf

3. Does the provision express or establish the desired condition (e.g., uses, criteria) or instream level of protection (e.g., antidegradation requirements) for waters of the United States immediately or mandate how it will be expressed or established for such waters in the future?
4. Does the provision establish a new WQS or revise an existing WQS?

If EPA approves a state's WQS submission, such standard(s) shall thereafter be the applicable standard for CWA purposes. When EPA disapproves a state's WQS, EPA shall notify the state and specify why the WQS is not in compliance with the requirements of the CWA and federal WQS regulations and specify any changes that are needed to meet such requirements (33 U.S.C. § 1313(c)(3); 40 CFR § 131.21).

Finally, EPA considers non-substantive edits to existing WQS to constitute new or revised WQS that EPA has the authority to approve or disapprove under § 303(c)(3). While such edits and changes do not substantively change the meaning or intent of the existing WQS, EPA believes it is reasonable to treat such edits and changes in this manner to ensure public transparency as to which provisions are applicable for purposes of the CWA. EPA notes that the scope of its review and action on non-substantive edits or editorial changes extends only to the edits or changes themselves. EPA does not re-open or reconsider the underlying WQS that are the subject of the non-substantive edits or editorial changes.

II. Background

On February 10, 2014, the Northwest Environmental Advocates filed a complaint in U.S. District Court for the Western District of Washington (Case No. 2:14-cv-0196-RSM) challenging, in part, EPA's February 11, 2008 CWA section 303(c) approval of the natural conditions provisions. On October 17, 2018, the Court issued an Order Granting a Stay (Dkt. 95) pending EPA's reconsideration of its prior determinations. The Order noted that EPA may complete its reconsideration by October 17, 2021, by making approval or disapproval decisions, or a final determination that such provisions are not water quality standards. The Court subsequently granted an extension for EPA to complete its reconsideration by November 19, 2021 (Dkt. 118).

This Technical Support Document constitutes EPA's reconsideration of the remaining provisions subject to the Court Order. EPA previously completed its review and reconsideration of the other provisions in actions dated April 30, 2019, October 13, 2020, and September 30, 2021.

III. Results of EPA's Reconsideration

In its February 11, 2008 action, EPA approved the revised natural conditions provisions at:

- WAC 173-201A-200(1)(c)(i) and WAC 173-201A-210(1)(c)(i): Allowable human contribution to natural conditions provisions for aquatic life temperature (fresh water and marine water, respectively);
- WAC 173-201A-200(1)(c)(v): Natural condition narrative aquatic life temperature criteria for lakes;
- WAC 173-201A-200(1)(d)(i) and WAC 173-201A-210(1)(d)(i): Allowable human contribution to natural conditions provisions for aquatic life dissolved oxygen (for fresh water and marine water, respectively);

- WAC 173-201A-200(1)(d)(ii): Natural condition narrative aquatic life dissolved oxygen criteria for lakes; and
- WAC 173-201A-260(1)(a): Natural and Irreversible Human Conditions.

Upon reconsideration, EPA is not changing and taking no action with respect to the February 11, 2008 approval of the provisions at WAC 173-201A-200(1)(c)(v) and WAC 173-201A-200(1)(d)(ii). EPA is disapproving the provisions at WAC 173-201A-200(1)(c)(i), WAC 173-201A-210(1)(c)(i), WAC 173-201A-200(1)(d)(i), WAC 173-201A-210(1)(d)(i), and WAC 173-201A-260(1)(a).

EPA's CWA section 303(c) action and the associated rationales are provided below. Today's action applies only to waters within the jurisdiction of the State of Washington and does not apply to waters that are within Indian Country, as defined in 18 U.S.C. § 1151. Nothing in this decision document shall constitute an approval or disapproval of a WQS that applies to waters within Indian Country. EPA, or authorized Indian Tribes, as appropriate, retain the authority to establish WQS for waters within Indian Country.

1. Natural Conditions Narrative Criteria For Lakes

In its February 11, 2008 action, EPA approved the revised temperature and dissolved oxygen natural conditions narrative criteria for lakes at WAC 173-201A-200(1)(c)(v) and WAC 173-201A-200(1)(d)(ii), respectively. More detail and information regarding EPA's action can be found in the 2008 decision document.[2]

The underlined text indicates the new and/or revised language from Ecology's 2006 WQS submittal, and strikeout text indicates Ecology's previous text, which had been replaced by the new or revised text.

Aquatic life temperature criteria for lakes

> **WAC 173-201A-200(1)(c)(v):** For lakes, human actions considered cumulatively may not increase the 7-DADMax temperature more than 0.3°C (0.54°F) above natural conditions. ~~Temperature - no measurable change from natural conditions.~~

Aquatic life dissolved oxygen criteria for lakes

> **WAC 173- 201A-200(1)(d)(ii):** For lakes, human actions considered cumulatively may not decrease the dissolved oxygen concentration more than 0.2 mg/L below natural conditions. ~~Dissolved oxygen - no measurable decrease from natural conditions.~~

EPA's Reconsideration: EPA has completed its reconsideration and is taking no action with respect to its February 11, 2008 approval of the revisions at WAC 173-201A-200(1)(c)(v) and WAC 173-201A-200(1)(d)(ii).

EPA Rationale for the 2008 approval:
In 2006, Ecology submitted revisions to the temperature and dissolved oxygen aquatic life criteria for lakes. The revisions clarified and quantified the previous criteria of "no measurable change from natural

[2] February 11, 2008. Letter from Michael F. Gearheard, Director, Office of Water & Watersheds, EPA Region 10, to David C. Peeler, Program Manager, Department of Ecology, re: EPA Approval of the 2003/2006 Revisions to the Washington Water Quality Standards Regulations. Available at: https://www.epa.gov/sites/production/files/2017-10/documents/wawqs-letter-02112008.pdf

conditions" (for temperature) and "no measurable decrease from natural conditions" (for dissolved oxygen) by identifying a 0.3ºC increase in temperature and a 0.2 mg/L decrease in dissolved oxygen as what would constitute a "measurable" departure from natural conditions. For temperature, the revision also added a 7-DADMax metric to the criterion.

In the February 11, 2008, Technical Support Document, EPA concluded that a 0.3ºC increase in temperature from natural conditions was insignificant and well within the range of uncertainty of the thermal requirements for salmon, which is approximately +/- 0.5ºC. EPA also noted that 0.3ºC was consistent with reliable field detection levels for temperature and is therefore considered within the error band associated with typical temperature monitors (pp. 27-28). The revised temperature criterion also added the 7-DADMax metric recommended for temperature standards by the *Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (EPA910-B-03-002, April 2003, hereinafter referred to as "Temperature Guidance") and that EPA determined to be scientifically defensible (p.4). EPA's 2008 approval, therefore, concluded that Washington's revisions to the aquatic life temperature criterion for lakes were protective of designated uses and scientifically defensible.

In assessing Washington's revisions to the dissolved oxygen criterion for lakes, EPA similarly concluded that a 0.2 mg/L decrease from natural conditions was insignificant. The 2008 approval rationale explained that an allowable decrease of 0.2 mg/L is within the monitoring measurement error for recording instruments typically used to monitor dissolved oxygen. EPA also explained that numerous factors impact oxygen levels in lakes and without at least some allowance for insignificant decreases a natural conditions criterion for dissolved oxygen in lakes would be unnecessarily restrictive for the protection of designated uses (p. 32). EPA's 2008 approval, therefore, concluded that Washington's revisions to the aquatic life dissolved oxygen criterion for lakes was protective of designated uses and scientifically defensible.

The narrative criteria are the applicable temperature and dissolved oxygen criteria for lakes in Washington, and leaving in place EPA's 2008 approval of these criteria ensures that aquatic life criteria for temperature and dissolved oxygen in lakes remain in effect for CWA purposes.

2. Natural and Irreversible Human Conditions

In its February 11, 2008 action, EPA approved the new narrative natural conditions provision at WAC 173-201A-260(1)(a) and took no action on the irreversible human conditions provision at WAC 173-201A-260(1)(b) after concluding the provision is not a WQS that EPA has the authority to approve or disapprove under section 303(c) of the CWA. More detail and information regarding EPA's action can be found in the 2008 decision document.[3]

With respect to WAC 173-201A-260(1)(a), EPA's 2008 decision stated that it is acceptable, under certain circumstances, for water quality criteria to reflect the natural condition of a water body as an alternative to the generally applicable numeric criteria. The rationale for this was that Washington's designated uses were supported by the water in its natural condition, prior to any human effects on water quality.

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[3] February 11, 2008. Letter from Michael F. Gearheard, Director, Office of Water & Watersheds, EPA Region 10, to David C. Peeler, Program Manager, Department of Ecology, re: EPA Approval of the 2003/2006 Revisions to the Washington Water Quality Standards Regulations. Available at: https://www.epa.gov/sites/production/files/2017-10/documents/wawqs-letter-02112008.pdf

The text of the provision first appeared in a 2003 water quality standards submittal to EPA and again in a 2006 submittal and is excerpted below.

> **WAC 173-201A-260(1):** Natural and irreversible human conditions.
> (a) It is recognized that portions of many water bodies cannot meet the assigned criteria due to the natural conditions of the water body. When a water body does not meet its assigned criteria due to natural climatic or landscape attributes, the natural conditions constitute the water quality criteria.

EPA's Reconsideration: EPA has completed its reconsideration and in accordance with its CWA authority, 33 U.S.C. § 1313(c)(3) and 40 CFR Part 131, disapproves the provision at WAC 173-201A-260(1)(a).

EPA Rationale: The natural conditions narrative provision at WAC 173-201A-260(1)(a) is broadly drafted and does not specify the types of criteria or pollutants to which it applies. On reconsideration, EPA concludes that as written this provision could be applied to a wide range of naturally occuring pollutants, including toxic pollutants, and could even allow an exception from otherwise applicable numeric human health criteria. Therefore, it is not consistent with EPA's interpretation of the relationship between natural conditions and the protection of designated human health uses, which is articulated in EPA's November 5, 1997 policy guidance entitled ''Establishing Site Specific Aquatic Life Criteria Equal to Natural Background.''[4] EPA's 2008 decision document cited to the 1997 policy guidance, as well as to language in an Advance Notice of Proposed Rulemaking for the Water Quality Standards program (*see* 63 Fed. Reg. 36,724, 36761 (Jul. 7, 1998)), as setting forth the relevant policy considerations for establishing water quality criteria based on natural conditions. However, what EPA failed to appropriately consider in its 2008 decision is that these documents only addressed the establishment of aquatic life criteria for pollutants at levels equal to the natural background condition, and expressly did not apply to human health uses, whereas the provision at WAC 173-201A-260(1)(a) is not similarly limited in scope to aquatic life uses or to specific pollutants.

In contrast with aquatic life uses, a naturally occurring level of a pollutant does not necessarily protect designated human health uses. Naturally occurring levels of a pollutant are assumed to protect aquatic life species that have naturally developed in the affected waters. However, humans generally do not adapt to higher ambient pollutant levels, even if they are naturally caused. Consequently, the same assumptions of protectiveness cannot be made with regard to designated uses that affect human health (*e.g.,* people eating fish or shellfish from Washington waters, and recreating in Washington waters). For this reason, EPA's 1997 guidance also states that where the natural background concentration exceeds the state-adopted human health criterion, at a minimum, states should re-evaluate the human health use designation.[5]

No Changes Necessary to Address the Disapproval: The effect of EPA's disapproval is that, as of the date of this action, the provision at WAC 173-210A-260(1)(a) is no longer an applicable WQS for CWA purposes. Because Washington's WQS currently include applicable numeric criteria that EPA determined to be protective of designated uses, no changes to Washington's WQS are necessary to meet the requirements of the CWA. Therefore, EPA is not specifying any changes that Washington must

[4] Davies, Tudor T., *Establishing Site Specific Aquatic Life Criteria Equal to Natural Background,* EPA Memorandum to Water Management Division Directors, Regions 1–10, State and Tribal Water Quality Management Program Directors, posted at: *https://www.epa.gov/sites/default/files/2014-08/documents/naturalbackground-memo.pdf*
[5] *Id.* at p. 2.

adopt to meet CWA requirements. EPA provides the following discretionary recommendations for the State's consideration.

EPA understands that WAC 173-201A-260(1)(a) was developed in parallel with numeric aquatic life criteria for marine and fresh waters, and that Washington intended to rely on the natural condition narrative to address circumstances where waterbody conditions are naturally less stringent than the adopted biologically-based numeric aquatic life criteria. In this respect the availability of a criterion that accounts for less stringent natural conditions was an important consideration in the establishment of numeric criteria for aquatic life. EPA continues to believe that appropriately drafted natural condition provisions can serve an important role in state WQS by reflecting a naturally occuring spatial and temporal variability in water quality that is protective of uses. A new general natural condition provision that is narrowly tailored to aquatic life uses could be adopted as a narrative criterion where numerical criteria cannot be established or to supplement numerical criteria (40 C.F.R. § 131.11(b)(2)). Alternatively, the adoption of a performance-based approach could be used to establish aquatic life criteria reflecting a natural condition for specific pollutants (see discussion for temperature and dissolved oxygen below).

EPA recommends removing the current WAC 173-201A-260(1)(a) from the State's WQS regulations to avoid confusion and provide greater clarity as to what is in effect for CWA purposes.

3. Allowable Human Contribution to Natural Conditions Provisions for Aquatic Life Temperature and Dissolved Oxygen Criteria For Fresh and Marine Waters

In its February 11, 2008 action, EPA approved the new and revised natural conditions provisions for temperature in fresh and marine waters at WAC 173-201A-200(1)(c)(i) and WAC 173-201A-210(1)(c)(i), respectively; and for dissolved oxygen in fresh and marine waters at WAC 173-201A-200(1)(d)(i) and WAC 173-201A-210(1)(d)(i), respectively. More detail and information regarding EPA's action can be found in the 2008 decision document.[6]

In the 2008 approval, EPA determined that insignificant temperature increases or insignificant decreases of dissolved oxygen concentrations above or below the natural condition were protective of the applicable designated uses because such insignificant departures from the natural condition were within the range of scientific uncertainty of effects on designated uses and/or within the error band associated with typical monitoring equipment. Specific to temperature, these "de minimis" allowable human-caused increases above natural conditions are consistent with the Temperature Guidance.[7]

The texts of each of the provisions are excerpted below.

Allowable human contribution to natural conditions provisions for aquatic life temperature:

> **Freshwater, WAC 173-201A-200(1)(c)(i):** When a water body's temperature is warmer than the criteria in Table 200 (1)(c) (or within 0.3°C (0.54°F) of the criteria) and that condition is due to

[6] February 11, 2008. Letter from Michael F. Gearheard, Director, Office of Water & Watersheds, EPA Region 10, to David C. Peeler, Program Manager, Department of Ecology, re: EPA Approval of the 2003/2006 Revisions to the Washington Water Quality Standards Regulations. Available at: https://www.epa.gov/sites/production/files/2017-10/documents/wawqs-letter-02112008.pdf

[7] EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards. EPA-910-B-03-002. April 2003. Available at https://nepis.epa.gov/Exe/ZyPDF.cgi/P1004IUI.PDF?Dockey=P1004IUI.PDF

natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F).

> **Marine water, WAC 173-201A-210(1)(c)(i):** When a water body's temperature is warmer than the criteria in Table 210 (1)(c) (or within 0.3°C (0.54°F) of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F).

Allowable human contribution to natural conditions provisions for aquatic life dissolved oxygen:

> **Freshwater, WAC 173- 201A-200(1)(d)(i):** When a water body's D.O. is lower than the criteria in Table 200 (1)(d) (or within 0.2 mg/L of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the D.O. of that water body to decrease more than 0.2 mg/L.

> **Marine water, WAC 173-201A-210(1)(d)(i):** When a water body's D.O. is lower than the criteria in Table 210 (1)(d) (or within 0.2 mg/L of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the D.O. of that water body to decrease more than 0.2 mg/L.

EPA's Reconsideration: EPA has completed its reconsideration and in accordance with its CWA authority, 33 U.S.C. § 1313(c)(3) and 40 CFR Part 131, disapproves the provisions at WAC 173-201A-200(1)(c)(i), WAC 173-201A-210(1)(c)(i), WAC 173-201A-200(1)(d)(i) and WAC 173-201A-210(1)(d)(i).

EPA Rationale:
The allowable human contribution to natural condition provisions for temperature (WAC 173-201A-200(1)(c)(i) and 210(1)(c)(i)) and disolved oxygen (WAC 173-201A-200(1)(d)(i) and 210(1)(d)(i)) allow for human actions considered cumulatively to cause insignificant increases in temperature (0.3ºC) or decreases in dissolved oxygen (0.2mg/L) from the natural condition of the waterbody. As discussed above, EPA is disapproving the provision at WAC 173-201A-260(1)(a) that allows for the natural condition of a waterbody to constitute the applicable criteria when the natural condition is less stringent than otherwise applicable numeric criteria.[8] Absent an approved WQS that allows for the natural condition to constitute the applicable water quality criteria, the applicable criteria for temperature and dissolved oxygen in Washington waters are the numeric criteria in Tables 200(1)(c) and (1)(d) and 210(1)(c) and (1)(d). However, the temperature and dissolved oxygen natural condition provisions are based on the natural condition of the waterbody; the provisions do not authorize human actions to cause insignificant exceedances to the applicable numeric criteria. EPA is therefore disapproving the temperature and dissolved oxygen provisions that allow insignificant human impacts to the natural condition because such impacts are not tied to approved criteria that are in effect under the CWA.

No Changes Necessary to Address the Disapproval: The effect of EPA's disapproval is that, as of the date of this action, the provisions at WAC 173-201A-200(1)(c)(i), WAC 173-201A-210(1)(c)(i), WAC 173-201A-200(1)(d)(i), and WAC 173-201A-210(1)(d)(i) are no longer applicable WQS for CWA purposes. Because Washington's WQS currently include applicable biologically-based numeric criteria

[8] EPA's interpretation of WAC 173-201A-260(1)(a) is consistent with Ecology's January 29, 2016 letter in which it stated "[t]he rule makes it clear that where Ecology identifies a natural condition that is less stringent than the numeric criteria in the state's water quality standards, the natural condition supersedes the numeric criteria." Letter from David C. Peeler, Water Quality Program Manager, Ecology, to Michael Gearheard, EPA Region 10, Re: Ecology Responses to USEPA Region 10 Questions Regarding Washington's 2003 Adopted Water Quality Standards, p. 2.

for temperature and dissolved oxygen that EPA determined to be protective of designated uses, no changes to Washington's WQS are necessary to meet the requirements of the CWA. Therefore, EPA is not specifying any changes that Washington must adopt to meet CWA requirements. EPA provides the following discretionary recommendations for the State's consideration.

Washington, at its discretion, could adopt new natural conditions criteria specific to temperature and/or dissolved oxygen. One possibility would be for Washington to adopt into its WQS a performance-based approach for establishing temperature and/or dissolved oxygen criteria representative of the natural condition of a waterbody. A performance-based approach is a binding methodology that provides a transparent, predictable, repeatable, and scientifically defensible procedure to derive numeric criteria or to translate a narrative criterion into quantifiable measures that are protective of designated uses. The performance-based approach relies on the adoption of a systematic process (i.e., a criterion derivation methodology) rather than a specific outcome (i.e., concentration limit for a pollutant) consistent with 40 CFR Sections 131.11 and 131.13. When such a performance-based approach is sufficiently detailed and has suitable safeguards to ensure predictable, repeatable outcomes, EPA approval of such an approach also serves as approval of the outcomes as well. *See EPA Review and Approval of State Water Quality Standards*, 65 FR 24,641, 24,649 (Apr. 27, 2000).

A second possibility would be for Washington to adopt numeric temperature and dissolved oxygen criteria that account for natural conditions using the best available relevant data. EPA encourages Washington to consider magnitude, frequency, and duration components in setting water quality criteria to protect against acute and chronic effects.[9] This may include establishing protective site-specific criteria accounting for specific characteristics, such as unique temperature and/or dissolved oxygen regimes in different waterbodies (see EPA's Temperature Guidance).[10] Site-specific criteria established in this manner would be subject to CWA section 303(c) review.

Washington, at its discretion, could also choose to adopt new WQS provisions that allow for human actions, considered cumulatively, to cause insignificant exceedances in temperature and dissolved oxygen. As articulated in the 2008 Technical Support Document, EPA believes insignificant or de minimis exceedances to applicable temperature and/or dissolved oxygen criteria caused by human actions, considered cumulatively, may still be protective of designated uses.[11] Any such human use allowance provision must be scientifically defensible and tied to approved criteria that are protective of designated uses, which could include criteria based on the natural condition of the waterbody.

EPA recommends removing the disapproved provisions from the State's WQS regulations to avoid confusion and provide greater clarity to what is in effect for CWA purposes.

[9] EPA Water Quality Standards Handbook – Chapter 3: Water Quality Criteria. EPA-823—B-17-001; 2017. Available at https://www.epa.gov/sites/production/files/2014-10/documents/handbook-chapter3.pdf

[10] EPA Issue Paper 3: Spatial and Temporal Patterns of Stream Temperature (Revised), October 2001. EPA-910-D-01-003, pages 2-9. Available at https://www.epa.gov/sites/production/files/2018-01/documents/r10-water-quality-temperature-issue-paper3-2001.pdf

[11] 2008 TSD at pp. 20-21, 32.

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Opinion on Puget Sound Nutrient Source Reduction Project Dissolved Oxygen Modeling and Bounding Scenarios (Ahmed et al. 2019)

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The Salish Sea Model is being used by Washington Department of Ecology to predict dissolved oxygen (DO) throughout the Salish Sea at multiple depths to assess whether any areas are out of compliance with the Washington Water Quality Standard of 0.2 mg/L decrease in dissolved oxygen due to human activities. Results of initial bounding scenarios are presented in Ahmed et al. 2019[i], where existing dissolved oxygen concentration (with human influence) were modeled for 2006, 2008, and 2014. Assumed "reference" conditions (conditions without human impact) for each year were also modeled where watershed and marine source nitrogen and carbon loads were set to an estimated natural level. The report concludes that regional nutrient contributions from humans exacerbate low DO causing approximately 20% (19%–23%) of the greater Puget Sound (by surface area) to fall below the dissolved oxygen standards (pg. 62). The opinions expressed below are based on our reading of this report and two subsequent conversations between Holtgrieve and Washington Department of Ecology staff about the modeling process (hereafter, Ecology).

Our overall concern is that the inappropriate treatment of uncertainty in the analysis, and the minimal effort to communicate that uncertainty, leads to a general overconfidence that nutrients are in fact a meaningful problem in the Puget Sound. A proper uncertainty assessment will decrease the surface area of Puget Sound considered out of compliance substantially (visually estimated to be a more than 80% reduction). Washington Department of Ecology, in essence, assumes their model is a perfect understanding of dissolved oxygen in Puget Sound. In fact, we know the model does not represent *in situ* dissolved oxygen conditions well enough to determine if a particular point on the map is not in compliance at the level of certainty expressed in the report (0.030–0.049 mg/L, page 59). All models have uncertainty, including uncertainty about the model itself, uncertainty in the parameters, and uncertainty in the data used to calibrate the model. This fundamental fact dictates that environmental modeling in support of decision-making must accurately and transparently incorporate uncertainty into analyses and policy documents.[ii] To make effective decisions, you must know not only the best scientific estimate of what is happening but also the chance of being wrong, which in this case is quite high. The information provided by Ahmed et al. 2019 falls well short of what can be considered appropriate treatment of uncertainty in environmental decision-making.[iii]

In establishing whether or not a location in Puget Sound at a given time is in compliance, there are two tests, conducted in series, and the site is considered out of compliance if both answers are affirmative:

1) Is the reference condition model prediction of dissolved oxygen below a threshold? The threshold is from 4 to 7 mg/L, varying by location.[iv]
2) Is the difference of existing and reference dissolved oxygen ≥ 0.2 mg/L? This is a comparison of two model runs, one for existing condition and a second for reference conditions.

There is uncertainty associated with both tests that must be considered. Currently the process only considers uncertainty for the second question and treats the first as being completely without error. This is incorrect. Furthermore, the calculation of the uncertainty of the difference between existing and reference conditions (i.e., question 2) as defined on page 59 of Ahmed et al. 2019 is incorrect. Ahmed et al. 2019 incorrectly treat the models' root mean squared error (RMSE) as equivalent to the standard deviation (SD) of the predictions. Third, in estimating the covariance of model runs, Ahmed et al. 2019 greatly inflate their sample size by treating all individual predictions for each cell and depth layer as independent. This artificially raises the covariance between model runs, which in-turn artificially shrinks their estimated standard deviation. Ahmed et al. 2019 also does not formally consider that predictions of unobservable conditions (i.e., the reference conditions) are inherently more uncertain than prediction of observed data – that is, they do not include predication intervals as would be standard for any regression model used to estimate a value that is unobservable.

The document appended below — written by my co-author Mark Scheuerell — details the specifics of why the Ahmed et al. 2019 uncertainty estimates are incorrect; it shows that using RMSE will substantially underestimate the uncertainty and why predictions of unobserved states are inherently more uncertain than comparing model outputs to data. ***Our initial reanalysis demonstrates the true standard deviation of the difference between model predictions is 0.32 mg/L, about 8 times greater than 0.041 mg/L reported in Ahmed et al. 2019 for 2014.*** Note this reanalysis addresses only one of at least four statistical problems.

With a standard deviation of 0.32 mg/L, the 95% prediction interval for the mean is conservatively on the order of ± 0.9 mg/L (assuming a very large sample size; see page 6 in the appendix). Put another way, if the model predicts a value of 6 mg/L for some place and time, we can say the true value is somewhere between 5.1 and 6.9 mg/L with only a 5% chance of being wrong about that. If we want only a 1% chance of being wrong, then we have to expand the possible range to between 4.7 and 7.3 mg/L. If we want to limit the range to being between 5.8 and 6.2 mg/L, then there is roughly a 72% chance of the true value being *outside* that range. This example is highly conservative and is an underestimate of the true uncertainty. ***Nonetheless, the uncertainty of a single prediction is <u>at least</u> 4.5-times higher than the 0.2 mg/L threshold criteria*** when using a 5% acceptable error rate.

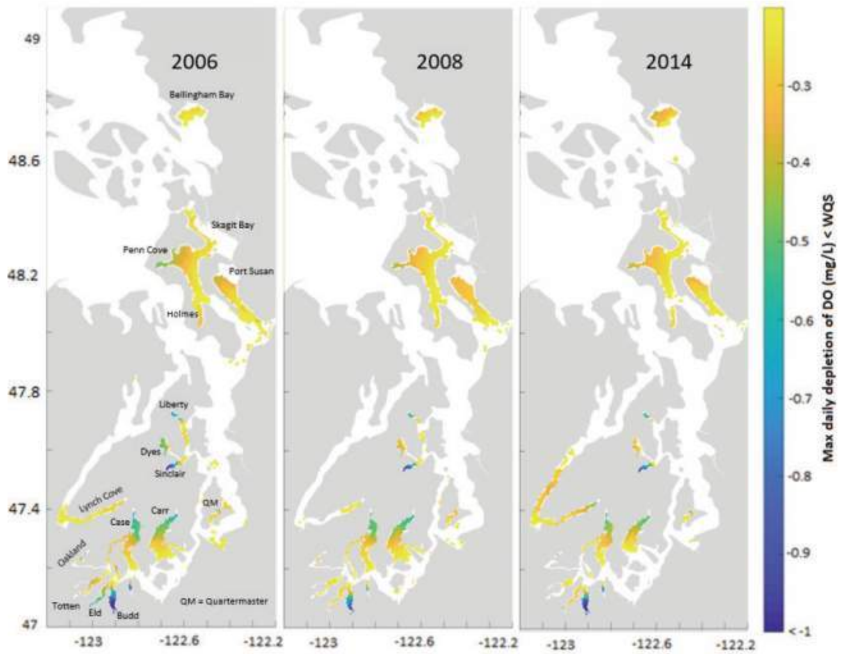

Figure 26 from Ahmed et al. 2019: Maximum dissolved oxygen (DO) depletions from anthropogenic sources in 2006, 2008, and 2014, leading to noncompliance with the water quality standards (WQS).

Given the above and to the extent the information in Ahmed et al. 2019 is true and meaningful, we can say that in order to be 95% confident that a given area of Puget Sound is in fact out of compliance, the model must predict a ≥ 0.9 mg/L depletion of dissolved oxygen. Figure 26 from Ahmed et al. 2019 above shows areas in Puget Sound with >0.2 mg/L depletion (darker areas are more depleted in DO). Only the darkest blue colors are ≥ 0.9 mg/L. ***Therefore, a very small fraction of the areas previously deemed out of compliance meet this 0.9 mg/L threshold for conclusively determining a human effect.*** In fact, most areas in Puget Sound that are currently considered out of compliance are very near the 0.2 mg/L criteria, which means there has been no measurable change in dissolved oxygen given uncertainty in the modeling process.

The four statistical errors described above and in the appended document — 1) not considering errors in prediction of reference dissolved oxygen, 2) use of RMSE in the variance calculations, 3) inflation of sample size, and 4) using confidence estimates rather than prediction estimates — are significant, and we demonstrate that these substantially change the assessment of compliance to the dissolved oxygen standard. In all cases, these statistical errors result in an underestimate of uncertainty that is meaningful for decision-making. We also note that the report does not include a full description of the modeling process, so it is very possible other statistical errors have occurred.

We recommend to Ecology the following:

1. Correct mistakes in calculating model uncertainty. Specifically, specify the standard deviation of the model fits to data rather than using RMSE, remove inflation of covariance by appropriately specifying the sample size, provide prediction intervals for forecasts, and consider uncertainty in both steps of compliance assessment process. We also recommend that validation procedures be employed, were parts of the observed data are held back, the

model parameters are fit, then the predicted results compared to the reserved data using RMSE or, preferably, formal cross-validation.
2. Allow an independent review of the uncertainty analysis related to compliance standards and incorporate all relevant suggestions into a new presentation of results.
3. Present the model uncertainties in a more transparent way that acknowledges that the model has large errors in predicting both absolute concentration and change in dissolved oxygen. Thus, the question about compliance is not really yes or no, but yes or no with a specified chance of being wrong. Policymakers must be presented an analysis with a correctly specified errors that accurately portray current scientific understanding.
4. Present the areas predicted to be out of compliance with an associated type I error probability. That is, make a map of areas that are predicted out of compliance at a 95% level of certainty, also maybe at the 90% and 80% levels. This will let policymakers judge for themselves how willing they are to be wrong, given the inherent communicated uncertainty in the modeling process. ***Acceptable error rate is an important policy decision.***

It is critically important that uncertainty in the model predictions be adequately considered and transparently reported to policymakers, as it will dramatically change the definition of the problem we aim to solve. Ahmed et al. 2019 fails to accomplish this critical task and thus is inconsistent with what is currently considered best practices. ***Mistakes in Ahmed et al. 2019 lead to <u>at least</u> an eight-fold underestimate of uncertainty and overconfidence in the model results, which leads to a systematic overestimate of the area expected to be out of compliance.*** A complete error analysis will undoubtedly increase the error level even more. If/when uncertainty is properly considered, the areas and times deemed out of compliance with the dissolved oxygen standard will decrease dramatically, fundamentally redefining the problem we aim to solve. It is therefore absolutely critical this part of the analysis be done correctly before any decisions are made.

We stand ready to assist Ecology in their analysis if requested.

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[i] Ahmed, A., C. Figueroa-Kaminsky, J. Gala, T. Mohamedali, G. Pelletier, S. McCarthy. 2019. Puget Sound Nutrient Source Reduction Project, Volume 1: Model Updates and Bounding Scenarios. Washington Department of Ecology, Publication No. 19-03-001.
[ii] Clark et al. (2001) Science 293(5530): 657-660.
[iii] Regan et al. (2005) Ecological Applications 15(4): 1471–1477
[iv] This part of the criteria remains a point of confusion and emphasizes the need for greater transparency in compliance assessment. We originally thought that the comparison was with respect to current conditions, as this seems most relevant to the issue at hand. However, on 3 June 2019, Christiana Figueroa-Kaminsky (Ecology) wrote in an email "Please note that to determine compliance with the standard—the first step is to compare natural or reference condition (not existing) with the 5 or 6 mg/L in most inlets. There are no observations for reference condition, so we have no statistics to present there. If the reference condition is below 5 or 6 mg/L for the inlets, we have to use the difference of the model runs (existing minus reference). This is by far the most common type of DO noncompliance found in our region. So, the difference of model runs method is the only way to compute compliance or not in more than about 95% of the instances." Regardless, considering uncertainty in predictions of absolute concentration (step 1) is necessary but has thus far been ignored.

Critique of model evaluation by the Washington Department of Ecology

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Comparison of existing and reference scenarios

The focus of the modeling analysis is a comparison of results obtained with two scenarios: a "reference" case that represents a system without anthropogenic inputs, and an "existing" case that represents contemporary conditions. Specifically, Ecology is interested in the difference between the modeled concentration of dissolved oxygen estimated via the two models. In addition, Ecology would like to know the estimated uncertainty in that difference.

Variance of predictions

In the section titled "Uncertainty in Dissolved Oxygen Depletion Estimates" (p59), it states,

> The RMSE of differences is calculated to understand the uncertainty associated with the result of subtracting one model scenario from another model scenario (i.e., the difference between two model scenarios). In this case, we calculated the error associated with the DO depletions computed from the difference between the existing and reference model scenarios.

The section then goes on to describe how the calculations were made using the estimated root mean squared error (RMSE) between the predictions and observations, but there is a mistake in the assumed relationship between the standard deviation of the predictions and the RMSE.

Variance of predictions

To demonstrate this, consider this simple equation that relates individual observations (o_i) and predictions (p_i):

$$o_i = p_i + e_i,$$

where e_i are the model prediction errors (i.e., the difference between the observed and predicted values). From this relationship we know that the variance of the observations is a function of the variances of both the predictions and errors, and their covariance, such that

$$\text{Var}(o) = \text{Var}(p) + \text{Var}(e) + 2\ \text{Cov}(p, e)$$

We can rewrite the above equation to show that the variance of the predictions is

$$\text{Var}(p) = \text{Var}(o) - \text{Var}(e) + 2\ \text{Cov}(p, e).$$

Variance in the difference of predictions

In this case Ecology is interested in the uncertainty (variance) in the difference between the predictions from the two models representing existing and reference conditions, which we write as p_{ex} and p_{ref}, respectively. We then define the difference δ as

$$\delta = p_{ex} - p_{ref}$$

and hence

$$\begin{aligned}\text{Var}(\delta) &= \text{Var}(p_{ex}) + \text{Var}(p_{ref}) - 2\ \text{Cov}(p_{ex}, p_{ref}) \\ &= \text{Var}(p_{ex}) + \text{Var}(p_{ref}) - 2\ \text{Cor}(p_{ex}, p_{ref})\ \text{SD}(p_{ex})\ \text{SD}(p_{ref})\end{aligned}$$

This is where Ecology gets their calculations wrong. In a forecasting context, the hope is that the predictions match the observations very closely and hence the errors are small. One measure of forecast skill is the root mean-squared error (RMSE), which equals the standard deviation of the errors. More specifically,

$$\text{RMSE}_{o,p} = \text{SD}(e) = \sqrt{\text{Var}(e)} = \sqrt{\frac{\sum(p_i - o_i)^2}{N}}.$$

Importantly, however, the $\text{RMSE}_{o,p}$ is not equal to the variance of the predictions, $\text{Var}(p)$, which is required for the calculations of the error in differences.

Re-analysis

The Ecology report does not provide estimates of the variance in the model predictions, but we can generate approximations from the information provided and a simple assumption. For most of the DO models, $\text{RMSE}_{ex} \approx 1$ (Table 7) and the correlation between the predicted and observed values is about 0.85 (Table 8). Recognizing that

$$\text{RMSE}_{ex} = \sqrt{(1 - R^2)}\ \text{SD}(o),$$

we can estimate the SD of the observations as

$$\mathrm{SD}(o) = \frac{\mathrm{RMSE}_{ex}}{\sqrt{(1-R^2)}} \approx \frac{1}{\sqrt{(1-0.85^2)}} \approx 1.9$$

and hence the variance of the observations is

$$\mathrm{Var}(o) = \mathrm{SD}(o)^2 \approx 1.9^2 = 3.61.$$

Now we can estimate the variance of the predictions for the model with existing conditions as above, with

$$\begin{aligned}
\mathrm{Var}(p_{ex}) &= \mathrm{Var}(o) - \mathrm{Var}(e) + 2\ \mathrm{Cov}(p_{ex}, e) \\
&= \mathrm{Var}(o) - \mathrm{RMSE}_{ex}^2 + 2\ \mathrm{Cov}(p_{ex}, e) \\
&\approx 3.6 - 1^2 + 2\ \mathrm{Cov}(p_{ex}, e).
\end{aligned}$$

Absent information on the covariance between the predicted values and the model errors, we will assume that the model is well behaved and $\mathrm{Cov}(p_{ex}, e) \approx 0$, such that

$$\mathrm{Var}(p_{ex}) \approx 3.6 - 1^2 + 2(0) = 2.6$$

To the extent that $\mathrm{Cov}(p_{ex}, e)$ is positive (negative), $\mathrm{Var}(p_{ex})$ will be larger (smaller) than this estimate.

If we also assume, as Ecology did, that $\mathrm{Var}(p_{ex}) = \mathrm{Var}(p_{ref})$, then we can estimate the variance in the difference (δ) between the predictions from the two models as above, such that

$$\begin{aligned}
\mathrm{Var}(\delta) &= \mathrm{Var}(p_{ex}) + \mathrm{Var}(p_{ref}) - 2\ \mathrm{Cor}(p_{ex}, p_{ref})\ \mathrm{SD}(p_{ex})\ \mathrm{SD}(p_{ref}) \\
&= \mathrm{Var}(p_{ex}) + \mathrm{Var}(p_{ex}) - 2\ \mathrm{Cor}(p_{ex}, p_{ref})\ \mathrm{SD}(p_{ex})\ \mathrm{SD}(p_{ex}) \\
&= 2\ \mathrm{Var}(p_{ex}) - 2\ \mathrm{Cor}(p_{ex}, p_{ref})\ \mathrm{Var}(p_{ex}) \\
&= 2\ \mathrm{Var}(p_{ex})\,(1 - \mathrm{Cor}(p_{ex}, p_{ref})) \\
&= 2(2.6)\,(1 - \mathrm{Cor}(p_{ex}, p_{ref}))\,.
\end{aligned}$$

Thus, if $\mathrm{Cor}(p_{ex}, p_{ref}) = 0$, then $\mathrm{Var}(\delta) = 5.2 \Rightarrow \mathrm{SD}(\delta) \approx 2.3$; conversely, as $\mathrm{Cor}(p_{ex}, p_{ref}) \to 1$ then $\mathrm{Var}(\delta) \to 0$.

Although Ecology's report did not say what $\mathrm{Cor}(p_{ex}, p_{ref})$ was, but we can estimate it from the calculations on p59. For example, if we assume that $\mathrm{Var}(\delta) = 0.041$ as for Ecology's model in 2014, then analogous to above we have

$$\mathrm{Var}(\delta) = \mathrm{Var}(p_{ex}) + \mathrm{Var}(p_{ref}) - 2\ \mathrm{Cor}(p_{ex}, p_{ref})\ \mathrm{SD}(p_{ex})\ \mathrm{SD}(p_{ref})$$
$$\Downarrow$$
$$\mathrm{Cor}(p_{ex}, p_{ref}) = \frac{(\mathrm{Var}(\delta) - \mathrm{Var}(p_{ex}) - \mathrm{Var}(p_{ref}))}{-2\ \mathrm{SD}(p_{ex})\ \mathrm{SD}(p_{ref})}$$
$$\approx \frac{(0.041 - 1^2 - 1^2)}{-2(1)(1)}$$
$$\approx 0.98$$

This correlation is remarkably high, indicating that the two models produce nearly identical predictions of DO. Inserting this correlation coefficient into the equation for $\mathrm{Var}(\delta)$ gives $\mathrm{Var}(\delta) = 2(2.6)(1 - 0.98) = 0.104$, and hence $\mathrm{SD}(\delta) \approx 0.32$. This value is about eight times greater than those reported in Ecology's document. Thus, if the treshhold concentration for DO depletion is 0.2 mg/L, then the estimated coefficient of variation (CV) around it is 160%.

Example of SD versus RMSE

Here is a simple example that shows how $\mathrm{SD}(\hat{y})$ and $\mathrm{RMSE}(\hat{y})$ are different. Consider a case where we had reason to believe that a variable y was a function of another variable x. In effort to undercover the nature of their relationship, we collected 20 samples of both y and x (Figure 1).

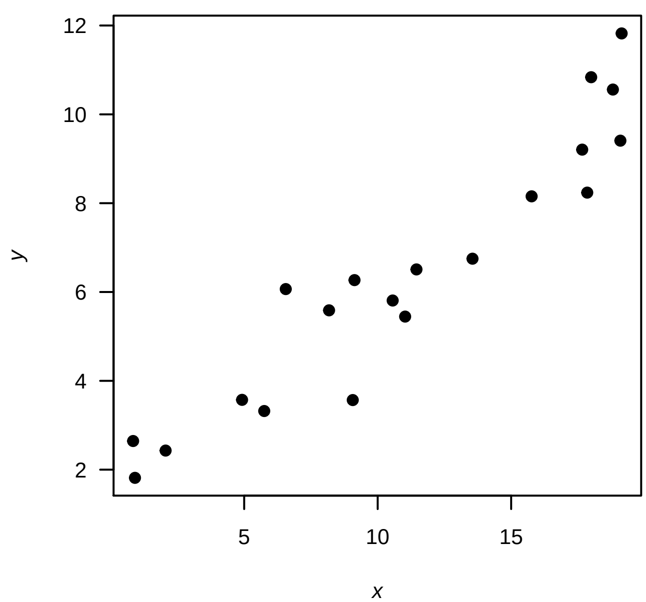

Figure 1. Plot of some hypothetical data.

Based on the apparent relationship between x and y, we might assume that each of the observed values y_i is a linear combination of an intercept β_0, the effect β_1 of a covariate x_i, and some random observation error ϵ_i, such that

$$y_i = \beta_0 + \beta_1 x_i + \epsilon_i,$$

and $\epsilon_i \sim \text{N}(0, \sigma)$. We could easily estimate the unknown parameters in this model (β_0, β_1, σ), and then use the deterministic portion of the model to make predictions to compare with each of the observed values. Specifically, the predictions ($\hat{y}_i$) would be given by a straight line, such that

$$\hat{y}_i = \hat{\beta}_0 + \hat{\beta}_1 x_i.$$

We could then estimate the SD of these predictions and the model's RMSE (Figure 2). It turns out that the SD of $\hat{y}$ is ~2.82, but the RMSE is only ~0.94, which is about 3 times less.

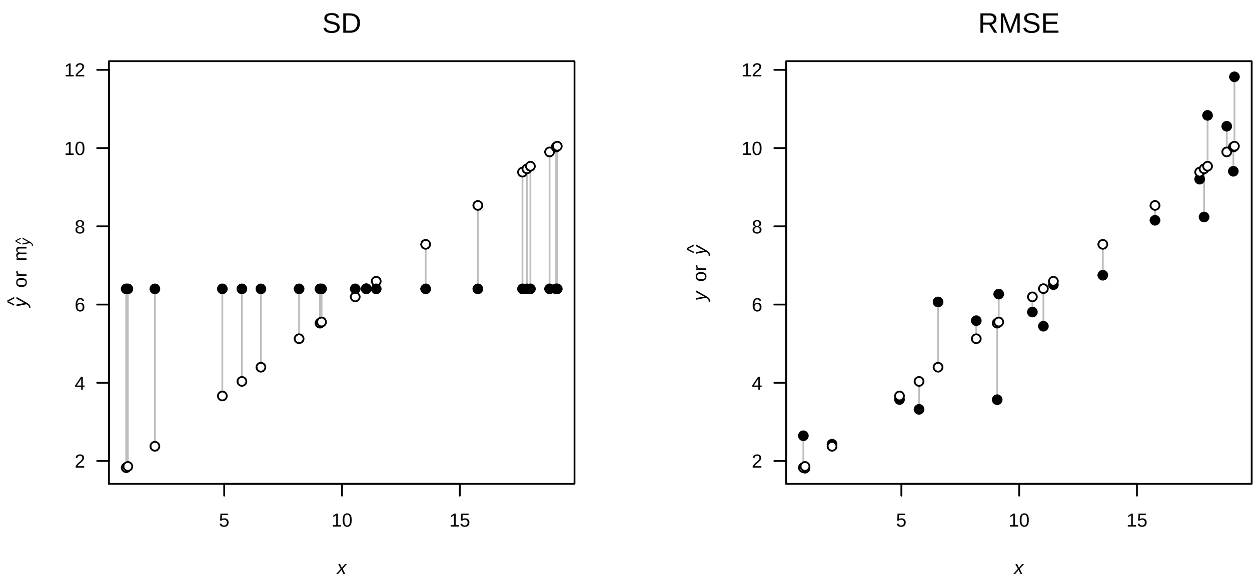

Figure 2. Graphical examples of the difference between the SD of the predictions (left) and the RMSE of the predictions (right). For the SD, the comparison is based upon the differences between the predictions (open circles) and their mean (filled circles). For the RMSE, the comparison is based upon differences between the predictions (open circles) and the observed data (filled circles). In both cases, one would square the length of each of the vertical gray lines, sum them up, and divide by the number of them before finally taking the square root.

Prediction errors

The above example dismisses an important aspect of RMSE: it should be used to compare "out of sample" predictions. Furthermore, RMSE give us an indication as to the predictive error, *on average*, rather than the uncertainty in a specific prediction.

Returning to our example above, we could estimate our uncertainty around the fitted relationship between x and y with a confidence interval (CI), which would give us an indication of the range of where the "true" fitted values would lie had we repeated our sampling exercise many times.

Specifically, a $(1-\alpha)100\%$ CI on the expected relationship between x and y at some value x_k is given by

$$\hat{y}_i \pm t_{\alpha/2,n-2}\sqrt{\sigma\left(\frac{1}{n}+\frac{(x_k-\bar{x})^2}{\sum(x_i-\bar{x})^2}\right)}.$$

The interval increases as the distance between x_k and $\bar{x}$ increases (Figure 3).

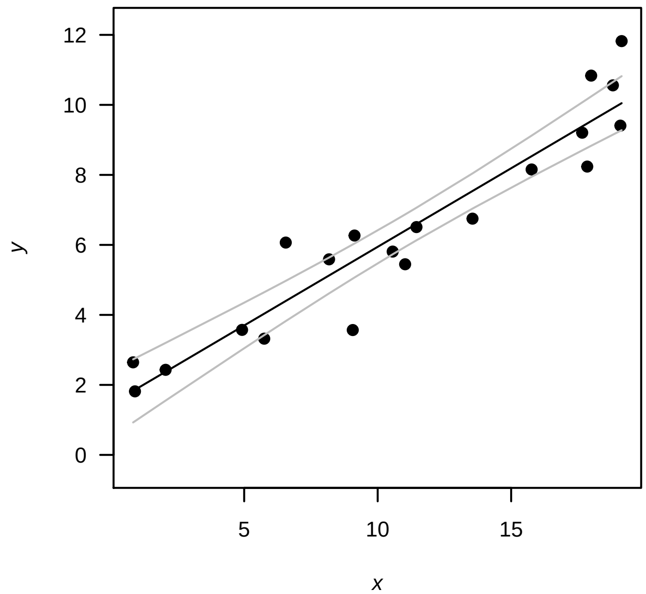

Figure 3. Example of a 95% confidence interval (gray lines) around the expected relationship between x and y (black line).

In a case like this, however, where we wish to make out-of-sample predictions about some new state of nature, our uncertainty around any single prediction will be necessarily greater. Specifically, a $(1-\alpha)100\%$ prediction interval (PI) around $\hat{y}$ at some value x_k is given by

$$\hat{y} \pm t_{\alpha/2,n-2}\sqrt{\sigma\left(1+\frac{1}{n}+\frac{(x_k-\bar{x})^2}{\sum(x_i-\bar{x})^2}\right)}.$$

Here the paranthetic multiplier on the residual variance σ has increased by 1, which means the prediction interval is wider (less certain) than the confidence interval (Figure 4). This is because the CI only needs to account for uncertainty in estimating the expected value of y whereas the PI needs to account for a random future value of y that tend to fall away from the mean.

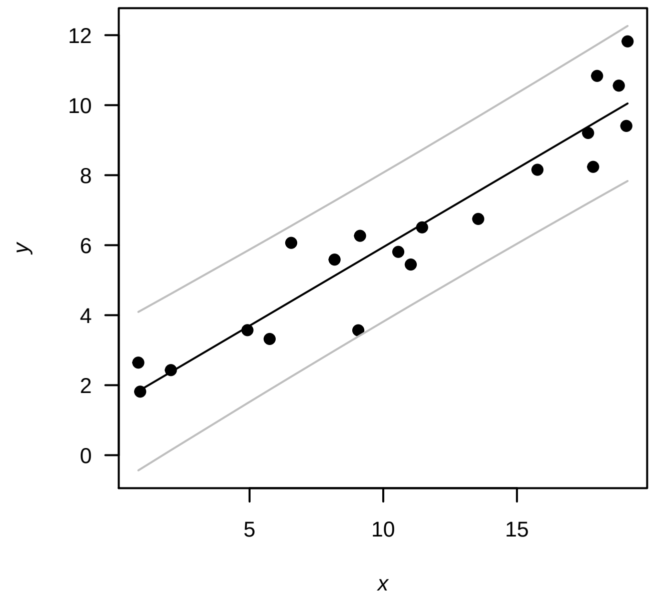

Figure 4. Example of a 95% prediction interval (gray lines) for future unobserved values of y.

So, for example, if we wanted to predict, with 95% certainty, what we would observe for y if $x = 10$, we would get 5.94 ± 2.13 (Figure 5). The relatively wide prediction interval suggests that it might be difficult to discern the prediction for y when $x = 10$ to the expected values for y if x were as low as 5 or as high as 15.

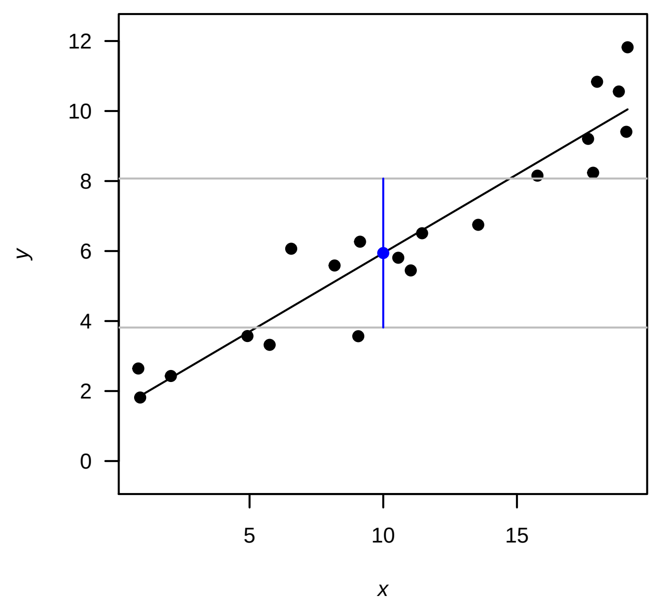

Figure 5. Example of the uncertainty around a new prediction for y when $x = 10$.

Memo

From: Lincoln Loehr
To: Scott Redman
Date: February 29, 2020 (minor corrections April 3, 2020)
Subject: Scientific perspective re dissolved oxygen criteria

It is virtually certain that the dissolved oxygen criteria are not biologically based, and have no documented scientific foundation. The dissolved oxygen criteria are the driver in the modeling efforts to date, and in the Department of Ecology's assertions of reasonable potential for all the dischargers to be contributing to violations of the criteria.

Ecology admits that the criteria were adopted in 1967 by a predecessor agency, and that the archives provide no documentation of the basis for the criteria other than a comment letter stating the need to allow some human degradation beyond natural levels in marine waters during periods of upwelling (which the criteria did accommodate). (Letter from Ecology's water quality standards coordinator Mark Hicks to Lincoln Loehr, July 8, 1998.)

Ecology asserts that the criteria were based on a 19**6**8 Department of the Interior criteria document. (Nutrient Forum presentation on May 30, 2018). However, the adopted dissolved oxygen criteria for both marine and freshwater bear no resemblance to the DOI document and it is virtually certain that the predecessor agency did not rely on that document.

Ecology acknowledges that the 0.2 mg/L difference from human causes component of the criteria is not biologically based. (Nutrient Forum presentation on May 30, 2018.)

The predecessor agency made no effort to understand actual dissolved oxygen levels throughout our inland marine waters before adopting the criteria (Eugene E. Collias, personal communication in the 1970s). Hence, the classifications applied to our inland marine waters (Extraordinary, Excellent, Good, and Fair) and their associated dissolved oxygen criteria had no relationship to what the waters actually exhibited.

The states bordering Chesapeake Bay, confronting the need for nutrient reductions, realized that the dissolved oxygen criteria they had could not work and with EPA's help, developed new dissolved oxygen criteria that recognized 5 different types of water, incorporated averaging considerations, as well as differences in depth and seasons and complied with endangered species consultation requirements with NMFS and USFWS. In developing new recommended dissolved oxygen criteria for Chesapeake Bay, EPA emphasized that 40 CFR 131.11 requires that states must adopt water quality criteria that protect the designated uses, that such criteria must be based on sound scientific rationale, and that such criteria must be based on scientifically defensible methods.

Washington's criteria were adopted before there was an EPA, before there was a Clean Water Act, and before EPA had developed the implementing regulations, which includes 40 CFR 131.11. Washington's criteria are 5**3** years old, are not biologically based, are without scientific rationale, and do not match well with what the real world looks like. The State Agency is negligent in its failure to develop new dissolved oxygen criteria meeting the requirements of 40 CFR 131.11. 303(d) listings of impaired waters for dissolved oxygen are based on the criteria, and the modeling to date is driven by the criteria. The flawed and non-biologically based dissolved oxygen criteria, make the necessity of the General Permit for nutrient reduction questionable.

I look forward to discussions about this concern at the mid-May meeting.

Lincoln Loehr
Oceanographer, water quality/permitting consultant

Attachments:

July 8, 1998 letter from Mark Hicks to Lincoln Loehr
40 CFR 131.11

Volume 17/Number 11/November 1986

Marine Pollution Bulletin, Volume 17, No. 11, pp. 489–493, 1986.
Printed in Great Britain.

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VIEWPOINT

Viewpoint is a column which allows authors to express their own opinions about current events.

The Exclusion of Science from Major Water Quality Decisions

LINCOLN C. LOEHR

Mr Loehr is an oceanographer who has participated in many oceanographic cruises in Puget Sound, Washington. He has become active in the political process seeking to change the state's law requiring secondary treatment of all municipal wastes discharged to marine waters.

A recent interpretation of the State law has determined that the state could not consider water quality as a factor when evaluating whether municipal sewage treatment plants discharging to Puget Sound or adjacent marine waters could be permitted to discharge at less than full secondary treatment level. The Federal law requires secondary treatment but has a waiver provision by which a discharger may present information that may permit a case-by-case decision on the level of treatment necessary. The information required by the Federal law to make this case-by-case decision is essentially scientific. Scientific information is irrelevant to the State law. To receive a waiver it is necessary for both the State Department of Ecology and the Federal Environmental Protection Agency to concur. Since the State Department of Ecology could not consider water quality, they denied virtually all waiver applicants. Given this State denial, the Environmental Protection Agency did not have to review the scientific information and issued denials. Thus we are launched on a program that ultimately will cost between $1 000 000 000 and $2 000 000 000. The scientific community is in general agreement that it will do little or nothing towards solving any of the real pollution problems that exist in Puget Sound. The public, however, rightfully expects that this should result in major improvements to the environment. Politics, environmental groups and press sensationalism have played a major role in shaping public opinion.

In 1982, 32 municipal sewage treatment plants (STPs) discharging to marine waters in the state of Washington applied for waivers of the Federal secondary treatment requirement under guidelines developed by the Environmental Protection Agency (EPA). Waivers are permitted under Section 301(h) of the Federal Clean Water Act.

Law Governing Issuance of a Section 301(h) Modified Permit

Section 301(h) of the Clean Water Act provides that:

The Administrator, with the concurrence of the State, may issue a permit under section 402 which modifies the requirements of subsection (b) (1) (B) of this section with respect to the discharge of any pollutant from a publicly owned treatment works into marine waters, if the applicant demonstrates to the satisfaction of the Administrator that:

1. there is an applicable water quality standard specific to the pollutant for which the modification is requested, which has been identified under section 304(a) (6) of this Act:
2. such modified requirement will not interfere with the attainment or maintenance of that water quality which assures protection of public water supplies and the protection and propogation of a balanced, indigenous population of shellfish, fish and wildlife, and allows recreational activities in and on the water.
3. the applicant has established a system for monitoring the impact of such discharge on a representative sample of aquatic biota, to the extent practicable;
4. such modified requirements will not result in any additional requirements on any other point or nonpoint source;
5. all applicable pretreatment requirements for sources introducing waste into such treatment works will be enforced;
6. to the extent practicable, the applicant has established a schedule of activities designed to eliminate the entrance of toxic pollutants from non-industrial sources into such treatment works;
7. there will be no new or substantially increased discharges from the point source of the pollutant to which

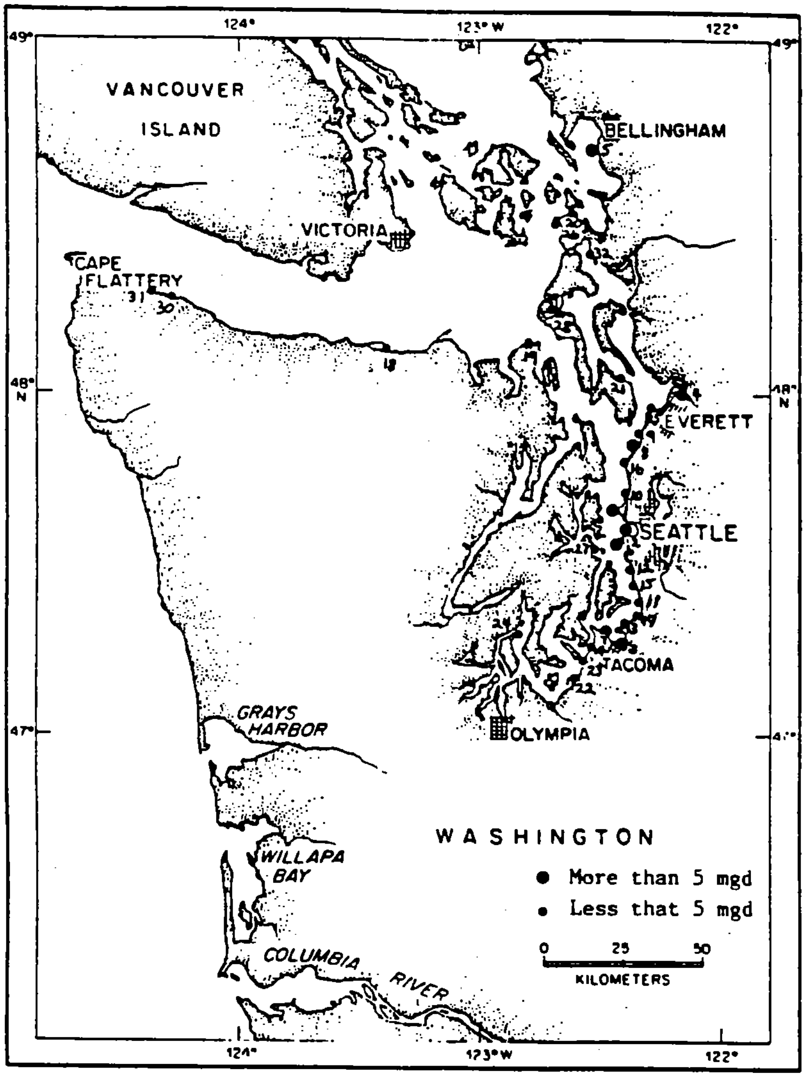

Fig. 1 Sewer discharges in the State of Washington that applied for waivers of the secondary treatment requirement.

the modification applies above that volume of discharge specified in the permit.

For the purposes of this subsection the phrase 'the discharge of any pollutant into marine waters' refers to a discharge into deep waters of the territorial sea or the waters of the contiguous zone, or into saline estuarine waters where there is strong tidal movement and other hydrological and geological characteristics which the Administrator determines necessary to allow compliance with paragraph (2) of this subsection, and section 110(a) (2) of this Act. A municipality which applies secondary treatment shall be eligible to receive a permit pursuant to this subsection which modifies the requirements of subsection (b) (1) (B) of this section with respect to the discharge of any pollutant from any treatment works owned by such municipality into marine waters. No permit issued under this subsection shall authorize the discharge of sewage sludge into marine waters. (Source: *Fed. Reg.*, Vol. 47, No. 228, 26 November, 1982.)

The 32 waiver applicants for the state of Washington are listed in Table 1 and their locations are shown in Fig. 1. All knew that applying did not assure them of a waiver, but they had definite reason to expect a thorough, case-by-case review of the environmental information that EPA required, and that approval or denial would be based on that review. EPA had even encouraged many of the smaller dischargers to apply for the waiver even though the information requirements were costly and EPA had originally imposed unrealistic time frames for the collection of this information.

There are other sewage treatment facilities discharging to Puget Sound that are at secondary treatment. Generally these were built to discharge secondary-treated effluent in recognition of site-specific environmental constraints (usually depth, mixing and flushing characteristics drove this decision). In some cases, environmental degredation from secondary treated effluent occurs because the volume of flow exceeds what the area in the vicinity of the discharge can handle. Proper outfall siting is critical and should also avoid commercially significant shellfish beds as well as seeking optimum physical parameters.

The time-line showing significant events in the development and implementation of the waiver process pertains to these dischargers, is as follows:

1972 Federal Water Pollution Control Act passed (later called the Clean Water Act).

1974 Municipality of Metropolitan Seattle (METRO) commenced detailed evaluation of impacts from its primary and secondary treatment facilities.

1976 METRO lobbied Congress to change the law to allow consideration of waivers on case-by-case basis. Los Angeles STPs joined in this effort.

1977 US Congress passes Section 301(h) amendments to the Clean Water Act. EPA tasked with developing the rules and regulations to implement this section.

1979 EPA promulgates 301(h) rules and regulations in June. Deadline for completed applications was September. In August, Region X EPA administrator sent letters to small dischargers urging them to apply for the waivers. Regulations stated that EPA would review, and that if they approved, the States would then review. Concurrence by both EPA and State necessary for granting of waiver.

1981 US General Accounting Office investigates EPA on subject of the 301(h) rules and determines that 'Billions could be saved' if EPA would make the rules more reasonable, especially for the smaller dischargers.

1982 US Congressional Investigations and Oversight Committee issues report blasting EPA for not carrying out the intent of Congress with regards to Section 301(h). Report was subtitled, 'A Case Study of Lawmaking by Rulemakers'.

1982 EPA tentatively decides to approve some Puget Sound waivers, including METRO's biggest facility at West Point. Decision now passed to State.

1982 EPA issues new 301(h) rules and regulations as well as detailed guidelines for answering the applicant questionnaire. Relaxed rules for small discharges (less than 5 mgd). Shifted review requirements to the State first, after which EPA would review if the State tentatively approved an application. All State dischargers who applied under the 1979 rules chose to reapply under the new rules.

1983 32 applications submitted, State Department of Ecology commences review. Some doubt raised about whether State law permitted them to consider water quality in this review.

1983 State Attorney General's office issues an opinion on the State law. 'All known, available, reasonable technology' must be used, *regardless of water quality*. Wording goes back to 1944.

1983 Effort to change State law. Bill passed in the House, died in Senate Park's and Ecology Committee.

1983 Puget Sound Water Quality Authority created by law, appointed by Governor, 21 members, *no marine scientists appointed.*

1983 Department of Ecology determines secondary treatment is reasonable, meaning (1) affordable, and (2) subject to environmental site-specific constraints but, (3) *without consideration of water quality*. Review of applications continues but all scientific information presented is now ignored in the review as it is irrelevant to the State law.

1984 Six grey whales die in Puget Sound. Considerable press interest in pollution stories. Election year and both Governor candidates make Puget Sound clean-up a political priority. A veterinarian autopsies one whale and proclaims Puget Sound pollution killed it. Greenpeace also blames pollution. National Marine Fisheries Service concludes pollution not the cause of death, and deaths viewed as from natural causes.

1984 Department of Ecology denies virtually all waivers except two of the smallest and the largest. These were considered unreasonable for secondary treatment on the basis of cost or environmental site-specific constraints. The two smallest (Sneehosh Beach and Manchester) would have had very high treatment costs of $75 to $98 per month per house, and the West Point facility would have had to fill in 20 acres of intertidal land to expand to secondary treatment.

1984 Puget Sound Alliance (a coalition of environmental groups) forms. They are strong on environmental activism and lobbying, but they are lacking in marine science participation in defining their goals.

1984 Washington Environmental Council and Friends of the Earth file a lawsuit with METRO for discharging less than secondary treated effluent.

TABLE 1
Waiver Applicants in Washington State
(see Fig. 1 for locations)

		Flow (mgd)
1	Seattle (West Point)	125.000
2	Seattle (Duwamish)	43.300
3	Tacoma (Central)	28.000
4	Everett	20.390
5	Bellingham	10.400
6	Seattle (Alki)	10.000
7	Tacoma (North End)	10.000
8	Edmonds	5.700
9	Lynnwood	4.000
10	Seattle (Carkeek)	3.400
11	Des Moines	3.380
12	SWSSD (Salmon Creek)	3.200
13	Lakehaven (Lakota)	3.040
14	Tacoma (Western Slopes)	3.000
15	SWSSD (Miller Creek)	2.850
16	Seattle (Richmond Beach)	2.500
17	Lakehaven (Redondo)	2.200
18	Port Angeles	1.830
19	Port Townsend	1.030
20	Anacortes (Main Plant)	0.890
21	Langley	0.500
22	Steilacoom	0.500
23	Westside S.D.	0.500
24	Mason County (Hartstene Point)	0.353
25	Mukilteo	0.250
26	Anacortes (Skyline)	0.230
27	Kitsap County (Manchester)	0.140
28	Coupeville	0.125
29	Penn Cove	0.060
30	Clallam County (Clallam Bay)	0.040
31	Clallam County (Seiku)	0.030
32	Skagit County (Snee-oosh Beach)	0.010

Source: Region X EPA

(The Clean Water Act does permit virtually anyone to sue a discharger, the State and the EPA on water quality issues such as secondary treatment).

1984 The Puget Sound Water Quality Authority endorses secondary treatment for all Puget Sound dischargers after debating the resolution for 20 minutes.

1984 The EPA commenced review and the new Regional Administrator decides to deny the waiver for the West Point facility.

1984 Five small dischargers decide to appeal through the State Pollution Control Hearings Board. The other dischargers do not appeal or even withdraw their applications.

1985 Select House Panel on Puget Sound Clean-Up formed in State Capitol and holds hearings twice a week for several months. Puget Sound Alliance actively lobbying. Informal group of marine scientists testify, questioning the wholesale conversion to secondary treatment and asking for the law to be changed to allow case-by-case decisions.

1985 Effort again made to change State law. Bill again passed in the House but dies in Senate Park's and Ecology Committee. One State Senator (Phil Talmadge) considered to be the individual who stopped the bill from going to the full Senate for voting in each case. He is identified here because of the pivotal role he has played in this very expensive undertaking. Depending upon one's point of view, he either deserves full credit or full blame.

1985 Appeals heard. During one appeal the Department of Ecology argued that the Pollution Control Hearings Board should not permit any testimony regarding Puget Sound, circulation, toxicants, water quality or the biota as it was irrelevant and prejudicial to the Department of Ecology's case. During another appeal, the Department of Ecology admitted that their departmental review of the application determined secondary treatment was not needed for water quality purposes. The decisions on the first three appeals have been made and the Hearings Board determined that State law did indeed prohibit them from considering water quality and the first three waiver appeals were denied.

While the above time-line effectively tells much of the story, there are some additional points to elaborate on. The Chairman of the Pollution Control Hearings Board did not sign the orders in which the board turned down the waiver denial appeals of Bellingham, Port Angeles and Lynnwood. Rather, he wrote a 6 page concurring statement. In it he repeated the Federal law (Section 301(h)) and the State law, and clearly identified that the requirement for secondary treatment here lay with the State law, not the Federal law. He clearly stated that the evidence supported the position that these communities' primary-treated effluents were not having significant impacts on the marine environment, and that there were significant impacts related to economic costs and the added requirements of disposing of additional sludge which outweighed the undefined benefits of secondary treatment. He stated several times that the State had to change the law to prevent this wasteful situation which, 'violates any standard of fairness'.

The main problems in Puget Sound are toxi[illegible] spots in the sediments and shellfish bed closures [illegible] bacteria. The toxic hot spots are site-specific and are related to past, or possibly present discharges from industries, industrial runoff, and urban storm sewer/combined sewer overflows to intertidal areas. The problems are not related to the majority of the sewer outfalls in Puget Sound. Because of the active circulation within Puget Sound and the tremendous volume of deep water which acts as a nutrient and dissolved oxygen buffer, there is not a problem associated with nutrient enhancement or dissolved oxygen depletion associated with most of the sewage treatment plants. A glacial fjord with good tidal circulation is considerably different from a shallow drowned river valley type of estuary.

During the recent debate on secondary treatment, I have been especially concerned with the position taken by the EPA. The regional administrator, Ms. Ernesta Barnes, has emphasized how the Federal law requires secondary treatment. She has downplayed the waiver provision. In testifying before the Select House Panel on Puget Sound on 25 March 1985 she emphasized how Congress intended secondary treatment and that the waiver provision only contemplated discharges to the open ocean. She emphasized that Puget Sound is not an open ocean. Note that the Federal Law itself (presented in this article) defines a discharge into marine wate[illegible] including 'saline estuarine waters where there is s[illegible] tidal movement and other hydrological and geological characteristics which the Administrator determines necessary to allow compliance . . .' The following paragraphs are quoted from the Congressional Investigation titled 'Implementation of the Clean Water Act concerning Ocean Discharge Waivers (A Case Study of Lawmaking by Rulemakers)' which was prepared in 1982.

> The 1977 ocean discharge waiver provision was controversial from the outset, due primarily to the fact that it represented the first breach in the new national approach to water pollution abatement adopted in 1972: the basing of cleanup requirements on the performance capability of treatment technologies. While communities discharging to fresh waters would still be required to meet the statute's minimum, 'technology based', secondary treatment requirement, qualified coastal communities would now have an opportunity to temper this mandate, based on assessment of the ocean's 'assimilative capacity', that is, the extent to which it could absorb pollution without harm.
>
> There were two basic reasons underlying Congress' willingness to make this limited exception: first, Congress recognized that the physical and chemical characteristics of the marine environment are significantly different from those of inland fresh waters[illegible]

that full secondary treatment was not necessary in all cases to achieve national water quality goals.

Second, Congress wanted to avoid treatment for treatment's sake, particularly given the multi-million dollar cost of the additional margin of wastewater treatment capability that would otherwise be required by many coastal communities. For those able to comply with the law's several strict prerequisites to a waiver, this expense could be avoided.

Subsequent investigation by the Subcommittee, and an additional day of hearings, on 18 February 1982, disclosed that the attitude of those EPA officials involved was one of at least reluctant acceptance of this amendment to the law, if not outright defiance. The record clearly shows that the regulations that the EPA proposed, and the regulations as finally adopted, along with other statements and actions of agency officials had the effect of preventing communities from obtaining waivers from the law's full municipal secondary treatment requirement.

The answers to the questions of how and why this happened can be seen in the collective set of attitudes, actions, and statements and written records of those EPA officials involved. Key, was the ability of the EPA rulemakers to transform their negative attitudes about the waiver amendment into both procedural and substantive constraints to its application. And underlying all of these actions was a functional, if not formal policy adhered to by the agency rulemakers; to avoid regulatory concessions that 'might weaken our no-retreat-from-secondary position'.

The subcommittee's oversight of the EPA's implementation of the 1977 ocean discharge waiver provision was not intended to review the 'environmental' merits of that amendment. Rather, it was initially concerned with why there had been so much delay in carrying out that amendment, and, later, *with the role and influence, respectively, that administrative agencies and their officials play in shaping or altering the intent and ultimate results of laws enacted by Congress.*

The record of what has transpired under the ocean discharge waiver provision of the Clean Water Act underscores the need for Congress to maintain close oversight of Executive departments and agencies. And to the extent that Congress continues to delegate rulemaking authority to the Executive, it must also be cognizant of the actions and comments of the rulemakers themselves.

It is essential that the State legislature change the State law so that the tremendous investment of secondary treatment is only spent where it is truly needed. This will make it easier then to fund clean-up actions that are necessary (e.g. site-specific toxic sediments and bacterial contamination of commercial shellfish beds). If the State law is changed, we can anticipate problems with EPA refusing to reopen the files of applicants who decided against appealing or who withdrew their applications. Those actions were taken in recognition of the futility of waivers under the State law, the public attitudes as formulated by the press and, the rhetoric of politicians. Congressional assistance may then be needed to grant an exception to EPA's time requirements for review of the waiver applications.

In view of the position taken by EPA in influencing this state's legislature regarding waivers, I believe it is time that the Congress again opens its investigations into EPA's role in implementing the Clean Water Act. We still are plagued by lawmaking by rulemakers!

Author's address: 12215 9th NW, Seattle, WA 98177, USA.

Barnes, Ernesta. Testimony of Region 10 Administrator Environmental Protection Agency, March 25, 1985, before the Select Committee on the Clean-Up and Management of Puget Sound. Transcripts prepared by the Office of Program Research, House of Representatives, State of Washington.

Eikenberry, Kenneth O. (Washington State Attorney General). 5 April 1985. Motion in Limine Regarding Water Quality Evidence filed before the Pollution Control Hearings Board, State of Washington on behalf of the State of Washington Department of Ecology at the start of hearings regarding the City of Lynnwood's appeal of the State's denial of their 301(h) application for the waiver of the secondary treatment requirements. PCHP Case No. 84-206.

Faulk, Lawrence J. (Chairman of the Washington State Pollution Control Hearings Board). 19 June 1985. Concurring opinion in the decision of the Pollution Control Hearings Board in the Case of the City of Bellingham's appeal of the state's denial of their 301(h) application for the waiver of the secondary treatment requirement (PCHB Case No. 84-211).

Faulk, Lawrence J. (Chairman of the Washington State Pollution Control Hearings Board). 3 October 1985. Concurring opinion in the decision of the Pollution Control Hearings Board in the Case of the City of Port Angeles' appeal of the state's denial of their 301(h) application for the waiver of the secondary treatment requirement (PCHB Case No. 84-178).

Faulk, Lawrence J. (Chairman of the Washington State Pollution Control Hearings Board). 3 October 1985. Concurring opinion in the decision of the Pollution Control Hearings Board in the Case of the City of Lynnwood's appeal of the state's denial of their 301(h) application for the waiver of the secondary treatment requirement (PCHB Case No. 84-206).

Federal Register, Vol. 46, No. 228, Friday, November 26, 1982, Part VI, Environmental Protection Agency, 'Modification of Secondary Treatment Requirements for Discharges Into Marine Waters; Final Rule'.

Pollution Control Hearings Board (Washington State). 19 June 1985. Final findings of fact, conclusions of law and order in the matter of City of Bellingham (appellant) v. State of Washington Department of Ecology (respondent) regarding the City of Bellingham's application for a waiver from the secondary treatment requirement.

Pollution Control Hearings Board (Washington State). 3 October 1985. Final findings of fact, conclusions of law and order in the matter of City of Port Angeles (appellant) v. State of Washignton Department of Ecology (respondent) regarding the City of Port Angeles' application for a waiver from the secondary treatment requirement.

Pollution Control Hearings Board (Washington State). 3 October 1985. Final findings of fact, conclusions of law and order in the matter of City of Lynnwood (appellant) v. State of Washington Department of Ecology (respondent) regarding the City of Lynnwood's application-for a waiver from the secondary treatment requirement.

US Environmental Protection Agency. August 1984. Analysis of the Section 301(h) Secondary Treatment Variance Application for Municipality of Metropolitan Seattle (METRO) Seattle, Washington West Point Treatment Plant.

US General Accounting Office. 1982. 'Billions Could Be Saved Through Waivers for Coastal Wastewater Treatment Plants. Report to the Congress. 55 pp.

US House of Representatives. Committee on Public Works and Transportation. Subcommittee on Investigations and Oversight. December 1982. 'Implementation of the Clean Water Act concerning Ocean Discharge Waivers (A Case Study of Lawmaking by Rulemakers).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101

WATER
DIVISION

November 19, 2021

Mr. Vince McGowan
Water Quality Program Manager
Washington State Department of Ecology
PO Box 47600
Olympia, Washington 98504-7600

Re: EPA's Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions

Dear Mr. McGowan:

The U.S. Environmental Protection Agency (EPA) has completed the review and reconsideration of Washington's natural conditions provisions (WAC 173-201A-200(1)(c)(i), 173-201A-210(1)(c)(i), 173-201A-200(1)(c)(v), 173-201A-200(1)(d)(i), 173-201A-210(1)(d)(i), 173-201A-200(1)(d)(ii), and 173-201A-260(1)(a)), which were submitted to EPA by the Washington Department of Ecology in 2003 and 2006. Under section 303(c) of the Clean Water Act (CWA), 33 U.S.C. § 1313(c), states must submit new and revised water quality standards to EPA for review and action, and EPA approves those water quality standards if they meet the requirements of the CWA and EPA's implementing regulations. EPA's review and reconsideration is outlined below and further described in the enclosed Technical Support Document.

As you are aware, on February 10, 2014, the Northwest Environmental Advocates filed a complaint in U.S. District Court for the Western District of Washington (Case No. 2:14-cv-0196-RSM) challenging, in part, EPA's February 11, 2008 CWA section 303(c) approval of the natural conditions provisions identified above. On October 17, 2018, the Court issued an Order Granting a Stay (Dkt. 95) pending EPA's reconsideration of its prior determinations. The Court subsequently granted an extension for EPA to complete its reconsideration by November 19, 2021 (Dkt. 118).

EPA's CWA section 303(c) action applies only to waters in the State of Washington and does not apply to waters that are within Indian Country, as defined in 18 U.S.C. § 1151. Nothing in the enclosed decision document shall constitute an approval or disapproval of a water quality standard that applies to waters within Indian Country. EPA, or authorized Indian Tribes, as appropriate, will retain responsibilities for water quality standards for waters within Indian Country.

Summary of EPA's Action

EPA has completed its reconsideration, as contemplated by the Court's Order, and is not changing its February 11, 2008 approval of the revisions to the following sections of WAC Chapter 173-201A.

- WAC 173-201A-200(1)(c)(v): Natural condition narrative aquatic life temperature criteria for lakes

- WAC 173-201A-200(1)(d)(ii): Natural condition narrative aquatic life dissolved oxygen criteria for lakes

Because EPA is not changing its earlier approval, it is taking no new action with respect to those provisions.

EPA has completed its reconsideration, as contemplated by the Court's Order, and is disapproving revisions to the following sections of WAC Chapter 173-201A pursuant to its authority under section 303(c)(3) of the CWA, 33 U.S.C. § 1313(c)(3), and 40 CFR Part 131:

- WAC 173-201A-260(1)(a): Natural and irreversible human conditions
- WAC 173-201A-200(1)(c)(i) and WAC 173-201A-210(1)(c)(i): Allowable human contribution to natural conditions provisions for aquatic life temperature (fresh water and marine water, respectively)
- WAC 173-201A-200(1)(d)(i) and WAC 173-201A-210(1)(d)(i): Allowable human contribution to natural conditions provisions for aquatic life dissolved oxygen (fresh water and marine water, respectively)

EPA appreciates Ecology's commitment and ongoing work to update Washington's water quality standards. We also appreciate the collaboration by your staff to address the complexities associated with criteria revisions. If you have any questions regarding this letter, please contact me at (206) 553-1855 or Lindsay Guzzo, EPA staff lead, at (206) 553-0268 or Guzzo.Lindsay@epa.gov.

Sincerely,

DANIEL OPALSKI

Digitally signed by DANIEL OPALSKI
Date: 2021.11.19 09:38:35 -08'00'

Daniel D. Opalski
Director

Enclosure: Technical Support Document

cc (e-Copy): Ms. Melissa Gildersleeve, Water Quality Management Section Manager, Ecology
Mr. Chad Brown, Water Quality Management Unit Supervisor, Ecology

Technical Support Document

EPA's Clean Water Act Action on Revisions to the Washington State Department of Ecology's Surface Water Quality Standards for Natural Conditions Provisions

November 19, 2021

I. Clean Water Act Requirements for Water Quality Standards

The objective of the Clean Water Act (CWA) is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters with an interim goal, where attainable, to achieve water quality that provides for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water. Under section 303(c) of the CWA and federal implementing regulations at 40 CFR § 131.4, states (and authorized tribes) have the primary responsibility for reviewing, establishing, and revising water quality standards (WQS). These standards include the designated uses of a waterbody or waterbody segment, the water quality criteria that protect those designated uses, and an antidegradation policy. This statutory and regulatory framework allows states to work with local communities to adopt appropriate designated uses (as required at 40 CFR § 131.10(a)) and to adopt criteria to protect those designated uses (as required at 40 CFR § 131.11(a)).

States are required to hold public hearings for the purpose of reviewing applicable WQS periodically but at least once every three years and, as appropriate, modify and adopt these standards (40 CFR § 131.20). Each state must follow applicable legal procedures for revising or adopting such standards (40 CFR § 131.5(a)(6)) and submit certification by the state's attorney general, or other appropriate legal authority within the state, that the WQS were duly adopted pursuant to state law (40 CFR §131.6(e)). The U.S. Environmental Protection Agency's (EPA) review authority and the minimum requirements for state WQS submittals are described at 40 CFR § 131.5 and 131.6, respectively.

States are required by 40 CFR § 131.11(a) to adopt water quality criteria that protect their designated uses. In adopting such criteria, states should establish numeric values based on one of the following:

(1) CWA section 304(a) guidance;
(2) CWA section 304(a) guidance modified to reflect site-specific conditions; or,
(3) Other scientifically defensible methods (40 CFR § 131.11(b)(1)).

In addition, states should establish narrative criteria where numeric criteria cannot be established or to supplement numeric criteria (see 40 CFR § 131.11(b)(2)).

Section 303(c) of the CWA requires states to submit new or revised WQS to EPA for review and action. EPA reviews these changes and approves the WQS if they meet the requirements of the CWA and EPA's implementing regulations.

EPA considers four questions (described below) when evaluating whether a particular provision is a new or revised WQS. If all four questions are answered "yes" then the provision would likely constitute a new or revised WQS that EPA has the authority and duty to approve or disapprove under CWA § 303(c)(3).[1]

1. Is it a legally binding provision adopted or established pursuant to state or tribal law?
2. Does the provision address designated uses, water quality criteria (narrative or numeric) to protect designated uses, and/or antidegradation requirements for waters of the United States?

[1] *What is a New or Revised Water Quality Standard under 303(c)(3)? Frequently Asked Questions*, EPA No. 820F12017 (Oct. 2012). Available at https://www.epa.gov/sites/production/files/2014-11/documents/cwa303faq.pdf

3. Does the provision express or establish the desired condition (e.g., uses, criteria) or instream level of protection (e.g., antidegradation requirements) for waters of the United States immediately or mandate how it will be expressed or established for such waters in the future?
4. Does the provision establish a new WQS or revise an existing WQS?

If EPA approves a state's WQS submission, such standard(s) shall thereafter be the applicable standard for CWA purposes. When EPA disapproves a state's WQS, EPA shall notify the state and specify why the WQS is not in compliance with the requirements of the CWA and federal WQS regulations and specify any changes that are needed to meet such requirements (33 U.S.C. § 1313(c)(3); 40 CFR § 131.21).

Finally, EPA considers non-substantive edits to existing WQS to constitute new or revised WQS that EPA has the authority to approve or disapprove under § 303(c)(3). While such edits and changes do not substantively change the meaning or intent of the existing WQS, EPA believes it is reasonable to treat such edits and changes in this manner to ensure public transparency as to which provisions are applicable for purposes of the CWA. EPA notes that the scope of its review and action on non-substantive edits or editorial changes extends only to the edits or changes themselves. EPA does not re-open or reconsider the underlying WQS that are the subject of the non-substantive edits or editorial changes.

II. Background

On February 10, 2014, the Northwest Environmental Advocates filed a complaint in U.S. District Court for the Western District of Washington (Case No. 2:14-cv-0196-RSM) challenging, in part, EPA's February 11, 2008 CWA section 303(c) approval of the natural conditions provisions. On October 17, 2018, the Court issued an Order Granting a Stay (Dkt. 95) pending EPA's reconsideration of its prior determinations. The Order noted that EPA may complete its reconsideration by October 17, 2021, by making approval or disapproval decisions, or a final determination that such provisions are not water quality standards. The Court subsequently granted an extension for EPA to complete its reconsideration by November 19, 2021 (Dkt. 118).

This Technical Support Document constitutes EPA's reconsideration of the remaining provisions subject to the Court Order. EPA previously completed its review and reconsideration of the other provisions in actions dated April 30, 2019, October 13, 2020, and September 30, 2021.

III. Results of EPA's Reconsideration

In its February 11, 2008 action, EPA approved the revised natural conditions provisions at:

- WAC 173-201A-200(1)(c)(i) and WAC 173-201A-210(1)(c)(i): Allowable human contribution to natural conditions provisions for aquatic life temperature (fresh water and marine water, respectively);
- WAC 173-201A-200(1)(c)(v): Natural condition narrative aquatic life temperature criteria for lakes;
- WAC 173-201A-200(1)(d)(i) and WAC 173-201A-210(1)(d)(i): Allowable human contribution to natural conditions provisions for aquatic life dissolved oxygen (for fresh water and marine water, respectively);

- WAC 173-201A-200(1)(d)(ii): Natural condition narrative aquatic life dissolved oxygen criteria for lakes; and
- WAC 173-201A-260(1)(a): Natural and Irreversible Human Conditions.

Upon reconsideration, EPA is not changing and taking no action with respect to the February 11, 2008 approval of the provisions at WAC 173-201A-200(1)(c)(v) and WAC 173-201A-200(1)(d)(ii). EPA is disapproving the provisions at WAC 173-201A-200(1)(c)(i), WAC 173-201A-210(1)(c)(i), WAC 173-201A-200(1)(d)(i), WAC 173-201A-210(1)(d)(i), and WAC 173-201A-260(1)(a).

EPA's CWA section 303(c) action and the associated rationales are provided below. Today's action applies only to waters within the jurisdiction of the State of Washington and does not apply to waters that are within Indian Country, as defined in 18 U.S.C. § 1151. Nothing in this decision document shall constitute an approval or disapproval of a WQS that applies to waters within Indian Country. EPA, or authorized Indian Tribes, as appropriate, retain the authority to establish WQS for waters within Indian Country.

1. Natural Conditions Narrative Criteria For Lakes

In its February 11, 2008 action, EPA approved the revised temperature and dissolved oxygen natural conditions narrative criteria for lakes at WAC 173-201A-200(1)(c)(v) and WAC 173-201A-200(1)(d)(ii), respectively. More detail and information regarding EPA's action can be found in the 2008 decision document.[2]

The underlined text indicates the new and/or revised language from Ecology's 2006 WQS submittal, and strikeout text indicates Ecology's previous text, which had been replaced by the new or revised text.

Aquatic life temperature criteria for lakes

> **WAC 173-201A-200(1)(c)(v):** For lakes, human actions considered cumulatively may not increase the 7-DADMax temperature more than 0.3°C (0.54°F) above natural conditions. ~~Temperature - no measurable change from natural conditions.~~

Aquatic life dissolved oxygen criteria for lakes

> **WAC 173- 201A-200(1)(d)(ii):** For lakes, human actions considered cumulatively may not decrease the dissolved oxygen concentration more than 0.2 mg/L below natural conditions. ~~Dissolved oxygen - no measurable decrease from natural conditions.~~

EPA's Reconsideration: EPA has completed its reconsideration and is taking no action with respect to its February 11, 2008 approval of the revisions at WAC 173-201A-200(1)(c)(v) and WAC 173-201A-200(1)(d)(ii).

EPA Rationale for the 2008 approval:
In 2006, Ecology submitted revisions to the temperature and dissolved oxygen aquatic life criteria for lakes. The revisions clarified and quantified the previous criteria of "no measurable change from natural

[2] February 11, 2008. Letter from Michael F. Gearheard, Director, Office of Water & Watersheds, EPA Region 10, to David C. Peeler, Program Manager, Department of Ecology, re: EPA Approval of the 2003/2006 Revisions to the Washington Water Quality Standards Regulations. Available at: https://www.epa.gov/sites/production/files/2017-10/documents/wawqs-letter-02112008.pdf

conditions" (for temperature) and "no measurable decrease from natural conditions" (for dissolved oxygen) by identifying a 0.3ºC increase in temperature and a 0.2 mg/L decrease in dissolved oxygen as what would constitute a "measurable" departure from natural conditions. For temperature, the revision also added a 7-DADMax metric to the criterion.

In the February 11, 2008, Technical Support Document, EPA concluded that a 0.3ºC increase in temperature from natural conditions was insignificant and well within the range of uncertainty of the thermal requirements for salmon, which is approximately +/- 0.5ºC. EPA also noted that 0.3ºC was consistent with reliable field detection levels for temperature and is therefore considered within the error band associated with typical temperature monitors (pp. 27-28). The revised temperature criterion also added the 7-DADMax metric recommended for temperature standards by the *Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards* (EPA910-B-03-002, April 2003, hereinafter referred to as "Temperature Guidance") and that EPA determined to be scientifically defensible (p.4). EPA's 2008 approval, therefore, concluded that Washington's revisions to the aquatic life temperature criterion for lakes were protective of designated uses and scientifically defensible.

In assessing Washington's revisions to the dissolved oxygen criterion for lakes, EPA similarly concluded that a 0.2 mg/L decrease from natural conditions was insignificant. The 2008 approval rationale explained that an allowable decrease of 0.2 mg/L is within the monitoring measurement error for recording instruments typically used to monitor dissolved oxygen. EPA also explained that numerous factors impact oxygen levels in lakes and without at least some allowance for insignificant decreases a natural conditions criterion for dissolved oxygen in lakes would be unnecessarily restrictive for the protection of designated uses (p. 32). EPA's 2008 approval, therefore, concluded that Washington's revisions to the aquatic life dissolved oxygen criterion for lakes was protective of designated uses and scientifically defensible.

The narrative criteria are the applicable temperature and dissolved oxygen criteria for lakes in Washington, and leaving in place EPA's 2008 approval of these criteria ensures that aquatic life criteria for temperature and dissolved oxygen in lakes remain in effect for CWA purposes.

2. Natural and Irreversible Human Conditions

In its February 11, 2008 action, EPA approved the new narrative natural conditions provision at WAC 173-201A-260(1)(a) and took no action on the irreversible human conditions provision at WAC 173-201A-260(1)(b) after concluding the provision is not a WQS that EPA has the authority to approve or disapprove under section 303(c) of the CWA. More detail and information regarding EPA's action can be found in the 2008 decision document.[3]

With respect to WAC 173-201A-260(1)(a), EPA's 2008 decision stated that it is acceptable, under certain circumstances, for water quality criteria to reflect the natural condition of a water body as an alternative to the generally applicable numeric criteria. The rationale for this was that Washington's designated uses were supported by the water in its natural condition, prior to any human effects on water quality.

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[3] February 11, 2008. Letter from Michael F. Gearheard, Director, Office of Water & Watersheds, EPA Region 10, to David C. Peeler, Program Manager, Department of Ecology, re: EPA Approval of the 2003/2006 Revisions to the Washington Water Quality Standards Regulations. Available at: https://www.epa.gov/sites/production/files/2017-10/documents/wawqs-letter-02112008.pdf

The text of the provision first appeared in a 2003 water quality standards submittal to EPA and again in a 2006 submittal and is excerpted below.

> **WAC 173-201A-260(1):** Natural and irreversible human conditions.
> (a) It is recognized that portions of many water bodies cannot meet the assigned criteria due to the natural conditions of the water body. When a water body does not meet its assigned criteria due to natural climatic or landscape attributes, the natural conditions constitute the water quality criteria.

EPA's Reconsideration: EPA has completed its reconsideration and in accordance with its CWA authority, 33 U.S.C. § 1313(c)(3) and 40 CFR Part 131, disapproves the provision at WAC 173-201A-260(1)(a).

EPA Rationale: The natural conditions narrative provision at WAC 173-201A-260(1)(a) is broadly drafted and does not specify the types of criteria or pollutants to which it applies. On reconsideration, EPA concludes that as written this provision could be applied to a wide range of naturally occuring pollutants, including toxic pollutants, and could even allow an exception from otherwise applicable numeric human health criteria. Therefore, it is not consistent with EPA's interpretation of the relationship between natural conditions and the protection of designated human health uses, which is articulated in EPA's November 5, 1997 policy guidance entitled ''Establishing Site Specific Aquatic Life Criteria Equal to Natural Background.''[4] EPA's 2008 decision document cited to the 1997 policy guidance, as well as to language in an Advance Notice of Proposed Rulemaking for the Water Quality Standards program (*see* 63 Fed. Reg. 36,724, 36761 (Jul. 7, 1998)), as setting forth the relevant policy considerations for establishing water quality criteria based on natural conditions. However, what EPA failed to appropriately consider in its 2008 decision is that these documents only addressed the establishment of aquatic life criteria for pollutants at levels equal to the natural background condition, and expressly did not apply to human health uses, whereas the provision at WAC 173-201A-260(1)(a) is not similarly limited in scope to aquatic life uses or to specific pollutants.

In contrast with aquatic life uses, a naturally occurring level of a pollutant does not necessarily protect designated human health uses. Naturally occurring levels of a pollutant are assumed to protect aquatic life species that have naturally developed in the affected waters. However, humans generally do not adapt to higher ambient pollutant levels, even if they are naturally caused. Consequently, the same assumptions of protectiveness cannot be made with regard to designated uses that affect human health (*e.g.,* people eating fish or shellfish from Washington waters, and recreating in Washington waters). For this reason, EPA's 1997 guidance also states that where the natural background concentration exceeds the state-adopted human health criterion, at a minimum, states should re-evaluate the human health use designation.[5]

No Changes Necessary to Address the Disapproval: The effect of EPA's disapproval is that, as of the date of this action, the provision at WAC 173-210A-260(1)(a) is no longer an applicable WQS for CWA purposes. Because Washington's WQS currently include applicable numeric criteria that EPA determined to be protective of designated uses, no changes to Washington's WQS are necessary to meet the requirements of the CWA. Therefore, EPA is not specifying any changes that Washington must

[4] Davies, Tudor T., *Establishing Site Specific Aquatic Life Criteria Equal to Natural Background,* EPA Memorandum to Water Management Division Directors, Regions 1–10, State and Tribal Water Quality Management Program Directors, posted at: *https://www.epa.gov/sites/default/files/2014-08/documents/naturalbackground-memo.pdf*
[5] *Id.* at p. 2.

adopt to meet CWA requirements. EPA provides the following discretionary recommendations for the State's consideration.

EPA understands that WAC 173-201A-260(1)(a) was developed in parallel with numeric aquatic life criteria for marine and fresh waters, and that Washington intended to rely on the natural condition narrative to address circumstances where waterbody conditions are naturally less stringent than the adopted biologically-based numeric aquatic life criteria. In this respect the availability of a criterion that accounts for less stringent natural conditions was an important consideration in the establishment of numeric criteria for aquatic life. EPA continues to believe that appropriately drafted natural condition provisions can serve an important role in state WQS by reflecting a naturally occuring spatial and temporal variability in water quality that is protective of uses. A new general natural condition provision that is narrowly tailored to aquatic life uses could be adopted as a narrative criterion where numerical criteria cannot be established or to supplement numerical criteria (40 C.F.R. § 131.11(b)(2)). Alternatively, the adoption of a performance-based approach could be used to establish aquatic life criteria reflecting a natural condition for specific pollutants (see discussion for temperature and dissolved oxygen below).

EPA recommends removing the current WAC 173-201A-260(1)(a) from the State's WQS regulations to avoid confusion and provide greater clarity as to what is in effect for CWA purposes.

3. Allowable Human Contribution to Natural Conditions Provisions for Aquatic Life Temperature and Dissolved Oxygen Criteria For Fresh and Marine Waters

In its February 11, 2008 action, EPA approved the new and revised natural conditions provisions for temperature in fresh and marine waters at WAC 173-201A-200(1)(c)(i) and WAC 173-201A-210(1)(c)(i), respectively; and for dissolved oxygen in fresh and marine waters at WAC 173-201A-200(1)(d)(i) and WAC 173-201A-210(1)(d)(i), respectively. More detail and information regarding EPA's action can be found in the 2008 decision document.[6]

In the 2008 approval, EPA determined that insignificant temperature increases or insignificant decreases of dissolved oxygen concentrations above or below the natural condition were protective of the applicable designated uses because such insignificant departures from the natural condition were within the range of scientific uncertainty of effects on designated uses and/or within the error band associated with typical monitoring equipment. Specific to temperature, these "de minimis" allowable human-caused increases above natural conditions are consistent with the Temperature Guidance.[7]

The texts of each of the provisions are excerpted below.

Allowable human contribution to natural conditions provisions for aquatic life temperature:

> **Freshwater, WAC 173-201A-200(1)(c)(i):** When a water body's temperature is warmer than the criteria in Table 200 (1)(c) (or within 0.3°C (0.54°F) of the criteria) and that condition is due to

[6] February 11, 2008. Letter from Michael F. Gearheard, Director, Office of Water & Watersheds, EPA Region 10, to David C. Peeler, Program Manager, Department of Ecology, re: EPA Approval of the 2003/2006 Revisions to the Washington Water Quality Standards Regulations. Available at: https://www.epa.gov/sites/production/files/2017-10/documents/wawqs-letter-02112008.pdf

[7] EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards. EPA-910-B-03-002. April 2003. Available at https://nepis.epa.gov/Exe/ZyPDF.cgi/P1004IUI.PDF?Dockey=P1004IUI.PDF

natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F).

Marine water, WAC 173-201A-210(1)(c)(i): When a water body's temperature is warmer than the criteria in Table 210 (1)(c) (or within 0.3°C (0.54°F) of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F).

Allowable human contribution to natural conditions provisions for aquatic life dissolved oxygen:

Freshwater, WAC 173- 201A-200(1)(d)(i): When a water body's D.O. is lower than the criteria in Table 200 (1)(d) (or within 0.2 mg/L of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the D.O. of that water body to decrease more than 0.2 mg/L.

Marine water, WAC 173-201A-210(1)(d)(i): When a water body's D.O. is lower than the criteria in Table 210 (1)(d) (or within 0.2 mg/L of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the D.O. of that water body to decrease more than 0.2 mg/L.

EPA's Reconsideration: EPA has completed its reconsideration and in accordance with its CWA authority, 33 U.S.C. § 1313(c)(3) and 40 CFR Part 131, disapproves the provisions at WAC 173-201A-200(1)(c)(i), WAC 173-201A-210(1)(c)(i), WAC 173-201A-200(1)(d)(i) and WAC 173-201A-210(1)(d)(i).

EPA Rationale:
The allowable human contribution to natural condition provisions for temperature (WAC 173-201A-200(1)(c)(i) and 210(1)(c)(i)) and disolved oxygen (WAC 173-201A-200(1)(d)(i) and 210(1)(d)(i)) allow for human actions considered cumulatively to cause insignificant increases in temperature (0.3ºC) or decreases in dissolved oxygen (0.2mg/L) from the natural condition of the waterbody. As discussed above, EPA is disapproving the provision at WAC 173-201A-260(1)(a) that allows for the natural condition of a waterbody to constitute the applicable criteria when the natural condition is less stringent than otherwise applicable numeric criteria.[8] Absent an approved WQS that allows for the natural condition to constitute the applicable water quality criteria, the applicable criteria for temperature and dissolved oxygen in Washington waters are the numeric criteria in Tables 200(1)(c) and (1)(d) and 210(1)(c) and (1)(d). However, the temperature and dissolved oxygen natural condition provisions are based on the natural condition of the waterbody; the provisions do not authorize human actions to cause insignificant exceedances to the applicable numeric criteria. EPA is therefore disapproving the temperature and dissolved oxygen provisions that allow insignificant human impacts to the natural condition because such impacts are not tied to approved criteria that are in effect under the CWA.

No Changes Necessary to Address the Disapproval: The effect of EPA's disapproval is that, as of the date of this action, the provisions at WAC 173-201A-200(1)(c)(i), WAC 173-201A-210(1)(c)(i), WAC 173-201A-200(1)(d)(i), and WAC 173-201A-210(1)(d)(i) are no longer applicable WQS for CWA purposes. Because Washington's WQS currently include applicable biologically-based numeric criteria

[8] EPA's interpretation of WAC 173-201A-260(1)(a) is consistent with Ecology's January 29, 2016 letter in which it stated "[t]he rule makes it clear that where Ecology identifies a natural condition that is less stringent than the numeric criteria in the state's water quality standards, the natural condition supersedes the numeric criteria." Letter from David C. Peeler, Water Quality Program Manager, Ecology, to Michael Gearheard, EPA Region 10, Re: Ecology Responses to USEPA Region 10 Questions Regarding Washington's 2003 Adopted Water Quality Standards, p. 2.

for temperature and dissolved oxygen that EPA determined to be protective of designated uses, no changes to Washington's WQS are necessary to meet the requirements of the CWA. Therefore, EPA is not specifying any changes that Washington must adopt to meet CWA requirements. EPA provides the following discretionary recommendations for the State's consideration.

Washington, at its discretion, could adopt new natural conditions criteria specific to temperature and/or dissolved oxygen. One possibility would be for Washington to adopt into its WQS a performance-based approach for establishing temperature and/or dissolved oxygen criteria representative of the natural condition of a waterbody. A performance-based approach is a binding methodology that provides a transparent, predictable, repeatable, and scientifically defensible procedure to derive numeric criteria or to translate a narrative criterion into quantifiable measures that are protective of designated uses. The performance-based approach relies on the adoption of a systematic process (i.e., a criterion derivation methodology) rather than a specific outcome (i.e., concentration limit for a pollutant) consistent with 40 CFR Sections 131.11 and 131.13. When such a performance-based approach is sufficiently detailed and has suitable safeguards to ensure predictable, repeatable outcomes, EPA approval of such an approach also serves as approval of the outcomes as well. *See EPA Review and Approval of State Water Quality Standards*, 65 FR 24,641, 24,649 (Apr. 27, 2000).

A second possibility would be for Washington to adopt numeric temperature and dissolved oxygen criteria that account for natural conditions using the best available relevant data. EPA encourages Washington to consider magnitude, frequency, and duration components in setting water quality criteria to protect against acute and chronic effects.[9] This may include establishing protective site-specific criteria accounting for specific characteristics, such as unique temperature and/or dissolved oxygen regimes in different waterbodies (see EPA's Temperature Guidance).[10] Site-specific criteria established in this manner would be subject to CWA section 303(c) review.

Washington, at its discretion, could also choose to adopt new WQS provisions that allow for human actions, considered cumulatively, to cause insignificant exceedances in temperature and dissolved oxygen. As articulated in the 2008 Technical Support Document, EPA believes insignificant or de minimis exceedances to applicable temperature and/or dissolved oxygen criteria caused by human actions, considered cumulatively, may still be protective of designated uses.[11] Any such human use allowance provision must be scientifically defensible and tied to approved criteria that are protective of designated uses, which could include criteria based on the natural condition of the waterbody.

EPA recommends removing the disapproved provisions from the State's WQS regulations to avoid confusion and provide greater clarity to what is in effect for CWA purposes.

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[9] EPA Water Quality Standards Handbook – Chapter 3: Water Quality Criteria. EPA-823—B-17-001; 2017. Available at https://www.epa.gov/sites/production/files/2014-10/documents/handbook-chapter3.pdf

[10] EPA Issue Paper 3: Spatial and Temporal Patterns of Stream Temperature (Revised), October 2001. EPA-910-D-01-003, pages 2-9. Available at https://www.epa.gov/sites/production/files/2018-01/documents/r10-water-quality-temperature-issue-paper3-2001.pdf

[11] 2008 TSD at pp. 20-21, 32.

A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington

Water Quality Program

Washington State Department of Ecology

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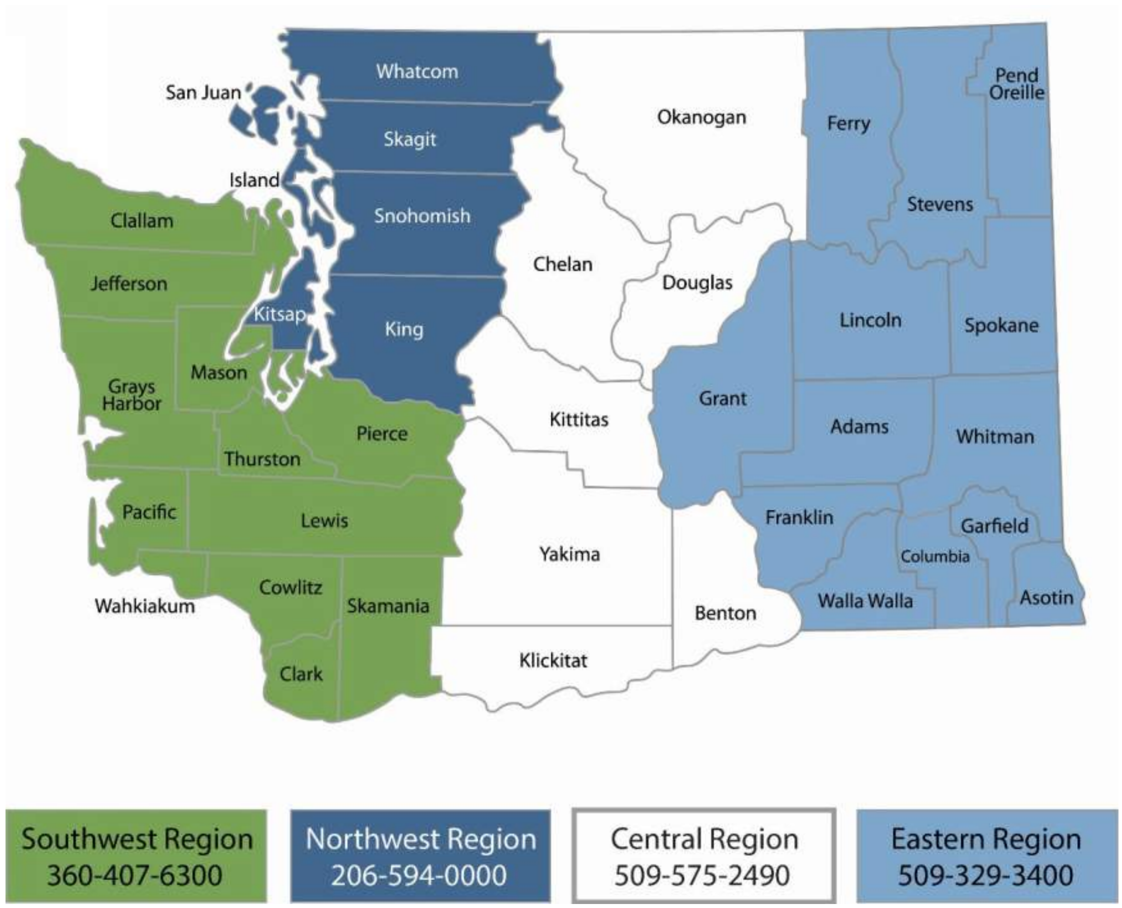

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DEPARTMENT OF
ECOLOGY
State of Washington

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Introduction and Background

Introduction and purpose

This publication is part of Chapter 173-201A Washington Administrative Code (WAC) Water Quality Standards for Surface Waters of the State of Washington.

Washington Department of Ecology (Ecology) recognizes that in some portions of some water bodies, the assigned aquatic life criteria may not be met due, in part, to the natural conditions of the water body, as acknowledged in EPA memorandum and guidance (Davies, 1997; EPA 2015). Therefore, if these natural climatic or landscape attributes are preventing attainment of applicable numeric aquatic life criteria, then the natural conditions of the system constitute the water quality criteria (see WAC 173-201A-260(1)(a)).

When the natural conditions of a waterbody are used to establish aquatic life water quality criteria, criteria values may be determined by use of various approaches, including the performance-based approach (see DRAFT WAC 173-201A-470).

When the performance-based approach is chosen to establish aquatic life water quality criteria for natural condition scenarios, development of these criteria values must follow the procedures in this document as per DRAFT WAC 173-201A-470. This performance-based approach can only be used for the following water quality parameters:

- Dissolved oxygen (DO; fresh water and marine water)
- pH (fresh water)
- Temperature (fresh water and marine water)

If the determination of aquatic life criteria values cannot meet the requirements set forth in this document, then alternative approaches, such as site-specific criteria, may be considered.

Regulatory information

Federal

The Clean Water Act requires states to adopt water quality standards that consist of designated uses, water quality criteria, and an antidegradation policy. Section 303(c)(2)(A) of the Clean Water Act gives the responsibility for adopting water quality standards to states and authorized Tribes, and that these standards will protect the public health or welfare, enhance the quality of water, and serve the purposes of the Act.

40 CFR 131.3(b) defines criteria as elements of the water quality standards (expressed as constituent concentrations, levels, or narrative statements) that represent a quality of water that supports a particular use such that when criteria are met, water quality will generally protect the designated use.

States and authorized Tribes must adopt water quality criteria that protect these designated uses (see 40 CFR 131.11). States and authorized Tribes may adopt, where appropriate, other criteria that differ from EPA's recommendations, so long as the criteria are:

- Based on sound scientific rationale,
- Contain sufficient parameters or constituents to protect the designated use or uses, and
- Support the most sensitive designated use of the waterbody.

States and authorized Tribes can adopt criteria that are modified to reflect site-specific conditions (see 40 CFR 131.11(b)(1)(ii)), so long as they are based on sound scientific rationale and protect designated uses. EPA has provided guidance for derivation of site-specific criteria outlined in *Water Quality Standards Handbook Chapter 3: Water Quality Criteria* (USEPA, 2023).

In 1997, EPA's Director of Office of Science and Technology Tudor T. Davies released a memo entitled *Establishing Site Specific Aquatic Life Criteria Equal to Natural Background* (Davies, 1997). In this memo, EPA recognized that naturally occurring concentrations of pollutants may exceed national criteria recommendations published under Section 304(a) of the Clean Water Act. EPA described how states and authorized Tribes may establish site-specific numeric aquatic life water quality criteria for waterbodies by setting the criterion value equal to natural background. Natural background was defined as "background concentration due only to non-anthropogenic sources; i.e., non-manmade sources" (Davies, 1997).

The memorandum recommends that the following elements should be included, at minimum, in a state's or tribe's water quality standards when setting criteria equal to natural background:

- A definition of natural background that states natural background is defined as the background concentration due only to non-anthropogenic sources, i.e., non-manmade sources.
- A provision that states site-specific criteria may be set equal to natural background.
- A procedure for determining natural background or a reference in the water quality standards to another document describing the binding procedure that will be used.

EPA has also developed additional documentation to provide clarity and direction for establishing site-specific criteria for temperature, dissolved oxygen, and pH (USEPA, 2015). This document provides a framework that includes recommendations for developing natural conditions criteria, including when using a performance-based approach for determining criteria values.

State

Water pollution control in the State of Washington is regulated under Chapter 90.48 Revised Code of Washington (RCW). This includes 90.48.010 RCW which declares that it is the public policy of the state to maintain the highest possible standard to ensure purity of waters consistent with public health, public enjoyment, and propagation and protection of wildlife, birds, game, fish, and other aquatic life.

90.48.035 RCW establishes the rule-making authority for the Department to promulgate rules and regulations necessary to carry out the provisions of Chapter 90.48, including water quality standards for the state.

Chapter 173-201A Washington Administrative Code (WAC) is the Water Quality Standards for Surface Waters of the State of Washington. This chapter establishes standards for public health and public enjoyment of waters in the State and for propagation and protection of fish, shellfish, and wildlife. The Water Quality Standards include, but are not limited to, the following sections regarding natural conditions criteria:

- WAC 173-201A-020 Definitions
    - Defines natural conditions or natural background levels, which means surface water quality present before any human-caused pollution.
- WAC 173-201A-260(1) Natural conditions and other water quality criteria and applications
    - Recognizes that portions of water bodies cannot meet the assigned aquatic life criteria due to natural conditions. When this occurs, this section establishes that the natural conditions constitute the water quality criteria.
- WAC 173-201A-430 Site Specific Criteria
    - Lists the requirements for determining site-specific criteria, which includes conducting development of such criteria that are scientifically justifiable.
- DRAFT WAC 173-201A-470 Performance-based approach
    - Lists the requirements for determining site-specific criteria using a performance-based approach. Criteria developed under this approach must be derived using procedures found in this document, which is adopted by reference into regulation.

Performance-Based Approach Use

Overview

Use of the performance-based approach may be considered when developing site-specific natural conditions criteria when all applicable and prerequisite state and federal regulations are met. This includes, but is not limited to, the natural conditions provision at WAC 173-201A-260(1)(a) and the performance-based approach at DRAFT WAC 173-201A-470.

Aquatic life water quality criteria values developed using the performance-based approach are applicable to the waterbody immediately following the performance-based approach derivation process, so long as all requirements set forth in this document are met. This document serves to meet the minimum recommendations in EPA's 1997 Memorandum that recommends water quality standards include a binding procedure that will be used for determining natural background (Davies, 1997).

Applicable parameters

Use of the performance-based approach is limited to the following parameters:

- Dissolved Oxygen, Fresh Water
- Dissolved Oxygen, Marine Water
- pH, Fresh Water
- Temperature, Fresh Water
- Temperature, Marine Water

Other parameters

This performance-based approach can only be used to establish natural conditions aquatic life criteria for water quality parameters listed in the above "Applicable Parameters" section. Natural conditions aquatic life criteria for other water quality parameters may be developed using alternative approaches specified at WAC 173-201A-260(1)(a), as applicable, and must follow all state and federal rulemaking regulations prior to becoming effective for state and federal Clean Water Act actions.

Natural conditions water quality criteria are appropriate only for the protection of aquatic life uses, not human health uses.

Process-Based Modeling Approach

Introduction

The process-based modeling approach characterizes the natural water quality for a parameter of interest through application of tools such as a water quality model. The water quality model determines the water quality dynamics for the parameter observed at the site of interest under current and natural conditions. This approach will allow quantification of effects at a site on the parameter of interest from both human sources and natural sources.

This approach can be used when there are indications that nonattainment of water quality criteria is due in part to natural processes. This approach can be used regardless of the level of human disturbance to the water body being evaluated, so long as the natural conditions for the parameter and site of interest can be quantified via the approach (i.e., the performance-based approach can be followed in its entirety).

In this approach, developing the natural conditions criteria consists of:

1. Defining where natural conditions will apply (site boundary).
2. Compiling existing, readily available, and credible current and historical water quality and site data.
3. Developing a Quality Assurance Project Plan (QAPP).
4. Obtaining new field data, if required in the QAPP.
5. Compiling, reviewing, and assessing any new field data to ensure it meets quality assurance (QA) / quality control (QC) goals.
6. Developing and calibrating a predictive model of the existing conditions of the waterbody or watershed, including defining temporal and spatial boundaries.
7. Evaluating model performance.
8. Determining whether nonattainment of numeric water quality standards is due, in part, to natural processes.
9. Calculating the natural conditions criteria values by removing known and estimated human-caused impacts from the predictive model.

The analysis of data and development of the criteria values must be documented. If the developed criteria values are used in subsequent state or federal Clean Water Act actions, then: (a) this documentation must be included with the documentation for the CWA action; and (b) the criteria values must be accessible to the public.

Define site boundaries

The first step in developing natural conditions criteria using this approach is defining site boundaries. The boundaries of the site of interest must be defined and documented. Boundary information should include geospatial information. The site boundary consists of the entire model domain, which may include multiple assessment units of interest to the project. Natural conditions criteria for each assessment unit will be derived based on the resolution of the model and the spatial and temporal variability of its predictions.

Project Quality Assurance Project Plan requirements

The next step in developing natural conditions criteria using this approach is developing the project Quality Assurance Project Plan (QAPP). Data quality objectives and measurement quality objectives must be established within the QAPP to ensure proper model calibration and evaluation such that, once met, the output of the model could be used to inform the selection of appropriate natural conditions criteria. Additional programmatic, departmental, or other requirements may exist for inclusion in any project QAPP.

The project QAPP must provide:

1. Key objectives, goals, and questions that are to be addressed by this project.
2. Observational data quality objectives.
3. Description of the data to be used, identified data needs, and data sources.
4. Model capability descriptions or references, including identification of key processes that drive water quality.
5. Model peer-review approach and/or documentation.
6. How spatial and temporal variability will be addressed in any model or models to ensure that natural condition estimates protect designated and existing uses.
7. Model approaches and key assumptions, which may include boundary conditions and associated determinations, initial or existing conditions, model resolution, inflow loads, or watershed inputs.
8. Description of the computational setup.
9. Model quality objectives, including how model calibration performance and model skill will be evaluated using both quantitative statistics, skill metrics, and qualitative methods.
    a) Model segment or grid size descriptions and rationale as to appropriateness linked to (4).
    b) Description of reasonable fit or other statistics between model-estimated and measured conditions following model calibration.
    c) Performance goal targets.
    d) Any model limitation, uncertainties, and assumptions, and how these could impact (if applicable) the reasonableness to meet the goals and objectives of the project.
    e) Quality Assurance and Quality Control considerations, such as adherence to the Department's programmatic QAPP for assessing impaired waters.

Data sources

All existing, readily available, and credible water quality and site characterization data for the site of interest and waters that affect the site of interest must be considered. Credible water quality data are defined by Washington's Water Quality Data Act in RCW 90.48.585 and discussed in Water Quality Policy 1-11 Chapter 2, Ecology publication 21-10-032. Waters that affect the site of interest include upstream waters (e.g., tributaries), groundwater, oceanic inputs, and waters outside the jurisdiction of the State of Washington (e.g., waters from another state or country) where relevant. The description of the data compiled and data sources must be documented in the project QAPP.

Water quality data

Water quality data must include data for the parameter(s) of interest in natural condition criteria value development. Additional water quality data may be necessary (e.g., salinity, ambient air temperature) to further demonstrate that nonattainment of an aquatic life criterion is due, in part, to natural causes or to characterize the site of interest. These data requirements will be detailed in the QAPP as they are project specific. For these data, including initial conditions data for model setup, the data must be from a range of years that encompasses the natural variability of a site, waterbody type, and parameter of interest.

Sources of readily available data include state and federal water quality databases. Washington maintains the Environmental Information Management[2] (EIM) database, which contains environmental monitoring data collected by Ecology scientists and partners. Federal water quality data includes data in the Water Quality Portal[3], which integrates data from the United States Geological Survey (USGS), EPA, and other state, federal, tribal, and local agencies. Other sources of information could include datasets related to forests and grasslands (such as from the United States Department of Agriculture Forest Service), water quality data collected by the United States Army Corps of Engineers, United States Department of Interior (including the Bureau of Reclamation) data, other state water quality databases, tribal water quality data, or other credible water quality data from outside the United States.

Existing, available, and credible data may also be found in academic and literature sources, and these published data from reputable research journals must be obtained and considered. Additional sources of data may include data collected under state or federally approved quality assurance project plans, private and public facilities (e.g., data collected as part of National Pollutant Discharge Elimination System, or NPDES, permits), and utilities (e.g., drinking water facilities).

Finally, Ecology has gathered relevant external data sets useful and applicable for water quality impairment studies. A list of these data sources, quality assurance information, and links to data are available in Appendix A of Ecology's Programmatic QAPP[4] (Ecology, 2017). This programmatic QAPP references data sets for water quality process-based modeling which are used to develop natural conditions aquatic life criteria. Data used should follow the quality objectives outlined in the section "Quality Objectives" of the above-referenced document.

[2] https://apps.ecology.wa.gov/eim/search/default.aspx
[3] https://www.waterqualitydata.us/
[4] https://apps.ecology.wa.gov/publications/SummaryPages/1703107.html

Site characterization data

In addition to water quality data, additional data must be identified to characterize the site of interest using all existing, readily available, and credible data. These data must also be sourced for waters that affect the site of interest (e.g., tributaries, upstream waters). These data may be necessary to characterize the site of interest and the application of the model (e.g., model validity), or data may be necessary to assist with other processes (e.g., modeling hydrodynamics, thermodynamics). Specific data needs must be addressed in the project specific QAPP.

Site characterization data information includes, but is not limited to, the following (required unless marked as optional):

- Data characterizing the boundary and initial conditions of the site.
    - Include data for any relevant or appropriate headwaters, tributaries, and groundwaters.
    - This may include applicable water quality data (e.g., dissolved oxygen, sediment characteristics, turbidity). This may also include information regarding nutrient fluxes (e.g., phosphorus, nitrogen, dissolved organic carbon), sediment fluxes, site alkalinity, or planktonic data.
    - Data should be from a range of conditions, both current and natural, encompassing the expected natural and impacted variability of a site and parameter of interest.
        - Conservative assumptions reflective of natural conditions will be made based upon sensitivity (range) testing.
    - Data gaps may be present. See the section “Data Gaps” below on how data gaps are addressed.
- Description of surrounding vegetation and riparian conditions.
    - This may include, but is not limited to, tree canopy cover data, system shade potential, any applicable stream buffer zones, or estimates of the fraction of solar radiation reaching the water surface.
- Waterbody morphology.
    - This includes size, shape (such as measured by shoreline development factor), and connectivity (such as via intersection with surface flow lines).
- Hydrodynamics and physical properties.
    - Including, but not limited to, density, salinity, and tidal attributes (where relevant).
- Light availability.

- Data characterizing light availability throughout the water column.
- Sediment mobilization and concentrations in the water column.
- Bio-geochemical concentrations and characteristics.
  - Includes relevant water quality and related parameters such as dissolved oxygen, nutrients, photosynthetic pigments, carbonate system concentrations, and metals.
- Sources of groundwater connected to the surface waters of interest.
  - Data could include groundwater quality data and characterization, flow rates, and sources of withdrawal or recharge.
- Hydrological modifications.
  - This may include identification of dams or impoundments, channelization (e.g., dredging, bank erosion) information, impacts to natural flow regimes, and evaluations of bottom roughness and gradient.
- Point source discharges.
  - Identification of all point-source discharges, including NPDES permits. Information related to the discharge should be sourced, such as effluent characteristics, discharge locations, and mixing zone boundaries.
- Non-point source discharges.
  - Identification of all known non-point sources, including those discharges within and upstream of the site of interest.
  - This includes runoff from all sources present that could impact the site, which includes all human activities including but not limited to: agriculture activities; septic systems; mining; presence of non-native vegetation; impervious surfaces; and forestry activities.
    - This could also include surface and groundwater non-point source load information.
  - Provide estimations for nutrient and organic carbon loads for dissolved oxygen and pH natural conditions calculations.
  - This includes water quality data associated with the non-point sources, volume of water from these discharges, and distance between runoff and the site of interest.
- Meteorological data.

    - This includes data such as ambient air temperature, precipitation, humidity, or wind as required by the modeling platform selected (refer to model documentation).
    - These data should capture the expected natural and impacted variability.
- Atmospheric deposition data.
    - Include information relevant to parameters of interest (e.g., nutrient deposition, inorganic carbon or sulfur deposition).
- Other climatic data.
    - This includes long-term data (collected or estimated through climatic models) that describe how humans have impacted the site from a global scale (e.g., watershed temperature increases due to emissions).
- Kinetic and physical rates and ratio data.
    - This includes, but is not limited to, attributes of a site such as primary production rates, aeration, organic carbon decomposition rates, and nutrient limitation rates.
    - Natural conditions parameterization of rate process and kinetic functions must rely on site-specific data, if available.
    - Kinetic and physical rates and ratio values must be consistent with model literature and understanding of natural dynamics for the site and parameter of interest.
- Invasive species.
    - Invasive species information should be sourced, including known habitat.
- Biological indices or other measures (optional).
    - Collect any available information regarding previously reported, scientifically applicable biological indices or other measures that characterize aquatic life health of the system. Indices or measures should be: published in reputable scientific journals or by local, state, tribal, or federal agencies; and peer reviewed.

Types of data

Data sourced for water quality and site characterization is not limited to numeric datasets. In addition to numeric data, all existing, readily available, and credible data could include, but is not limited to, data in the form of:

- GIS data (e.g., maps).

    - Such as maps of the site of interest and surrounding area, including upstream, that indicates historical and current land cover or land use.
- Site-survey data.
    - Data in, near, and around the site of interest, including road coverage and density, hydrological alterations, or other human-constructed structures.
- Site photographs.
    - These could show the presence or extent of riparian vegetation, tree canopy, and waterbody morphology.
- Records from relevant state or federal agencies.
    - This may include information such as historic or current mining activities, forest logging, or other major human actions (e.g., NPDES permits) within or upstream of the site.
- Cultural histories, interviews, or other tribal information of the watershed.
    - This could be used to demonstrate historical uses of the waters.

Data timeframe and metadata requirements

There are no restrictions or limits on obtaining applicable data other than those previously identified (i.e., all existing, readily available, and credible data). Ideal datasets will include long-term data[5] for the water quality parameter(s) of interest and data that represents pre-industrial periods or before large-scale human impacts.

If combining data across multiple time frames to estimate natural conditions, the methodology used in combining data sets must be documented and will be appropriately conservative to capture the range of conditions that protect existing and designated uses across the scales of aggregation.

All associated metadata must be included alongside the sourced water quality and site characterization data. This includes any quality assurance or quality control information, geospatial information, and data collection information (e.g., time of collection, depth).

Data gaps

Any data gaps in the data compilation should be identified. If data gaps are filled (such as through estimation), or any data are estimated for the project, the process for doing so must be described in the project QAPP and final report, and its use must be supported with best professional and scientific judgement.

[5] Defined as data collected regularly (e.g., monthly) over at least ten years.

Model development and requirements

The process-based modeling approach considers the use of a model or models to estimate natural conditions of a system, which can be used to determine appropriate natural conditions criteria for the site of interest. Any models used in this approach must follow the requirements set forth in the project QAPP as well as the following requirements:

- The model must allow for reproducibility of results.
  - This means the model code should be open source, with existing and reference input and output files, alongside data sources, and made available to the public.
- The model framework, including the model code, will have undergone a formal peer-review process before application, or be recognized as widely-used code in the published literature, if not peer reviewed previously and fully documented.
  - Documentation of the peer-review process must be described in the project QAPP or final report associated with this approach.
- Model selection will be from a set of best available modeling tools applicable for the specific purpose to estimate natural conditions based on the project requirements and best professional judgement.
- The model or models chosen must be able to simulate all key processes and sources affecting the parameters of interest.
- Calibration of the model must be done using reasonable adjustments of model parameters, as defined using best professional judgement and comparison to typical parameter ranges documented in literature, peer-reviewed reports, and other similar studies, to achieve a reasonable fit between model-estimated and measured conditions based upon the peer review of the individual model, or by comparing to documented model fit statistics from other similar applications using the same model.
  - The quality of the model calibration must be documented and include both qualitative and quantitative evaluations.
- The model should be able to recreate the existing condition scenarios with the quality specified in the project QAPP.
  - Model calculated outputs must be compared with measured data at calibration locations. A sufficient number of calibration locations will be defined and identified prior to model application.
  - Modeled hydrodynamics and relevant parameters (e.g., DO, temperature, pH) for all waterbody types simulated must be evaluated.
- Model documentation should information about and what are the unknowns and uncertainties in model outputs.
- The model must have sufficient resolution (and such resolution is documented) to:
  - Predict horizontal and vertical variations in water quality (e.g., tributary confluences, varied depths in stratified reservoirs). These predictions must be generated on least an hourly basis.

    - Capture the impacts to all designed uses, including the most sensitive designated use, and provide rationale for this determination in the project QAPP or final report.
    - Identify criteria outcomes that are fully protective of the designated or existing uses.
- The model domain must be large enough to encompass the entire system of interest while sufficiently accounting for boundary conditions.
- All model parameter values must be documented.
- The flow and water quality information for any groundwater, tributaries, upstream inflows, and open boundary inflows must be set at estimated natural conditions of those waters based on readily available and credible information.
    - The methods used and assumptions made must be documented.
- Sensitivity testing must be conducted on the means and ranges on parameters which affect the natural condition outcome.

All technically feasible steps to improve model performance and representativeness of the model, based on available information, must be taken prior to model acceptance and use to estimate natural conditions.

Determining that nonattainment is due, in part, to natural processes

Introduction

Use of the process-based modeling approach must include an evaluation that determines the extent of how the nonattainment of the applicable water quality criteria is due to a natural process or variation. In this determination, use of this approach must consider all required elements listed in this section during site characterization and evaluation. If any required element is not applicable or relevant to a site (e.g., there are no hydromodifications within or upstream of the site of interest), then its non-applicability or non-relevancy must be justified using firm scientific rationale or professional judgement.

Due to hydrological differences, required elements are split between fresh waters and marine waters. Use WAC 173-201A-260(3)(e) to determine whether fresh water or marine water criteria apply to the site of interest.

Accounting for human-caused impacts and pollution

In the process for determining the extent of natural conditions' impact on nonattainment of the applicable water quality criteria, analysis of the various elements will include factors related to human-caused impacts to surface water quality. Ultimately, these impacts will need to be accounted for and removed in the natural condition estimation.

Specifically, human-caused sources of pollution originating within the boundaries of the State of Washington impacting surface waters of the State must be accounted for and removed in the natural condition mechanistic model. This includes accounting for all known sources of heat, oxygen-demanding pollutants, and pH-altering pollutants, including but not limited to those listed within each element.

All other human-caused sources of pollution that impact the site must be accounted for as best as possible using existing, readily available, and credible information (e.g., global climate change, boundary inputs from sources outside the United States). These sources can be excluded from the model if it is not feasible to model it, but the impact of these sources must be estimated outside the model before deriving the final criteria values. While data used to address these other sources of pollution must meet credibility requirements, it may not meet other resolution or frequency requirements established in the project QAPP. Further, these data may range in database size and complexity, from simple numeric datasets to complex models that have previously been developed to estimate human impacts to water quality on a global scale.

Any source or stressor that are not part of any model used in this approach must have a rationale for exclusion. These sources must not affect the parameter or site of interest.

Any final natural conditions criteria values used for further state and federal Clean Water Act actions must represent the natural conditions of the water of interest as defined in WAC 173-201A-020: that the natural conditions reflect the water before any human-caused pollution.

Human structural changes

The performance- based approach may not be used to derive criteria for specific assessment units of waters that contain human structural changes that cannot be effectively remedied (see WAC 173-201A-260(1)(b)). In these situations, alternative criteria may be developed (e.g., site-specific criteria, through a use attainability analysis).

The performance-based approach, however, may be used for other assessment units that are impacted by a waterbody containing human structural changes (as per WAC 173-201A-260(1)(b)), so long as the regional natural condition values with an underlying scientific basis defined in the project-specific QAPP or relevant documentation are used to remove the potential impacts of the irreversible structural changes.

Elements – fresh waters

Each element contains a description of the information to be evaluated in the model. The use of each of these elements and subsequent analyses based on corresponding data should be documented in the final report.

Boundary and initial conditions of site

The boundary or initial conditions of the site includes any relevant or appropriate headwaters, tributaries, and groundwaters. These site conditions are used to define flow, water quality concentrations (including but not limited to nutrients, carbon, dissolved oxygen, and temperature), and other biological, chemical, and physical parameters in the spatial area of interest for the model. Boundary conditions must be set at estimated natural conditions of these waters, based on readily available and credible data. All methods used and assumptions made in setting boundary conditions for natural condition predictions must be documented in the final report. This documentation must include rationale for boundary siting within the model domain as well as water quality conditions.

Impacts by humans on boundary or initial conditions of the site must be accounted for and removed in the natural condition estimation. This includes but is not limited to:

- Any impacts by humans on tributaries which influence the site of interest.
- Loss of stream baseflow or other flow changes (e.g., stagnant conditions)
- Decreased groundwater availability due to human withdrawals.
- Human recharge to groundwater that results in discharges that affect DO levels and nutrient concentrations in streams.
- Increased sedimentation, including fine sediment.
- Changes to benthic submerged aquatic vegetation.
- Changes in residence time of the system.

All methods and procedures to characterize how these will be accounted for and removed will be included in the QAPP and documented in the application of the PBA.

Hydrologic or hydraulic modifications

Hydrologic or hydraulic modification data are evaluated to understand how modifications to the site have changed over time, regardless of whether anthropogenically or naturally caused. This information will be used to:

- Demonstrate changes in the water compared to historical records, including identification where and when major hydrological projects occurred.
- Estimate natural channel widths to system potential shade calculations.
- Model water system changes with the removal or alteration of any hydrological or hydraulic modifications (i.e., dams, culverts, and other modifications removed in the natural simulation).
- Demonstrate the impact of groundwater fluxes into the system including groundwater restoration in the natural simulation.
- Account for withdrawals or pumping outside of boundary conditions and adjust inflow accordingly such that it reflects natural flows.
- Explicitly model surface withdrawals as point abstractions in current conditions flow balance then remove withdrawals for natural condition determinations.

Impacts to water quality must be accounted for and removed in the natural conditions' estimation, and the process for doing so must be in the project specific QAPP. This includes:

- Upstream and downstream impacts from dams.
    - Stream temperature impact, including but not limited to timing and depth changes of seasonal thermoclines.

    - Dissolved oxygen impacts, including but not limited to releases of water with low DO concentrations and changes in primary productivity and respiration.
    - pH impacts, including but not limited to impacts during water thermal stratification and changes in primary productivity and respiration.
- Loss of channel complexity.

See "Human Structural Changes" for additional information.

Riparian conditions

Data regarding the riparian conditions of the site must be reported and analyzed. Riparian differences between existing conditions and natural conditions may be a driver in impact of solar radiation on the water body of interest. This information could be used in:

- System potential shade estimations.
- Comparison of vegetation height or density to applicable reference sites.
- Making historic tree height comparisons.
- Perform analyses using tree diameter data, which is used to estimate tree heights using known species-specific relationships.

The loss of riparian shade or other vegetation impacts along the shoreline due to human actions must be accounted for and removed in natural condition estimations.[6] The methods used must be documented.

Meteorological conditions

Applicable meteorological conditions and data must be reported and evaluated based on the project requirements. Analyses of meteorological conditions will be used to:

- Develop hydrodynamic and thermodynamic simulations based on a range of conditions.
- Investigate differences between current and unaltered habitats.
- Demonstrate how reduction of air temperatures could reflect small changes in riparian climates.
- Measure climate change impact on the natural conditions of a system over time.

Impacts must be accounted for and removed (e.g., climate change impacts on air temperature). As these impacts will vary by project and possibly over time, the specific impacts identified, accounted for, and removed must be documented and provided in the final report.

Point source discharges

Impacts by all point source discharges within and upstream of the site of interest must be documented and evaluated. This information may be useful to:

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[6] For example, determine system potential tree height based on General Land Office survey bearing tree records converted to tree heights using known species-specific relationships between diameters and height.

- Model how removal or reduction of a pollutant in discharged effluent would affect the water quality parameters of interest.
- Demonstrate how effluent flow rate adjustments would influence the system under evaluation.

These impacts from discharges (e.g., NPDES permitted discharges, wastewater, stormwater outfalls) must be accounted for and removed in natural condition estimations.[7] This includes but is not limited to:

- Accounting for impact of point source effluent on dissolved oxygen, including biochemical oxygen demand and nutrient loads.
- Discharge impacts on water temperature.
- Effects on pH (including changes or increases in pH range or extremities).

Non-point source discharges

All readily available non-point source discharges within and upstream of the site of interest must be evaluated for impact to the site of interest. This includes surface and groundwater non-point source loads. This element is to understand the pollutants entering the site waters dispersed from any land-based or water-based activity that is not otherwise regulated under a state surface water discharge permit or NPDES permit. This information will be used to:

- Demonstrate how alterations or reductions of these discharges could influence water quality of the site.
- Compare data to reference sites to estimate non-point impact.
- Develop a reference natural condition land-use condition for further analysis in any developed water quality model.

Any impacts from non-point source discharges, including human development in the watershed, must be accounted for, and removed, when estimating natural conditions of the site.[8] This includes accounting for impact of non-point source discharge on the biochemical oxygen demand, dissolved oxygen, nutrients, temperature, and pH of the water. All processes and methods used must be included in documentation and the final report.

Kinetic and physical rates and ratios

Kinetic and physical rates and ratios relate to temporal or speed attributes at which chemical, biological, or physical reactions or processes take place. The values assigned to rates are estimated in the model calibration process. If there is information indicating that a rate or ratio is impacted by human-caused factors, these impacts to the rates or ratio must be accounted for and removed when estimated natural conditions.

[7] No discharges allowed in natural condition estimations.
[8] For example, using a reference natural condition land use condition.

Invasive species

Information regarding invasive species should be provided and evaluated. In the context of this approach, “invasive species” refers to non-native plants or animals that have been introduced into the site of interest since the start of the industrial era, or native plants or animals that have hyper-aggressively propagated due to human-conditioned environments. This information may be used to:

- Demonstrate the impact that invasive species have on shade changes over time in shade analyses.
- Demonstrate impact to water quality with reduction or removal of invasive species.

Impacts of invasive species must be accounted for and removed in natural condition estimations. This may include evaluating impact of invasive species on lower trophic level organisms or aquatic life (e.g., benthic vegetation) and how invasive species may have caused changes in water quality. Methods and data sources for invasive species and methods for capturing return to non-invasive status must be documented and included in final report.

Elements – marine waters

Each element contains a description of the information to be evaluated as well as examples of how analysts may use this information. The use of each of these elements and subsequent analyses based on corresponding data should be contained in the final report.

Boundary and initial conditions of site

The boundary or initial conditions of the site includes any relevant or appropriate headwaters, tributaries, and groundwaters. These site conditions are used to define flow, water quality concentrations, and other biological, chemical, and physical parameters in the spatial area of interest for the model. These must be set at estimated natural conditions of these waters, based on readily available and credible data. All methods used and assumptions made in setting boundary conditions for natural condition predictions must be documented in the final report.

Impacts by humans on boundary or initial conditions of the site must be accounted for and removed in the natural condition estimation.

Hydrologic or hydraulic modifications

Hydrologic or hydraulic modification data are evaluated to understand how modifications to the site have changed over time, regardless of whether anthropogenically or naturally caused. This information could be used to:

- Demonstrate changes in the water compared to historical records, including identification where and when major hydrological projects occurred.
- Model water system changes with the removal or alteration of any hydrological or hydraulic modifications.
- Account for withdrawals or pumping outside of boundary conditions and adjust inflow accordingly.

Impacts to water quality must be accounted for and removed in the natural conditions' estimation. See "Human Structural Changes" for additional information.

Meteorological conditions

Applicable meteorological conditions and data should be reported and evaluated based on the project requirements. Analyses of meteorological conditions may be used to:

- Investigate differences in these conditions between current and unaltered habitats.
- Evaluate scale-appropriate inputs that influence factors such as algal photosynthesis, productivity, mixing, or stratification.

When using this element in the mechanistic approach, generally use the same meteorological observational or model-based meteorological files for natural conditions as existing conditions, unless specified otherwise in the project QAPP or there exists a firm scientific basis.[9]

In estimating natural conditions criteria, impacts must be accounted for and removed, and the methods and process must be included in documentation and the final report.

Point source discharges

Impacts by all point source discharges within and upstream of the site of interest must be documented and evaluated. This information may be useful to:

- Model how removal or reduction of a pollutant in discharged effluent would affect the water quality parameters of interest.
- Demonstrate changes in water quality if effluent concentrations into marine or brackish waters (including those from freshwater systems) were set to natural ambient levels.

These impacts from discharges (e.g., NPDES permitted discharges, wastewater, stormwater outfalls) must be accounted for and removed in natural condition estimations. Methods and process for doing so must be included in documentation and the final report. This includes but is not limited to:

- Accounting for impact of point source effluent on the biochemical oxygen demand.
- Discharge impacts on water temperature outside mixing zones.
- Effects on pH (including changes or increases in pH range or extremities).

Non-point source discharges

All non-point source discharges must be evaluated for impact to the site of interest. This element is to understand the pollutants entering the site waters dispersed from any land-based or water-based activity that is not otherwise regulated under a state surface water discharge permit or NPDES permit. This information may be used to:

[9] For example, some projects may have this element based on published literature and will not be modeled.

- Demonstrate how alterations or reductions of these discharges could influence water quality of the site.
- Make comparisons to reference sites to estimate non-point impact.

Any impacts from non-point source discharges, including human development in the watershed, should be accounted for, and removed, when estimating natural conditions of the site. This includes accounting for impact of non-point source discharge on the parameter of interest, such as biochemical oxygen demand, temperature, and pH of the water. The methods and process for doing so must be included in documentation and in the final report.

Kinetic and physical rates and ratios

Kinetic and physical rates and ratios relate to temporal or speed attributes at which chemical, biological, or physical reactions or processes take place. This information may be used in:

- Model calibration process.
- Specify rates or ratios for natural conditions when there is a scientific basis to do so.

Impacts to these rates and ratios must be accounted for and removed when estimating natural conditions. The methods and process for doing so must be included in documentation and in the final report. This includes:

- Evaluating the ability of the water to hold dissolve oxygen, and subsequently, determining loss of that ability based on increases of water temperature due to human-caused impacts.
- Analyzing changes to algal and plant photosynthetic rates due to eutrophication driven by human causes (e.g., point- and non-point loading of nitrogen and phosphorus).
- Evaluation of human-driven changes in biological productivity.

Determining natural conditions criteria values

Criteria magnitude

The process-based modeling approach uses a model to estimate natural conditions of a system, which can be used to determine appropriate natural conditions criteria for the site of interest. Development of the applicable natural condition criteria magnitudes must consider all existing, readily available, and credible data for the site of interest. Any biogeochemical and physical relationships used for determining natural conditions must be established based upon known relationships for pristine or pre-anthropogenic conditions.

Natural condition criteria magnitude estimations must reflect the natural conditions of the system without any human impacts. See “Accounting For Human-Caused Impacts and Pollution” for additional details.

Modeling outputs and subsequent analysis must include a demonstration of the natural extent of the parameter.[10] This includes:

- Describing long term (multi-week to inter-annual) range and variation in the parameter.
- Calculations of summary statistics, including low or high percentiles, as appropriate, of the natural condition estimations.
- Demonstration of how input variability (e.g., flows, temperatures) impacts the magnitude of the parameter(s) under investigation.

Determination of the natural condition criteria magnitudes must be done on a specified cell by cell or node by node (depending upon the model) basis. The basis for these decisions must be documented, and the resulting criteria values must provide protection for all designated and existing aquatic life uses. Natural conditions criteria cannot be developed for areas where reliable estimates of the natural conditions cannot be produced.

Model outputs that estimate natural conditions represent the system potential conditions of the site. The model output resolution will vary by project design (as described in the QAPP), data availability, and model choice. The highest resolution model outputs that represent the natural conditions criteria magnitudes of the site must:

- Meet the precision and accuracy requirements set forth in the project QAPP,
- Reflect the parameter (DO, temperature, pH) biologically based numeric criteria metrics,
- Abide by the data and modeling requirements in this performance-based approach, and
- Protect designated and existing uses by removing all human-caused impacts and pollution to the water of interest.

If various model outputs are used in analysis (such as from using multiple model runs across different years), then the model run(s) chosen must best reflect the long-term natural condition of the system and capture the range of long-term conditions.

If aggregating estimated natural condition criteria values to "simplify" the final natural conditions criteria,[11] then criteria values must be aggregated in such a way that:

- Any aggregated groupings (e.g., water assessment units) are scientifically or professionally justifiable.
- The natural condition criterion value determined post-aggregation is fully protective of aquatic life across the entire grouping.[12]

[10] Such as the range of magnitude of the parameter.
[11] Such as determining a single criterion value that applies to two assessment units.
[12] For example, consider a temperature determination scenario aggregating two assessment units that are abutting in a freshwater stream. If the natural condition criterion value determined for one assessment unit is estimated to be 16.2°C and the other assessment unit criterion value is estimated to be 16.8°C, then the final aggregated natural condition temperature criterion value that protects aquatic life across the grouping would be 16.2°C.

This process of aggregation, support for the groupings used, and calculations for the natural condition criteria values must be documented and have a firm scientific basis. Further, these criteria values must fully protect designated and existing uses.

Finally, criteria magnitudes determined may reflect a singular or combination of values[13], and these values must protect designated and existing uses based on the chosen statistical metrics (e.g., 7-DADMax, no more than one exceedance in a 10-year period).[14] This includes protections against acute and chronic impacts of the parameter on aquatic life.

Criteria duration and frequency

Any developed natural conditions criteria must include duration and frequency components. In estimation of the natural conditions, the statistical metric will be the biologically based numeric criteria for each parameter simulated. The duration and frequency of these natural condition estimates should match the duration and frequency requirements of the applicable biologically based numeric aquatic life criteria within WAC 173-201A.[15]

Criteria evaluation and application

Developed natural conditions criteria must include the periods of the year when the criteria values apply, if applicable. For example, the criteria might only be applicable for the summer period or during low flow conditions. If natural conditions criteria were calculated using such restrictions (e.g., seasonal boundaries), then any developed natural conditions criteria values have the same restrictions. The period of application for natural conditions criteria will not include times or conditions where limited or no data are available; the existing biologically based numeric criteria would continue to apply during these times or conditions.

Site-specific numeric aquatic life criteria derived in accordance with the performance-based approach are the applicable numeric aquatic life criteria for the site (as identified in "Define Site Boundaries" upon derivation). This includes times or conditions where analysis demonstrates that the natural conditions criteria are more stringent than the existing biologically based numeric criteria. Further, criteria values developed using the performance-based approach must protect existing and designated uses in downstream waters and must not cause degradation of downstream receiving waters.

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[13] This determination is project specific. For instance, the final natural conditions criteria magnitudes could be a singular value that applies across the entire year, or the final criteria could be multiple values with each singular value representing a seasonal criterion. The determination of the criteria magnitudes and any restrictions for when they apply (e.g., seasonal) must be documented and provided in the final report.

[14] See "Criteria Duration and Frequency."

[15] For example, if developing natural conditions criteria for temperature in a riverine system that cannot meet the applicable biologically based criteria in Table 200(1)(c), the natural conditions criteria determined in this process would have calculated magnitude values that are 7-DADMax criteria not to be exceeded at a probability frequency of more than once in ten years.

Documentation and use

Once the natural conditions criteria values (including magnitude, duration, frequency) are determined, these values can be used for state and federal Clean Water Act actions, such as for Water Quality Assessments or in Total Maximum Daily Load development. If using this value for these state and federal actions, then all evaluation, analyses, data, and decision points from this process-based modeling approach must be documented and reported, and this must be provided alongside the calculated values and project QAPP. The report format should follow accepted agency templates or protocols.

The final report must include sources of model uncertainty in summarized form. The report will also include how the model output was used to establish natural conditions criteria, identifying outcomes for each site-specific determination as applicable. This will include documentation on how model outputs and external jurisdictional data were analyzed to calculate the natural conditions criteria values.

The report must also include information on natural condition estimates, including but not limited to:

- Summary tables
- Cumulative relative frequency tables
- Natural variation and central tendencies for simulated waters
- Spatial and temporal considerations
- Changes from the project QAPP
- An appendix that includes all sources of data, approaches, and references not previously documented and used in the analysis

This report will undergo agency peer review through established departmental processes with a specific mention for reviewers to focus on the natural conditions analyses. This peer review must be completed prior to the use of these natural condition criteria values in further state and federal Clean Water Act actions (e.g., TMDLs, NPDES permits, CWA 401 certifications).

All documentation (including, but not limited to the project specific QAPP, final report, and criteria) must be made available to the public if using the natural condition criteria values in further state and federal Clean Water Act actions.

Appendix A. References

Davies, Tudor T. 1997. Establishing Site Specific Aquatic Life Criteria Equal to Natural Background. Memorandum to Water Management Division Directors, EPA Regions 1-10, and State and Tribal Water Quality Management Program Directors. Dated 5 November 1997. Office of Water, Office of Science and Technology. Washington, D.C.

United States Environmental Protection Agency (USEPA). 2015. A Framework for Defining and Documenting Natural Conditions for Development of Site-Specific Natural Background Aquatic Life Criteria for Temperature, Dissolved Oxygen, and pH: Interim Document. Office of Water, Office of Science and Technology. Washington, D.C. EPA 820-R-15-001.

United States Environmental Protection Agency (USEPA). 2023. Water Quality Standards Handbook Chapter 3: Water Quality Criteria. Office of Water, Office of Science and Technology. Washington, D.C. EPA 823-B-23-001.

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Water Quality Program

Washington State Department of Ecology

Olympia, Washington

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Department of Ecology’s Regional Offices

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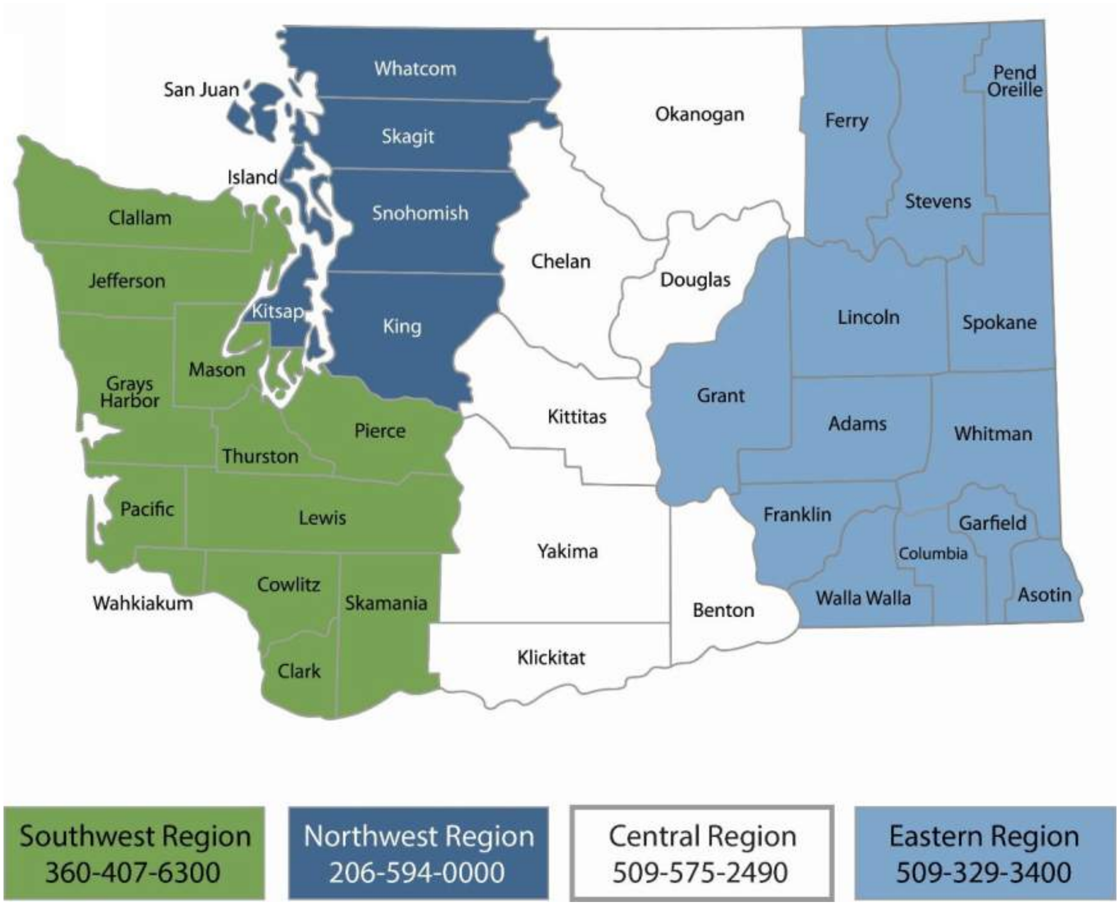

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Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
Headquarters	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington

Water Quality Program
Washington State Department of Ecology
Olympia, WA

March 2025 | Publication 25-10-022

DEPARTMENT OF
ECOLOGY
State of Washington

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Introduction and Background

Introduction and purpose

Washington Department of Ecology (Ecology) recognizes that in some portions of some waterbodies, the assigned aquatic life criteria may not be met due, in part, to the natural conditions of the waterbody. Therefore, if these natural climatic or landscape attributes are preventing attainment of applicable numeric aquatic life criteria, then site-specific numeric aquatic life criteria representing these natural conditions can be calculated following processes listed at Washington Administrative Code (WAC) 173-201A-260(1)(a)). This includes the performance-based approach (WAC 173-201A-260(1)(a)(i) and WAC 173-201A-470).

When the performance-based approach is used by Ecology to establish natural condition aquatic life water quality criteria, development of these criteria values must follow the procedures and methods in this document as per WAC 173-201A-470. The perrformance-based approach is limited by WAC 173-201A-470 to the following water quality parameters:

- Dissolved oxygen (DO; fresh water and marine water)
- pH (fresh water)
- Temperature (fresh water and marine water)

If the determination of aquatic life criteria values cannot meet the requirements set forth in this document, then site-specific criteria can be established by following the alternatives listed at WAC 173-201A-260(1)(a)(i).

Regulatory information

Federal

The Clean Water Act (CWA) requires states to adopt water quality standards that consist of designated uses, water quality criteria, and an antidegradation policy. Section 303(c)(2)(A) of the CWA gives the responsibility for adopting water quality standards to states and authorized Tribes, and that these standards will protect the public health or welfare, enhance the quality of water, and serve the purposes of the Act.

40 CFR 131.3(b) defines criteria as elements of the water quality standards (expressed as constituent concentrations, levels, or narrative statements) that represent a quality of water that supports a particular use such that when criteria are met, water quality will generally protect the designated use.

States and authorized Tribes must adopt water quality criteria that protect these designated uses (see 40 CFR 131.11). States and authorized Tribes may adopt, where appropriate, other criteria that differ from the Environmental Protection Agency's (EPA's) recommendations, so long as the criteria are:

- Based on sound scientific rationale,
- Contain sufficient parameters or constituents to protect the designated use or uses, and
- Support the most sensitive designated use of the waterbody.

States and authorized Tribes can adopt criteria that are modified to reflect site-specific conditions (see 40 CFR 131.11(b)(1)(ii)), so long as they are based on sound scientific rationale and protect designated uses. EPA has provided guidance for derivation of site-specific criteria outlined in *Water Quality Standards Handbook Chapter 3: Water Quality Criteria*.[2]

Any new or revised criteria adopted by states or authorized Tribes must be submitted to EPA for review to determine if the criteria meet the requirements of the CWA and its implementing regulations (33 USC 1313(c)(3)). If approved by EPA, the criteria become applicable for CWA purposes and remain the applicable criteria until EPA approves a change, deletion, or until EPA promulgates more stringent criteria if necessary to meet CWA requirements (40 CFR 131.21(c), (e)).

State

Water pollution control in the State of Washington is regulated under Chapter 90.48 Revised Code of Washington (RCW). This includes 90.48.010 RCW which states that it is the public policy of the state to maintain the highest possible standard to ensure purity of waters consistent with public health, public enjoyment, and propagation and protection of wildlife, birds, game, fish, and other aquatic life.

90.48.035 RCW establishes the rule-making authority for the Department to promulgate rules and regulations necessary to carry out the provisions of Chapter 90.48, including water quality standards for the state.

The Water Quality Standards for Surface Waters of the State of Washington are codified at WAC Chapter 173-201A. This chapter establishes standards for public health and public enjoyment of waters in the State and for propagation and protection of fish, shellfish, and wildlife.

[2] United States Environmental Protection Agency (USEPA). 2023. Water Quality Standards Handbook Chapter 3: Water Quality Criteria. Office of Water, Office of Science and Technology. Washington, D.C. EPA 823-B-23-001.

Performance-Based Approach

Overview

A performance-based approach is a binding methodology that provides a transparent, predictable, repeatable, and scientifically defensible procedure to derive numeric criteria protective of designated uses. When a performance-based approach is sufficiently detailed and has suitable safeguards to ensure predictable, repeatable outcomes, EPA's approval of the approach also serves as an approval of criteria derived consistent with the approach.

Aquatic life water quality criteria values developed using the performance-based approach are applicable to the waterbody upon derivation, so long as all requirements set forth in this document are met.

Applicability

Use of the performance-based approach is limited to the parameters listed at WAC 173-201A-470(2). Natural conditions aquatic life criteria for other water quality parameters must be developed using site-specific criteria pursuant to WAC 173-201A-430 (as specified at WAC 173-201A-260(1)(a)(ii)), as applicable, and must follow all state and federal rulemaking regulations prior to becoming effective for state and federal CWA actions. Natural conditions water quality criteria are appropriate only for the protection of aquatic life designated uses, not human health uses.

Chapter 1: Marine Dissolved Oxygen

Introduction

This is a binding approach for deriving natural condition aquatic life water quality criteria for marine dissolved oxygen (DO) through the use of water quality models. Water quality models determine the water quality dynamics for marine DO observed at the site of interest under current and natural conditions. This approach will allow quantification of effects at a site from both human sources and natural sources.

In this process, developing the natural conditions criteria consists of:

1. Defining where natural conditions apply (i.e., the site boundary) and the model domain.
2. Compiling existing, readily available, and credible current and historical water quality and site data.
3. Developing a Quality Assurance Project Plan (QAPP).
4. Obtaining new field data, if needed.
5. Compiling, reviewing, and assessing any new field data to ensure it meets quality assurance (QA) / quality control (QC) goals.
6. Developing and calibrating a model of the existing conditions of the waterbody or watershed, including defining temporal and spatial boundaries.
7. Evaluating model performance.
8. Estimating natural condition inputs to the model by removing known and estimated human-caused impacts.
9. Calculating the natural conditions criteria values by running the model with natural condition inputs.
10. Documentation of performance-based approach use.

The performance-based approach will generally be conducted step-wise; however, as modeling is an adaptive process, it may be necessary to repeat or circle back through certain steps during the project.

The analysis of data and development of the criteria values must be documented. If the developed criteria values are used in subsequent state or federal CWA actions, then: (a) this documentation must be included with the documentation for the CWA action; and (b) the criteria values must be accessible to the public.

Step 1: Define site boundaries and model domain

The first step in this process is defining the site boundaries, model domain, and model cell resolution. The site boundaries encompass where natural conditions criteria are being determined. The model domain must include the site boundaries and contributing waters to the area where the natural conditions criteria are being determined. The site and model domain may include multiple CWA 303(d) assessment units of interest to the project. The site boundaries and model domain for the site of interest must be defined and documented.

Boundary information must include geospatial information. This information must be documented in the respective project QAPP and/or other documentation as part of this performance-based approach.

For cell resolution, it must be sufficient to predict horizontal and vertical variations in water quality on at least an hourly basis. Establishing the model grid is project specific, and therefore, the process for doing so must be documented in the respective project QAPP and/or other documentation. When establishing the model grid and selecting cell resolution, considerations include, but are not limited to, the following:

- Sufficiently fine to resolve features of the site (e.g., shoreline, islands, watersheds, river mouths).
- Allow for selected temporal simulation (e.g., year-long).
- Bathymetry information and accuracy for the site.
- Ensuring representation of identified subbasins in large model domains.
- Simulation of key location-specific biogeochemical forcings (e.g., incorporation of eelgrass meadows is a step towards modeling water quality in the nearshore).

Step 2: Compile data

All existing, readily available, and credible data and information to characterize the site of interest and waters that affect the site of interest must be considered to model current and natural conditions. Waters that affect the site of interest include, but are not limited to:

- Upstream waters (e.g., tributaries, groundwaer, wetlands), and
- Oceanic inputs

A description of the data compiled and data sources must be documented in the project QAPP. For these data, including initial conditions for model setup, the data must encompass the natural variability of a site, waterbody type, and parameter of interest. Table 1 provides typical data needs for modeling both the current and natural conditions.

Table 1. Data needs for modeling current and natural conditions.

Category	Current Conditions	Natural Conditions
Water Quality Observations, Marine Water	Marine water quality observations (e.g., salinity, temperature, photosynthetically active radiation, chlorophyll-*a,* dissolved oxygen, dissolved and particulate fractions of speciated nutrients, density)	--
Water Quality Observations, Fresh Water	Freshwater quality observations (e.g., nutrients, temperature)	Freshwater quality observations (e.g., nutrients)
Hydrodynamics	Hydrodynamic data (tides and currents)	--
Other Observational Data	E.g., sediment oxygen demand, respiration, productivity	As applicable
Freshwater Nutrient Inputs	Nutrient inputs (e.g., total nitrogen, organic carbon)	Nutrient inputs (e.g., total nitrogen, organic carbon) without anthropogenic influence
Point-Source Marine Discharges	Nutrient loadings for direct marine point source discharges	Nutrient loadings for direct marine point source discharges reflective of no anthropogenic influence
Meteorology	Meteorology (e.g., air temperature, solar radiation, wind velocity) and changes to meteorological variables (e.g., air temperature)	Meteorological variables (e.g., air temperature, solar radiation)
Hydrology	Freshwater hydrology (e.g., flows, precipitation)	Freshwater hydrology (e.g., flows, precipitation)
Oceanic Boundary Conditions	Oceanic boundary conditions (e.g., water chemistry, tidal pulses)	--
Morphology	Waterbody morphology and bathymetry	Waterbody morphology
Other Human Activity	Other human activity information	Other human activity information
Site Information	E.g., site photographs	E.g., site photographs, historical records

Existing, readily available, and credible data

Sources of existing and readily available data include, but are not limited to, state and federal water quality databases. Washington maintains the Environmental Information Management[3] (EIM) database, which contains environmental monitoring data collected by Ecology scientists, local governments, other state agencies, Tribes, non-profit organizations, and other partners. Federal water quality data includes data in the Water Quality Portal[4], which integrates data from the United States Geological Survey (USGS), EPA, and other state, federal, tribal, and local agencies. Other sources of information may include water quality data collected by the United States Army Corps of Engineers, United States Department of Interior (including the Bureau of Reclamation) data, other state water quality databases, tribal water quality data, or other credible water quality data from outside the United States.

Any data obtained from academic and literature works (e.g., research journals) must be from published and reputable sources. Additional sources of data may include data collected under state or federally approved QAPPs, private and public facilities (e.g., data collected as part of National Pollutant Discharge Elimination System, or NPDES, permits), and utilities (e.g., drinking water facilities).

Ecology has gathered relevant external data sets useful and applicable for water quality impairment studies, and Ecology may use these external datasets in this performance-based approach. A list of these data sources, quality assurance information, and links to data are available in Appendix A of Ecology's Programmatic QAPP for Water Quality Impairment Studies[5]. This programmatic QAPP references data sets for water quality process-based modeling which are used to develop natural conditions aquatic life criteria. Data used must follow the quality objectives outlined in the section "Quality Objectives" of the above-referenced document.

Finally, determination of whether data and information are credible must follow Washington's Water Quality Data Act in RCW 90.48.585, which is further discussed in Ecology's Water Quality Policy 1-11 Chapter 2,[6] publication 21-10-032. If Ecology determines that a lack of credible data will impede estimating natural conditions, in order to proceed with this performance-based approach, Ecology must collect additional data under an amended QAPP, project-specific QAPP, or scope of work (*see* Steps 4 and 5 of this chapter).

[3] https://apps.ecology.wa.gov/eim/search/default.aspx
[4] https://www.waterqualitydata.us/
[5] https://apps.ecology.wa.gov/publications/SummaryPages/1703107.html
[6] https://apps.ecology.wa.gov/publications/SummaryPages/2110032.html

Site characterization data

In addition to water quality data, all existing and readily available data and information must be considered for use to characterize current and natural conditions at the site. These data must also be sourced from waters that affect the site of interest. Site characterization data information include, but are not limited to:

- Boundary conditions (including oceanic boundaries).
- Waterbody morphology.
- Hydrodynamics and physical properties (e.g., salinity).
- Light availability.
- Hydrological modifications (e.g., water withdrawals).
- Point source discharges.
- Nonpoint source discharges (including tributary boundaries).
- Meteorology.
- Kinetic and physical rates and ratio data.

Data timeframe and metadata requirements

There are no restrictions or limits on obtaining applicable data other than those previously identified (i.e., all existing, readily available, and credible data). Ideal datasets will include long-term data[7] for the water quality parameter of interest and data that represents pre-industrial periods or before large-scale human impacts.

If combining data across multiple time frames to estimate natural conditions, the methodology used in combining data sets must be documented and must be appropriately conservative to capture the range of conditions that protect existing and designated aquatic life uses across the scales of aggregation.

All associated metadata and data sources must be included and documented alongside the sourced water quality and site characterization data, such as in the project QAPP. This includes all quality assurance or quality control information, geospatial information, and data collection information (e.g., time of collection, depth).

Data gaps

Any data gaps must be identified. If data gaps are filled using estimates, the process for doing so must be documented and justified. Methods to estimate data gaps include, but are not limited to: interpolation, regression, and using information from regional models.

[7] Defined as data collected regularly (e.g., monthly) over at least ten years.

If Ecology determines that a lack of credible data will impede estimating natural conditions, in order to proceed with the performance-based approach, Ecology must collect additional data under an amended QAPP, project-specific QAPP, or scope of work (*see* Steps 4 and 5 of this chapter).

Step 3: Develop A Project Quality Assurance Project Plan

A Quality Assurance Project Plan (QAPP) must be developed and followed. Data quality objectives and measurement quality objectives must be established within the QAPP to ensure proper model calibration and evaluation such that, once met, the output of the model informs the determination of appropriate criteria.

The project QAPP must provide:

1. Key objectives, goals, and questions that are to be addressed by this project.
2. Observational data quality objectives.
3. Description of the data to be used, identified data needs, and data sources.
4. Model capability descriptions or references, including identification of key processes that drive water quality.
5. Model peer-review approach and/or documentation.
6. How spatial and temporal variability will be addressed in any model to ensure that natural condition estimates protect designated and existing uses.
7. Model approaches and key assumptions, which may include boundary conditions and associated determinations, initial or existing conditions, model resolution, inflow loads, or watershed inputs.
8. Description of the computational setup.
9. Model quality objectives, including how model calibration performance and model skill will be evaluated using both quantitative statistics, skill metrics, and qualitative methods.
    a) Model segment or grid size descriptions and rationale as to appropriateness linked to (4).
    b) Description of reasonable fit or other statistics between model-estimated and measured conditions following model calibration.
    c) Performance goal targets.
    d) Any model limitation, uncertainties, and assumptions, and how these could impact (if applicable) the reasonableness to meet the goals and objectives of the project.
    e) Quality Assurance and Quality Control considerations, such as adherence to the Department's programmatic QAPP for assessing impaired waters.

Step 4: Collect new data

If Ecology determines that existing, readily available, and credible data are insufficient and will impede estimating natural conditions and the ability to proceed with the performance-based approach, Ecology must collect additional data under an amended QAPP, project-specific QAPP, or scope of work, and there must be information that details the spatial and temporal scope of data collection and any other requirements for collection. The QAPP or scope of work must include the methods used to collect new data. This may include Ecology's standard operating procedures for watershed health monitoring.[8] Collected data must meet requirements for data listed in Step 2 of this document.

Step 5: Ensure new data meets quality assurance and control goals

If any new field data are collected (Step 4 of this chapter), then compiling, reviewing, and assessing these data must be done to ensure it meets Ecology's quality assurance and quality control goals outlined in the project QAPP. These processes must be documented, such as in the project QAPP. Additional information on Ecology's quality assurance and quality control is found on Ecology's Quality Assurance webpage.[9]

Step 6: Develop and calibrate the model

The performance-based approach includes developing a water quality model for current conditions and then uses the model to estimate natural conditions of a system. Any model(s) used must follow the requirements set forth in the project QAPP (Step 3) as well as the following requirements:

- The model must allow for reproducibility of results.
    - Model code must be open source, with existing and reference input and output files, alongside data sources, made available to the public.
- The model framework, including model code, must have undergone a formal peer-review process before application, or if not previously peer reviewed, must be recognized as widely-used code in the published literature and fully documented.
    - Documentation of the peer-review process must be described in the project QAPP or other documentation as part of the performance-based approach.
- Model selection must be from a set of best available modeling tools applicable for the specific purpose to estimate current and natural conditions based on the project requirements.
    - This includes, but is not limited to, the Salish Sea Model[10] and other models of comparable rigor.
- Model or models chosen must simulate all key processes and sources affecting marine DO, and must be described in the model documentation.

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[8] https://apps.ecology.wa.gov/publications/UIPages/PublicationList.aspx?IndexTypeName=Topic&NameValue=Standard+Operating+Procedure+(SOP)+%e2%80%94+Watershed+Health+Monitoring&DocumentTypeName=Publication.

[9] https://ecology.wa.gov/issues-and-local-projects/investing-in-communities/scientific-services/quality-assurance

[10] https://ecology.wa.gov/research-data/data-resources/models-spreadsheets/modeling-the-environment/salish-sea-modeling

- Processes include, but are not limited to, those identified in the QAPP for a Dissolved Oxygen Modeling Study for Puget Sound[11] (e.g., microbial rates, circulation or residence time, phytoplankton dynamics).

- Model calibration must be done using reasonable adjustments of model parameters to achieve a reasonable fit between model-estimated and measured conditions based upon peer review of the individual model, or by comparing to documented model fit statistics from other similar applications using the same model.
    - The quality of the model calibration must be documented and include both qualitative and quantitative evaluations.
- Model calculated outputs must be compared with measured data.
    - A sufficient number of calibration locations must be defined and identified prior to model application.
- Modeled hydrodynamics and relevant parameters for all waterbody types simulated must be evaluated.
- Model documentation must include information about any unknowns and uncertainties in model outputs.
- The model must have sufficient resolution[12] (and such resolution must be documented) to:
    - Predict horizontal and vertical variations in water quality. These predictions must be generated on least an hourly basis.
    - Capture the impacts to all designated uses, including the most sensitive designated use, and provide rationale for this determination in the project QAPP or other report generated as part of this performance-based approach.
    - Resolve features of the site (e.g., shoreline, islands, watersheds, river mouths).
    - Allow for selected temporal simulation (e.g., year-long).
    - Reflect available bathymetry information.
    - Ensure representation of identified subbasins in large model domains.
    - Incorporate simulation of key location-specific biogeochemical forcings (e.g., incorporation of eelgrass meadows for modeling water quality in the nearshore).
- All model parameter values must be documented.
- Sensitivity testing must be conducted on the means and ranges on selected key parameters which could significantly affect the natural condition outcome.

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[11] https://apps.ecology.wa.gov/publications/SummaryPages/0903110.html. Page 42, titled "3. What are the dominant processes affecting dissolved oxygen?"

[12] Model resolution will depend on available data and site of interest. See Puget Sound Dissolved Oxygen Modeling Study: Development of an Intermediate Scale Water Quality Model (https://apps.ecology.wa.gov/publications/documents/1203049.pdf) or Puget Sound Nutrient Souce Reduction Project Volume 1: Model Updates and Bounding Scenarios (https://apps.ecology.wa.gov/publications/SummaryPages/1903001.html) for examples of how cell sizes were determined for the Salish Sea Model, as an example.

All feasible and practicable steps to improve model performance and representativeness of the model must be taken prior to model acceptance and use to estimate natural conditions.

Step 7: Evaluating model performance

Model performance must be evaluated and documented. Methods and approaches for model evaluation must be included within the project QAPP. Performance documentation must include comparisons of model outputs to historic or collected field data, summary statistics, figures, or data tables. The model must meet any quality assurance, quality control, and performance minimum requirements outlined in the project QAPP. Model evaluation includes, but is not limited to: sensitivity tests; uncertainty analyses; and evaluation of observed water quality conditions during specified years and simulating the effects of various, alternative nutrient-loading scenarios.[13]

All feasible and practicable steps to improve model performance and representativeness of the model must be taken prior to model acceptance and use to estimate natural conditions. If the model performance cannot meet these requirements, then the performance-based approach cannot be used to develop marine DO aquatic life criteria based on the natural conditions of a site.

Step 8: Estimating Natural Conditions

Introduction

When estimating natural conditions, use of performance-based approach must consider all required elements listed in this step. If any required element is not applicable or relevant to a site, then its non-applicability or non-relevancy must be documented.

Developing a scenario without human-caused impacts and pollution

Various elements in the current condition model include human-caused impacts to surface water quality, such as point sources discharging into marine waters. To model natural conditions, a model scenario needs to be developed that represents conditions in the absence of pollution and human-caused impacts. All human-caused impacts must be accounted for and removed using all existing, readily available, and credible information to develop the natural conditions scenarios.

Natural conditions are estimated through modeling by removing all anthropogenic sources from the model simulation for those sources where it is feasible and practicable to model, and then estimating and removing the remaining anthropogenic sources where it is not feasible or practicable to model where existing and credible data are readily available. After all sources of anthropogic pollution have been removed, natural conditions criteria are identified (Step 9).

[13] Such as was done in the Dissolved Oxygen Modeling Study for Puget Sound (https://apps.ecology.wa.gov/publications/SummaryPages/0903110.html).

All data used to address anthropogenic sources of pollution must meet data credibility requirements. For those data where it is not feasible or practicable to model, data does not need to meet other resolution or frequency requirements established in the project QAPP.

Human structural changes

The performance-based approach will not be used to derive criteria for specific assessment units of waters that contain human structural changes that cannot be effectively remedied (see WAC 173-201A-260(1)(b)).

Required elements

The use of each of these elements and subsequent analyses based on corresponding data must be documented in any final report associated with this performance-based approach. These elements must be accounted for and removed when estimating natural conditions, and elements include but are not limited to:

- Establishing oceanic open boundary and initial conditions.
    - Oceanic water temperature, salinity, dissolved oxygen, nitrogen, organic carbon, and Chlorophyll-*a*.
    - Global-scale ocean circulation changes, if any.
- Establishing freshwater input loads.
    - Must account for and remove human activities that may affect regional hydrodynamics.
    - Flow and water quality information.
    - Natural background nutrient concentrations, including but not limited to upstream tributaries, adjacent wetlands, and groundwater inputs.
- Other sources, as identified, that affect boundary conditions, such as legacy sources.
- Point source discharges.
- Non-point sources.
- Activities affecting hydrodynamics, channel morphology, channel complexity, light availability, riparian environments, and sediment mobilization.
- Meteorological conditions (e.g., air temperature changes, climate).
- Submerged aquatic vegetation.
- Invasive species.
- Any necessary kinetic and physical model rate changes.
    - Kinetics include, but is not limited to, those connected with eutrophication, such nutrient cycling, algal dynamics, sediment and biogeochemical oxygen demand.[14]

[14] For example, Section 2.1 Process Description of the Puget Sound Dissolved Oxygen Modeling Study (https://apps.ecology.wa.gov/publications/SummaryPages/1203049.html) describes kinetics simulated in the intermediate-scale water quality model.

Model outputs

Modeling outputs and subsequent analyses must represent the natural variability of marine DO (such as the range of values). This includes, but is not limited to:

- Description of long-term (e.g., multi-week, intra-annual) range and variation in marine DO.
- Demonstration of how variability of selected key inputs (e.g., freshwater flows, temperature) impact the magnitude of marine DO.[15]

Model outputs that estimate natural conditions represent the potential conditions of the site. The model output resolution will vary by project design (as described in the QAPP), data availability, and model choice. The model outputs of the site must:

- Abide by the data and modeling requirements in this performance-based approach chapter, and
- Protect designated and existing aquatic life uses by removing all human-caused impacts and pollution to the water of interest.

If various model outputs are used in analysis (such as from using multiple runs), then the model runs chosen must best reflect the natural conditions of the site and capture the range of conditions.

Other Considerations

Freshwater hydrology as it was reflected in a hindcast year modeled may be used. Water quality conditions (e.g., concentrations) must be set at estimated natural conditions. The methods used and any assumptions made must be documented. Finally, all feasible and practicable steps to improve representativeness of the model used to estimate natural conditions must be taken.

Step 9: Determining natural conditions criteria values

Criteria magnitude

The performance-based approach estimates the natural conditions of marine DO at a site (Step 8), which are used to determine natural conditions criteria for the site. Natural condition criteria must reflect the natural conditions of the system without any human impacts; see Step 8 for further details and requirements.

Once estimates of natural conditions are produced, then outputs are aggregated. Criteria values must not be over-aggregated in space (vertically or horizontally) or in time.

[15] For example, see the analyses performed and reported in Volume 1 of the Puget Sound Nutrient Source Reduction Project (https://apps.ecology.wa.gov/publications/SummaryPages/1903001.html).

First, volume-weighted horizontal aggregations are performed on model results. Horiziontal groupings must reflect Washington's CWA Section 303(d) assessment units as defined in Section 1C of *Water Quality Program Policy 1-11 Chapter 1: Washington's Water Quality Assessment Listing Methodology to Meet Clean Water Act Requirements*.[16] Horizontal aggregations use the mean value for concurrent temporal outputs across the assessment unit at each depth layer in the model.

Second, the time series values (e.g., hourly) within each assessment unit *and* each depth layer are reduced to daily minimum DO values for each day of the simulation.

The results of this aggregation process are criteria values for marine DO for each day within the temporal window of the model (e.g., summer growing season), each assessment unit, *and* each depth layer within each assessment unit. There is no vertical aggregation allowed. These natural condition criteria values are protective of existing and designation aquatic life uses. The aggregation process used to calculate criteria values must be documented.

Criteria duration and frequency

Any developed natural conditions criteria must include duration and frequency components in addition to magnitude values. The duration and frequency components must match the duration and frequency of the biologically-based numeric marine DO criteria at WAC 173-201A-210(1)(d).

Criteria evaluation and application

Developed natural conditions criteria must only include the periods of the year when natural conditions were estimated. For example, the criteria values may only be applicable for the summer period if the natural conditions were estimated using such bounds (e.g., seasonal). Any developed natural condition criteria values have the same bounds or restrictions as the methods used for estimation. For all other times when natural conditions were not estimated, the existing and applicable biologically-based numeric criteria continue to apply.

Step 10: Documentation and use

Once the natural conditions criteria values (including magnitude, duration, frequency) are determined, these values are applicable for use in state and federal CWA actions. If used, all evaluation, analyses, data, and decision points from this approach must be documented. Any reports generated from use of the PBA must follow accepted agency templates or protocols.

[16] https://apps.ecology.wa.gov/publications/SummaryPages/1810035.html

Documentation must include sources of model uncertainty in summarized form. Further, documentation must show how the model outputs were used to establish natural conditions criteria, also include information on natural condition estimates, including but not limited to:

- Summary tables
- Cumulative relative frequency tables
- Natural variation and central tendencies for simulated waters
- Spatial and temporal considerations
- Amendments to the project QAPP.
    - Any amendments to the project QAPP must be consistent with the PBA requirements.
- Sources of data, approaches, and references not previously documented and used in the analysis

All documentation (including, but not limited to, the project specific QAPP, model outputs, and determined natural conditions criteria) must be made available to the public when using the natural condition criteria in subsequent state and federal CWA actions.

REGION 10
SEATTLE, WA 98101

July 26, 2024

Marla Koberstein
Department of Ecology
Water Quality Program
P.O. Box 47696
Olympia, Washington 98504-7696

Dear Ms. Koberstein:

Thank you for the opportunity to provide comments on the Washington State Department of Ecology's proposed amendments and additions to Chapter 173-201A Washington Administrative Code – Water Quality Standards for Surface Waters of the State of Washington, filed on May 10, 2024. Specifically, Ecology proposes revisions to WAC 173-201A-020, WAC 173-201A-200, WAC 173-201A-210, WAC 173-201A-260, and WAC 173-201A-430. In addition, Ecology proposes to adopt a new section at WAC 173-201A-470 that incorporates by reference the adoption of Ecology's publication *A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington*. [May 2024, Publication 24-10-017].

Pursuant to Clean Water Act section 303(c), the EPA has the duty to review and approve or disapprove new or revised water quality standards submitted by states and authorized Tribes. With respect to water quality criteria, the EPA's implementing regulation at 40 CFR § 131.11(a)(1) requires that "criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use." In its preamble to the 2000 final rule, *EPA Review and Approval of State and Tribal Water Quality Standards,*[1] the EPA articulated the concept of a "performance-based" approach as one way for states and authorized Tribes to streamline the administrative processes for site-specific criteria. The EPA stated that, "[a] performance-based approach relies on adoption of a process (i.e. a criterion derivation methodology) rather than a specific outcome (i.e. concentration limit for a pollutant) consistent with 40 CFR 131.11 & 131.13. When such a "performance-based" approach is sufficiently detailed and has suitable safeguards to ensure predictable, repeatable outcomes, EPA approval of such an approach can also serve as approval of the outcomes as well." While the EPA did not promulgate regulations specifying the required elements of a performance-based approach, the EPA indicated that such an approach should specify "methodologies, minimum data requirements, and decision thresholds," and should be "binding, clear, predictable, and transparent" to be consistent with 40 CFR § 131.11 requirements.[2]

[1] 65 FR 24641
[2] *Id.* at 24647-48

The EPA has reviewed Ecology's proposed rule revisions, including the proposed performance-based approach incorporated by reference in the rule, Ecology's Technical Support Document, and Implementation Methods. As currently proposed, the EPA is concerned that Ecology's performance-based approach for developing site-specific natural conditions criteria is not sufficiently "binding, clear, predictable, and transparent." Specifically, many decision thresholds in the approach are framed as non-binding considerations. The approach lists the steps of the process but doesn't follow those steps in a clear and predictable sequence. To improve transparency, additional documentation should be included in the approach and not deferred to future site-specific applications. In support of Ecology's efforts, the EPA provides the enclosed comments and suggestions based on our review of the proposed rule and the applicable statutory and regulatory requirements.

The EPA appreciates Ecology's commitment to update Washington's water quality standards. We look forward to continuing to engage with you throughout this process. If you have any questions, please contact Rochelle Labiosa of my staff at (206) 553-1172 or labiosa.rochelle@epa.gov.

Sincerely,

REBECCA GARNETT Digitally signed by REBECCA GARNETT
Date: 2024.07.26 15:25:01 -07'00'

Rebecca Garnett
Manager, Standards and Assessment Section
Water Division

Enclosure

cc: Kalman Bugica, Washington State Dept. of Ecology

EPA Comments on Washington's Natural Conditions Criteria Rulemaking Documents
July 26, 2024

The EPA's comments below reflect the following categories in descending order of importance: (1) consistency with regulations, including missing steps and/or binding language; (2) comments on details; (3) comments on reorganization; and (4) recommendations to improve the document. Each comment is labeled in accordance with this categorization.

1. **WAC 173-201A-310(3)**. Consistency with regulations. The EPA recommends deleting this provision from the Washington WQS to provide consistency with the new revisions contained in the proposed rule. This provision states that "natural conditions constitute the water quality criteria" without any further explanation that the site-specific criteria approaches identified at 173-201A-260 must be followed to establish natural conditions criteria. If this provision is not deleted, please consider revising to include a reference to WAC 173-201A-260(1)(a). If the state opts not to make the suggested revisions, the EPA requests that Ecology provides a clarification to the EPA that this provision will be implemented consistent with WAC 173-201A-260(1)(a).

2. **Proposed Rule Language: AMENDATORY SECTION (Amending WSR 24-01-088, filed 12/18/23, effective 1/18/24).**
    a. WAC 173-201A-02. Definitions
        1. Consistency with regulations. The EPA recommends deleting the second sentence in the definition of natural conditions: "*When estimating natural conditions in the headwaters of a disturbed watershed it may be necessary to use the less disturbed conditions of a neighboring or similar watershed as a reference condition.*" Although this provision is not new or revised, this sentence could be read as a conflicting approach to the state's new and revised procedures for natural conditions at WAC 173-201A-260, -430, and -470 because a "reference condition" may allow some anthropogenic disturbance, which is inconsistent with the concept of a natural conditions approach.

        2. Consistency with regulations. The EPA recommends revising the definition of "performance-based approach" (PBA) to focus on what a PBA is, instead of what it is not, and offers the following revised version: "*Performance-based approach" means a water quality standard that is a transparent process (i.e. methodology) which is sufficiently detailed and has suitable safeguards that ensures predictable and repeatable outcomes, rather than a specific outcome. The outcomes from the performance-based approach are site-specific criteria.*"

           Additionally, the EPA recommends removing the references to the CWA federal implementing regulations at 40 CFR Part 131, as they do not specifically address the requirements of a PBA. In the preamble to the 2000 final rule, *EPA Review and Approval of State and Tribal Water Quality Standards,*[3] the EPA articulated the concept of a "performance-based" approach.

[3] 65 FR 24641

3. Binding language. The EPA recommends adding a definition of "mechanistic models" to provide additional clarity about the type of tool that will be used in the PBA. The EPA's Council for Regulatory Environmental Modeling guidance (2009) defines a mechanistic model as "*a model whose structure explicitly represents an understanding of physical, chemical, and/or biological processes. Mechanistic models quantitatively describe the relationship between some phenomenon and underlying first principles of cause*."

b. **WAC 173-201A-200(1) and WAC 173-201A-210(1).** Consistency with regulations. The EPA recommends adding a sentence to the end of each provision to clarify that human sources of pollution outside of the *de minimis* allowance for the local and regional sources cannot cause any increase in temperature or decrease in dissolved oxygen.
   1. For part (c)(i), please add: "All other sources considered cumulatively may not cause any increase in the natural 7-DADMax temperature."
   2. For part (d)(i), please add: "All other sources considered cumulatively may not cause any decrease in the natural dissolved oxygen concentration."

   The EPA also recommends removing the "local and regional sources" qualifier and describing such a qualifier in guidance or implementation documentation.

   We also recommend adding a reference to WAC 173-201A-260 to each of the cumulative cap provisions to connect the natural conditions procedures to natural conditions provisions.

   It is our understanding that the provisions for dissolved oxygen at (d)(i) are only applicable to the biologically-based numeric criteria in Table 200(1)(d) and not to the saturation state-based criteria. Therefore, we recommend the provision be revised to clarify that point. Additionally, the EPA recommends referring to "D.O." as "D.O. concentration" or "D.O. criteria" depending on the context, such as *"…the D.O. concentration of that waterbody to decrease by more than 10 percent or 0.2 mg/L below the natural conditions-based D.O. criteria, whichever decrease is smaller."*

c. **WAC 173-201A-260(1).** Consistency with regulations. Consideration of attainability per 40 CFR section 131.10 referenced in the state's revised rule is not appropriate for natural conditions criteria or other site-specific criteria statements. Such criteria are established to protect the current designated uses and cannot consider attainability. The EPA suggests the following revisions to clarify the applicable criteria when natural conditions are not applicable (i.e. the biologically-based numeric criteria):

   a) The applicable aquatic life criteria for water bodies in Washington are the biologically-based numeric criteria in [Tables 200(1)(c)…] *unless the application of 260(1)(a)(i)-(ii) results in site-specific numeric aquatic life criteria representing specific conditions unique to a waterbody.*

   (i) Aquatic life criteria for temperature, pH, or dissolved oxygen for freshwaters or dissolved oxygen or temperature for marine waters based on natural conditions will be

derived following either the individual site-specific criteria approach pursuant to WAC 173-201A-430 or the performance-based approach pursuant to WAC 173-201A-470.

(ii) For parameters other than dissolved oxygen, pH, or temperature for freshwaters or dissolved oxygen or temperature for marine waters, aquatic life criteria based on natural conditions will be derived pursuant to WAC 173-201A-430.

(b) When a water body does not meet its assigned criteria due to human structural changes that cannot be effectively remedied (as determined consistent with the federal regulations at 40 C.F.R. 131.10), then alternative estimates of the attainable water quality conditions may be used to establish alternative criteria for the water body (see WAC 173-201A-430 and 173-201A-440).

> Note, the EPA's suggested revision to provision "b" deletes the statement about natural conditions. Combining natural conditions and attainability creates ambiguity around how the rules function together.

d. **WAC 173-201A-430.** Consistency with regulations. The EPA recommends the following revisions:
    1. **WAC 173-201A-430(1)** must be revised in accordance with the EPA regulations at 40 CFR section 131.11. Attainability is pertinent to use attainability analyses and establishment of designated uses and should not be included in site-specific criteria statements, where the criteria are to protect the current designated use(s). The EPA suggests the following revisions: *"Where the existing and designated uses for the water body would be fully protected using an alternative criterion, site-specific criteria may be adopted."*
    2. **WAC 173-201A-430(1)(a)** includes references to designating uses and the federal regulations for designating uses. The establishment of site-specific criteria does not pertain to designating uses; therefore, we recommend deleting the phrases "designating and" as well as the reference to 40 CFR 131.10.
    3. The EPA recommends the following revision for **WAC 173-201A-430(3)** to ensure consistency with federal regulations: "*The decision to approve the site-specific criterion must be based on a demonstration that it will protect the existing and designated uses of the water body."*

e. **WAC 173-201A-470.** Consistency with regulations.
    1. Please delete "as revised" language at the end of **WAC 173-201A-470(1)**. The EPA cannot approve language that encompasses future revisions.
    2. Additionally, for clarity and consistency, **WAC 173-201A-470(4)** must reference WAC 173-201A-430 as the only approach to establish natural conditions outside of the PBA. the EPA recommends specific revisions to WAC 173-201A-470(4) to clarify the criteria in place until a natural criteria using the PBA or other site-specific criteria are established. The EPA offers the following

recommended revisions to **WAC 173-201A-470** to address these concerns as well as other rule language improvements:

WAC 173-201A-470 Performance-based approach. This performance-based approach may be used to establish numeric criteria based on natural conditions for a site that are fully protective of existing and designated aquatic life uses.

(1) *Aquatic life water quality criteria must be derived using the procedures referenced in ecology publication 24-10-017,*[add date]*, "A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington."*

(2) *Application of the performance-based approach for establishing aquatic life water quality criteria is limited to the following:*

(a) *Aquatic life temperature criteria in fresh water;*
(b) *Aquatic life dissolved oxygen criteria in fresh water;*
(c) *Aquatic life pH criteria in fresh water;*
(d) *Aquatic life temperature criteria in marine water;*
(e) *Aquatic life dissolved oxygen criteria in marine water.*

(3) *Aquatic life water quality criteria developed using this approach are applicable to the water body upon derivation.*

(4) *If the requirements set forth in the performance-based approach cannot be met, then site-specific criteria can be established by following the provisions at WAC 173-210A-430. The numeric criteria at XXX* [Ecology to add citations to biologically-based numeric criteria] *are applicable until a new SSC is established.*

3. **A Performance-Based Approach for Developing Site-Specific Natural Conditions Criteria for Aquatic Life in Washington, Publication 24-10-017, adopted by reference into WAC 173-201A-470** requires significant revisions to be sufficiently detailed and have suitable safeguards to ensure predictable, repeatable outcomes to be approved as a PBA since the approval of the approach serves as the approval of the outcomes as well. The PBA should specify methodologies and minimum data requirements and be binding, clear, predictable, and transparent to be consistent with 40 CFR section 131.11. The EPA is providing specific comments that fall under the following categories, with examples of specific issues within the categories:
    - **Missing Steps.** Critical steps in the PBA process are missing (see comment 3.b.4. below). Additionally, critical data and elements requirements are missing from the approach which are described below.
    - **Binding Language.** All steps in the approach must be binding. Several areas need revision to convey that the step is binding and required (i.e. revising “may” or “should” terminology to “must”).
    - **Consistency with Regulations.** The PBA includes anthropogenic impacts into the determination of the natural condition by including reference conditions or irreversible human sources into the approach. All references to any anthropogenic impacts must be revised.
    - **Additional Detail or Prescriptiveness.** Overall, more detail is needed throughout the document to ensure a repeatable and transparent process. The following must be included for each step in the process: binding principle language, procedures for

how specific steps will be executed, and sideboards, such as minimum data requirements, and spatial and temporal resolution requirements.

- **Reorganization.** Reorganization to increase clarity and transparency of the process that will be followed to derive the site-specific criteria based on natural conditions.
- **Recommendations for Improvement.** The EPA offers suggested revisions for areas of improvement.

The specific comments below are grouped section by section, following in order of the PBA, as per the steps identified in EPA's recommended reorganization (11 Steps; see comment b.4, below).

a. Introduction and Background

1. **Binding Language:** This section includes a mix of mandatory binding statements and nonbinding statements. We recommend that the state adds clear distinctions between nonbinding text and the performance-based approach procedures that must be binding.
    i. The "Human Structural Changes" section is not a procedure and should not be a part of the binding PBA portion of this document. The EPA recommends moving it to the Introduction and Background section.
    ii. Additionally, the EPA's recommends revisions to the "Human Structural Changes" section:

        The performance-based approach may not be used to derive criteria for specific assessment units of waters that contain human structural changes that cannot be effectively remedied (see WAC 173-201A-260(1)(b)). In these situations, alternative criteria may be developed through adoption of site-specific criteria or by revising the designated use and setting new criteria to support that revised use after completing a use attainability analysis. These alternative approaches require EPA review and action pursuant to CWA section 303(c).

        Finally, please revise the second paragraph of this section so that it is a part of the procedures for the removal of anthropogenic sources in the PBA and move this paragraph to Step 10 (EPA revised steps) "Model Application."
2. **Consistency with Regulations**: There are several statements throughout the document including in this section to the effect that when portions of water bodies cannot meet the assigned aquatic life criteria due to natural conditions, the natural conditions constitute the water quality criteria. These statements are not accurate unless they are contingent upon the acceptable approaches for deriving natural conditions criteria pursuant to WAC 173-201A-260(1)(a). Therefore, these statements must be revised to include references to WAC 173-201A-260(1)(a) at every mention in the document.

b. Performance-Based Approach Use

1. **Binding Language:** The text in these introductory paragraphs does not include a clear start to the binding procedures. The EPA recommends including the

following suggested language: "*This document serves to meet the recommendations in EPA's 1997 Memorandum that recommends water quality standards include a binding procedure that will be used for determining natural background (Davies, 1997). The approach set forth below constitutes a binding procedure.*"

2. **Recommendations for Improvement**: We recommend replacing the "Process-Based Modeling Approach" heading with "Criteria Derivation Approach" since the only option is Process-Based Modeling.
3. **Binding Language**: The following statement must be revised for clarity since the state's approach solely focuses on mechanistic water quality model applications: "*The process-based modeling approach characterizes the natural water quality for a parameter of interest through application of ~~tools such as a~~ mechanistic water quality models.*"
4. **Reorganization and Missing Steps**: The PBA lists nine steps to be used in this approach; however, some critical steps are missing from the approach and the body of the approach itself does not align with the existing 9 steps. The EPA recommends reorganizing the document using the following steps as a framework for the approach to provide a clear, sequential, and repeatable process:
   1. *Defining where and when (if not year-round) natural conditions will apply (site boundary) and what parameters and types of waters will be simulated.*
   2. *Creating a conceptual model specific to the application.*
   3. *Selecting a Mechanistic Model.*

   a. *Allowed models and model considerations.*

   4. *Developing a Quality Assurance Project Plan (QAPP).*
   5. *Compiling all existing, readily available, and credible current and historical water quality and site data.*
   6. *Obtaining new field data, if necessary to fill datagaps. Specifications provided in the QAPP.*
   7. *Compiling, reviewing, and assessing any new field data to ensure it meets quality assurance (QA)/quality control (QC) goals.*
   8. *Developing and calibrating a predictive model of the existing conditions of the waterbody or watershed, including defining temporal and spatial boundaries.*
   9. *Evaluating model performance.*
   10. *Model Application*
       a. *Determining whether nonattainment of numeric water quality standards is due, in part, to natural processes.*
       b. *Calculating the final natural conditions criteria applicable to the site by removing all known human-caused impacts from the predictive model.*
       c. *Crosswalking criteria to demonstrate protection of designated and existing uses.*
   11. *Model Documentation*

5. **Binding Language**: The steps of the PBA must be binding and each section must be detailed and followed in a stepwise fashion. This provides transparency to the EPA, stakeholders, and the public about how the PBA will be applied since the approval of the PBA serves as the approval of the outcomes as well. It also ensures that the process will be applied consistently from project to project.
6. **Missing Steps:** The procedures must include setting up the model grid and include the principle that the model grid accurately represents the physical characteristics of the waterbody. Procedures for documenting the decisions in translating bathymetric data to the model grid must be included, including identifying data sources, procedures to analyze the data, and procedures for how to link the bathymetry to the model grid. This is an important step for building a water quality model.
7. **Binding Language:** The document must require the use of *all* existing readily available credible data (under Data Sources) to ensure the most accurate range of conditions are simulated. There are several statements with lesser language, such as *should* use all existing data or to use existing and readily available data rather than to use *all* existing and readily available data. We recommend consistent language throughout the document on this point.
8. **Binding procedures/additional details needed**: As written, most sections of the PBA are not sufficiently detailed and lack methods and procedures. The following are examples of additional details that need to be included in steps 1-11 recommended above.
    1. Step I: identified as “Defining site boundaries,” should cover additional elements that define the scope of applicability, including parameter(s), waterbody types, bathymetry, and time frames of the PBA assessment. Please identify the typical datasets and resolutions (horizontal and vertical to be sufficient for capturing hydrodynamic/biogeochemical properties for different types of waterbodies), and validation steps that must be applied to complete this step.
    2. Step II: Develop Conceptual Model. For additional transparency, the EPA recommends adding to the PBA a requirement to develop a conceptual model by waterbody type and parameter (or waterbody type and multiple parameters). The state may include language such that the conceptual models can be updated if needed to reflect site-specific conditions. Example: “*For marine waters, we will rely upon the conceptual model from Khangaonkar et al. 2018 - FVCOM-ICM model conceptual model excerpted into Appendix B. All state variables and processes identified in the conceptual models will be represented in the mechanistic models.*”

    3. Step III: Model Selection. This section must include a list of models Ecology intends to use, procedures for identification of the appropriate model for a given application (including model selection criteria),

identifying any model limitations and ways to account for and address limitations. Additional models with a comparable scope, application and level of rigor may be used. Example: "*The list of models Ecology has identified for the purpose of this natural conditions criteria performance based approach includes, but not limited to, CE-QUAL-W2; CE-QUAL-ICM; FVCOM; HSPF; and QUAL2KW …*"

Additional requirements for this section include Ecology's list of peer review requirements and open-source code. This is already reflected in the list of model requirements in the PBA but should reside in this section. In addition, several other requirements for selecting a model must be added, such as sufficient resolution and processes/dynamics to capture all aspects of the interaction between the hydrodynamics/physical dynamics and biogeochemical processes, sources, cycling, and drivers. The resolution and decisions for that resolution must be documented in the project QAPP.

The model requirements review must include review of the following:

- Prediction of the horizontal and vertical transport and other physical dynamics for complex topography.
- Biogeochemical model predictions that can be generated on least an hourly or finer temporal resolution.
- Predictions that can capture changes in all state variables for the model and processes.
- Prediction sufficient to capture the impacts to all designated and existing uses, including the most sensitive use(s).

The model domain and complexity must be able to be large enough to encompass the entire system of interest while sufficiently accounting for boundary conditions and all anthropogenic sources (see Step I, above).

The model must be able to be set up to simulate all key processes relevant to the current and natural condition of the parameter, site, and waterbody that is the focus of the application.

The PBA procedures must include a list of the state variables for the model that are required to be simulated, and what sources and drivers are included in both the hydrodynamic and biogeochemical simulations (processes). Assumptions and decisions must be documented in the QAPP or final report.

For all listed models, the strengths and limitations of each model and procedures to address or compensate for those limitations must be identified, which could include adding a margin of safety to the outcomes/criteria derived. Ifa model with comparable rigor is used, all of the above information including rationale for level of rigor must be documented in the model selection section of the project QAPP .

4. Step IV: Project Quality Assurance Project Plan requirements. The EPA recommends that Ecology identifies the sections of the QAPP document available at https://apps.ecology.wa.gov/publications/documents/1703107.pdf for and notes the requirements that are binding.
    a. **Reorganization**: QAPP development must come before the compiling data step if the QAPP is to cover data compilation and analysis. However, if there will be a separate data QAPP and a separate modeling QAPP, then each QAPP step must be added prior to the target of interest (compiling and analyzing data or setting up and applying the model, respectively).
    b. **Binding Language**: Step 4.4 of the current QAPP plan should be edited further to add the word "all" because it must include all key processes, not just a subset. Recommended revision: "*Model capability descriptions or references, including ability to simulate all natural and anthropogenic drivers and all key processes that impact water quality.*"
    c. **Binding Language**: Step 4.7 must be made binding, by switching "may" to "must" as well as adding "including but not limited to" language since there is a limited list as written. Suggested revision with EPA additions in italics: "Model approaches and key assumptions, which *must include but are* not limited to boundary conditions and associated determinations, initial or existing conditions, model resolution, inflow loads, and watershed inputs."
    d. **Missing Step:** Step 4.9 must include an additional step for model quality objectives including "reasonable best fit" information, i.e. determination that adequate data is available for calibration which is essential for model preparation.
5. Step V: Compiling Data and Identifying Data Gaps.
    a. **Reorganization:** It is unclear how the data described in this section relate to the model simulations. Certain data are needed to set up the model (e.g. boundary condition data, calibration data, rate data for current conditions estimates) and other data to apply the model for the natural conditions estimates. The section must be reorganized to better explain what data are needed and for what purpose (e.g. sensitivity testing), as well as the sources of those data and procedures for incorporating the data into the model. There is a mention of contributing waters but the state must include all watershed contributions as well.
    b. **Recommendations for Improvement**: Please resolve the overlap between this section (Step V) and the "required elements" sections of the document. The required elements include data

needs which belong in Step V. Other aspects of the required elements, e.g. process steps and sources, should be moved to the model set up and application steps.

c. **Additional Detail**: For each data section, waterbody type, and parameter, Ecology must add the types of data/information to populate, establish, and run the model, including the list of state variables for the model, for both current and natural conditions.
d. **Additional Detail**: All data for state variables for the model to be simulated in the model of interest must be included as a list in model set up and calibration. For example, for dissolved oxygen simulations, please include, at a minimum, the relevant state variables for light, temperature, algae, dissolved oxygen, nutrients, and carbon and any others deemed essential.
e. **Missing Steps:** Ecology must ensure that the site characterization is comprehensive as well as the characterization of sources and drivers of pollution. Step V.A. *Site characterization data* is missing the requirement to evaluate legacy effects resulting from past silviculture, agriculture, mining, and development. These activities influence channel form and thus, light, substrate, riparian growth, in-stream cover, sediment transport/turbidity and productivity. The EPA recommends including this information as a data requirement and evaluating the impact from these activities when establishing the natural conditions estimate.
f. **Binding Language**: The PBA states that all site characterization data must be considered in the determination of the natural pH, DO, and temperature at a site (required unless marked as optional). However, subsequent sections use non-binding language such as “should” or “may” where binding language such as “must” is needed throughout the PBA. The EPA recommends revising the PBA to use binding language throughout including for the full range of conditions. For example, the introduction to the site characterization section states, “These data may be necessary to characterize the site of interest and the application of the model.” In addition, all site characterization data types must be labeled “including but not limited to” since the descriptors include few aspects that could influence a simulation and others may exist.

g. **Reorganization**: While the required elements section includes a list of elements that need to be evaluated by the model, it does not include the methods to do those evaluations or how they will be accounted for when modeling the natural condition. The EPA recommends a substantial rewrite for the required elements section accordingly and we recommend moving this section to EPA's suggested process Step VIII. for clarity.

h. **Additional Prescriptiveness**: For all elements (marine and fresh) in this section, Ecology must include all procedures for establishing and running the model, including how sources and impacts will be removed. This section is a mixture of processes, data, and sources as written. For clarity, the EPA recommends revising this section to specify a logical process for establishing and then applying the model. Our recommendation is to add Appendices C and D with the state variables and equations/solutions that will be included in the model simulation (or references to that information), as well as a more complete list of sources and drivers for each model listed.
i. **Additional Prescriptiveness**: The point source discharges element in the required elements section appropriately includes removal of point source discharges (and other discharges) of pollutants that impact DO, pH, and temperature. However, the procedures do not indicate the data needs and how these sources will be removed. The PBA must specify *how* these sources will be removed in step-by-step procedures. Then, for the natural condition simulation, these discharge flows all would be set to zero (i.e. turned off).
j. **Additional Details and Consistency with Regulations:** The nonpoint source discharges element in the required elements section includes one bullet and footnote 8 that states "reference natural conditions." The EPA recommends providing more detail to clarify this reference condition is consistent with the definition of natural conditions in the state regulations to be used in the PBA.
k. **Additional Prescriptiveness**: For each *Element*, Ecology must add procedures for acquiring/populating the model data. For example, for the "light" element, please define what data will be used, such as Kd estimates, secchi, or PAR sensors. Please also specify the other data types that are acceptable and what range of data is needed to populate the model(s) in the PBA as well.
l. **Recommendations for Improvement**: There is a section called, "Types of data" but includes datasets that may overlap with the previous section. We recommend changing the title to "Additional Types of Data for Site Characterization."
m. **Additional Prescriptiveness**:
    i. Throughout Step V, the datasets and types are not all specifically identified. For clarity, each subtype of data should be revised to specify the type of data and add

"including but not limited to" since the list only includes some of the data.

ii. Under the "Data Gaps" element, conservative assumptions must be made where there are major data gaps or other uncertainties. Please include statements/procedures to reflect this with citation to approaches and procedures to fill data gaps in the PBA. Include a section on filling data gaps in the QAPP and include these methods for peer review.

6. Step VI: **Missing Step:** The EPA recommends that Ecology adds a step titled "Step VI. Acquiring New Field Data," for acquiring new field data when needed. This section should include a discussion of when new field data will be needed and references to the procedures that will be used to collect that data (e.g. reference SOPs for field collection).
7. Step VII: **Missing Step:** The EPA recommends that Ecology adds a step titled "Step VII. QA/QC of New Field Data" for what quality assurance and quality control measures will be undertaken for the collection of new field data. This section should include the procedures for QA/QC or references to appropriate state SOPs.
8. Step VIII: Model development and calibration (the EPA-recommended title for this necessary step).
    a. **Reorganization:** We recommend pulling several aspects from other parts of the PBA into this section and adding missing subsections. This section must cover all steps needed in model development and calibration. Suggested introductory text for this section: "*The process-based modeling approach uses a mechanistic model(s) to estimate the current conditions for the waterbody of interest. Once this is established, this model will be used to simulate the natural conditions of a system by removing all anthropogenic sources that influence the parameter of interest at the site of interest (completed in Step IX).*"
    b. **Recommendations for Improvement**: The following statement: "*The model or models chosen must be able to simulate all key processes and sources affecting the parameters of interest."* must be revised to "*The model(s) will simulate all key processes and sources affecting the parameters of interest.*" The model(s) will already have been selected in the model selection step, so this section should describe what the model will do.
    c. **Missing Step**: The first substep after identifying the model is creating the model grid, which is currently missing from the PBA.
        i. The model grid must be consistent with the bathymetric data. Minimum horizontal and vertical resolutions for different types of waterbodies must be included or the state could include decision rules for determining the appropriate resolution. The level of vertical and horizontal

differentiation is important for capturing biogeochemical and density-driven processes. Initial hydrodynamic simulations and sensitivity testing should be used to further inform the resolution and configuration needed to represent all key processes in the model.

d. **Recommendations for Improvement:** There is overlap between the "Data" listed in Step V and the "Required Elements" listed in the suggested reorganized Step VIII. Please differentiate which procedures and minimum data requirements for any model in each section. The sections must state that all impacts by humans on boundary conditions of the site must be accounted for and removed in the natural conditions estimation.
e. **Additional Prescriptiveness**: The PBA currently includes a sparse list of required elements. The EPA recommends expanding the list of required elements. Additionally, all methods and procedures to characterize how anthropogenic sources will be accounted for and removed need to be included in the "Required Elements" section of the PBA. When documenting the PBA, details on decision points should be included in the documentation of the application of the PBA.
f. **Missing steps**: The EPA recommends a second sub-step added to the Model Development and Calibration step for input files to be developed for the initial conditions, boundary conditions, discrete point sources, nonpoint sources, and rate constants. The PBA should specify that all input files, which could be referenced from the applicable manuals or included in a reference for clarity, will be populated using the range of all existing and readily available credible data from Step V. All state variables for the model, equations, solutions, and processes simulated by each model must be identified in model documentation and the PBA must include decision rules if there are choices to be made among the equations/solutions, variables, and processes.
g. **Missing Steps and Additional Detail**:
    i. Data selected for populating boundary conditions must represent seasonal variability that impacts the waterbody and parameter of interest.
    ii. Currently the PBA contains no bounds on calibration provided or certainty that model performance will be adequate for the purpose of establishing current conditions and the natural conditions. Ecology must add text to the effect that models must only be calibrated to reflect the expected range in variability of conditions at a site.[4]

[4] EPA R10's 2016 QAPP for modeling guidance - https://19january2021snapshot.epa.gov/sites/static/files/2020-02/documents/wq_modeling_qapp_guidance_region_10_dec_2016.pdf.

h. **Consistency with Regulations and Binding Language:** The phrase stating that calibration can be done *"…by comparing to documented model fit statistics from other similar applications using the same model."* could be interpreted broadly in terms of accepting any application calibration no matter how good and therefore must be revised. This calibration section must state that the model must be able to simulate current and natural conditions. As this current phrase in the PBA could allow inappropriate model calibration, this language does not meet the federal requirement for a sound scientific rationale (40 CFR section 131.11(a)(1)).

i. **Additional Prescriptiveness**: The "required elements" section of the PBA is incomplete and does not cover all processes, sources, and drivers that impact the parameters identified. Ecology must include all sources and impacts to be removed from the current condition estimation to determine the natural condition estimation. Additionally, procedures and methods must also be added for each type of process. For example, for riparian shade, it is unclear what and how the state intends to estimate the impact of current shade on waterbodies of different types, and then secondly how they intend to estimate natural shade determinations.

9. Step IX: Model application.
    a. **Additional Prescriptiveness:** Procedures must be added or minimum requirements included regarding how the model will be applied so that the PBA is transparent and repeatable. After the model has been developed, calibrated, and verified to accurately recreate the current conditions (over the range of spatial and temporal variability), the model will be applied to estimate the natural condition. The EPA recommends adding this step, Step IX, to capture all of the needed details on model application.
    b. **Binding Language and Additional Details:** The following details need to be included in the model application section. Please indicate clearly in Step IX that all anthropogenic sources must be removed in the natural condition mechanistic model to determine the natural conditions. This includes accounting for all known sources of heat, oxygen-demanding pollutants, and pH-altering pollutants. Suggested revisions to address this comment are identified below:

       The removal of nonpoint sources and point sources must be accomplished in two ways for different anthropogenic stressors. For nonpoint sources, fluxes for all stressors, e.g. nutrient concentrations from anthropogenic sources, must be zeroed out or water concentrations set to natural estimates. For all contributing waters to the domain of the model, flow magnitude and timing must be restored to natural.

       For point source dischargers that contribute to the domain, all *discharges will be turned off (e.g. set to zero flow).*

   c. **Missing Step:** Sensitivity testing must be conducted over representative conditions for the parameters which affect the natural condition outcome. This must be added to the document.

10. Step X: Removal of anthropogenic sources that cannot be explicitly simulated with the mechanistic model and determining the final set of natural conditions criteria applicable to the waterbody.
    a. **Additional Prescriptiveness**: Ecology must describe the methods and procedures for removal of anthropogenic sources that it is not technically feasible to simulate in the model. The EPA recommends that the PBA include lists of sources that will be removed and the typical procedures that will be used. For example, if natural boundary fluxes from Canada are to be established and are not part of the model, Ecology should specify how will this be accounted for outside of the model.
    b. Derivation Natural Conditions Criteria- change to criteria derivation.
       i. **Consistency with regulations**: The modeling timeperiod must include the conditions that affect the sources and cycling impacting a parameter, i.e. the waterbody conditions that affect designated uses. The EPA recommends making clear that an annual simulation is required, or if a shorter timeperiod is used, then a justification must be provided.
       ii. **Additional Detail**: Ecology has not clearly identified that the durations and frequencies for the BBNC will be the applicable durations and frequencies for the natural conditions criteria. Please include the BBNC durations and frequencies in the appropriate places so that those durations and frequencies will be applicable to the natural conditions criteria and indicate that no alternate durations and frequencies will be used.
       iii. **Additional Prescriptiveness**: Additional procedures must be added to clarify the results of the criteria derivation. Example language to meet this level or detail: "*To establish protective criteria at all times and locations, the most protective natural condition after removal of all anthropogenic sources will be applied as the final criteria from the range of conditions simulated, or the time varying full range of conditions will be applied in accordance with appropriate flow-load assumptions, after removal of all anthropogenic sources. Natural conditions criteria for each assessment unit will be outputted at the resolution of the model nodes or cells/segments corresponding to at least the resolution of each assessment unit and will reflect the*

duration and frequency components of the biologically-based criteria in [cite WA's biologically-based numeric criteria]."

11. Step XI: Model Documentation
    a. **Reorganization**: The EPA recommends including all information about model documentation in this section.
    b. **Additional Prescriptiveness**: Ecology notes in the documentation section of the PBA that the report on the natural conditions estimate must include any changes from the project QAPP. The EPA is concerned that this indicates that the methodology specified in the PBA may not be followed for criteria derivation and may not meet the requirements of a PBA being transparent and repeatable. Please specify that only minor modifications may be made to improve the model.

4. Proposed Updates to Natural Conditions Provisions in Chapter 173-201A WAC, Technical Support Document, Publication 24-10-015

a. General Provision. Please delete "*When this occurs, the natural conditions constitute the water quality criteria*" from the opening paragraph. Additionally, there are several statements that refer to natural conditions constituting the water quality criteria. As noted in the EPA's comments on the draft rule and PBA documents, we recommend that the state link similar statements throughout the document to the approaches for establishing natural conditions at WAC 173-201A-260(1)(a) or delete those statements.
b. The Services finalized a new rule on April 5, 2024, that revises portions of the ESA implementation regulations, including portions of the regulations summarized in the TSD. The new rule became effective May 6, 2024, and can be found at https://www.federalregister.gov/documents/2024/04/05/2024-06902/endangered-and-threatened-wildlife-and-plants-regulations-for-interagency-cooperation. The EPA recommends referencing the changes in the new rule.
c. The Davies 1997 memorandum is guidance, not regulation. Therefore, EPA recommends changing the "minimum requirements" and "must include" language to recommendations.
d. Page 31 includes references to "statistical modeling" approaches as well as mechanistic modeling approaches; however the PBA is only focused on mechanistic modeling approaches. While the statements are factual, the EPA recommends providing more context for when a statistical modeling approach might be used (e.g. currently only allowable under WAC 173-201A-430 for site-specific criteria development).
e. Appendix B: The EPA's comments on the Elements Section of the draft PBA document apply to this appendix.
f. When referring to the document, *EPA workgroup report on principles to consider when using natural conditions provisions 2005*, please note that this was an informal EPA discussion group and not a formal workgroup. The resulting document was developed to provide clarity but does not represent a formally issued guidance.

5. Rule Implementation Plan, Publication 24-10-016

a. The EPA comments on the rule language and on the PBA should be cross walked and reflected in updates to this document.

b. Page 9. Please clarify the following:

   1. Opening sentence: What is meant by the "current rule." Is it the currently effective rule, or the revised rule amendments and updates?
   2. Human Action Allowance Considerations. Recommend revising to reflect that the allowances are also "within" a certain amount of each criterion.
   3. The revised rules are paraphrased, and some of the qualifying language is not included. Recommend including the draft rules verbatim for clarity.

c. Page 11

   1. Use of the Performance Based Approach. Consistent with the comments above, please reference WAC 173-201A-260(1)(a) when developing natural conditions criteria.
   2. This statement about establishing natural conditions lacks detail, *"…so long as the regional natural condition values with an underlying scientific basis defined in the project-specific QAPP…"* Please also reference the appropriate approaches that are allowed under WAC 173-201A-260(1)(a)4.
   3. The EPA recommends adding clarifications to the permitting and TMDL implementation sections to clearly identify when in each process a criteria will be derived using the PBA. For example, some statements are confusing, such as on page 15, TMDL status #4, there is a statement to "*Include new criteria in study design and sampling and drop old criteria*" but the criteria may not have been developed yet if they are via the PBA.

d. Page 15, Using the Performance Based Approach. This section has some unclear language, including "subtracting" anthropogenic impacts, rather than removing all impacts. In addition, there is mention that "extra jurisdictional sources" will be accounted for from a reference condition. However, such sources should be included in the current conditions simulations and then removed to do the natural conditions simulations under the PBA if technically feasible. Where it is not technically feasible to model extra jurisdictional sources and remove them, it may be possible for the state to account for and remove those separately to establish natural conditions criteria free from anthropogenic pollutants.

e. Page 16

   1. Please clarify that the biologically-based numeric criteria duration and frequencies are applicable to the following statement, "*These estimates, alongside the applicable and protective duration and frequency components, represent the natural conditions criteria for that water quality parameter."*
   2. Natural Conditions General Provision. If Ecology intends to develop PBA-based criteria during the TMDL process, as described in Ecology's rulemaking presentations and in other documents, it is unclear when that would be triggered unless the state had first listed those waters as impaired pursuant to the biologically based numeric criteria. The EPA recommends revising the following statement since it appears contrary to the intended approach,

"*Therefore, determination of the natural conditions criteria that constitute the water quality criteria must be done before deciding whether to place waterbody segments into impaired categories when the nonattainment of a standard is only due to natural conditions, and not as result of human-caused pollution.*"

3. 401 Certifications. Similar to the comment above, the EPA recommends clarifying when/what is applicable under this implementation scenario to reflect the state's intended approach.