PORTLAND WATER BUREAU
FROM FOREST TO FAUCET
Bull Run TREATMENT PROJECTS

Memorandum

Subject: Second Open Record Period Response to Testimony Related to Stormwater

Project #:	**PWB:**	W02563

Date: May 19, 2025

To: Dan Hogan, Project Manager / Portland Water Bureau

From: Mark Graham, P.E. Project Manager, Stantec

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Reviewed by: Michelle Cheek, Deputy Program Manager / Portland Water Bureau

This memorandum responds to a selection of public comments related to stormwater issues entered into the land use record during the first open record period (Exhibit S).

The responses below are intended to broadly address the themes and concepts in this selection of public comments. For that reason, these responses are likely to also be applicable to other public comments now in the record or that are placed in the record after the date of this response.

Comment 0: Exhibit S.2 David Shapiro Comments – page 1

But after it does the job of filtering the water it will be spent and the spent caking agent will have to be removed and the PWB will put it on large trucks daily and send it down the small and winding roads that lead to I84. Will animals get run over? These large diesel burning dump trucks will also be shedding their microplastics into Beaver Creek,Johnson Creek, and the Columbia River as they make their way to Pendelton.

Response to Comment 0:

As described in Exhibit N.58 (Filtration Facility Site Stormwater Drainage Report), impervious surface areas at the Filtration Facility drain to onsite vegetated stormwater quality treatment facilities (i.e., Best Management Practices (BMPs)), including planters, basins, grassy swales, filter strips, and an ecoroof, all designed to meet the Portland SWMM requirements and remove a variety of pollutants of concern. These BMPs use plant and soil media to treat stormwater using a combination of unit removal processes including sedimentation, filtration, sorption, infiltration, and biologic uptake. These BMPs are commonly classified as “bioretention” facilities.

Exhibit U.20.h

Microplastics have not been specifically identified as a pollutant of concern in the Portland SWMM; however, removal of microplastics in stormwater runoff using bioretention has been investigated more recently, including several local studies (Wolfand et al. 2023; Struzak et al. 2024)[1] [2]. Collectively, both laboratory and field results are promising and suggest removal of microplastics via settling, filtration, and adsorption (Koutnik et al. 2022)[3], consistent with the unit removal processes employed by BMPs proposed at the Filtration Facility site. Studies have also noted the correlation of microplastic removal and TSS removal (Wolfand et al. 2023). Thus, microplastics in stormwater runoff are anticipated to be removed using bioretention facilities as proposed at the Filtration Facility site.

Comment 1: Exhibit S.10 Susan Swinford Comments - 4.30.2025 – page 2

> **Chemical Use and Runoff:** Filtration plants routinely use toxic chemicals (e.g. chlorine, coagulants, fluorosilicic acid, ammonia). Any routine release or spill risks contamination of adjacent waterways and wetlands. The EPA notes that even typical chlorine discharges *"may be quite toxic to aquatic organisms"* epa.gov. Thus if treated water, backwash, or accidental leaks enter a creek or wetland, fish, insects and plant life will suffer damage (weakened health or mortality).

Response to Comment 1:

The comment inaccurately states that the Filtration Facility will use fluorosilicic acid – PWB has no plans to add this, or any other fluoridation chemical, at the Facility.

As described in Exhibit I.87 (Supplemental Information about Chemical Safety), the Filtration Facility will have multiple engineered safety features, including physical separation of chemicals, monitoring and alarm systems, and secondary containment for chemical transfer and storage areas. There will not be any "routine release" or "typical … discharges" of chemicals from the Filtration Facility.

In addition, the Filtration Facility will be staffed 24/7 by trained and certified treatment operators who will perform routine safety checks and oversee chemical deliveries. The Water Bureau has a long history – more than 95 years – of safely handling water treatment process chemicals. The Water Bureau will employ best management practices to ensure the safe storage and handling of chemicals used at the Filtration Facility, which will allow the Water Bureau to avoid adverse impacts on natural resources from treatment chemicals. The design and operations plan for the Filtration Facility prioritize safety and implement industry best practices in the handling of treatment chemicals, which will allow the Water Bureau to avoid adverse impacts on natural resources from treatment chemicals. The Water Bureau's highly trained and dedicated facility operators will handle treatment chemicals at the Filtration Facility to avoid adverse impacts on natural resources. The Water Bureau will provide for safe transportation of treatment chemicals and will avoid adverse impacts to natural resources from transportation of chemicals by implementing industry best practices. The Facility is designed for "zero liquid discharge," containing any leaks or overflows within the closed-loop process, as described in Exhibit I.60 (Overflow Basin Overview).

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[1] Wolfand, J., et al. 2023. "Microplastics: The Occurrence in Stormwater Runoff and the Effectiveness of Bioretention Systems for Removal" *J. Environ. Eng.* 149(11) 04023078. https://ascelibrary.org/doi/10.1061/JOEEDU.EEENG-7285.

[2] Struzak, M., et al. 2024. "Evaluation of Biochar as an Amendment for the Removal of Metals, nutrient, and Microplastics in Bioretention Systems" *J. Environ. Eng.* 150(4) 04024007. https://ascelibrary.org/doi/10.1061/JOEEDU.EEENG-7487.

[3] Koutnik, V. S., et al. 2022. "Microplastics retained in stormwater control measures: Where do they come from and where do they go?" Water Res. 210 (Feb): 118008. https://doi.org/10.1016/j.watres.2021.118008.

Comment 2: Exhibit S.10 Susan Swinford Comments - 4.30.2025 – page 2

> In addition, the facility's parking lots, roads, and storage pads will be impervious surfaces. Stormwater runoff from these surfaces carries oils, metals and chemical residues into the soil and streams. This non-point pollution further degrades water quality, diminishing the ability of streams and wetlands to support fish and invertebrates. Together, these effects clearly *impair the quality and capability* of water bodies.

Response to Comment 2:

As noted in Exhibit S.29 (Response to Testimony Related to Stormwater and Groundwater), the project stormwater system, as described in Exhibit N.58 Filtration Facility Site Stormwater Drainage Report, will treat for pollutants of concern (including fine sediment) from impervious surfaces including asphalt and concrete surfaces typical of parking areas and roads.

As described in Exhibit N.58 (Filtration Facility Site Stormwater Drainage Report), impervious surface areas at the Filtration Facility drain to onsite vegetated stormwater quality treatment facilities, including planters, basins, grassy swales, filter strips, and an ecoroof, all designed to meet the Portland SWMM requirements and remove pollutants of concern. These BMPs use a combination of unit removal processes including sedimentation, filtration, sorption, infiltration, and biologic uptake to specifically address potential water quality impacts from impervious surfaces (including any "oils, metals, and chemical residues") prior to discharge at the Points of Discharge described in Exhibit N.58.

Comment 3: Exhibit S.11 John Swinford Comments - 5.01.2025 – page 1

> **Water quality** in nearby wetlands and streams may be impaired by runoff, vehicle emissions, or chemical leakage.

Response to Comment 3:

See Response to Comments 1 (chemical leakage) and 2 (stormwater treatment of "runoff").

Comment 4: Exhibit S.15 Jennifer Hart Comments - 5.05.2025 – page 2

> -erosion and sedimentation: The pumping of groundwater and operational stormwater into Johnson Creek is causing increase erosion, leading to sedimentation in Johnson Creek. This degrades water quality and is affecting aquatic life dependent on clear water.

Response to Comment 4:

To the extent this comment is about construction water management, it is outside the scope of this proceeding and irrelevant to compliance with MCC 39.7515(B).

As noted in Exhibit S.29 (Response to Testimony Related to Stormwater and Groundwater), there was a brief period when the flow spreader was not functioning as designed for construction. Because of permitting delays, there was not enough time between construction of the flow spreader and the commencement of discharge to have planting established below the flow spreader. Instead, a section of rip rap was placed below the flow spreader to protect against erosion. The rip rap was improperly placed, resulting in a concentration of discharge for a period of time. The issue was identified and remedied with submersible pumps and installation of other Best Management Practices. DEQ has accepted the modifications, and the Facility is in compliance with the 1200-CA permit. If or when construction resumes after this remand proceeding, the construction water release systems will be modified for improved performance.

The commenter is also concerned about operational stormwater and its potential erosive impact leading to sedimentation in Johnson Creek. Exhibit N.59 (Stormwater Flow Spreader and Vegetative Slope) explains how the stormwater conveyance and treatment systems are designed to prevent concentrated flows down slopes. As concluded on page 6 of Exhibit N.59, "the proposed flow spreader and vegetated slope are conservatively designed, exceeding design criteria in the SWMM for similar facilities. The design achieves even flow distribution across the vegetated slope and limits maximum flow velocity to a maximum of 1.3 ft/s (less than half the SWMM criteria), providing energy dissipation and preventing erosion problems and sediment transport off the BRFF site or into Johnson Creek."

Comment 5: Exhibit S.15 Jennifer Hart Comments - 5.05.2025 – page 2

> -temperature changes: Altering land surface, asphalt, many buildings with roofs, and stormwater will lead to change in temperature regimes in Johnson Creek. Warmer water will negatively impact aquatic ecosystems.

Response to Comment 5:

As described in Exhibit N.58 (Filtration Facility Site Stormwater Drainage Report), page 6, stormwater runoff is not considered by Oregon Department of Environmental Quality (DEQ) to be a significant contributor of heat or "thermal loading" to surface waters like Johnson Creek. Instead, DEQ has found that the largest contributor to elevated temperature is the increased impact from solar radiation loads due to disturbances of riparian vegetation. The project will include extensive plantings to restore and enhance the riparian area in the southwest corner of the filtration facility site, as explained in Exhibit N.60 (Filtration Facility Site & Lighting, Drawing 00-LU-306 Landscape Plan). That riparian area was previously farmed land (see Exhibit N.64, pages 16-20), which lacked thermal protection and contributed sediment to adjacent creeks, as described in Exhibit N.55 (Potential for Aquatic Natural Resources Effects), esp. pages 4 – 7.

Additionally, in an abundance of caution, temperature management strategies have been incorporated into the Filtration Facility stormwater system design, including the minimization of stormwater detention facility drawdown times and standing water depth, as well as the installation of mature vegetation in stormwater management facilities to shade the facilities and reduce the effects of stormwater exposed to sunlight and a heated atmosphere. These temperature management strategies are not required by any stormwater regulations nor by the SWMM, but instead were voluntarily included by the project to protect nearby aquatic resources, even though stormwater is not considered significant contributor to thermal loading.

In addition, as described in Exhibit N.58, review of historic, local rainfall data indicates that rainfall depths associated with design storm events and yielding stormwater runoff do not predominately occur during the hot summer season (June-September) when thermal loading from site stormwater could be the greatest risk. Nevertheless, to additionally ensure that the project will not adversely affect thermal loading in Johnson Creek, PWB is facilitating the reduction of water temperatures in Johnson Creek by purchasing land downstream of the Filtration Facility and removing an in-channel pond, known as "Cottrell Pond", that is a known source of heating in Johnson Creek. The memorandum submitted concurrently with this memo in this second open record period from Biohabitats provides additional information about the removal of Cottrell Pond and the thermal benefits in Johnson Creek that will result from this part of the filtration project.

Overall, the combination of the voluntary temperature management strategies, the low risk of occurrence of a storm during a period of atmospheric heating that would yield stormwater runoff from the site, the addition of extensive plantings to restore and enhance the riparian area, and the removal of Cottrell Pond, leads to the conclusion that the project will not adversely affect thermal loading or negatively impact aquatic ecosystems in Johnson Creek.

Comment 6: Exhibit S.21 Courter Response to N.55 - Aquatic Natural Resources Effects - 5.05.2025 – page 2

"Further impacts [to aquatic habitats] from sedimentation, flow alteration, and temperature increases are inevitable unless project activities are halted."

Response to Comment 6:

Negative impacts by the facility are not "inevitable." The ways in which the Filtration Facility addresses impacts cited in this comment – sedimentation, flow alteration, and temperature increases – have been extensively discussed in documents submitted to the record and in responses to other comments, specifically within Exhibit N.58 (Filtration Facility Site Stormwater Drainage Report) and Exhibit S.29 (Response to Testimony Related to Stormwater and Groundwater).

"sedimentation" -- The project stormwater system (detailed in Exhibit N.58) will reduce the potential for sediment transport and discharge compared to the predevelopment agricultural conditions (which included periods of exposed, cultivated soils) by using vegetated stormwater management facilities (i.e., BMPs) approved in the Portland Stormwater Management Manual (Portland SWMM) implemented specifically for sediment removal (refer to Exhibit N.58, Table 3). In addition, proposed vegetated areas at the Filtration Facility will be restored using permanent native grassland seeding with trees and understory plants appropriate for the surrounding context and for habitat restoration. The extensive re-vegetation of the site will dramatically reduce sediment runoff. See N.60 (Filtration Facility Site & Lighting Drawings), 00-LU-306 Landscape Plan.

"flow alteration" -- Flow alteration impacts are alleviated by the Filtration Facility's adherence to flow control requirements outlined in the Multnomah County Design and Construction Manual (MCDCM). Such requirements align with the flow control performance standards in the Portland SWMM that are designed to address potential hydromodification (the alteration of natural flow patterns that result in the degradation of a stream) impacts. MCDCM's flow control requirements require control of the post-development flow to 50% of the pre-development flow for design storm events (beginning with the 2-year design storm). Proposed onsite stormwater facilities (detention ponds, bioretention basin, and an ecoroof) have been designed in accordance with the MCDCM to control the release of post-development stormwater flows, such that the flow control requirements are met at each Point of Discharge (POD) from the Filtration Facility.

As outlined in Exhibit N.58, Section 3.5.2 and Attachment F, to further confirm that proposed onsite stormwater facilities address the range of hydromodification considerations (including flow alteration), facility sizing was also evaluated using the Clackamas County Water Environment Services (WES) BMP Sizing Tool, which uses continuous simulation modeling to evaluate pre- and post-development flows and the duration of those peak flows to size stormwater facilities for a range of geomorphically significant flows (established by ODOT as 42% of the 2-year peak flow through the 10-year peak flow). The sizing of the proposed stormwater facilities was confirmed by this WES Tool as meeting these hydromodification standards.

"temperature increases" -- Finally, as discussed in the Response to Comment 5, stormwater is not considered to have a significant impact on instream temperatures, but the Water Bureau will implement a combination of voluntary temperature management strategies to prevent increases in thermal loading and will remove Cottrell Pond to reduce temperatures in this section of Johnson Creek.

Comment 7: Exhibit S.21 Courter Response to N.55 - Aquatic Natural Resources Effects - 5.05.2025 – page 5

> **OVERRELIANCE ON BEST MANAGEMENT PRACTICES AND DEFERRED ADAPTIVE MANAGEMENT**
>
> Throughout the memo, Biohabitats relies on proposed BMPs such as vegetated swales, flow spreaders, and eco-roofs as "guarantees" against environmental harm. It also cites future "adaptive management" as a remedy for unknown risks.
>
> This approach is insufficient. MCC 39.7515(B) requires that before approval, the applicant demonstrate that resources will not be adversely affected—not that impacts will be "managed" later.
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> BMPs:
>
> - Are unenforceable promises unless conditions of approval are tied to specific outcomes.
> - Often fail in the field under winter storm conditions, steep slopes, and clay-heavy soils.
> - Cannot offset direct habitat conversion, tree loss, and hydrologic changes already underway.
>
> Further, adaptive management is undefined and unenforceable. The County cannot abdicate responsibility to future reviews that may never occur and that will be controlled by the same project proponents.

Response to Comment 7:

The BMPs integrated into the project's stormwater systems' designs are based on proven, effective techniques, incorporating scientific research, industry standards, and practical experience. They are referenced in Portland SWMM as stormwater treatment facilities. For this reason, it is unclear why the commenter, on page 1 of Exhibit S.21, calls BMPs "unverified". Their use is enforced by local and state regulators and are based on the best available science to prevent adverse effects on natural resources. In this way, the BMPs serve as an appropriate objective measure to ensure protection of natural resources around the project. Moreover, stormwater BMPs have been applied at the Filtration Facility with additional, voluntary consideration for the local conditions, including an analysis of local storm volumes, slope conditions, and soil types.

The commenter is also concerned that the stormwater BMPs will "fail in the field under winter storm conditions[.]" To the contrary, the stormwater management systems have been designed for storms up to and including the 25-year, 24-hour design storm event, and have been further designed to consider the 50- and 100-year storms. As shown in Tables 4 and 5 of Exhibit N.58 Attachment L (Climate Change Considerations in Design of Stormwater Management System), the "Filtration Facility detention ponds will continue to function and maintain freeboard during the 50- and 100-year design storm events[.]]" Therefore, the filtration facility stormwater system will not fail under even the most extreme (100-year) winter storm conditions.

The commenter also is concerned about stormwater BMP failure because of "steep slopes, and clay-heavy soils." These factors are addressed in the design of the specific stormwater management systems for the project. First, the stormwater conveyance and treatment systems are designed to prevent concentrated flows down slopes. At the filtration facility site, the only steep slope that will interact with the stormwater system is the area below the flow spreader. As explained in Exhibit N.59, the "flow spreader and vegetated slope are an integrated facility which provides energy dissipation and evenly distributes flows from the BR FF stormwater management system across the slope downstream of the flow spreader, conveying that flow to Johnson Creek without creating erosion or scour (evidence by gullies or rills) or mobilizing sediment." Page 2. This is an appropriate facility for use on this slope, as evidenced by the fact that the slope is approximately 12%, well below the SWMM standard of a gradient of 20% or less. Exhibit N.59, page 4.

Second, due to the limited measured infiltration at the Facility site (the commenter's concerns about the type of soils appears to be about limited infiltration potential), the proposed system does not rely on the use of infiltration for stormwater management. Instead, stormwater treatment and detention facilities, as well as off-site conveyance, are used in conformance with the MCDCM and Portland SWMM. (See Exhibit N.58, Section 1.6.1, for a discussion of infiltration and Section 2.2 for a discussion of soil types.)

PWB has not proposed that BMPs are intended to "offset direct habitat conversion, tree loss, [or] hydrologic changes." In the work in the record from Sarah Hartung, including Exhibit N.56 and Exhibit S.32, and a supplemental response entered into the record concurrently with this memorandum, the quantity and quality of habitat before construction (including trees that will be removed) is compared to the habitat that will result from the Project, with the conclusion that the project will not adversely affect wildlife habitat. The Hartung analysis does not rely whatsoever on stormwater BMPs offsetting habitat conversion.

As to "hydrologic changes", Response to Comment 6 above and Exhibit N.58 (Filtration Facility Site Stormwater Drainage Report) describe how onsite stormwater facilities meet conservative flow control performance standards that mitigate the rate of channel forming flows commonly associated with hydromodification. Stormwater facility sizing was also evaluated using the Clackamas WES BMP Sizing Tool that evaluates both peak flow and flow duration matching, providing additional assurance that the system protects against hydromodification.

Finally, adaptive management is not intended to address known potential conditions, but rather unknown, future conditions. Land use can only address known future conditions – inherently, concerns about truly unknown future conditions are too speculative to be required to be addressed in a land use permitting process. To require otherwise would prevent approval of any project. For this reason, adaptive management for stormwater (and other portions of the project) is referenced as an additional measure, not as a primary factor responding to concerns about compliance with the approval criterion.

Moreover, adaptive management is not undefined, but includes monitoring, triggers, and actions that will allow PWB to rapidly implement improvements to the stormwater management system when changes, which cannot currently be predicted, occur. Adaptive management for stormwater systems is a best practice for providing a structured, responsive process to improve stormwater performance over time in the face of uncertain changes to climate and weather patterns over the life of the project.

That said, the project has planned for future changes that can be reasonably predicted, including the effects of climate change, as discussed in Attachment L to Exhibit N.58 Filtration Facility Site Stormwater Drainage Report. The sizing of proposed stormwater facilities at the Filtration Facility have been evaluated in the context of climate-adjusted design storm events to identify the ability of proposed stormwater infrastructure to manage increased rainfall in the future while adhering to current performance standards. Identified excess capacity in the onsite conveyance, treatment, and detention stormwater system will be used to accommodate projected increases in rainfall. Furthermore, PWB has committed to monitor system performance and climate change indicators, and modify the system as required to maintain or improve performance over time.

Comment 8: Exhibit S.21 Courter Response to N.55 - Aquatic Natural Resources Effects - 5.05.2025 – page 6

"Extensive impervious surface creation with no stormwater infrastructure, nor County plan for stormwater conveyance."

Response to Comment 8:

It is inaccurate to say that there is "no stormwater infrastructure" proposed to serve the project. In fact, the stormwater infrastructure for the Filtration Facility is extensive, including systems that collect and convey stormwater, treat stormwater, detain stormwater, and discharge stormwater off site at rates and locations consistent with pre-development conditions. Refer to Exhibit N.58 (Filtration Facility Site Stormwater Drainage Report).

The commenter may be implying that project stormwater needs to be discharged only to a public stormwater main (a "County plan") for the project to be built. This is not the case. First, discharging to an overland flow path and maintaining existing drainage patterns, particularly for linear construction, is allowable and preferred by the governing stormwater design standards, provided that adequate outfall protection and energy dissipation and/or erosion control are used. This project has proposed these measures at each point of discharge according to the relevant stormwater design standards and site-specific needs, coordinating with Multnomah County in the development of Facility and off-site stormwater management systems.

Comment 9: Exhibit S.21 Courter Response to N.55 - Aquatic Natural Resources Effects - 5.05.2025 – page 6

"These conditions contribute to: Altered stream hydrology ('flashy' flows)."

Response to Comment 9:

This was addressed in response to Comment 6 and in Exhibit N.58 (Filtration Facility Site Stormwater Drainage Report). Both references describe how stormwater facilities are sized to meet MCDCM's flow control standard to mitigate the rate of channel forming flows (so called "flashy flows") commonly associated with hydromodification. Detention pond sizing was also evaluated using the Clackamas WES BMP Sizing Tool that evaluates both peak flow and flow duration matching, providing additional assurance that the system protects against hydromodification.

Comment 10: Exhibit S.21 Courter Response to N.55 - Aquatic Natural Resources Effects - 5.05.2025 – page 6

"Biohabitats provides no quantitative modeling, no flow estimates, and no sediment loading analysis to support its 'no effect' claim concerning water quality."

Response to Comment 10:

The commenter appears to have not read the Exhibit N.58 (Filtration Facility Site Stormwater Drainage Report), on which Biohabitats relies in its analysis. In Exhibit N.58, and hundreds of pages of attachments, quantitative modeling to inform the design of treatment, detention, and conveyance stormwater facilities is provided. These quantitative models include calculated estimates of flows used to design and analyze each proposed facility (each pond, for example). Sizing and design of stormwater treatment facilities in accordance with the MCDCM and Portland SWMM meets water quality performance standards addressing pollutants of concern, including Total Suspended Solids (TSS), which addresses this commenter's concern about "sediment loading". For TSS specifically, the estimated percent reduction of TSS by facility type used in the stormwater management system is provided in Table 3, page 6, Exhibit N.58.

Comment 11 S.23 Courter Response to N.59 - Stormwater - 5-05-2025 – Page 1

> *Current Conditions*
>
> The flow spreader, as relied on in the Stantec Report (N.59), was fully installed by PWB by January 2025. In "functioning" to collect and distribute stormwater over the past four to five months, it is not evenly distributing flow and reducing velocity to prevent erosion and sediment mobilization as Stantec claims. Groundwater pumping is generating a continuous discharge upwards of 1,600 gallons per minute (3.56 cubic feet per second), just under the 3.7 cfs threshold cited in Table 1 of Exhibit N.59 as necessary to meet design performance criteria. Despite this, the actual discharge is causing significant channelization, erosion, and sediment transport into Johnson Creek (see *Natural Resources Remand Report*, Exhibit N.43 and video documentation in Exhibit N.14). Attempts to mitigate these effects using hay bales have proven ineffective. Although flow has been slowed in parts of the SEC area, it becomes concentrated again as it moves through steeper sections of the slope—beyond the uphill grades of 12% and 9%—resulting in renewed channelization and erosion into the riparian corridor and surface waters.

Response to Comment 11:

This comment is about construction water management, and as such is outside the scope of this proceeding and irrelevant to compliance with MCC 39.7515(B).

It is false to say that the flow spreader "was fully installed by PWB by January 2025," and therefore "functioning" as it would in its final design. Instead, as explained in Exhibits N.59 and S.29, and the Response to Comment 4, a temporary version of the flow spreader was installed by the contractor for construction activity. That said, PWB is committed to establishing the final design of the flow spreader, including the extensive riparian plantings, much earlier in the construction period to prevent any adverse impacts on Johnson Creek. As noted on page 6 of Exhibit S.29, if or when construction resumes after this remand period, PWB has committed to modifying the construction water release system so that peak discharges from the flow spreader to Johnson Creek will be even lower, on the order of 500 gallons per minute (gpm), and will generally correlate with the timing of runoff from precipitation events. This limit can be maintained up to the 25-year recurrence, 24-hour duration storm event. Modifications to the construction water release systems, if or when construction resumes, will also remove the rip rap and instead establish the plantings described in Exhibit N.59 below the flow spreader. This will be done during the next available window appropriate for plantings (for example, that is generally winter for bare root plants) and provide irrigation during the establishment period. Establishment of the plantings will involve adaptive management, which may include the use of coir fabric mats or other groundcover that will prevent erosion and sediment transport while plants are established and/or a temporary perforated pipe flow spreader below the areas where vegetation is actively being established. Overall, this strategy will establish the ultimate flow spreader design, including the extensive riparian plantings, much earlier in the construction period, preventing any adverse impacts on Johnson Creek.

Exhibit S.29 (Response to Testimony Related to Stormwater and Groundwater), describes the short period during construction when the flow spreader was not functioning as designed. Because of permitting delays, there was not enough time between construction of the flow spreader and the commencement of discharge to have planting established below the flow spreader. Instead, a section of rip rap was placed below the flow spreader to protect against erosion. The rip rap was improperly placed, resulting in a concentration of discharge for a brief time. The issue was identified and remedied with submersible pumps. If or when construction resumes after this remand proceeding, the construction water release systems will be modified for improved performance.

Finally, Exhibit N.59 (Stormwater Flow Spreader and Vegetative Slope) provides that the stormwater conveyance and treatment systems are designed to prevent concentrated flows down slopes. Moreover, the basis of design for the flow spreader uses discharge from 25-year design storm, as it provides the most conservative design standard. As concluded on page 6 of Exhibit N.59, “the proposed flow spreader and vegetated slope are conservatively designed, exceeding design criteria in the SWMM for similar facilities. The design achieves even flow distribution across the vegetated slope and limits maximum flow velocity to a maximum of 1.3 ft/s (less than half the SWMM criteria), providing energy dissipation and preventing erosion problems and sediment transport off the BRFF site or into Johnson Creek.”

Comment 12 S.23 Courter Response to N.59 - Stormwater - 5-05-2025 -- Page 2

> “Despite PWB’s reliance on engineering practices and compliance with general stormwater manuals, the proposed system introduces engineered infrastructure into an ecologically sensitive area, alters natural hydrology, and creates permanent modifications to a riparian zone. These impacts, whether mitigated through design features or vegetation, constitute an adverse effect.”

Response to Comment 12:

The design of the stormwater system did not merely rely on “engineering practices and compliance with general stormwater manuals”. Instead, it was designed to address the unique characteristics of the Filtration Facility and Filtration Facility site by applying BMPs and other field-proven engineering principles.

The proposed stormwater system does not “introduce engineered infrastructure into an ecologically sensitive area” nor create adverse “permanent modifications to a riparian zone”. The system – including the flow spreader -- is located entirely outside of the 200-foot SEC buffer that surrounds Johnson Creek, in an area that was previously used for commercial nursery farming, as shown in Exhibit N.59 Stormwater Flow Spreader and Vegetated Slope. A commercial nursery farm is not “an ecologically sensitive area”.

The SEC incorporates a 200-foot buffer area around Johnson Creek (and other area waterways) because scientific studies support the effectiveness of 100-foot or greater buffers in restoring and protecting stream habitats. As explained by the nonprofit organization American Rivers, “Recent science demonstrates that forested buffers of at least 100’ in width excel at restoring and protecting streams, their habitats and the activities and uses streams support.”[4] A comprehensive review by the U.S. Environmental Protection Agency (EPA) indicates that buffers of at least 100 feet are effective in removing nitrogen and other contaminants from surface runoff, thereby improving water quality.[5] A comprehensive scientific literature review published in the Journal of American Water Resources Association, as explained by the Stroud Water Resource Center, found that a 100-foot-wide forested buffer maintains the natural structure and habitat of important stream communities, supporting biodiversity and ecological resilience.[6] The SEC overlay zone creates a 200-foot buffer on either side of Johnson Creek – doubling the recommended 100-foot best practice to be additionally protective and create additional riparian area.

Instead of placing “engineered infrastructure” into the 200-foot riparian buffer SEC area on either side of Johnson Creek, the project will create additional high-value habitat within that riparian buffer, as described in Exhibit N55 Potential for Aquatic Natural Resources Effects. The replacement of cultivated farmland with riparian buffer area planting will resist surface erosion, minimize the risk of thermal loading, and provide additional habitat.

Finally, the system does not “alter[] natural hydrology.” The hydrology of the site was not in a “natural” state pre-construction. The pre-development agricultural land use was a significant contributor of sediment, nutrients, and pesticides to Johnson Creek (See Biohabitats’ response to Exhibit S.21). The agricultural lack of a buffer zone between the field and the waters of the creek, the lack of stormwater management facilities, and the practice of harvesting trees in mid-winter contributed to soil erosion into Johnson Creek. The agricultural use also increased the occurrence of flashy flows by compaction of soils and reduction in infiltration. In contrast, by using engineered stormwater management facilities at the Filtration Facility site, the pre-construction hydrology of the site will be maintained and improved by the system as the pre-development points of discharge are maintained in the post-development condition and peak flow rates are reduced (by approximately 50%) in the post-development condition when compared to predevelopment conditions at all points of discharge, as described in Exhibit N.58 Filtration Facility Site Stormwater Drainage Report.

Comment 13 S.23 Courter Response to N.59 - Stormwater - 5-05-2025 -- Page 2

> “The introduction of stormwater runoff into an SEC area via artificial infrastructure—including a concrete flow spreader, weir, and drain rock bedding—represents a clear and permanent alteration of natural functions. … [T]hese are constructed systems within a protected riparian corridor[.]”

Response to Comment 13:

See Response to Comment 12.

[4] https://www.americanrivers.org/wp-content/uploads/2016/05/AmericanRIvers_EconomicValueRiparianBuffers-2016.pdf
[5] https://www.epa.gov/sites/default/files/2019-02/documents/riparian-buffer-width-2005.pdf
[6] https://stroudcenter.org/press/100-ft-wide-forest-keeps-streams-healthy/

Comment 14 S.23 Courter Response to N.59 - Stormwater - 5-05-2025 – page 2

> **2. Engineered Infrastructure is Incompatible with SEC Area Intent**
>
> Constructed features such as concrete weirs, level spreaders, and graded vegetated slopes undermine the fundamental intent of SEC protections. Engineered elements:
>
> - Disrupt existing soil profiles and native root networks.
> - Introduce long-term maintenance needs incompatible with passive natural function.
> - Depend on assumptions about flow behavior and climate conditions that may not hold over time.
>
> No matter how well designed, these artificial systems **transform a natural riparian buffer into a managed stormwater utility corridor**, which contradicts current policy framework for the area, including SEC areas.

Response to Comment 14:

Work in the SEC zone has been limited exclusively to native planting. From Exhibit S.29, response to Comment 1:

> Over the past few years, the Water Bureau has embarked on a planting program within the SEC zone in the southwest corner of the Filtration Facility site, with the objective of creating an area that functions as a riparian forest even while construction is ongoing, providing both habitat and water quality protection. This work will be ongoing during the construction period.

Exhibit N.60 Filtration Facility Site & Lighting, Drawing 00-LU-306 Landscape Plan shows that all of the SEC zone is a “Riparian Forest Planting Area.” That is, rather than “transform a natural riparian buffer into a managed stormwater utility corridor”, the project will transform a heavily-impacted commercial nursery field area into a natural riparian buffer area.

Additionally, the flow spreader will not “introduce long-term maintenance needs incompatible with passive natural function.” First, this site was not in a “natural” state, as explained above. Second, the design accounts for maintenance needs, and provides a large enough area between the flow spreader and the SEC area to be able to maintain the flow spreader and associated components of the project without entering the SEC.

The stormwater management system does not “[d]epend on assumptions about flow behavior and climate conditions that may not hold over time.” Instead it anticipates that climactic conditions and weather patterns will change (see Exhibit N.58 Filtration Facility Site Stormwater Drainage Report - Attachment L: Climate Change TM) and uses a conservative design to accommodate near-term changes, and an adaptive management approach, described above, to respond to long-term changes that cannot be accurately predicted at this time.

Comment 15 S.23 Courter Response to N.58, N.59 - Stormwater - 5-05-2025 – page 3

4. Climate Risk and Structural Limitations

The design is based on the 25-year storm event, yet **climate science strongly supports increasing storm intensities and irregular weather patterns, which are not being taken into account.** Relying on historical storm profiles does not ensure the system will avoid future erosion, sediment loading, or vegetation failure, especially over the decades-long life of the facility. Any exceedance of flow capacity will adversely affect the SEC area and Johnson Creek.

Response to Comment 15:

It is inaccurate to say that the stormwater design is "based on the 25-year storm event" and no consideration of climate science was "taken into account." PWB has considered climate change impacts, as described in Exhibit N.58 Site Stormwater Drainage Report - Attachment L: Climate Change TM, concluding that "The conservative sizing in the design for conveyance, treatment (water quality), and flow control (water quantity) for the stormwater system at the Filtration Facility site includes excess capacity to accommodate the impacts of projected increases in rainfall due to climate change."

As described in Exhibit N.58 Filtration Facility Site Stormwater Drainage Report - Attachment L: Climate Change TM, University of Washington climate adjustment factors have been applied to current, 24-hour design storm events to reflect future, climate adjusted 24-hour design storms for comparative purposes. The sizing of proposed stormwater facilities at the Filtration Facility have been evaluated in the context of climate-adjusted design storm events to identify the ability of proposed stormwater infrastructure to manage increased rainfall in the future while adhering to current performance standards. Identified excess capacity in the onsite conveyance, treatment, and detention stormwater system will be used to accommodate projected increases in rainfall. PWB will adopt an adaptive approach to planning, monitoring, and system improvements to address uncertainty regarding climate change in the future.

Comment 16 S.25 CPO Response to N.64 - Pre-Construction Conditions - 5.05.2025 – page 1

Specific Misrepresentations in N.64:

- Selective photos depicting property with bare dirt or covered in weeds
- Omission of timeline of PWB tree removal plans for Surface Nursery. Farming operations were significantly altered after upcoming tree removal notice in 2019; limited tree cultivation between 2019-2021.
- All photos from 2019 through present-day are not accurate representations of farming at the proposed filtration site.

Response to Comment 16:

Photographs in Exhibit N.64 were provided for context to show how typical agricultural practices at the filtration facility site pre-construction disturbed soil and caused erosion and sediment transport. Pre-2018 photographs submitted in Exhibit S.25 (all taken during dry weather) show large areas of bare dirt, sparse cover plantings, and the same dirt roads shown in Exhibit N.64.

As described in Exhibit N.58 Filtration Facility Site Stormwater Drainage Report, pre-construction site conditions were considered in the evaluation of stormwater management facility sizing and existing stormwater runoff rates. Calculations accounted for existing soil conditions (> 90% Cazadero Silty Clay Loam, hydrologic soil group C) and land cover conditions / Curve Number selection associated with Row Crops in good condition, consistent with the reported condition of the site up to 2019. Those design assumptions are accurate representations of farming at the site.