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memorandum

date May 5, 2025

to Tim Brooks, Winterbrook Planning; David Peters, City of Portland Water Bureau

from Phil Gleason, ESA | Environmental Science Associates

subject Portland Water Bureau Filtration Facility Project: Responses to AQ- and GHG-Related Testimony At or Prior to Hearing

Introduction

Under contract with Winterbrook Planning, Environmental Science Associates (ESA) has prepared this technical memorandum to respond to air quality (AQ) and greenhouse gas (GHG) related evidence entered into the land use record at or before the public Remand Hearing on April 16, 2025, for the Portland Water Bureau (PWB) Water Filtration Facility and Pipeline Project (Project). Specifically, this memorandum provides responses to AQ and GHG items contained the “N” and “R” Exhibits.

ESA previously provided a technical memorandum, “Portland Water Bureau Filtration Facility Project: Operational Air Quality Analysis” prepared by Phil Gleason, dated April 15, 2025, which was included in the land use record as staff’s Exhibit N.61 (referred to hereafter as, “ESA’s Operational AQ Analysis”) (Multnomah County, 2025a). This memorandum builds upon ESA’s Operational AQ Analysis and uses defined terms and other concepts from that technical memorandum.

Responses to AQ and GHG Testimony for Exhibits “N” and R”

Exhibit N.43 (Cottrell CPO & PHCA Adverse Effects Report – 4.15.2025). Page 5, paragraph 2, of Exhibit N.43 provides the following air-quality related comment regarding carbon dioxide (CO₂) emissions generated by construction activities (Multnomah County, 2025b):

“As a result, significant natural resource impacts have already occurred, including... the release of thousands of tons of CO₂ emissions from construction equipment and haul trucks.”

Response to Exhibit N.43 (Construction CO₂ Emissions):

The Hearings Officer held, and the Land Use Board of Appeals affirmed, that construction is not within the scope of the Proposed Use to be considered in this land use proceeding (Multnomah County, 2023 and LUBA, 2025). Therefore, this comment is irrelevant to this proceeding and to compliance with MCC 39.7515(B). CO₂ emissions from construction activities are short-term and confined to the temporary construction period. The effects of global climate change are the result of worldwide GHG emissions. Individual projects of certain sizes, like the

one proposed, do not generate enough GHG emissions to meaningfully affect or influence global climate change, nor would the Project's CO₂ emissions separately affect natural resources in an adverse manner.

Exhibit N.43 (Cottrell CPO & PHCA Adverse Effects Report – 4.15.2025). Page 28 of Exhibit N.43 provides the following air-quality related comment regarding “Irreparable Effects of Filtration Facility and Pipeline on Air Quality” and carbon sequestration (Multnomah County, 2025b):

“Farmland acts as a natural carbon sink (when managed sustainably) due to crop density and well-managed soils. A carbon sink is something that absorbs more carbon dioxide (CO₂) than it gives off (see proceeding equation), helping to reduce greenhouse gases in the atmosphere. Omission and fragmentation of farmland, leads to more CO₂ in the air, contributing to climate change. When farmland is replaced by industrial development, the CO₂ equation flips, and the ecosystem no longer benefits from the carbon sink; industrial development increases carbon emissions. Carbon sinks are vital to support ecosystem resilience and biodiversity by curbing greenhouse gases...

Therefore, nursery stock cultivation on the 90+ acre parcel served as a carbon sink ($C_{in} > C_{out}$). Impervious surfaces and facility-associated carbon emissions from the ultimate use facility forces the existing land to switch to a carbon source ($C_{in} < C_{out}$).”

Response to Exhibit N.43 (Carbon Sequestration):

Although this comment is initially framed as an AQ topic, the comment instead focuses on carbon sequestration at the site. Carbon sequestration is not an AQ topic. CO₂ is a GHG – a different classification of atmospheric constituents not regulated by the EPA or Oregon Department of Environmental Quality (ODEQ) in the same manner as criteria air pollutants (for which ambient AQ standards [AAQS] have been established – see ESA's Operational AQ Analysis, pg. 2; Multnomah County, 2025a). As described below, the commenter has not provided any evidence to support the notion that (1) the pre-developed site functioned as a carbon sink, (2) the post-developed site under Project conditions would convert the site to a carbon source, or (3) the Project would result in an adverse effect on natural resources. As detailed below, ESA's analysis provides evidence that:

- There were existing emission sources at the site (e.g., off-road equipment usage and vehicle trips) that partially or fully offset any carbon sequestration provided by the trees from the site's pre-development use.
- The Project has a sustainable design that minimizes CO₂ emissions, is consistent with PWB's *Net Zero* strategy,
- Vegetation planted under post-development conditions would continue to sequester CO₂ at the site.
- Individual projects of certain sizes, like the one proposed, do not generate enough GHG emissions to meaningfully influence global climate change or have an adverse effect on natural resources. This is true regardless of the site's pre- or post-development capacity to act as a carbon sink or source.

First, by the commenter’s own admission, “farmland acts as a carbon sink (*when managed sustainably*)...” (*emphasis* added by ESA). The commenter provides no evidence that the site was managed in a sustainable manner or that the site was functioning as a carbon sink under pre-development conditions. To function as a carbon sink, a site must sequester more carbon than it releases. Historical agricultural operations at the site involved CO₂ generating activities. These emission-generating activities included, but were not limited to: tractor operation, worker commutes via bus and passenger vehicles, haul and vendor trucks for material import and goods export, sprayers used to apply fertilizers and chemicals, water conveyance and distribution for irrigation, and other assorted equipment use for tending to the fields. Many of these pieces of off-road equipment were powered by diesel fuel. On- and off-road vehicles, as well as the imbedded CO₂ emissions in the electricity used to convey and distribute water to the crops,^{1,2} contributed to CO₂ emissions at the site under pre-development conditions. In addition, any carbon sequestration value credited to the site under pre-development conditions would have been attributable to young trees that were planted as seedlings and raised for about three to five years before being harvested. Young plants grow faster and fix (i.e., sequester) CO₂ more rapidly per unit of biomass compared to more mature trees; however, tree pruning (a standard practice in agricultural operations, particularly for ornamental nursery trees like those raised previously at this site) removes leaf vegetation, which inhibits photosynthesis and reduces the rate of carbon sequestration. Thus, the commenter is incorrect in making a broad assumption that the site functioned as a carbon sink under pre-development conditions. Agricultural operations have the capacity to sequester carbon, but the site also generated CO₂ emissions under pre-development conditions that otherwise partially or fully offset any quantity of CO₂ being sequestered at the site.

Second, the commenter claims that the Project would transition the site to a carbon source, but once again provides no evidence to support such a statement. The Project includes numerous sustainability measures that would reduce its carbon footprint. For example, one of the considerations that went into the Facility’s site selection was that its unique geographic location accommodates untreated water conveyance to the Facility via gravity, instead of pumping the water to the Facility. Pumping water to the facility would have increased electricity use from the Project under post-development conditions (and generated indirect CO₂ emissions through the pumping process). Additionally, consistent with Strategy 4 of PWB’s *Net Zero Strategy*, the Project would not include natural gas-fired boilers, which would have produced CO₂ emissions during fuel combustion (PWB, 2024). Instead, the Project has been designed to treat water via mechanical and chemical means, and the machines used during this process would be powered by electricity. The State of Oregon currently has several legislative and regulatory mandates for retail electricity providers³ to reduce GHG emissions associated with electricity sold to Oregon customers. For example, House Bill (HB) 2021 “Clean Electricity by 2040” requires retail electricity providers to reduce GHG emissions to 80 percent below baseline emissions by 2030, 90 percent by 2035, and 100 percent by 2040 (OPUC, 2021). As opposed to using natural gas, the Project has been designed to use electricity as a fuel source for typical day-to-day operations, which would allow the Project to benefit from these legislative requirements and reduce the Project’s carbon footprint as electricity supplied to the Project becomes cleaner (i.e., less GHG intensive) over time. Similarly, the Project has been designed to reduce GHG emissions from PWB’s vehicle fleet. The Facility would provide electric vehicle (EV) parking spaces, which is consistent with Strategy 3

¹ Imbedded GHG emissions refers to the GHG emissions generated during the production of electricity. For example, natural gas- and coal-powered plants generate GHG emissions during the combustion of fuels used to generate electricity. In contrast, renewable sources (e.g., solar and wind) generate GHG-free electricity.

² Under pre-development conditions, irrigation was provided to the site via a groundwater well on the Surface Nursery property immediately south of the filtration site. Irrigation water from the groundwater well was pumped and piped to the Project site for irrigation purposes.

³ “Retail electricity providers” includes Portland General Electric, who would supply electricity to the Project.

in PWB's *Net Zero* Strategy, and furthers PWB's efforts to electrify their vehicle fleet (PWB, 2024).⁴ Transitioning gasoline- and diesel-powered vehicles to EVs would help reduce long-term GHG emissions from Facility operation as retail electricity providers comply with HB 2021. Also consistent with PWB's *Net Zero* Strategy, the Project would install a rooftop solar array that generates renewable electricity for the administration building, reducing the quantity of electricity sourced from the grid (and the associated GHG emissions while retail electricity providers are still in the ramp up of the quantity of renewable energy they provide to comply with HB 2021). Finally, the Project includes the planting of more than 3,000 trees at the Facility, which would establish permanent vegetation at the site and sequester CO₂ under post-development conditions.

Third, and most importantly, the effects of global climate change are the result of worldwide GHG emissions. Individual projects of certain sizes, like the one proposed, do not generate enough GHG emissions to meaningfully influence global climate change, nor would the Project's CO₂ emissions have a material effect on ecosystem resiliency or biodiversity. Whether the Project converts the site from a carbon sink to a carbon source is immaterial in this regard; the Project would not adversely affect natural resources.

Overall, ESA's analysis of this topic reveals that: (1) activities associated with the prior agricultural use either partially or fully offset any carbon sequestration provided at the site through equipment use and other GHG emission sources, (2) the Project's design is consistent with PWB's long-term *Net Zero* strategy and would plant vegetation that reestablishes carbon sequestration at the site under post-development conditions, and (3) individual projects of certain sizes, like the one proposed, do not generate enough GHG emissions to meaningfully influence or affect global climate change. Therefore, the project would not adversely affect natural resources by emission of GHGs.

Exhibit N.45 (Paul Willis Comments – 4.15.2025). Page 3, bullet points 1 and 3, provide the following generalized air-quality related comments (Multnomah County, 2025c):

“Air and Water Pollution: The Plant's operation will introduce chemicals used in water treatment *into the air* and possibly surrounding water bodies. *These chemicals can negatively affect the local flora and fauna.* The surrounding land and streams may suffer contamination from runoff, jeopardizing aquatic life and wildlife that rely on clean, uncontaminated water sources...

Chemical Exposure: The use of industrial chemicals at the Plant poses additional risks to nearby wildlife. Even with best practices in place, the potential for chemical runoff, spills, or *vaporization into the atmosphere* cannot be entirely eliminated, and it would directly affect local species' health and the quality of nearby water resources” (*emphasis added by ESA*).

Response to Exhibit N.45 (AQ Effect on Flora and Fauna):

ESA's Operational AQ Analysis is applicable to the Project's capacity to adversely affect local flora and fauna based on AQ emissions from the Project. The EPA has established Primary and Secondary National Ambient Air

⁴ Upon commencement of initial operations, the Facility would include two, level 2, public EV charging stations and one level 2 EV charging station for PWB fleet vehicles. The Project has also been designed to accommodate four additional public EV charging stations and two additional EV charging stations for PWB fleet vehicles.

Quality Standards (NAAQS). The Primary NAAQS (on which the *De Minimis Thresholds* are based, see ESA's Operational AQ Analysis, pgs. 2 and 3; Multnomah County, 2025a) are designed to protect public health, including sensitive populations such as children, the elderly, and individuals with respiratory or heart conditions (EPA, 2017). Secondary NAAQS are intended to protect public welfare (including animals, crops, and vegetation) from harmful effects of air pollution (EPA, 2017). The concentration limits specified in the Secondary NAAQS are either the same as or less stringent than the Primary NAAQS (i.e., the Secondary NAAQS would be exceeded at either the same time or after the Primary NAAQS). ESA's Operational AQ Analysis demonstrates the Project's AQ emissions would be substantially below the *De Minimis Thresholds* and are therefore too small to cause or contribute to a violation of the Primary NAAQS. Since the Primary NAAQS are either the same or more stringent than the Secondary NAAQS, the Project's emissions would also be too small to cause or contribute to a violation of the Secondary NAAQS. Additional rationale substantiating why the Project's AQ emissions would not adversely affect local flora and fauna is provided below:

- **Flora (Plants).** Air quality pollutants typically remain suspended in the atmosphere for several hours to days, depending on their size and weight, and disperse in accordance with local meteorological conditions. This allows ample time for dispersion, reducing the already low pollutant concentrations from Project emission sources to levels that would have a negligible effect on flora. Similarly, concentrations would be sufficiently reduced at the point of deposition⁵ such that they, too, would have a negligible effect on flora. Although the commenter's concern is that AQ emissions from the Project could adversely affect local flora, it is also the case that the Project includes the planting of more than 3,000 trees, which would affect AQ through the direct removal of air pollutants, including surface-level ozone (O₃), sulfur dioxide (SO₂), and nitrogen oxides (NO_x) (Nowak, 2014; EPA, 2024). The Project would not adversely affect flora based on their exposure to AQ emissions generated by the Project.
- **Fauna (Wildlife).** As discussed in the "Flora (Plants)" response above, the Project would not exceed the Secondary NAAQS that have been adopted to protect public welfare, including animals. Furthermore, wildlife is transient and would not experience prolonged or high-concentration exposure to Project-generated AQ emissions. The highest pollutant concentrations from Project emission sources (which would already be rather low to begin with) would primarily be located inside the fenced area of the Facility, in proximity of the sources themselves. The distance from Project emission sources to the areas where wildlife could be located allows time and space for dispersion, reducing already low pollutant emissions the further they travel from the source. Furthermore, the Filtration site has been designed to have shrub and tree hedge buffers (Buffers) around the perimeter of the Facility. As described under the "Flora" discussion above, the EPA recognizes trees as a natural mechanism for extracting pollutants from the air (EPA, 2024). A recent meta-analysis of global field studies found that vegetation can reduce ambient concentrations of particulate matter (PM) by roughly 16–27 percent, NO_x by 14–36 percent, and SO₂ by 20–48 percent, under various conditions in an urban setting (Gong, 2023).⁶ This supports the conclusion that air pollutant concentrations from Project-related emissions would be substantially reduced at offsite locations where wildlife may be present. Project-related and existing off-site vegetation

⁵ Deposition is the process where air pollutants, both gases and particles, are transferred from the atmosphere to the Earth's surface.

⁶ ESA acknowledges the Project is within a rural, non-urban setting; however, relative pollutant reductions (i.e., the percent change in local concentrations) near the Facility would still be substantial based on the natural filtration process undertaken by vegetation. Furthermore, the Project is upwind of a considerable amount of existing vegetation that would continue to function as a pollution buffer, further filtering Project emissions and background concentrations from other local and regional sources.

would further diminish the already low magnitude of pollutant concentrations at nearby natural lands where wildlife could be present. The Project would not adversely affect fauna based on their exposure to Project-generated AQ emissions. The Project's AQ emissions would be low to begin with, pollutants would have ample time and space to disperse before reaching locations where wildlife may be present, and both Project (i.e., Buffers) and off-site vegetation would substantially reduce pollutant concentrations in the areas where wildlife is most likely to be present. The Project would not adversely affect natural resources because of fauna exposure to Project-generated AQ emissions.

As described above, the Project's AQ emissions would not exceed the *De Minimis Thresholds*, and are therefore too small to cause or contribute to a violation of the Primary or Secondary AAQS. The Project's AQ emissions would not adversely affect flora or fauna, and vegetation planted by the Project would assist in extracting AQ pollutants generated by the Project as well as other sources contributing to air quality conditions in the vicinity of the Project.

Response to Exhibit N.45 (Chemical Vaporization):

The commenter is concerned that the Project poses additional risks to nearby wildlife based on chemical vaporization into the atmosphere. The chemicals proposed for water filtration activities at the site, documented in Table 1 of the Basis of Design Report, are either non-volatile or have very low volatility, meaning that they would not readily vaporize as suggested by the commenter (Stantec, 2021). Furthermore, these water treatment chemicals would be contained within storage vessels, pipelines, and machinery at the Facility meeting industry best practice standards. The chemicals would not be openly stored in an outdoor environment, which dramatically minimizes their capacity to become airborne through other, non-vaporization means. ESA's Operational AQ Analysis addressed fugitive dust emissions from dry chemical transfer (a different physical process) associated with vendor deliveries made to on-site storage silos (Multnomah County, 2025a; pgs. 3 through 5). The Project would not vaporize water treatment chemicals, nor would AQ emissions pose risks to nearby natural resources. Overall, it continues to be our professional conclusion that the Project's AQ emissions would not adversely affect natural resources.

Exhibit N.48 (Charles Ciecko Comments – 4.15.2025). Page 18, paragraphs 2 through 4, provide the following (Multnomah County, 2025d):

"Ex.E.9 pgs. 5-7 detailed specific concerns related to adverse impacts of project construction and ongoing operations on air quality from heavy haul trucks, large construction equipment and subsequently regular use of large diesel generators (50,000 gal. of diesel will be stored on site and used regularly), numerous chemical deliveries and off-hauling of plant by-products

In response, PWB stated: Ex I.75, pg. 2: "The city of Portland participates in the Clean Air Construction (CAC) Program" and "Contractors working on the Bull Run Filtration Project will need to certify that all applicable diesel equipment or vehicles are registered and in compliance with the CAC Program or have a valid exemption."

PWB never provided any explanation of what the impact of the CAC Program meant in terms of reducing massive amounts of diesel emissions or explained what a valid exemption meant or how many pieces of

diesel equipment pieces would be permitted to have a "valid exemption". I challenge the PWB to provide that information during this remand process so that the impact of their project on this community's air quality and climate change can be assessed. Although the PWB may argue that air pollution is primarily "construction related" and therefore does not count, the simple fact is that emissions will continue as a result of operations and public health and climate impacts will last long after construction ends."

Response to Exhibit N.48 (Construction AQ Emissions):

The Hearings Officer held, and the Land Use Board of Appeals affirmed, that construction is not within the scope of the Proposed Use to be considered in this land use proceeding (Multnomah County, 2023 and LUBA, 2025). Construction emissions would not be emitted upon completion of Project construction. Therefore, this comment is irrelevant to this proceeding and is irrelevant to compliance with MCC 39.7515(B).

Response to Exhibit N.48 (Operational AQ Emissions):

This has been addressed in the record.

Exhibit R.11 (Jeff Knapp Comments – 4.16.2025). Pages 2 and 6 provide the following air-quality related comments (Multnomah County, 2025e). Page 2 broadly addresses construction and operational emissions, while page 6 attempts to link Portland's prohibition of gas-powered leaf blowers to the activities proposed by the Project.

Page 2: "Every Year – Perpetually

- ~3,600 cubic yards of waste – dump trucks worth
- ~8,000 tons of chemicals
- ~781 Truck Trips = mass quantities of CO₂ and pollutants...

During Construction

- ~122,000 Truck Trips
- Mass quantities of CO₂ & pollutants released to the environment"

Page 6: "City of Portland able (sic) to recognize gas leaf blowers are bad for the environment and sufficient to warrant action in an urban environment, but perpetual generation of thousands of cubic yards of chemically laden residuals that must be trucked away and these many hundreds of heavy trucks certainly generating tremendous amounts of noise & pollutants is acceptable in a wildlife rich rural area."

Response to Exhibit R.11 (Pg. 2: Construction AQ and GHG Emissions):

The Hearings Officer held, and the Land Use Board of Appeals affirmed, that construction is not within the scope of the Proposed Use to be considered in this land use proceeding (Multnomah County, 2023 and LUBA, 2025). Construction emissions would not be emitted upon completion of Project construction. Therefore, this comment is irrelevant to this proceeding and is irrelevant to compliance with MCC 39.7515(B).

Response to Exhibit R.11 (Pg. 2: Operational AQ and GHG Emissions):

This has been addressed in the record.

Response to Exhibit R.11 (Pg. 6: Toxic Operational Pollutants)

The commenter is incorrect in their assertion that the residuals would be chemically laden. The residual solids generated during the water treatment process would be inert, and not result in an adverse effect to AQ natural resources. Otherwise, this has been addressed in the record.

References

The following references were used in the preparation of this memorandum.

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- Multnomah County, 2023. "Notice of Hearings Officer Decision." Case No. T3-2022-16220. November 29, 2023. https://multco.us/file/t3-2022-16220_hearings_officer%27s_decision-0/download
- Multnomah County, 2025a. Exhibit N.61: PWB Operational Air Quality Analysis 4.15.2025. Memorandum Prepared by Environmental Science Associates. April 15, 2025. https://multco.us/file/n.61_pwb_operational_air_quality_analysis_4.15.2025/download
- Multnomah County, 2025b. Exhibit N.43: Cottrell CPO & PHCA Adverse Effects Report - 4.15.2025. https://multco.us/file/n.43_cottrell_cpo_%26_phca_adverse_effects_report_-_4.15.2025/download
- Multnomah County, 2025c. Exhibit N.45: Paul Willis Comments - 4.15.2025. https://multco.us/file/n.45_paul_willis_comments_-_4.15.2025/download
- Multnomah County, 2025d. Exhibit N.48: Charles Ciecko Comments - 4.15.2025. https://multco.us/file/n.48_charles_ciecko_comments_-_4.15.2025/download
- Multnomah County, 2025e. Exhibit R.11: Jeff Knapp Comments - 4.16.2025. https://multco.us/file/r.11_jeff_knapp_comments_4.16.2025/download
- Nowak, D., Hirabayashi, S., Brodine, A., and Greenfield, E. (Nowak, et al.), 2014). Tree and forest effects on air quality and human health in the United States. *Environmental Pollution* Volume 193, October 2014, Pages 119-129.
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United States Environmental Protection Agency (EPA), 2024. "Benefits of Trees and Vegetation." Website. Updated December 18, 2024. Accessed April 30, 2025. <https://www.epa.gov/heatislands/benefits-trees-and-vegetation#:~:text=Improved%20air%20quality,from%20fossil%20fuel%20power%20generation>



LUP Hearings <lup-hearings@multco.us>

Applicant's First Open Record Period Submission -- T3-2022-16220

Zoe Powers <zpowers@radlerwhite.com>

Mon, May 5, 2025 at 11:47 AM

To: LUP Hearings <lup-hearings@multco.us>

Cc: "Peters, David" <David.Peters@portlandoregon.gov>, Renee France <rfrance@radlerwhite.com>, Zoe Powers <zpowers@radlerwhite.com>

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Multnomah County Staff,

At this link, please find the applicant's submissions into the record for the First Open Record Period of T3-2022-16220 on remand:

<https://radlerwhite.sharefile.com/d-sc32887acc9964f03b16e192384a89def>

I have personally endeavored to make sure these are all searchable, unlocked/editable, and of a proper size. I understand that in our last submission we missed recognizing that one of the documents was locked by an engineer's stamping procedure and it caused additional work for staff. Please let me know if you have that issue again and I will have the document corrected.

Thank you,

Zoe Lynn Powers

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Work Hours: I work normal business hours all days except for Tuesdays. **On Tuesdays, I work until 2:30 PM and then return around 7 PM.** If you have an urgent matter on a Tuesday afternoon between 2:30 PM and 7 PM, please call my legal assistant, Brittany, at 971.634.0216. Brittany will be able to contact me.

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