4.2 Surface Water

This section provides an analysis of potential impacts to surface waters. Surface water impacts from the proposed KFIP Project development have been evaluated and weighed to determine whether the proposed Project would have significant surface water quantity and quality impacts affecting river functions, on-site wetlands, or listed salmonids.

The KFIP Project includes a lower elevation floodplain area along the Puyallup River, and a higher elevation, older river terrace to the south, where it is proposed to build seven warehouses. The higher elevation terrace will be referred to as “high terrace” in the following discussion.

Surface waters considered in this analysis include the Puyallup River and its floodplain, on-site wetlands in the floodplain to the east (Wetlands A, B, and C) and Wetland D, a depressional wetland located on the high terrace in the southeast KFIP Project site.

4.2.1 Study Area

The study area for surface water impacts includes the Middle Reach of the Puyallup River (River Mile [RM] 10.3 to 17.4, as defined by the U.S. Army Corps of Engineers [USACE], Figure 4-7), the on-site floodplain, and the upland contributing basin that sends surface water flows toward the site from the south.

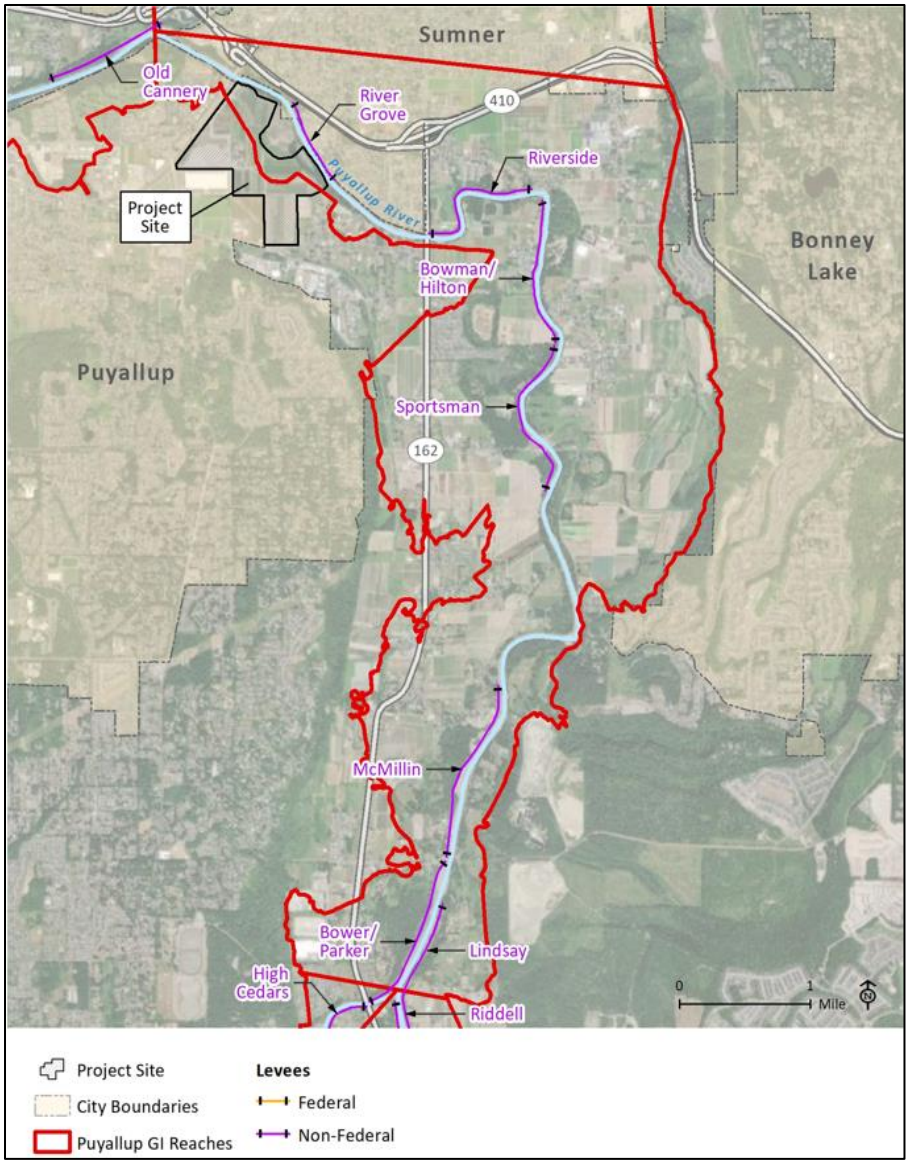

Figure 4-7. Middle Reach of the Puyallup River, Showing Dikes and Levees

4.2.2 Relevant Plans Policies, and Regulations

This section and Table 4-3 provided below summarizes federal, state, and local regulations related to surface water that are relevant to the KFIP Project.

Table 4-3. Overview of Relevant Regulations

Law and Regulation	Description
Federal	
Sections 404 and 401 of the Clean Water Act (CWA; 33 Code of Federal Regulations [CFR] 26, Subchapter 4, Section 1344)	Section 404 is administered primarily by the USACE and Section 401 by Ecology as a state-agent of the United States Environmental Protection Agency (USEPA). These agencies review and permit projects proposing in-water work related to fill and/or water quality impacts in Waters of the United States (WOTUS).
FEMA Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP), Model Ordinance, Region 10 (2012)	FEMA and NFIP provide flood insurance to City, County, and state governments. The model ordinance requires a biological assessment of impacts to Endangered Species Act (ESA) species for any project proposed in a floodplain. In general, new development in the floodplain is discouraged, but if allowed, cannot have negative impacts on flood storage or listed species. See PCC Chapter 18E.70 Flood Hazard Areas for local implementation of these federal regulations.
Endangered Species Act (ESA, 16 USC 1531 et seq.)	To ensure that the proposed action is not likely to jeopardize existence of any listed threatened or endangered animal species or result in adverse modification of designated critical habitat.
Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267)	Defines essential fish habitat (EFH) and requires federal agencies to consult with the National Marine Fisheries Service (NMFS) on activities that may adversely affect EFH.
State	
Growth Management Act (GMA)	Requires all cities and counties in Washington to adopt development regulations that protect critical areas, which include frequently flooded areas, wetlands, streams, and fish and wildlife habitat conservation areas.
Section 401 of the Clean Water Act (CWA; 33 CFR 26, Subchapter 4, Section 1344)	Section 401 is administered at a federal level by the USEPA, which has delegated review authority to Ecology. Ecology reviews and certifies Section 401 water quality permits for projects proposing in-water work in WOTUS.
Washington State Water Pollution Control Act (90.48 RCW)	Ecology regulates wetlands under the state Water Pollution Control Act (RCW 90.48) and the Washington State Shoreline Management Act (SMA; RCW 90.58). Ecology also provides guidance to local jurisdictions under SEPA to identify wetland-related issues early in permit and review processes. Administrative orders are issued under RCW 90.48.120. Ecology requires that all projects affecting surface waters in the state must comply with the provisions of the state's Water Pollution Control Act, including those waters or wetlands that are not subject to the federal CWA regulations.

Law and Regulation	Description
Washington State Department of Ecology NPDES Permit Program	The NPDES permit program controls water pollution by regulating sources that discharge pollutants into WOTUS (CWA, 33 USC Sections 1251 et seq. and WAC2 197-11-200 through 240). Ecology develops and administers NPDES municipal stormwater permits in Washington State. These permits regulate discharges to both surface waters (via surface conveyances) and to groundwaters (via infiltration facilities) of the state.
Washington State Shoreline Management Act (SMA; RCW 90.58)	The SMA provides for the management of water bodies or watercourses identified as "shorelines of the state". Areas under SMA jurisdiction include the designated shoreline water body; lands within 200 feet upland of the ordinary high-water mark; and associated wetlands and floodplains. With this state law as a foundation, local shoreline management plans are to be developed and regulated by counties and cities.
Washington State Department of Fish and Wildlife (WDFW) Hydraulic Project Approval (HPA; WAC 220-660)	The WDFW HPA program, regulated under Washington State law (RCW 77.55), is intended to ensure that construction in or near state waters is done in such a way as to protect fish and their aquatic habitats. An HPA must be obtained from WDFW by anyone planning hydraulic projects in most marine and fresh waters. WAC 220-660-130 is the streambank protection chapter of the WAC and is applied by WDFW on streambank restoration projects.
Local	
Pierce County Critical Areas Regulations (Pierce County Code [PCC] Title 18E)	This ordinance was developed under the directives of the GMA. PCC 18E Critical Areas Regulations were adopted to protect the critical areas of Pierce County from the impacts of development and protect development from the impacts of hazard areas by establishing minimum standards for development of sites which contain or are adjacent to identified critical areas.
Pierce County Shoreline Master Program (PCC Title 18S)	The Pierce County Shoreline Master Program identifies the Puyallup River as a Shoreline of the state (designated Urban Conservancy). The regulated shoreline area includes all lands within 200 feet of the ordinary high water mark, plus all floodplains within 200 feet of the edge of the floodway and to the outer edge of all associated wetlands.
Pierce County Stormwater Management and Site Development Manual (PCSWDM)	The PCSWDM includes LID requirements for stormwater treatment systems. Among their purposes are promotion stormwater infiltration where practicable and the return of filtered stormwater to the groundwater aquifer close to where the water (i.e., rainfall) originates. The Manual also provides rules designed to protect wetland hydrology, from both a water quality and water quantity standpoint.

Law and Regulation	Description
Pierce County Construction Regulations	Title 17A regulations relate to grading and stormwater drainage, intended to minimize detrimental downstream impacts from uncontrolled runoff during construction.
Pierce County Comprehensive Plan Policies	The Pierce County Comprehensive Plan is a tool to assist County Councilmembers, planning commissioners, County staff, and others in making land use and public infrastructure decisions. It provides the framework for the County's Development Regulations.
City of Puyallup Stormwater Management Program Plan (SWMPP)	The SWMPP provides guidance on how the City manages its stormwater to meet requirements of the City's NPDES Phase 2 permit, as administered by Ecology.
City of Puyallup Critical Areas Regulations (PMC Chapter 21.06 CRITICAL AREAS)	The Puyallup Critical Areas regulations (PMC Chapter 21.06) are similar to those of Pierce County, as both are designed to meet standards defined in the GMA. However, some regulatory details are different.
City of Puyallup Comprehensive Plan (CPCP)	The CPCP includes government planning policies that call for the protection, preservation and enhancement of water resources and other natural environment components. It is "*the long-term vision and plan for managing the built and natural environment in the City of Puyallup,*" and provides policy guidance used by City staff to make decisions related to growth and development.

Federal

United States Army Corps of Engineers, Clean Water Act Sections 401 and 404

The CWA regulations require fill permits (Section 404) and a water quality impact assessment and certification (Section 401) for any direct impacts to Waters of the United States (WOTUS).

In general, since the mid-1980s, WOTUS included all coastal marine waters, freshwater lakes, rivers, and streams in addition to wetlands[1] that were adjacent to or that had either permanent or ephemeral surface water connections to those waters. Inclusion of wetlands in the regulatory definition was based partly on the fact that many large wetland systems that cross states lines are used for hunting, fishing, mining, and other interstate commerce activities. Isolated wetlands, those which do not have a surface water connection to other WOTUS at any time, were not typically regulated under federal law.

[1] Wetland definition: "*Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.*" This definition of wetlands has been used by the USACE and the USEPA since the 1970s for regulatory purposes.

In March 2023, the Biden Administration finalized a definition of WOTUS, which included wetlands with a significant nexus[2] to other WOTUS, in response to a series of previous court cases and findings which had resulted in a fluctuating regulatory definition since 2015. However, a recent Supreme Court decision (May 25, 2023 – Sackett v. Environmental Protection Agency) has revised the federal definition of WOTUS to include wetlands only if they have a continuous surface water connection to rivers, lakes, or marine water bodies.

In order to conform with the May 25, 2023, Supreme Court decision, on August 29, 2023, the United States Environmental Protection Agency (USEPA) issued a Final Rule to amend the CWA WOTUS definition that was previously published in the Federal Register on January 18, 2023. The new federal definition of WOTUS "*removes the significant nexus test from consideration when identifying tributaries and other waters as federally protected*". Effectively, the new definition of WOTUS includes only relatively permanent bodies of navigable water and directly adjacent wetlands sharing the same water table. Therefore, wetlands and smaller tributary seasonal streams that are not directly adjacent to larger rivers, lakes and marine waters are no longer protected under federal law.

Please see discussion below about State of Washington wetland regulations, which will effectively replace the review and permitting functions provided previously under federal Section 404 regulations.

The CWA also regulates water quality through the NPDES permit process, which is administered at the state level by Ecology under Section 402 of the CWA (discussed below).

Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP), Model Ordinance, Region 10 (2012)

FEMA and NFIP provide flood insurance to City, County, and state governments. The model ordinance for Region 10 requires a biological assessment of impacts to Endangered Species Act (ESA) species for any project proposed in a floodplain. In general, the FEMA model ordinance does not prevent development, but it indicates that new development in the floodplain is not encouraged if there is a possible alternative location outside of the floodplain, and it recommends certain development accommodations to reduce flood risk. However, if allowed, any new development in the floodplain should not result in loss of flood storage, riparian habitat, nor result in significant impacts to listed species.

See PCC Chapter 18E.70 Flood Hazard Areas, discussed below for local implementation regulations.

Endangered Species Act (ESA – 16 USC 1531 et seq.)

The ESA requires that applicants seeking a federal action, such as issuing a permit under a federal regulation, undergo consultation with United States Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS). This is intended to ensure that the action is not likely to

[2] Per the USEPA December 2022 definition: "*A significant nexus exists if the waterbody (alone or in combination) significantly affects the chemical, physical, or biological integrity of traditional navigable waters, the territorial seas, or interstate waters.*"

jeopardize the continued existence of any listed threatened or endangered animal species or result in the destruction or adverse modification of designated critical habitat. NMFS is responsible for managing, conserving, and protecting ESA-listed marine species. USFWS is responsible for terrestrial and freshwater species. Both NMFS and USFWS are responsible for designating critical habitat for ESA-listed species.

This Act prohibits "taking" of listed species. "Take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any species listed as threatened or endangered under the ESA (16 USC 1531 through 1544), or attempt to engage in any such conduct. Such an act may include significant habitat modification or degradation where wildlife is killed or injured by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267)

Requires fishery management councils to include descriptions of essential fish habitat (EFH) and potential threats to EFH in all federal fishery management plans. Also requires federal agencies to consult with NMFS on activities that may adversely affect EFH.

State

Washington State Water Pollution Control Act (90.48 RCW)

Requires that all projects affecting surface waters in the state must comply with the provisions of the state's Water Pollution Control Act, including those waters that are not necessarily subject to the federal CWA regulations.

As a result of the recent Supreme Court decision described above (May 25, 2023 – Sackett v. Environmental Protection Agency), the USACE will take a lesser role in regulation of fill impacts to wetlands under Section 404 of the CWA.

However, the State of Washington is still responsible for protecting water quality under Section 401 of the CWA, and Ecology will take over as the primary review agency when a project proposes direct fill impacts to wetlands, as defined under state law. In the past, Ecology applied the same authority when regulating isolated wetlands (which were not regulated under federal law).

Per guidance from the Ecology website: "*For* [impacts to] *non-federally regulated wetlands, applicants must submit a request for an Administrative Order to comply with the state Water Pollution Control Act (Chapter 90.48 RCW). [*Ecology*] issue[s] Administrative Orders under this act for impacts to wetlands that are not jurisdictional under the federal regulations (e.g., non-federally regulated wetlands or NFRs). These wetlands remain protected under state and local laws and rules.*"

Washington State Department of Ecology NPDES Permit Program

The NPDES permit program controls water pollution by regulating sources that discharge pollutants into WOTUS (CWA, 33 USC Sections 1251 et seq. and WAC2 197-11-200 through 240). Ecology develops and administers NPDES municipal stormwater permits in Washington state. These permits regulate

discharges to both surface waters (via surface conveyances) and to groundwaters (via infiltration facilities) of the state.

There are two types of permits:

- Phase I Municipal Stormwater Permits regulate discharges from municipal storm sewer systems (MS4s) owned or operated by large cities and counties, including Pierce County.
- Phase II Municipal Stormwater Permits regulate discharges from certain "small" MS4s in Washington, including the City of Puyallup.

The current Phase I and Phase II permits were effective Aug. 1, 2019, and will expire on July 31, 2024. New permits will replace the old, applying any regulatory updates to previous permit requirements. These permits require local governments to develop and implement a stormwater management program designed to reduce pollution in stormwater runoff. Typically, the local stormwater management program requires creation of a stormwater management plan for a proposed development. That plan is submitted for review by the local jurisdiction to ensure concurrence with the Stormwater Management Manual for Western Washington (SMMWW; Ecology 2019), or a locally developed and adopted equivalent manual, such as the PCSWDM.

Construction projects that disturb more than one acre of land and which discharge to surface water or a conveyance system that drains to surface waters must obtain NPDES coverage under a Construction Stormwater General Permit.

Washington State Shoreline Management Act (RCW Ch. 90.58)

The Washington State Shoreline Management Act (SMA) provides for the management of water bodies or watercourses identified as "shorelines of the state". Areas under jurisdiction of the SMA include the designated shoreline water body, lands within 200 feet upland of the ordinary high water mark, and associated wetlands and floodplains. With this state law as a foundation, local shoreline management plans are to be developed and regulated by counties and cities.

The Puyallup River is regulated as a Shoreline of the State, and therefore, each City and County where it is found is required to development a management plan for this river.

Washington State Department of Fish & Wildlife Hydraulic Project Approval (WAC 220-660)

The Washington State Department of Fish and Wildlife (WDFW) Hydraulic Project Approval (HPA) program, regulated under Washington State law (RCW 77.55), is intended to ensure that construction in or near state waters is done in such a way as to protect fish and their aquatic habitats. An HPA must be obtained from WDFW by anyone planning hydraulic projects in most marine and fresh waters.

Specific to streambank restoration projects, regulations and specific guidance is provided in WAC-220-660-130, intended to avoid additional impacts to fish habitat from eroding and unstable riverbanks.

Local (County and City)

The KFIP site is located in unincorporated Pierce County, within the City of Puyallup's UGA. It is served by and affects city infrastructure and critical areas in the City of Puyallup as well as areas of its UGA

within Pierce County. Surface water quality and quantity protection is generally addressed at a local level in a wide range of city or county stormwater and critical area management regulations, but also in related codes that regulate disposal of pollutants or hazardous waste.

Various Pierce County Regulations that impact management of surface water will be reviewed first, followed by a short, comparative discussion about equivalent or parallel regulation in the City of Puyallup. City of Puyallup codes does not currently apply to the Project but is provided to provide context in relation to the potential for future annexation into the City.

Pierce County Regulatory Review

Pierce County Stormwater Management and Site Development Manual (PCSWDM)

An updated PCSWDM was adopted, effective on July 1, 2021. In relation to the discussion below, changes between the 2015 and 2021 versions were insignificant.

The PCSWDM provides regulations and detailed guidance on stormwater management, designed to meet Ecology's standards (as defined by the USEPA NPDES program), and as required under the County NPDES permit.

The manual also provides rules designed to protect wetland hydrology, from both a water quality and water quantity standpoint. Floodplain wetlands, such as Wetlands A, B, and C on site, are surface water systems, but are usually hydrologically dependent on a combination of surface and groundwater inflows. The stormwater management system for new development is required under the manual to maintain wetland hydroperiods (i.e., the hydrologic volumes, timing, and duration that define and support functions and values of the on-site wetlands) (PCSWDM Section B.4.2 Guide Sheets 3B and 3C, details below).

According to the current USEPA NPDES impervious surface growth model, runoff from impervious surfaces in urban and urbanized areas results in greater runoff volumes and faster rates and is the major contributor of pollutants. This results in changes in hydrology and water quality that often result in changes to habitat, increased flooding, less aquatic biological diversity, and increased impacts from sediment movement and surface erosion.

> "*Traditional stormwater management approaches that rely on peak flow storage have generally not targeted pollutant reduction and can exacerbate problems associated with changes in hydrology and hydraulics*."

To meet these federal and state standards, the PCSWDM lists minimum requirements and provides guidance as to how to accomplish these goals in Pierce County. Specific to this Project, the following guidance is noted:

- Minimum Requirement #4 in the PCSWDM is related to Preservation of Natural Drainage Systems and Outfalls. It states that runoff cannot cause significant adverse impacts to downstream waters and downgradient properties. It further states that all outfalls are required to use energy dissipation systems*, and to "prevent erosion at and downstream of the discharge location".*

- In Section B.4.2 Guide Sheet 3B: Protecting Wetlands from Changes in Water Flows (Hydroperiod), the manual states that a wetland's hydroperiod must be protected and maintained, and that the "*total volume of water into a wetland on daily basis should not be more than 20 percent higher or lower than the pre-project volumes*" and "*total volume of water into a wetland on a monthly basis should not be more than 15 percent higher or lower than the pre-project volumes.*"

A wetland **hydroperiod** is defined as having hydrology at the same time of year and in the same volume as historical conditions.

- Section B.4.2 Guide Sheet 3C: Guidelines for Protecting Wetlands from Pollutants, provides methods to ensure that a wetland is protected from pollutants generated by a development, including use of effective erosion control.

These stormwater management regulations indicate that a project site must be managed to protect on-site wetlands and downstream water bodies from both direct and indirect impacts to water quantity and quality. Therefore, these regulations apply directly to potential impacts from the KFIP site, the associated outfall structure which has already been constructed on the floodplain, in addition to protection of on-site wetland hydroperiod and water quality.

Under this requirement, runoff cannot cause significant adverse impacts to downstream waters and downgradient properties; all outfalls are required to use energy dissipation systems; and prevent erosion at and downstream of the discharge location.

The Puyallup River is deemed flow control exempt, and therefore despite promoting infiltration in most areas, the PCSWDM only requires that volumes equivalent to "*91% of the runoff volume as estimated by an approved continuous runoff model*" (which approximately equates to the 6-month 24-hour storm event) must receive some form of 'basic' treatment prior to release to the Puyallup River[3]. Thus, all volume flows greater than the minimum treatment volumes that result from larger storms can be released directly to the river without any treatment, and infiltration is not required. Therefore, the future developed KFIP site (which was previously farmed and infiltrated most direct rainfall) is allowed under the PCSWDM to capture and treat the required minimum storm volumes and send the remainder of the runoff to the Puyallup River untreated.

Table 4-4 below is from the PCSWDM, *Vol. V – Runoff Treatment BMPs, Figure 2.1 Treatment Facility Selection Flow Chart*). The table provides a list of facilities that can be used to provide basic versus enhanced treatment of stormwater.

[3] To understand the relation between the 91 percent runoff volume and the 6-month, 24-hour storm event (as estimated by an approved continuous runoff model, and storm intensity and duration), please refer to City of Tacoma 2003 Storm Water Management Manual, Appendix I-B Water Quality Treatment Design Storm, Volume, and Flow Rate at https://cms.cityoftacoma.org/enviro/Surfacewater_1/SWMM2003/V1-AppB.pdf.

Table 4-4. Runoff Treatment

Basic Treatment	Enhanced Treatment
Biofiltration Swales	Large Sand Filter[a]
Filter Strips	Treatment Wetland[a]
Basic Wet Ponds	Compost Amended Vegetated Filter Strip[a]
Wet Vault	Two-Facility Treatment Train
Treatment Wetlands	Bioretention[a]
Combined Detention/Wet Pool	Media Filter Train
Sand Filters	Emerging Technologies[a]
Bioretention	
Media Filter Drain	
Emerging Technologies[b]	

Source: Adapted from PCSWDM Vol. V – Runoff Treatment BMPs, Figure 2.1 Treatment Facility Selection Flow Chart
[a] When Phosphorous Control and Enhanced Treatment are required, the Large Wet Pond and certain types of emerging technologies will not meet both types of treatment requirements. A different or an additional treatment facility will be required to meet Enhanced treatment.
[b] Emerging Technologies are simply other techniques not specifically listed above that can be documented to attain the same or greater level of water quality.

The KFIP stormwater design information describes that enhanced rather than basic treatment will be used prior to releasing stormwater runoff to the Puyallup River (Table 4-4). In addition, the current proposal is to infiltrate roof runoff from four of the warehouse roofs in trenches sited along the top of slope at the northeastern edge of the high terrace. However, the infiltration facility design does not provide modeled data to show how the wetland hydroperiods of the on-site wetlands will be preserved by this proposal, as required by the PCSWDM.

The PCSWDM does allow for direct discharge of site runoff to the Puyallup River, but this does not relieve the applicant of ensuring that the on-site wetland hydroperiods are maintained, as required in the PCSWDM. Under current conditions, groundwater that was recharged by surface stormwater infiltrating through the high terrace surface provides hydrology to the on-site wetlands from approximately mid-winter through early summer months, i.e., to Wetlands A, B and C on the floodplain to the east, and also to Wetland D located in the southeastern portion of the high terrace.

These regulations and their intended effects on protecting wetland hydrology, habitat and water quality in the Puyallup River are also discussed in Sections 4.3 Groundwater and 4.4 Plants and Animals.

Pierce County Construction Regulations

Title 17A describes regulations related to on-site grading and stormwater drainage during construction phases, intended to minimize detrimental downstream impacts from uncontrolled runoff. The regulations implement the County NPDES stormwater permit and incorporate the PCSWDM.

Pierce County Shoreline Master Program (PCC Title 18S Development Policies and Regulations – Shorelines)

PCC Title 18S, the current Pierce County Shoreline Master Program, was adopted in 2018 and is in the process of being updated (Ordinance 2022-37s, effective December 2022). PCC Title 18S establishes allowed uses, and defines buffers, setback requirements, and mitigation requirements for regulated

waterways. PCC Title 18S identifies the Puyallup River at the KFIP site as a Shoreline of the state with a shoreline environmental designation of Conservancy (Pierce County Shoreline Designations maps, October 2019). The regulated shoreline area includes all lands within 200 feet of the ordinary high water mark (OHWM), plus all floodplains within 200 feet of the edge of the floodway and to the outer edge of all associated wetlands.

Thus, the entire floodplain and the floodplain wetlands at the KFIP site are in the regulated Shoreline jurisdiction and are subject to Shoreline Master Program (SMP) regulations.

> *PCC 18S.20.040 Conservancy Shoreline Environment Designation (SED). "The intent of the Conservancy SED is to conserve and manage existing natural resources and valuable historic and cultural areas while providing recreational benefits to the public and while achieving sustained resource utilization and maintenance of floodplain processes. Shoreline ecological functions should be preserved by avoiding development that would be incompatible with existing functions and processes, locating restoration efforts in areas where benefits to ecological functions can be realized, keeping overall intensity of development or use low, and maintaining most of the area's natural character."*

Pierce County Critical Areas Regulations (PCC Chapters 18E.10-18E.120)

Under the GMA (RCW 36.70A.060), local governments are required to establish policies and development guidelines to protect the functions and values of critical areas: rivers, streams, lakes, wetlands, floodplains, aquifer recharge areas, and others. The Pierce County Critical Areas Regulations, Title 18E includes regulations designed to provide protection pertaining to surface waters on the KFIP site, including the following critical areas, all of which are present on the KFIP site.

- wetlands (PCC 18E.30),
- regulated fish and wildlife species and habitat conservation areas (PCC 18E.40),
- flood hazard areas (PCC 18E.70),
- erosion hazard areas (PCC 18E.110), and
- landslide hazard areas (PCC 18E.80).

Mitigation Sequencing (PCC Chapter 18E.40.050) is required in Pierce County when a developer is considering potential impacts to critical areas. Avoidance of the impact is required if possible. If not possible, the impact must be minimized and mitigated as outlined below. Mitigation for alterations to habitat areas must achieve equivalent or greater biological functions and must address adverse impacts upstream and downstream of the development site.

> *PCC 18E.030.050*
>
> *A. Mitigation. All regulated development activities in wetlands or buffers shall be mitigated according to this Title subject to the following order:*
>
> *1. Avoiding the impact altogether by not taking a certain action or parts of actions;*

2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to reduce impacts;

3. The following types of mitigation (in the following order of preference):

a. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

b. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;

c. Compensating for the impact by replacing or providing substitute resources or environments. The purchase of credits from an in-lieu fee mitigation program (ILF program) or wetland mitigation bank may be an acceptable means of meeting this requirement for compensation (see Chapters 18G.20 and 18G.30 PCC);

4. Monitoring the impact and compensation and taking appropriate corrective measures; and

5. Mitigation for individual actions may include a combination of the above measures.

PCC Chapter 18E.30 (Wetlands) defines standard wetland buffer widths in relation to the Category Rating score and Land Use Intensity (Table 4-5 and Table 4-6). The County does not impose mitigation requirements on Category III wetlands smaller than 2,500 square feet and Category IV wetlands smaller than 10,000 square feet, as long as they are not contiguous to other wetlands, are not in a shoreline zone and are not part of a wetland mosaic.

Table 4-5. PCC Chapter 18E.30: Wetland Buffer Widths

Generalized Category of Wetland	Base Buffer Width
Category I	150 feet
Category II	100 feet
Category III	50 feet
Category IV	25 feet

Table 4-6. PCC Chapter 18E.30: Land Use Intensity Types

Land Use Impact "Intensity" Based on Development Types	
Rating of Impact from Proposed Changes in Land Use	**Types of Land Uses that Cause the Impact Based on Common Zoning Categories**
High	Commercial, Urban, Industrial, Institutional, Retail Sales, Residential with more than 1 unit/acre, New agriculture (high- intensity processing such as dairies, nurseries and green houses, raising and harvesting crops requiring annual tilling, raising and maintaining animals), High intensity recreation (golf courses, ball fields), hobby farms
Moderate	Residential with 1unit/acre or less, Moderate-Intensity Open Space (parks), New agriculture (moderate-intensity such as orchards and hay fields)
Low	Forestry, Open space (low-intensity such as passive recreation and natural resources preservation)

PCC Chapter 18E.40 (Regulated Fish and Wildlife Species and Habitat Conservation Areas), defines activities allowed in stream buffer areas and defines stream buffer widths in relation to Stream Type (Table 4-7).

Table 4-7. PCC Chapter 18E.40 Stream Buffers and Water Type

Water Type	Water Body Criteria	Buffer Width
Type S1	Marine Shoreline Critical Salmon Habitat	100 feet from the OHWM
Type F1	Fish-bearing streams, including waters diverted for fish hatcheries, and 1,500 feet upstream from the point of diversion, and tributaries, if important to protect downstream water quality.	150 feet from the OHWM
Type F2	Fish-bearing streams adjacent to a landslide hazard area as set forth in Chapter 18E.80 PCC.	150 feet from the OHWM or the minimum buffer distance required in PCC Chapter 18E.80, whichever is greatest
Type N1	Perennial or seasonal non-fish bearing streams within 0.25 mile of the confluence with a Type F stream.	115 feet from the OHWM
Type N2	Perennial or seasonal non-fish bearing streams that are either more than 0.25 mile upstream from the confluence with a Type F stream or are not connected at all to a Type F stream.	65 feet from the OHWM
Type N3	Lakes or ponds that do not support any critical fish species	35 feet from the OHWM

PCC Chapter 18E.70 (Flood Hazard) describes limitations on development in a regulated floodplain. The regulations are intended to minimize losses due to floods and to provide rules about activities allowed within flood hazard areas. These rules specifically describe an intent to minimize damage to critical fish and wildlife habitat areas. Depending on the type of flooding and precision of flood mapping available, areas within 150 to 300 feet horizontal from a flood zone, and 2 to 10 feet elevation above a base flood elevation may require analysis to determine what activities may be allowed. In general, new development in a flood zone is discouraged, but may be allowed with proper engineering, mitigation and floodproofing.

PCC Chapter 18E.110 (Erosion Hazard Areas) defines areas with potential erosion hazard that may result in land retreat, usually related to impacts from an adjacent water body, but also from unprotected surface erosion. At the KFIP site, the Riverine Erosion Hazard Area definition applies, which regulates "*the suspected risk of erosion through either loss of soil, slope instability, or land regression [*which*] is sufficient to require additional review to assess the potential for active erosion activity or apply additional standards*." This regulation applies on river floodplains mapped by FEMA, specifically within the mapped CMZ[4] on the on-site floodplain adjacent to the Puyallup River. In general, new structures are generally discouraged. Erosion and flow conveyance protection is required in the floodplain to minimize risk of riverine erosion.

> ***Flow Conveyance.*** *New excavated conveyance areas shall be equivalent to existing conveyance within the flood fringe. Equivalent shall mean a mechanism for transporting water from one point to another using an open channel system."*
>
> *"**Erosion Protection.** Development shall be protected from flow velocities greater than 2 feet per second through the use of bio-engineering methods or, when bio-engineering methods have been deemed insufficient to protect development, then hard armoring may be utilized. All erosion protection shall extend 1 to 3 feet, depending on development requirements, above the base flood elevation and shall be covered with topsoil and planted with native vegetation. (See Figure 18E.70-14 in Chapter 18E.120 PCC.).*

PCC Chapter 18E.80 (Landslide Hazard Area) defines areas that may be subject to mass movement due to a combination of geologic, seismic, topographic, hydrologic, or manmade factors. Indicators of a potential hazard include obvious evidence of failure, but also include area with slopes greater than 20 percent and relief greater than 20 feet, or slopes greater than 40 percent and relief greater than 15 feet, or sloped areas with soft or liquifiable soils, etc. Areas that meet these slope characteristics have been provisionally identified by Pierce County and require a geological assessment.

The standard buffer is the greater of these two – 50 ft from top of slope or a distance of one-third the height of the slope, for facilities located at the top of slope, or as recommended by the geologist to ensure safe operations. The setback may be increased if there is considered to be an increased risk downslope from stormwater drainage impacts.

The slopes along the northeast edge of the high terrace include several Landslide Hazard Areas Indicators (PCC 18E.80.020.A) and meet the definition of a Potential Landslide Hazard Area (PCC 18E.80.020.B). The proposed infiltration trench sites may not meet PCC setback requirements, and they have not apparently been assessed by a geotechnical professional (as required by PCC 18E.80.040.B.7) to ensure they will provide effective infiltration function and will not impact slope stability.

[4] Please refer to Section 4.1 Geology for CMZ details.

Pierce County Comprehensive Plan Policies

The Pierce County Comprehensive Plan was developed under the provisions of the GMA (Chapter 365-196, WAC). This Comprehensive Plan is a tool to assist County Councilmembers, planning commissioners, County staff, and others involved in making land use and public infrastructure decisions. It provides the framework for the County's Development Regulations. The current Pierce County Comprehensive Plan (effective October 1, 2021) defines goals and policies used by the County when making decisions related to growth and development, as relates to long-range county planning.

The GMA outlines 14 goals for the development and adoption of a comprehensive plan and development regulations. Specific to this section (4.2 Surface Water), the following planning goals specifically apply:

- Environment: Protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water.

The Environmental Element (Chapter 7) of Pierce County's Comprehensive Plan describes approaches for maintaining the natural environment, including sections on how to protect and manage surface water systems, including wetlands. Specific to surface water management, many of the goals require or strongly encourage use of mitigation sequencing and application of LID techniques—such as infiltration of stormwater—to avoid and reduce potential impacts to floodplains, wetlands, fish habitat and water quality. Specific primary goals in the Environmental Element related to surface water management include (but are not limited to):

- Policy ENV-15.5 Require that regulated activities occur with avoidance of impacts as the highest priority, and apply lower priority measures only when higher priority measures are determined to be infeasible or inapplicable.

A list of additional Comprehensive Plan policies specific to protection of surface water is provided below:

Overall Goals:

- *GOAL ENV-1: Conserve and protect critical and environmentally sensitive areas.*
  - *Policy ENV-1.5: Coordinate with other entities to protect critical areas, address environmental issues, and fulfill ecosystem restoration obligations.*

Water Quality Goals:

- *GOAL ENV-5: Protect aquifers and surface waters to ensure that water quality and quantity are maintained or improved.*
  - *Policy ENV-5.6: Require performance standards for new development and retrofitting of existing facilities.*
  - *Policy ENV-5.11: Protect water quality and quantity necessary to support healthy fish populations.*
  - *Policy ENV-5.13: Reduce runoff pollutants into surface and groundwater.*

  - *Policy ENV-5.14: Require the use of low impact development principles and best management practices for stormwater drainage including use of infiltration systems, such as bioretention, rain gardens, and permeable pavement, to maintain water quality for fish and wildlife.*

Fish and Wildlife Goals:

- *GOAL ENV-8: Maintain and protect habitat conservation areas for fish and wildlife.*
  - *Policy ENV-8.2: Place regulatory emphasis on protecting and achieving no net loss of critical habitat areas.*

Hazardous Areas (including floodplains) Goals:

- *GOAL ENV-10: Avoid endangerment of lives, property, and resources in hazardous areas.*
  - *Policy ENV-10.2.1: Require appropriate standards for site development and structural design in areas where the effects of the hazards can be mitigated.*
  - *Policy ENV-10.2.4: Direct sewer lines, utilities, and public facilities away from hazardous areas.*
  - *Policy ENV-10.4: Maintain natural river channel configurations whenever possible.*

Wetlands Goals:

- *GOAL ENV-11: Establish appropriate long-term protection to ensure no net loss of wetlands.*
  - *Policy ENV-11.4: Require wetland mitigation for impacts that cannot be avoided.*

Best Available Science, Review, and Adaptive Management Goals:

- *GOAL ENV-14: Designate and protect all critical areas using best available science.*
  - *Policy ENV-14.1: Give special consideration to conservation and protection of anadromous fisheries.*
- *GOAL ENV-15: Recognize the value of adaptive management for providing flexibility in administering critical area and shoreline regulations.*
  - *Policy ENV-15.2: Prioritize post-project compliance monitoring.*
  - *Policy ENV-15.3: Utilize new technologies and methodologies where appropriate to resolve environmental problems.*
  - *Policy ENV-15.5: Require that regulated activities occur with avoidance of impacts as the highest priority, and apply lower priority measures only when higher priority measures are determined to be infeasible or inapplicable.*

Storm Drainage and Surface Water Management Goals:

- *GOAL U-32: Improve surface water and groundwater quality.*
  - *Policy U-32.1: Address water quality in stormwater facility maintenance and capital improvement projects.*
  - *Policy U-32.2: Reduce and eventually eliminate harm to water quality from stormwater discharges. Do this through use of on-site infiltration and best management practices and*

source control of pollutants; control of development density and location; preservation of stream corridors, wetlands and buffers; and development, maintenance of a system of stormwater retention and detention facilities, and retrofit of existing facilities to eliminate or reduce untreated stormwater flows

- *GOAL U-35: Manage stormwater in consideration of the varied uses associated with natural drainage systems.*
  - *Policy U-35.2.5:* Promote infiltration, bioretention, dispersion, and permeable pavement.
- *GOAL U-37: Reduce or eliminate the stormwater drainage impacts from roadways onto adjacent properties and into surface waters.*
- *GOAL U-38: Make the use of Low Impact Development (LID) techniques in public and private developments the preferred and most widely used method of land development.*
- *GOAL U-39: Ensure that negative downstream impacts will not occur from on-site runoff.*
- *GOAL U-45: Coordinate the general flood control strategy with the federal fisheries service approved salmon recovery plan for Puget Sound.*

City of Puyallup Regulations (Comparison to Pierce County)

As described above, the Project site is located in unincorporated Pierce County, within the City of Puyallup's UGA. It is served by and affects city infrastructure and critical areas in the City of Puyallup and its UGA. Surface water quality and quantity protection is generally addressed at a local level in a wide range of city or county stormwater and critical area management regulations, but also in related codes that regulate disposal of pollutants or hazardous waste.

Various Pierce County Regulations that impact management of surface water were reviewed first above, but are followed below by a short, comparative discussion about equivalent or parallel regulation in the City of Puyallup. But City regulations do not apply until such time as the UGA is annexed into the City.

City of Puyallup Stormwater Management Program Plan (SWMPP)

The City of Puyallup's SWMPP is updated each year, to describe actions Puyallup will take to maintain compliance during the 2020 Permit period, as required by the City's Phase 2 NPDES Permit (i.e., August 1, 2019, through July 31, 2024). The 2023 SWMPP provides guidance on how the City manages its stormwater to meet requirements of the City's NPDES Phase 2 permit, as administered by Ecology. Under the SWMPP, the City has made LID the preferred approach for new development, in order to "*minimize impervious surfaces, native vegetation loss, and stormwater runoff in all types of development situations where feasible*".

The Phase 2 Permit allows the City to discharge stormwater runoff Into Waters of the State (i.e., streams, rivers, lakes, wetlands) as long as the City implements certain water quality programs designed to protect water quality. This goal is to be attained by reducing discharge of pollutants "*to the maximum extent practicable*" by using specific BMPs.

The BMPs are grouped under several program categories, including but not limited to Stormwater Planning, MS4 Mapping and Documentation, Controlling Runoff from Development, Redevelopment, and Construction Sites, Operations and Maintenance, and Monitoring

The SWMPP (Section S5.C.8) requires the City to implement a program designed to prevent and reduce runoff pollutants from surfaces that discharge to the City stormwater system. This would include requiring implementation of source control BMPs from current operations or, as needed, requiring construction of treatment facilities to reduce pollutants associated with existing land use.

In addition, under Section 9.1, the city is required to define maintenance standards that are "*as protective, or more protective [SIC] of facility function*" than those specified in the Ecology Manual. And for stormwater facilities that do not have maintenance standards, the City is required to develop a maintenance standard.

Under Section 10, the City is required to have a program in place to ensure that permanent stormwater facilities are checked after major storm events to determine whether the facility was damaged or requires maintenance, and as such, applies to the existing KFIP stormwater outfall structure.

City of Puyallup Shoreline Master Program (PSMP)

The City's Shoreline Master Program (PSMP) establishes "*allowed uses"*, and defines buffers, setback requirements, and mitigation requirements for regulated waterways. The Puyallup River at the KFIP site is a Shoreline of the state with a designation of Urban Conservancy in the City. The regulated shoreline area in both the City and County includes all lands within 200 feet of the OHWM, plus all floodplains within 200 ft of the edge of the floodway and to the outer edge of all associated wetlands.

Thus, similar to County regulations (which apply to the KFIP site until it is annexed into the City), the entire floodplain and the floodplain wetlands at the KFIP site are assumed in this analysis to be in the regulated Shoreline zone and if annexed in the future, will be subject to PSMP regulations.

City of Puyallup Critical Areas Regulations (Chapter 21.06 CRITICAL AREAS)

Under the CMA (RCW 36.70A.060), local governments are required to establish policies and development guidelines to protect the functions and values of critical areas: rivers, streams, lakes, wetlands, floodplains, wildlife habitat, erosion and landslide hazard areas, and others. The Puyallup Critical Areas regulations (Puyallup Municipal Code Chapter 21.06 Critical Areas, PMC Chapter 21.06) includes regulations similar to those of Pierce County, as both are designed to meet standards defined in the GMA. However, some regulatory details are different.

PMC Chapter 21.06 regulations were most recently updated in 2022. These regulations apply to lands directly west of the KFIP site, which are within the City of Puyallup, and will apply to any future KFIP site development after annexation into the City. Ideally, the PMC Chapter 21.06 regulations are not in conflict with similar and parallel County regulations, which apply to the current KFIP Category III wetlands smaller than 1,000 square feet (if not along a riparian corridor or part of a wetland mosaic), and does not regulate Category IV wetlands smaller than 4,000 square feet as long as the wetland is not associated with a shoreline, is not part of a wetland mosaic, does not score 5 or more points when rated, does not contain priority or critical habitat, and the impacts are fully mitigated in accordance with conditions from Ecology and USACE.

PMC Sections 21.06.1010-1080 (Article X Fish and Wildlife Species and Habitat Conservation Areas) defines activities allowed in stream buffer areas and defines stream buffer widths in relation to Stream Type and habitat type, as listed below in Table 4-8.

Table 4-8. PMC Section 21.06.1050 Stream, Riparian and Non-Riparian Habitat Buffer widths

Water Type	Water Body Criteria	Standard Buffer Width
Type I	"Shorelines of the State" within the city's corporate limits and the urban growth area—specifically the Puyallup River and Clarks Creek, below Maplewood Springs;	150 feet from the OHWM
Type II	Other fish-bearing streams or streams with significant recreational value, or with significant wildlife habitat functions. Within the city's corporate limits and the urban growth area, known Type II streams such as Deer Creek, Diru Creek, Meeker Ditch, Rody Creek, Silver Creek, Wildwood Creek, Woodland Creek, and Wapato Creek	100 feet from the OHWM
Type III	Streams with perennial or intermittent flow that are not used by anadromous fish.	50 feet from the OHWM
Type IV	Intermittent or ephemeral streams less than two feet wide at the OHWM that are not used by anadromous or resident fish	35 feet from the OHWM
Non-riparian habitat areas	These habitat areas must support or have a primary association with federally listed species, state priority habitats and species, or habitats and species of local importance	Determined on a site-by-site basis

PMC Section 21.06.12 (Article XII Geologically Hazardous Areas) defines areas that are susceptible to erosion, landslides, earthquakes, volcanic activity, or other potentially hazardous geological processes. Alteration of geologically hazardous areas and their buffers may be allowed based on the degree to which risks can be mitigated. Removal of vegetation with soil-stabilizing functions from an erosion or landslide hazard area or related buffer is generally prohibited.

Point discharges from surface water facilities and roof drains onto or up-slope from an erosion or landslide hazard area is prohibited except when water can be tightlined to a point where there are no erosion hazard areas, or where the discharge flow rate matches predeveloped conditions with adequate energy dissipation, or where discharge is dispersed across a steep slope onto a low-gradient undisturbed buffer where the released water would infiltrate in the buffer and not increase slope saturation (as certified by a geotechnical professional).

PMC Chapter 21.07 (Flood Damage Protection, a separate chapter from the Critical Areas Chapter 21.06) describes limitations on development in a regulated floodplain. The regulations are intended to protect human life and health, minimize public costs associated with flood control and relief projects, minimize damage to public facilities, and meet requirements for maintaining eligibility for flood insurance and disaster relief.

These rules specifically describe methods intended to control alterations to natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters, and to control or minimize filling, grading, dredging and other development which may increase flood damage.

Applicants for development permits in a floodplain area are to submit a professional habitat assessment report describing effects of the proposed development (during both construction and operation) on

floodplain functions and documenting that the proposed development will not result in "take" of any species listed as threatened or endangered under the ESA. The functional impacts that are to be described include a requirement for hydrologic and hydraulic analyses in accordance with standard engineering practice to ensure that the proposal avoids "take" of listed species. The report must also describe flood storage capacity impacts; channel migration and bank stability impacts; riparian vegetation impacts; habitat forming and isolation impacts; impacts to floodplain refuge for fish during higher velocity flows; and impacts to spawning substrate.

Development permits will be denied if the proposal will result in "take" of any species listed as threatened or endangered under the ESA, unless the Applicant provides the City with evidence that the federal and state permits required to authorize such take have been obtained.

City of Puyallup Comprehensive Plan Goals and Policies

The 2020 CPCP includes government planning goals and policies that call for the protection, preservation and enhancement of water resources and other Natural Environment Elements. These City policies are provided for context because the proposed development is within the City's UGA, which includes shared natural and constructed surface water systems with the County, and because the already constructed outfall structure intended to receive runoff from the KFIP Project site is shared with an already operating outfall managed by the City of Puyallup– the Viking Warehouse facility.

The CPCP is described as "*the long-term vision and plan for managing the built and natural environment in the City of Puyallup*." It provides policy guidance used by City staff to make decisions related to growth and development. Key strategies to be implemented in order to maintain the City's environmental assets—as related to surface water management—are summarized below:

- Use a science-based approach to ensure no net loss of critical areas' ecological functions and values;
- Maintain and strive to enhance a healthy natural ecosystem through environmental stewardship programs that engage the citizens of Puyallup; and
- Adoption of a 'no-net loss' approach.

Chapter 2 describes approaches for managing the environment. Goals and Policies that relate to surface water management at the KFIP site include (but are not limited to):

<u>Sustainability and Environmental Stewardship:</u>

- *Goal NE-1 Safeguard the natural environment by meeting the needs of the present without compromising the ability of future generations to meet their own needs.*
  - *Policy NE-1.1 Establish policy and regulations that consider and implement Best Available Science when making environmental decisions, where applicable.*
- *Goal NE-2 Lead and support efforts to protect and improve the natural environment, protect and preserve environmentally critical areas, minimize pollution, and reduce waste of energy and materials*.

Critical Areas:

- *Goal NE-3 Protect, integrate and restore critical areas and their aesthetic and functional qualities through conservation, enhancement and stewardship of the natural environment.*
  - *Policy NE–- 3.1 Implement projects and programs that include adaptive management based on Best Available Science to revise policies, regulations and programs as needed to reflect changes in scientific advancement and local circumstances.*
  - *Policy NE–- 3.3 Implement monitoring and adaptive management to programs and critical areas mitigation projects to ensure that the intended functions are retained and, when required, enhanced over time.*
  - *Policy NE–- 3.5 Conserve and protect environmentally critical areas from loss or degradation. Maintain as open space hazardous areas and significant areas of steep slopes, undeveloped shorelines and wetlands.*
  - *Policy NE–- 3.6 Avoid land uses and developments that are incompatible with environmentally critical areas; protect critical area functions based on the intensity of land uses near them.*

Geologically Hazardous Areas (including erosion hazard areas):

- *Goal NE-4 Preserve and enhance the natural scenic qualities, ecological function and value, and the structural integrity of hillsides to protect life, property and improvements from landslide, erosion and volcanic hazards.*
  - *Policy NE–- 4.2 Require appropriate levels of study and analysis as a condition to permitting construction within Geologically Hazardous Areas (and etc.).*
  - *Policy NE–- 4.8 Establish setbacks around the perimeter of site-specific Landslide Hazard Areas to avoid the potential to undermine these areas, cause erosion and sedimentat*ion…and etc.

Frequently Flooded Areas:

- *Goal NE-6 Minimize the potential for injury and property loss associated with flooding while preserving and restoring the ecological function and value of flood prone areas.*
  - *Policy NE–- 6.1 Reduce the amount of effective impervious surface in floodplains and uplands contributing runoff to downstream floodplains.*
  - *Policy NE–- 6.2 Employ no net impact floodplain management to avoid impacts to both upstream and downstream properties.*
  - *Policy NE–- 6.5 Direct uses that require substantial improvements or structures away from areas within the 100-year floodplain.*
  - *Policy NE–- 6.12 Explore new methods to limit effective impervious surface to protect environmental resources such as streams and allow for groundwater recharge, allow for efficient land use, mandate low impact development techniques throughout all phases of site planning and development and accommodate the level of development intensity planned for the area.*

Wetlands:

- *Goal NE-7 Identify and protect wetland resources and ensure "no net loss" of wetland function, value and area within the city.*
  - *Policy* NE–- 7.3 Use mitigation sequencing guidelines when reviewing projects impacting wetlands.

Water Quality:

- *Goal NE-8 Protect, improve and enhance the quality of all aquatic resources city-wide through best management practices, with a distinct emphasis on mimicking natural processes and use of low impact development techniques.*
  - *Policy NE–- 8.1 Maintain surface water quality necessary to support native fish and wildlife meeting state and federal standards over the long term.*
  - *Policy NE–- 8.8 Protect and enhance rivers, streams and lakes, including riparian and shoreline habitat, to protect water quality, reduce public costs, protect and enhance fish and wildlife habitat, and prevent environmental degradation.*
  - *Policy NE–- 8.11 Avoid development impacts to riparian corridors by taking the following measures:*
    - a. Protect riparian vegetation within stream buffers to maintain ecological functions.
    - b. Enhance and rehabilitate these areas if they are impacted by development and encourage this when development takes place on adjacent uplands.
    - c. Establish stream buffers to protect riparian ecological functions that contribute to healthy stream systems.
    - d. Promote activities and programs that will establish additional native vegetation along the city's stream corridors.
  - *Policy NE-8.13 Encourage restoration and enhancement of the Puyallup River…, other riparian stream corridors, wetlands, and associated buffers with priority given to areas associated with listed species and TMDL water-cleanup plans.*

Fish and Wildlife Habitat:

- *Goal NE-9: Identify and protect fish and wildlife areas within the city by engaging citizens in restoration, protection and stewardship of those habitats throughout the city.*
  - *Policy NE-9.14: Protect salmon, steelhead and other fish, plants, and wildlife that rely on the aquatic environment by protecting and improving water quality.*

4.2.3 Affected Environment

The affected environment, for purposes of this section (4.2 Surface Water), includes the KFIP site and the Middle Reach of the Puyallup River (Figure 4-7), the on-site floodplain, and the upland contributing basin that sends surface water flows toward the site from the south (Figure 4-8). The study area is within Water Resource Inventory Area (WRIA) 10, Puyallup/White River. This section summarizes the environmental setting related to existing surface waters and associated features within and near the Project site.

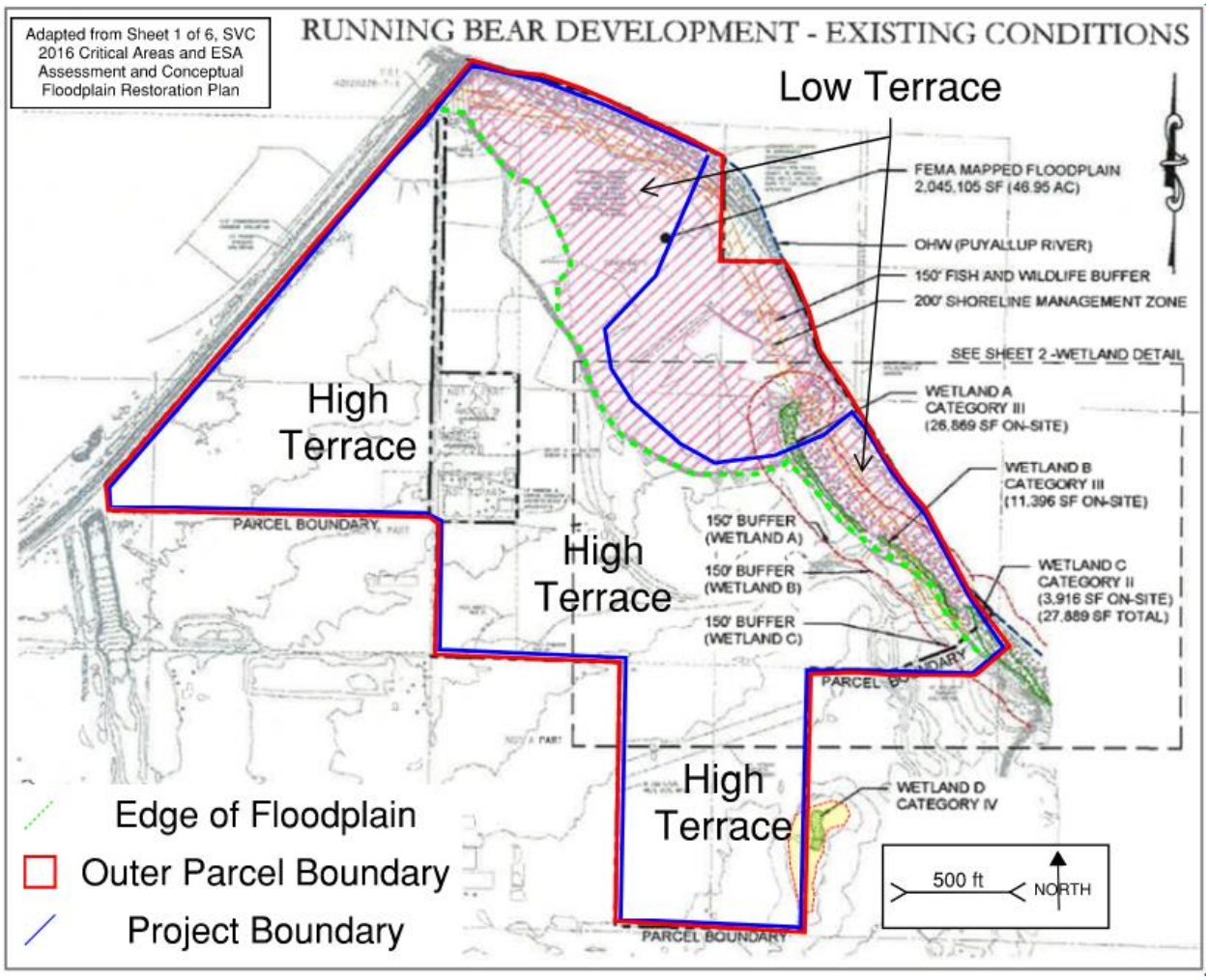

Figure 4-8. Map of FEMA Floodplain and Wetlands A, B and C Delineated by Soundview Consultants (SVC 2016) and Expanded Outline of Wetland D per EIS Team Delineation 2020 (yellow polygon).

The KFIP site is proposed for future construction of seven warehouses and associated infrastructure. The site is currently actively managed as farmland. It is located on a post-glacial, alluvial terrace located on the left bank of the Puyallup River. There are two terrace features on site, a high elevation terrace to the southwest, where it is proposed to build the KFIP warehouses (high terrace), and a low elevation terrace to the northeast along the Puyallup River, which is an active floodplain (floodplain). The entire high terrace and parts of the 100-year floodplain have been regularly plowed and planted with agricultural crops.

Surface waters within or directly adjacent to the KFIP site include the Puyallup River and its associated floodplain, and four (4) wetlands. The Puyallup River is regulated as a Shoreline, and most of these surface waters are within the Puyallup River Shoreline zone (which includes the entire floodplain and three of the four on-site wetlands).

The EIS team carried out on-site visits during various times of the year from 2019 through 2023 to document conditions and collect data related to ongoing EIS work. Previous reports prepared by the

developer's consultants related to assessment of stormwater management, wetlands, and plants and animals impacts on site were also reviewed by the EIS team, including but not limited to:

- Barghausen Engineering: Various stormwater reports and stamped design drawings:
  - Barghausen Engineering *Conceptual Grading and Storm Drainage Plan*, stamped 03/26/2021.
  - Barghausen [KFIP] Engineering *Offsite Conveyance Analysis Report*, prepared for Michelson Puyallup Partners, LLC. April 2,2018.
  - Barghausen Engineering *Offsite Conveyance Analysis Report* for Van Lierop property, prepared for Running Bear Development Partners. March 1, 2018, revised June 14, 2018.
- Soundview Consultants: reports prepared for the KFIP site:
  - March 2016: *Draft Critical Areas and ESA Assessment and Conceptual Floodplain Restoration Plan*
  - September 2016: Draft Critical Areas Assessment report replaced the March 2016 report
  - December 2016: Critical Areas Assessment final report updated and replaced the September 2016 Draft report; and was accepted by Pierce County
  - October 2020: *As-Built Report*, Technical Memorandum describing baseline site conditions after construction of the outfall and installation of plant materials was complete.
  - December 2022: *Year 1 and 2 Monitoring Report*, describing conditions at the Viking Outfall
  - May 2023: Memorandum related to HPA and riverbank erosion
- Talasea Consultants: reports prepared for the Viking warehouse site.
  The stormwater outfall structure described in the report was initially intended to support the Viking warehouse development but was also intended to accept future stormwater flows from the KFIP site. Therefore, aspects of the Talasea reports also apply to the KFIP site—specifically information related to the outfall structure, mitigation plans and assessment of conditions in the Puyallup River.
  - January 2017: Biological Evaluation
  - March 2018: JARPA form and Detailed Mitigation Plan

Puyallup River

The KFIP site is directly adjacent to the Puyallup River. The Middle Reach of the river (which includes the KFIP site) starts at RM 10.3 (the confluence with the White River) and extends upstream to RM 17.4 (the confluence with the Carbon River). The basin that flows to this section of the River is approximately 438 square miles (Geoengineers 2003).

The Puyallup River is regulated by Pierce County as a shoreline of statewide significance (PCC Title 18S – Conservancy Designation) and as a Type F1 fish-bearing stream (PCC Chapter 18E.40 – Fish and Wildlife Habitat Conservation Area).

In Pierce County, FI streams are assigned a standard buffer of 150 feet (PCC Chapter 18E.40, Table 18E.40.060-1), measured landward from the river's OHWM. The County's SMP standard Shoreline jurisdiction extends 200 feet landward from the OHWM, but is wider within the KFIP Project area because the shoreline jurisdiction also includes the entire floodplain and wetlands A, B and C. The

Conservancy Shoreline standard buffer/setback from the OHWM is 100 feet wide, as measured from the OHWM at the river. When there are differences between the Critical Area and the SMP regulations, the most protective setback or buffer is applied. The 150-foot critical area buffer is most restrictive, and therefore applies.

Water quality in the Puyallup River adjacent to the KFIP site is currently documented as having Category 1 (Low risk) impacts from occasional exceedance of bacteria and Ammonia-N criteria; Category 2 (Moderately Low risk) impacts from high copper content (per Puyallup Tribe data), high pH and low dissolved oxygen readings, and Category 5 (High risk) exceedance of 32 degrees Fahrenheit (°F) temperature limits. However, data detailing ongoing water quality monitoring work in the Puyallup River is limited. New research about a potentially significant water quality impact to the Puyallup River associated with stormwater runoff from paved areas is described below.

Surface Water Impacts to Listed Species

Water quality and fish habitat in the river is affected by scouring, erosion and sediment loads from regular riverine flooding. Some of these impacts are natural and ongoing in the Puyallup River. However, the outfall structure at the edge of the river was originally approved to provide an outfall for the Viking warehouse site, which only sends water to the western side of the structure. The eastern side was built at the same time with apparent intent to serve the future KFIP development, but without appropriate assessment of additional hydraulic impacts from significantly greater future KFIP outfall volumes.

Construction of the outfall has resulted in unpermitted placement of large boulders below the OHWM and increased bank erosion under current conditions. Undercutting at the riverbank has resulted in some materials from the outfall construction—some boulders and A-jacks originally installed at top of slope and bioengineered sections of the riverbank slope face—starting to slump and fail. Some of these materials have fallen down the bank and into the river. Ongoing riverbank erosion (described in more detail below) has resulted and will result in impacts to fish and fish habitat in the Puyallup River (Confluence 2023).

The WDFW has been tracking this situation through the HPA originally issued for the Viking project. WDFW staff met with KFIP consultants on site at the end of 2022 to assess conditions at the end of a 3-year monitoring period at the riverbank in relation to how the riverbank has been impacted by outfall construction. In their 2022 Correction Request concerning the outfall facility HPA, WDFW documented unpermitted placement of several boulders below the OHWM, failure of the plants installed for riverbank impacts mitigation to survive at required rates (minimum required survival was 80 percent), and documented riverbank erosion where previously installed plantings had been washed away in winter floods. WDFW required repair of the riverbank, through a new HPA. This work is described in detail in the following section and below.

To assess impacts of the bank failure and ongoing erosion on listed species and habitat in the river, the City's fisheries biologist consultant (Confluence Environmental) reviewed the WDFW HPAs and assessed streambank stabilization repairs that were installed under the most recent HPA in May 2023. In their report (Confluence, August 2023), Confluence noted that streambank stabilization protocols that are to be applied under the WDFW HPA permit are defined in the *Integrated Streambank Protection Guidelines*

(ISPG). WAC 220-660-130 codifies the ISPG, which represents the best available science and provides critical technical guidance for designing and permitting bank stabilization projects in Washington State. The ISPG requires that streambank stabilization projects be grounded in sound scientific and engineering principles. For that reason, a successful bank stabilization design must be engineered to incorporate fluvial geomorphic processes and to address local ecological conditions.

The WAC defines stream bank protection as any structure (permanent or temporary) that is built to reduce or prevent stream bank and shoreline erosion in Waters of the State, such as the Puyallup River. Structural techniques may include armoring the bank with riprap, concrete, or timber, or use of live plantings, rootwads, and large woody material, depending on site-specific hydraulic and ecologic conditions. Some projects integrate both structural and biotechnical techniques, particularly in high energy environments when hard armoring is needed, but benefits from using biotechnical techniques can also be applied.

In particular, the intent of this work is to protect fish life and fish habitat, particularly where listed species are present. *"Direct loss of habitat from bank erosion may include loss of aquatic vegetation, spawning gravel, large woody material, riparian zone vegetation, and flood plain connectivity as well as alteration of the channel"* (WAC 220-660-130[2]). Durable and effective bank stabilization will avoid and minimize adverse impacts to fish and fish habitat.

Confluence reviewed the intent of WAC 220-660-130, specifically subsections 3(a), 4(b) and 4(b)(i, ii, iii, v, vi, vii, and viii), and evaluated whether the streambank stabilization work either from the original 2018 bank stabilization installation pursuant to the original HPA or the May 2023 repair work met requirements of the WAC.

Confluence's review identified shortcomings and failures to meet WAC requirements in the 2018 and in 2023 HPAs:

- The streambank stabilization design work in 2018 and in 2023 was not carried out by qualified professionals (i.e., with expertise in geomorphology or hydraulic engineering).
- The work did not take into account immediately adjacent fluvial morphology or hydraulics, such as the location of the river thalweg directly adjacent to the bank or the intensity and duration of wet season flows.
- The work did not apply basic mitigation sequencing, which should start with avoidance of the impact, then progress to minimizing impacts as much as possible.
- There was no "Basis of Design" report, which would document the engineering and hydraulics foundation of various design components, as required to incorporate ecological and geomorphological processes at the site.
- There was no site and reach assessment conducted to support the initial 2018 design, and the subsequent 2021 scour report (WCI 2021) did not apply current riverine morphology, did not take ecological processes into account and did not address efficacy of the existing bank stabilization installation or outfall structure design.
- The 2023 repair work did not provide a site reach assessment report, and thus was similarly flawed and compromised with numerous design deficiencies and predictable modes of failure.

There was no stamped or scaled engineering design drawing, but rather only a hand-sketched concept drawing with minimal detail.

- Unpermitted placement of boulders below the OHWM (a violation of the CWA and state law) was not addressed in the May 2023 repair work.
- The original 2018 design as well as the May 2023 repair work does not protect spawning and rearing habitat in the River, as flood events comparable to past winters are expected to undercut the new installation and continue to erode the riverbank at the outfall. This is expected to lead to delivery of additional boulders and concrete debris from upslope into the Puyallup River, which would further degrade habitat.

Confluence concluded:

> *There is no evidence that the [streambank protection] work was based on sound engineering principles and required hydraulic and geomorphic assessments of erosion risk. City hydraulics experts [NHC, 2023] have evaluated the installation and have indicated that the installation is likely to fail under expected future conditions. More extensive bank stabilization will be required to protect the outfall, leading to additional expense and additional adverse impacts to fish and fish habitat.*

In addition to bank failure at the site associated with the stormwater outfall resulting in impacts to fish life and fish habitat in the river, recent research from Tian et al. (2021, 2022) and others (McIntyre and Kolodjiez 2021) has identified another impact of the stormwater. That is a release of a tire rubber derived chemical in stormwater runoff, the antioxidant 6PPD (often found in microscopic tire wear particles) and its soluble byproduct 6PPD-quinone (6PPD-q). This research is also discussed in Section 4.4 Plants and Animals.

This pollutant is commonly found in stormwater runoff from paved surfaces throughout the world. In the Pacific Northwest, this chemical has recently been found to have lethal effects, specifically, on trout and salmon species, with the highest sensitivity to date reported in coho salmon, but also high sensitivity reported for other listed salmonids and fish. Research on other salmonids is ongoing. Characteristic toxicity symptoms include increased ventilation, gasping, spiraling, and loss of equilibrium shortly before death, which is reported to occur within 1–96 hours of exposure at very low concentrations of the pollutant.

Tian et al. (2022) reported a revised juvenile Coho salmon lethal concentration 50 (LC50)[5] of less than 0.1 micrograms per liter (µg/L), indicating substantial lethal sensitivity to 6PPD-q. Research to determine how this sensitivity is expressed in other salmonid species is ongoing. Brinkmann et al. (2022) evaluated potential for acute toxicity of 6PPD-q to rainbow trout, brook trout, arctic char, and white sturgeon. They reported 96-hour acute toxicity thresholds (LC50) of 1.0 µg/L or less for the two trout species,

[5] LC50 is the amount of a substance suspended in the air required to kill 50 percent of a test animals during a predetermined observation period. LC50 values are frequently used as a general indicator of a substance's acute toxicity.

indicating lethal sensitivity in these trout species. Lethal impacts to other salmon species are assumed but not yet fully documented.

Current stormwater regulations and manuals adopted prior to this research, reported in 2021, do not directly address this new research or new recognition of a pollutant, but generally indicate that best available science is to be applied in relation to providing adequate treatment for any critical stormwater runoff pollutant known to have a lethal effect on listed species (which are protected under both federal and state law).

Ecology has published new guidance about 6PPD as of June 2022 and October 2022 (Ecology (D and E) 2022), which advises how jurisdictions under NPDES permits should best manage this critical pollutant to avoid illegal take of listed species. This guidance reported that the primary pathway of 6PPD-q transport to a river is via runoff from paved roads and parking areas or through conveyance systems (storm drainpipes and catch basins) that discharge to surface waters or direct discharges to surface waters.

Two categories of BMPs that can be used to reduce impacts from the tire oxidant pollutant were identified in the June 2022 guidance:

- Stormwater Flow and Treatment BMPs
- Source Control BMPs.

Stormwater dispersion, infiltration or biofiltration Flow and Treatment BMPs were described as having high potential to minimize impacts from the 6PPD chemical, with specific requirements as to the composition of the underlying soil or infiltration media—usually related to having a minimum content of organic material, clay, or another material with comparable sorption characteristics (i.e., high Cation Exchange Capacity).

Alternately, under Source Control BMPs, polluted parking lot and road runoff could be separated from relatively clean roof runoff and redirected to water quality treatment facilities designed to remove the pollutant prior to release.

Sedimentation (i.e., settling ponds) as a Flow and Treatment BMP was considered only moderately effective, because the 6PPD tire oxidant particles tend to float and some of the pollutant is soluble, so does not settle. Filtration as a Flow and Treatment BMP (such as filtration through pure sand, which has low sorption capabilities) was also considered less effective due to varying 6PPD particle sizes and chemical solubility allowing some of the pollutant to escape.

If no BMPs are provided using prescriptive infiltration, sorption, filtration, or sedimentation treatment, then potential for pollutant removal from stormwater runoff sent via surface flow from the KFIP site to the river is low. The current PCSWDM allows for direct surface stormwater outfall to the Puyallup River after ‘basic’ water quality treatment of smaller storms, i.e., volumes equivalent to 91 percent of the

runoff volume as estimated by an approved continuous runoff model[6]. This runoff volume is approximately equal to what was previously called the 6-month 24-hour storm event (i.e., a 24-hour storm volume that might be expected twice a year, or once every 6 months). As described above, the KFIP stormwater design information indicates that enhanced rather than basic treatment will be used prior to releasing stormwater runoff volumes equivalent the 6-month storm to the Puyallup River (Table 4-4). However, the PCSWDM allows flows from storms larger than the 6-month, 24-hour event to be released to the river without any treatment, assuming that dilution by the greater water volumes will be adequate to reduce risks from stormwater pollutants.

Some, but not all of the enhanced treatment options listed in Table 4-4 may be effective at removal of 6PPD from the KFIP runoff prior to release to the Puyallup River. These methods should be compared to the recommended treatment options described in Ecology guidance and recent research publications cited above to determine what best treatments can be applied to remove 6PPD from new KFIP stormwater runoff volumes.

The PCSWDM allows volumes in excess of the 6-month storm minimum to be released without any water quality treatment, but this does not relieve the applicant of ensuring that listed species in the river near the outfall are adequately protected from impacts of the 6PPD pollutant. As described above, recent guidance from Ecology indicates that specific stormwater dispersion, infiltration or biofiltration approaches using infiltration media with high Cation Exchange Capacity (CEC) can be used to minimize lethal impacts to listed species from the 6PPD chemical.

Because the 6PPD pollutant has lethal effects on salmonids at very low concentrations, applying the "basic" or "enhanced" treatment standards alone may not provide enough protection to ensure no harm (i.e., take) to listed species in the Puyallup River near the new outfall. In addition, because this is a new outfall that will introduce new volumes of 6PPD to the river, it presents an increased risk to salmonids relative to pre-outfall conditions. Therefore, it does not maintain or improve the current status quo, but rather will increase the current background level of 6PPD pollution in the river.

Protection of listed species is required under federal, state and local law, and in relation to current KFIP site design, this newly identified impact to surface water quality which increases risk to listed salmonids in the river adjacent to the KFIP site suggests a need for reassessment or redesign of KFIP stormwater management plan and/or facilities. Protecting listed salmonids in response to the new information about tire chemicals would also be consistent with Pierce County's Comprehensive Plan policies for using best available science and adaptive management for critical areas (Goal ENV-14, Goal ENV-15, Policy ENV-15.3).

[6] To understand the relation between the 91 percent runoff volume and the 6-month, 24-hour storm event (as estimated by an approved continuous runoff model, and storm intensity and duration), please refer to City of Tacoma 2003 Storm Water Management Manual, Appendix I-B Water Quality Treatment Design Storm, Volume, and Flow Rate at https://cms.cityoftacoma.org/enviro/Surfacewater_1/SWMM2003/V1-AppB.pdf.

Erosion and Bank Failure

As described above, water quality in the river is affected by scouring, erosion and sediment loads from regular riverine flooding. Some of these impacts are natural and ongoing. However, construction of the outfall structure at the edge of the river has resulted in an increase in bank erosion. The KFIP outfall structure is located in the floodplain directly adjacent to the river channel on the left riverbank. Recent observations by the EIS team indicate new and ongoing erosion and undercutting from surface flows at the riverbank at the outfall structure location. New sediment deposits within the outfall structure from regular river flooding and scouring and subsequent erosion impacts at the top of bank at the edge of the structure have resulted from the removal of pre-outfall bank vegetation (riverine buffer vegetation) and from the loss of mitigation plantings on the riverbank (willow wands). Lack of effective protection of the riverbank at the downslope edge of the outfall structure has exacerbated baseline scouring along the riverbank. Over time, riverbank erosion at the outfall could have secondary impacts to the railroad trestle, located directly downstream from the KFIP site outfall structure (Figure 4-10).

Minimum Requirement #4 in the PCSWDM (related to preservation of natural drainage systems and outfalls) states that runoff cannot cause significant adverse impacts to downstream waters and downgradient properties, that all outfalls are required to use energy dissipation systems, and are required to "*prevent erosion at and downstream of the discharge location*". This requirement has not been met in that there are no effective energy dissipation measures in place between the leading edge of the outfall at top of bank and the river surface below. Energy dissipation measures are needed to protect the riverbank from erosive impacts caused by stormwater flows from the outfall. The river OHWM at this location is 38.5 feet elevation, and the leading edge of the outfall is approximately 41.5 feet elevation, resulting in a 3-plus-foot drop to the river and continually exposing the riverbank to considerable erosive forces.

In August 2021, WEST Consultants Inc. (WCI, 2021) prepared a river scour analysis for Viking LLC and Running Bear Development Partners, LLC. The stated purpose of the analysis was only to define scour potential in the Puyallup River near the BNSF Trestle Bridge which could result from notching the levee embankment to build the new outfall structure. Thus, the WCI analysis was limited to assessment of potential for river scouring during flooding events at the embankment below the new stormwater outfall structure, and assessment of potential for impacts to the BNSF RR trestle directly downstream. It did not include any assessment of potential scour impacts that might result from existing or future surface stormwater discharges from the existing Viking warehouse facility or the future KFIP warehouse complex.

In the analysis, WCI focused on the fact that the new outfall created a wide "notch" in the old levee embankment at the north end of the KFIP site. The report outcome indicates that the notch (i.e., the outfall structure location) increases potential for scouring, due to more water flowing through the notch or across the floodplain and back into the river through the notch/outfall structure during flood events than would previously have occurred. The WCI model assessed potential scour impacts of the 10-, 50- and 100-year floods. The model results indicated that the scour potential would increase during flooding events at the river embankment below the outfall as a result of construction of the outfall—particularly for the comparatively smaller events (such as the 10-year flood). The WCI model also indicated that

scour potential would decrease a negligible amount at the BNSF railroad bridge abutments and piers just downstream from the outfall. Therefore, the WCI model predicts that the "notch" would increase river scour potential at the outfall, particularly during the 10-year storm (when floodwater depths are only moderately high), and when shallower flood waters have direct erosive impact on the outfall structure surface and the unprotected riverbank.

Removal of the levee and then further lowering the ground level for the outfall to create the notch has created a point of concentration for these overbank flows returning to the river during floods. While this was always the case at this location, the outfall has increased flow velocities, concentration of flow, and shear stresses (NHC and SCJ, February 2023). Based on observations by the EIS team, during high water events, the wide notch at the new outfall structure has allowed the river to backwater flood through the outfall structure and over farm fields to the southeast, with surface flooding extending 200–300 feet from the edge of the river. When the river surface drops, flood water flows back out to the river through the notch and over the exposed riverbank, leaving deep deposits of silts and fine sands in the base of the outfall from suspended river sediments and surface erosion of the farmed floodplain.

The WCI report concludes that the constructed outfall "*is expected to increase the risk of local scour at the base of the outfall embankment for each of the modeled flood scenarios if the existing countermeasures in place at the outfall are not sufficient*." "Existing countermeasures" refers to how the outfall structure is constructed or designed to control erosion and sediment movement at the new "notched" location. However, the scour report specifically notes that WCI *"did not evaluate whether the existing scour countermeasures at the constructed outfall provide adequate scour protection as built."* Thus, no guidance was provided by WCI as to whether the design of the outfall structure is adequate to resist and survive impacts from increased riverine flooding and scouring under current conditions, and no guidance was provided to describe potential impacts to the river or outfall structure from new upland surface flows (i.e., current runoff from the Viking warehouse site and future runoff from the KFIP warehouse complex discharging through the outfall).

City of Puyallup engineers reviewed the scour analysis report and noted that the model used channel bathymetry derived from riverbed surveys completed in 2002 for the 2017 FEMA Flood Insurance Study (FEMA, 2017). However, their local experience with the Puyallup River indicated the 2002 riverbed survey was outdated. This is supported by Google Earth photos, which indicate that a more recent gravel bar has formed on the right bank upstream of the railroad trestle. The new gravel bar has pushed the central flow channel against the left bank at the KFIP site. Therefore, the changed river hydraulics caused by the new gravel bar location might not be adequately represented in the 2002 riverbed survey, which was used as a basis for the WCI scour model analysis. This suggests that under existing conditions, scour potential along the left bank might be even greater than was indicated in the WCI analysis.

City of Puyallup engineers suggest that more recent cross sections of the river surveyed by the USGS and reported in a 2010 USGS Channel Conveyance Report (USGS 2010) should have been used for the scour analysis to better define potential impacts at the outfall from the river. Puyallup River data in the 2010 USGS report (based on river surveys from the summer of 2009) supports the contention that the main flow channel had moved closer to the left bank of the river since 2002. Under current conditions, the thalweg is at the toe of the left riverbank at the outfall.

To document and assess on-site evidence of scouring indicated by the WCI model, City of Puyallup engineers, stormwater management staff and hydraulics consultants have evaluated the outfall structure condition and performance during several site visits from September 2021 through June 2023. They also evaluated the condition of the levee embankment and organization of gravel bars in the river whenever on site in the past.

As described above, the Viking outfall structure currently discharges stormwater from a single warehouse facility into the Puyallup River. It is proposed to use the same outfall structure to receive runoff from the future KFIP seven warehouse development, which would be located directly adjacent to and east of the Viking facility. The review of current site conditions at the outfall by the City's hydraulics consultants (Northwest Hydraulic Consultants, NHC) did not distinguish between the two sides of the outfall, because the design is identical, as are the river processes acting on it. Therefore, their results describe current conditions affecting the entire outfall.

From field observations and as indicated from Google Earth photos, the EIS team and NHC hydraulics consultants verified that the center of the river channel (thalweg) was being forced to the left bank of the river near the KFIP outfall location due to the gravel bar along the right bank aggrading over time. During medium flows, the thalweg appeared to be running diagonally from right bank to left bank upstream of the outfall location and was directed at the KFIP site riverbank about 200 feet upstream of the outfall structure. They also noted that there was significant erosion along the left bank face of the levee, hydraulic impacts that affect the outfall location. During lower flows, the majority of the force of the thalweg is directed at the bank just upstream of the outfall due to a gravel bar constriction at this location. This existing condition does not appear to be considered in the WCI scour analysis and likely results in underestimation of the outfall toe slope scour risk.

WDFW Hydraulic Project Approval Technical Review

Since 2018, the outfall structure has been undergoing a separate and parallel permit and review process through the WDFW Hydraulic Project Approval (HPA) program (original permit 2018-6-194, issued 4 October 2018). The outfall construction was completed in fall of 2019. The 2018 HPA performance standards included site revegetation along the top and slope of the cleared riverbank with a minimum 80 percent plant survival requirement at the end of the 3-year monitoring period and required that the revegetated riverbank slope be able to withstand a 100-year flood event. No work was to occur waterward of the OHWM, as was depicted on 2018 outfall structure design drawings at the time (shown as being at 38.5 feet elevation).

At the end of the 3-year monitoring period in late 2022, WDFW met with KFIP consultants at the site to review conditions along the riverbank area regulated under the HPA. Based on results of that site assessment, WDFW issued a Correction Request on November 16, 2022, which noted that the riverbank was eroding. In addition, WDFW noted that there were 10 to 20 two-man boulders at or below the OHWM of the river, which were not allowed in the permit. The Correction Request documented that KFIP's consultant acknowledged that they had placed the boulders on the riverbank slope without permission. WDFW further noted that the required riparian area plant survival was less than the 80 percent required minimum.

Therefore, site conditions at the end of the three-year monitoring period in 2022 did not meet the 2018 HPA performance standards and were in violation of requirements that no materials would be placed waterward of the OHWM. Streambank stabilization work was required by WDFW to solve the problem.

SVC (KFIP wetland consultants) provided a concept sketch of a streambank stabilization plan to WDFW in late 2022, and a new HPA that defined the limits and intent of the proposed work was issued by WDFW on April 24, 2023. The proposed repair was approved with a requirement that the work be completed between April and August 2023. The work was completed in May 2023.

The 2023 HPA Project Description (Permit Number 2023-6-161+01) was as follows:

> *Placement of interwoven live willow brush, fascines, and root wads (36-inch diameter and 10 foot length) within an approximately 400 square foot area to address recent erosion that has occurred at the interface of the Puyallup R bank and outlet of the Viking stormwater facility. Intent is to infill and stabilize an area of pocket erosion and encourage the development of a live willow mattress (similar to what has already formed on the western half of the outfall) where high stem densities provide roughness and help recruit and retain sediment and resist surface erosion. Approximately 100 willow stakes will be planted.*
>
> *Proposed willow stakes may be subject to the planting and survival requirement conditions contained in a separate HPA (Permit # 2018-6-194+02, Application ID: 11998).*[7]
>
> *This work is considered a mitigative action to offset fish life impacts associated with the previous placement of 10-20 large cobbles/1-man boulders in the project area without prior HPA authorization. Proposed project is consistent with corrective actions required to attain voluntary compliance under Administrative Enforcement Identification Number 73.*

SVC's bank stabilization concept sketch was attached to the HCP. It showed installation of 8 feet long[8] willow tree boles with 3-foot-diameter rootwads extending below the OHWM at the river. No information was provided as to how the new OHWM was determined (more on this below). Notes in the concept sketch described the tree stems as being woven with two layers of branches at least 2 inches in diameter and 10 feet long. This "brush mattress" was to be backfilled with alluvium, then live stakes were to be installed at 2-foot centers throughout the brush mattress. Additional live stakes were to be placed at 1-foot centers along the riverbank upslope from and around the brush mattress perimeter and along the entire eroding bank slope about 20–30 feet upstream from the brush mattress. The brush mattress structure was to be anchored with chain to "existing buried wood" and to two ground anchors.

[7] Indicating that 80 percent percent survival of plantings after three years and withstanding 100-year storm forces that were required in the original 2018 HPA will apply to the 2023 streambank stabilization work.
[8] The HCP required 10-foot-long tree boles.

The City was the lead agency in the original 2015 SEPA determination, which was part of permit review process for construction of the Viking warehouse in 2018. The Viking storm trunkline and one-half of the spillway (the physical outfall facilities) was dedicated to the City as a condition of the Viking project. The City received an easement for the area of the trunkline pipe and one-half of the spillway together with a maintenance agreement that covers the Viking portion of the outfall structure. The 2015 SEPA determination was apparently relied upon by WDFW as the basis for the 2018 and 2023 HPA actions, which reviewed the outfall under WDFW regulations. However, WDFW did not consult with the City about or give the City notice of the 2022 Correction Request decision or the 2023 HPA until after it was issued.

For this reason, the City sought feedback from its own experts as to the efficacy and impacts of the outfall structure as well as the proposed streambank stabilization repair work being undertaken for the 2023 HPA. The City is actively seeking resolution and additional information from WDFW as to the process, approval, and design for any future work that may be carried out under an HPA permit.

The City's hydraulics consultant (NHC) evaluated both HPAs and the eroding riverbank at the outfall both before and after May 2023 repair work was carried out. NHC and SCJ prepared a deficiencies report outlining critical hydraulic functions affecting bank stability and associated habitat mitigation conditions in and near the outfall structure (NHC and SCJ, February 2023). In June 2023, NHC prepared a separate HPA Mitigation Action Assessment (NHC, June 2023), a memorandum specifically addressing the May 2023 repair work required under the 2023 HPA and carried out by SVC, KFIP's wetland consultant. In August 2023, the City's fisheries biologist consultant (Confluence Environmental) reviewed both HPAs as well as the May 2023 streambank stabilization work and prepared a report describing typical standards for this work as well as an assessment of how the May 2023 repair work would affect listed fish and fish habitat in the Puyallup River.

In the Deficiencies Report, NHC noted that the 2018 HPA for the project includes conditions which address the hydraulic performance of the outfall structure and requirements for bank protection:

> *Provision 24. The biotechnical bank protection technique design must withstand the 100-year peak flow.*

NHC also noted the lack of surveyed benchmarks in the KFIP design drawings (as required in the HPA permit[9]). This baseline information is needed to inform future outfall structure and riverbank monitoring and functional assessments.

As described in the Deficiencies Report, since completion of the outfall structure in fall 2019, there has been an almost complete failure of the biotechnical bank protection where the outfall discharges to the Puyallup River; however, there has not been a 100-year event. The 100-year peak flow on the Puyallup River just upstream from its confluence with the White River (less than 0.5 mile downstream from the

[9] HPA 11998, Permit #2018-6-194+02: "*Requirement 23. Establish the waterward distance of the structure from a permanent benchmark(s) (fixed objects). Locate and mark the benchmark(s) in the field prior to the start of work. Protect the benchmark to serve as a post-project reference for ten years.*"

outfall) is estimated by FEMA as 43,500 cfs. The peak flow experienced to date since completion of the outfall structure in 2019, as reported by the USGS for the Puyallup River at E. Main Bridge (USGS gage 12096505, immediately downstream from the outfall), was 33,500 cfs on 7 February 2020. This was approximately a 25-year peak flow, well below the 100-year peak flow. It is evident that the bank protection as originally designed and built has failed to meet the 100-year peak flow performance standard required under the HPA. NHC simulated main channel velocities "*to be around 7-8 ft/second at the outfall, with some high velocity zones on the bank due to converging return flows from the floodplain,*" and therefore they expect more bank erosion in the future.

As described in the NHC Mitigation Action Assessment report, it is doubtful that the May 2023 installation would meet this same 100-yr flow requirement (NHC, June 2023). To assess the May 2023 streambank stabilization treatment, NHC visited the site on June 8, 2023, less than a month after the installation was complete. They documented bank slumping between the newly installed brush mattress and live stakes; They observed that the tree boles with rootwads were secured to an existing stump with manila rope (not with chain, as described in the sketch drawing) on the upstream side and to a mechanical anchor on the downstream side of the installation; They noted that the clean sandy material that was used to rebuild the slope is cohesionless and likely to re-erode during expected future flood events.

> *…we do not expect the brush mattress to provide significant long-term bank protection or stability. The mitigation effort also did not address stormwater discharge related erosion concerns, namely the creation of incised single threaded channels and cascading flow conditions at the interface of the outfall and Puyallup River. Both of which are anticipated to result in long-term stability and maintenance issues.*

In the Deficiencies Report, NHC noted that both the current PCSWDM (Minimum Req. #4) and SMMWW (Ecology 2019) require that new outfalls must not cause a significant adverse impact to downstream receiving waters and downgradient properties and are required to provide for energy dissipation. However, there are no energy dissipation measures in place between the leading edge of the outfall at top of bank and the river surface below. During periods between floods, this results in a 3-plus-foot drop to the river from the outside edge of the stormwater outfall, which results in erosion and undermining the bank at the structure.

Since outfall construction was completed in 2019, much of the bank near the outfall structure has been severely eroded. In Figure 4-9, Figure 4-10, and Figure 4-11 (from the Deficiencies Report), note the areas of severe erosion and scalloping just upstream from the outfall in 2019 and 2020 where there is minimal riparian tree vegetation (Figure 4-9 and Figure 4-10). Also note the subsequent loss of riverbank on both sides of the central line of Ecology blocks when comparing the 2019 aerial photo (Figure 4-10) to the 2022 site photo (Figure 4-11). NHC noted in both reports that five to ten feet of riverbank was eroded away along the outside edge of the outfall.

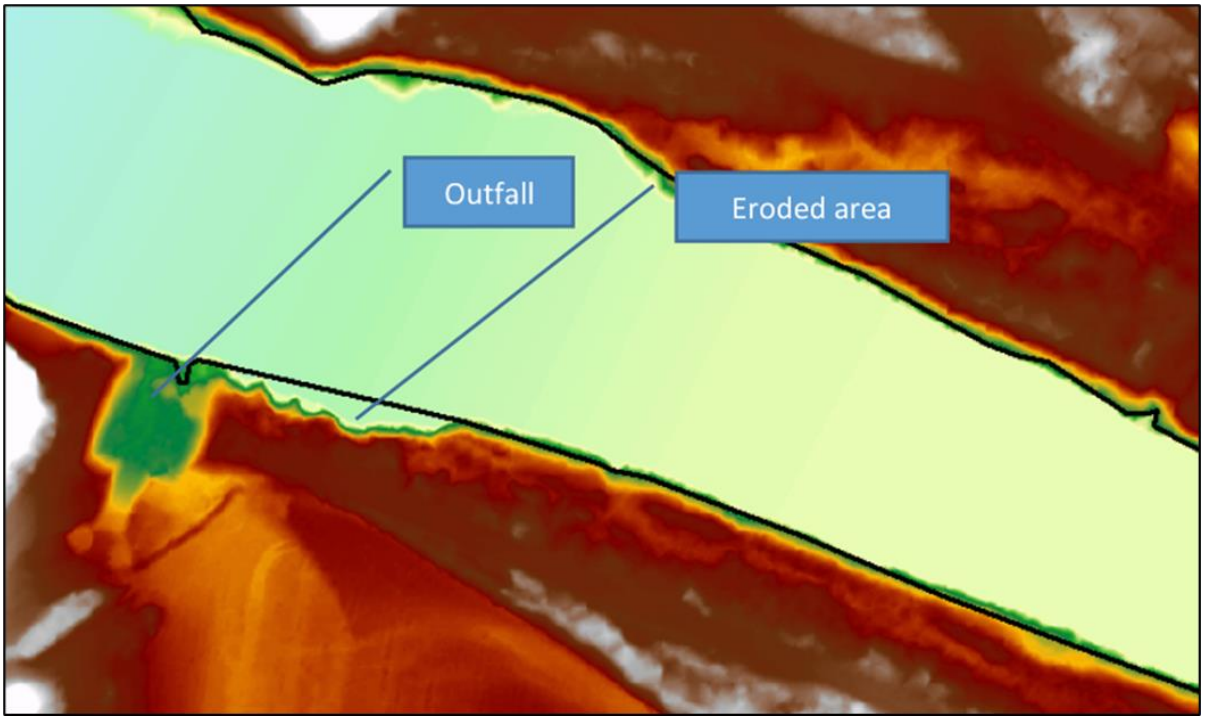

Figure 4-9. 2020 LiDAR topography with 2011 bank line in black showing more recent bank erosion upstream of the outfall, which has occurred since clearing for construction was initiated in 2018. Final mitigation plantings installed in 2020.

Figure 4-10. December 2019 UAV image annotated with erosional features. The riverbank waterward of the edge of outfall has eroded 5–10 feet since this photo was taken.

The May 2023 repair work was limited to soft armoring installations comparable to what had already failed in the past. This continued attempt to address the bank erosion problem in this high energy hydraulic environment with soft armoring and low energy bank stabilization techniques does not address the significant hydraulic forces indicated by past flood events and river data, and it does not address the lack of appropriately sized and engineered energy dissipation devises or materials that are still needed at the interface between the outfall and the river.

Figure 4-11. Concentrated flow spilling over, eroding, and undercutting vegetated bank. Photo taken on March 15, 2022, NHC.

Most of the originally installed streambank stabilization efforts (draped coir fabric and willow wands) on the top of bank and down the sloped face of the river bank at the outfall structure are gone (scoured away during annual rainy season flooding), and some of the A-Jacks at the outside edge of the outfall structure have been undermined and are only prevented from falling into the river by their retaining cables.

City engineers and other permitting agencies (including but not limited to WDFW and Ecology) prefer to first consider use of softer or more natural mitigation measures designed to push the river thalweg away from the left bank and outfall structure, such as barbs or constructed log jams. These would be designed to deflect flow away from the bank and mitigate for the increased shear stress at the edge of the structure while also increasing channel complexity, improving habitat, and restoring natural riverine functions.

However, the May 2023 streambank repair is not adequately robust to counteract the significant river hydraulic forces at this location. Properly engineered “soft armoring” structures could be used at the western end of the remaining levee (eastern side of the new outfall) on the river side. However, these measures must be designed to withstand considerable hydraulic forces during high flows, and most likely would need to be interlaced with some hard armoring structures or materials.

Reports from both the City's hydraulics experts (NHC) and KFIP's scour analysis report (WCI, August 2021) indicate that scouring at the riverbank is expected and hard armoring would be needed to counteract those forces.

The WCI report recommended riprap at the riverbank toe slope if needed to address the predicted increased scour problem from the river (more discussion on this below). Recent analysis by NHC indicated that the riprap sizes recommended by WCI were unlikely to be sufficient to withstand the hydraulic forces present at the outfall location. To address the increased scour potential and ongoing erosion in the present environment (ignoring future impacts from KFIP stormwater), consideration should be given to riprap protection along the toe of the bank at the outfall and should extend from the railroad bridge to a suitable point upstream of the outfall. This hard armoring could be integrated with certain soft armoring and/or professionally designed bioengineering measures in more protected areas that are better able to withstand this high energy riverine environment. Further analysis is needed before deciding on specific solutions, riprap sizes and engineering design, and a**ll** in-stream structures will require review and permitting from federal and state agencies.

Other Outfall Design Issues

During EIS Team site visits in 2021, 2022, and 2023, in addition to documenting ongoing riverbank erosion problems, the EIS team noted that the outfall structure had flooded many times since construction was completed in 2018–2019 (as documented in Figure 4-12).

Stamped engineering drawings from 2018 show that the base of the outfall has a surface elevation ranging between 41.5 and 42.4 feet and an Ordinary High Water Mark elevation of 38.5 feet. However, OHWM guidance from Ecology (Ecology [F], 2016) indicates that the OHWM should be higher than any unvegetated gravel or sand bars in the adjacent river and indicates that the OHWM elevation is typically equivalent to the 2-year flood stage, as would be determined from river gages adjacent to the Project site location. A quick analysis of the directly downstream E Main USGS 12096505 stage data (with data from water years 2011 through 2023), shows that the 2-year stage is about 42.8 feet NGVD29 (46.29 NAVD88). And this gage is a foot or two lower in elevation than the outfall location. This gage data, as depicted in Figure 4-12 below, indicates that the OHWM elevation of 38.5feet marked on the site design drawings may require revision and updating to reflect current conditions and river gage data, and as may affect expected permitting and review processes. With new site conditions that have resulted from riverbank erosion and outfall construction, a new assessment and determination of OHWM elevation and location that follows guidance from Ecology should be carried out, and a new OHWM report should be provided.

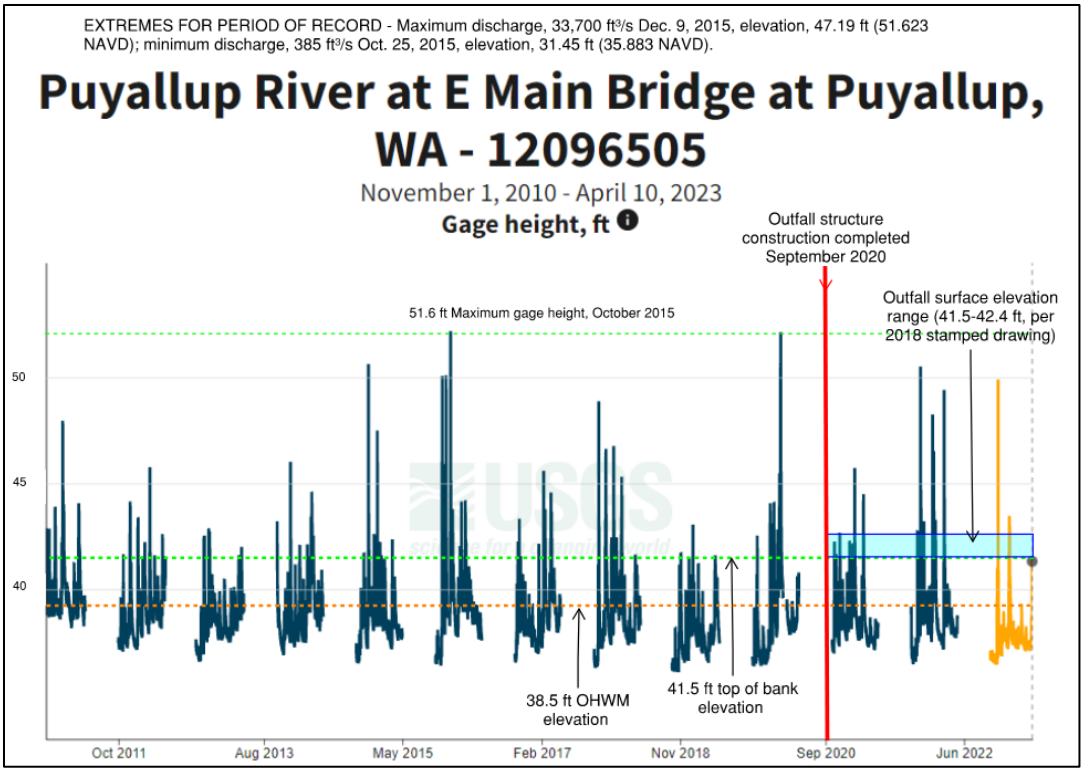

Figure 4-12. Showing flood events record in relation to the outfall structure elevation (indicated with a blue polygon).

In a related issue, the Puyallup River typically carries suspended fine sand and silt sediments from glacial meltwater, which have settled within the base of the outfall structure during repeated flooding events over the years. The flood sediment deposits may also be affected by erosion and translocation of sandy floodplain sediments from unvegetated farmed surfaces within the on-site floodplain (Figure 4-13) during backwater flooding events, which have occurred at least two times since outfall construction was completed. This has resulted in deep sandy flood sediment deposits within the outfall structure, over three feet deep in some areas, which periodically bury or scour away existing vegetation and impact outfall structures, such as Ecology blocks, logs, and boulders. Stormwater discharges from the Viking site have eroded deep channels through these flood sediments to reach the riverbank (Figure 4-14), indicating that the sediment filled outfall base does not provide significant energy dissipation function.

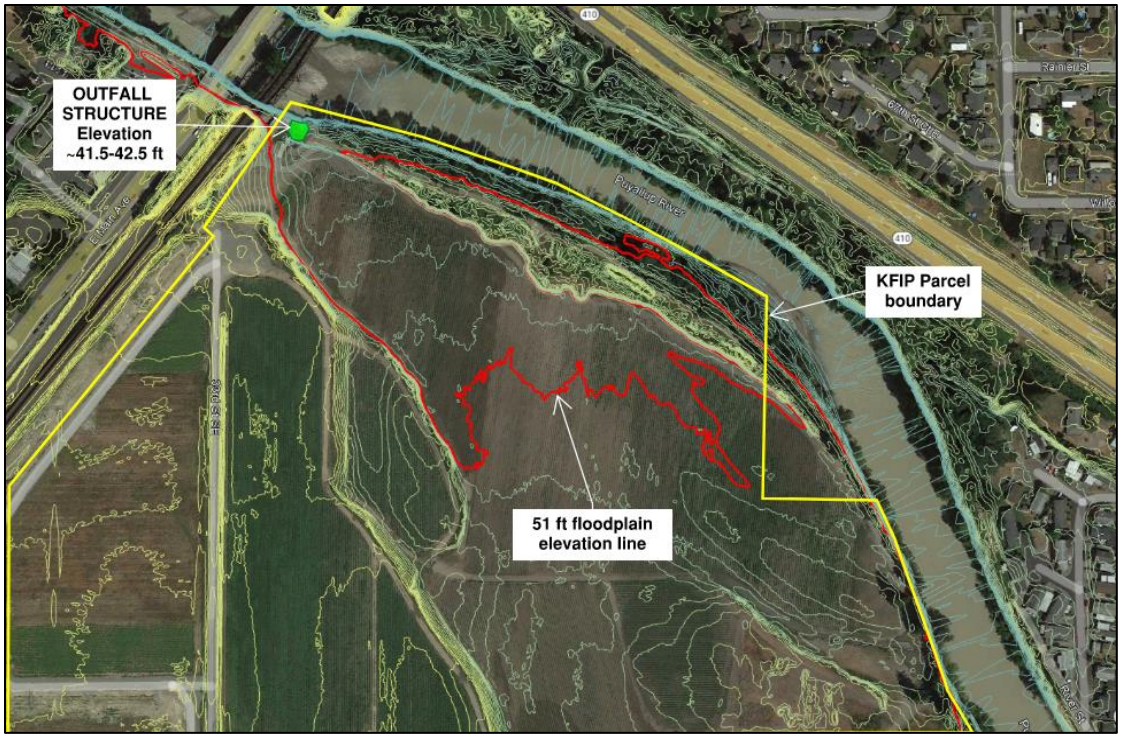

Figure 4-13. LiDAR topography showing the 51 ft elevation line on the floodplain, as relates to the 25-year flood event (51.6 ft elevation) recorded in October 2015.

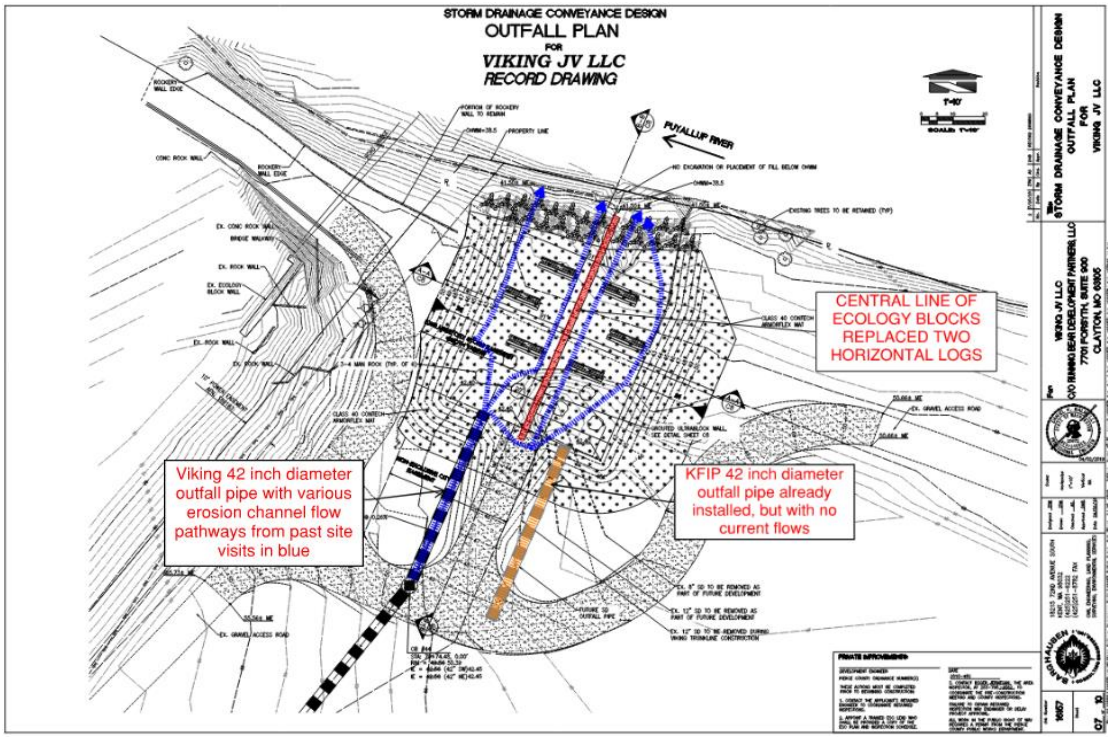

Figure 4-14. Figure adapted from Soundview 2020 Sheet C7, As-Built outfall facility showing deep eroded stormwater channels observed during various Viking outfall site visits (blue lines). The erosion channels reform each year in response to new flood deposits and subsequent runoff events.

The 2018 *Offsite Conveyance Report* prepared for the KFIP site (Barghausen 2018) indicates that the outfall design assumed sheet flow of stormwater discharge through the outfall structure. There are no calculations or detailed information in the report showing that intent, and under current conditions, there is minimal if any sheet flow through the outfall, but rather there is deep channelized flow through flood-deposited sediments. The 2018 report does not mention any expectation of flood sediment deposits in the outfall base. An outfall structure designed to provide for energy dissipation during storm events would typically include hydraulic analysis and engineering specifications in its design drawings or monitoring plans. Such materials have not been available with regard to this application. There are no documents or outfall design descriptions indicating that significant sediment deposition and the subsequent channelization of stormwater discharges was expected and accounted for in design of the outfall structure; nor whether the sediment deposits and channelization presents a concern related to the performance of the structure.

Observations by the EIS team experts of current conditions in and around the outfall raised concerns about the possibility of failure and associated significant adverse harm to the riverbank and river system as a result. Failure would mean there is no available engineered outfall to effectively serve the current Viking site or the fully developed future KFIP site. Current conditions indicate the outfall would not disperse or control impacts of stormwater outfall flow and would not protect the riverbank and downstream areas from erosion when at full flow discharge capacity under current or future developed site conditions.

Design drawings depicting changes to the outfall structure design over time show that at least two different outfall facility designs were considered. A detailed analysis of the changes to design over time is provided in the recent deficiencies report (NHC and SCJ, 2023). The original outfall design was included in the Talasea Mitigation Plan report (March 1, 2018) and was approved by Pierce County. That outfall design plan showed eight anchored logs installed in staggered offsets, presumably intended to force water from the two 42-inch-diameter outfall pipes to meander and spread throughout the structure base, a dissipation function. The western pipe currently receives flows from the existing Viking warehouse. The eastern pipe is not yet active but is intended to receive future flows from the not yet constructed KFIP seven-warehouse complex.

A revised outfall facility design was submitted to Pierce County by the KFIP engineer on March 27, 2018 (Figure 4-14). The updated design removed the previously proposed Armor Flex mat that was to extend down the riverbank to below the OHWM. In the revised design drawing, the Armor Flex mat terminates approximately 10 to 15 feet landward of the riverbank, several feet above and landward from the designated OHWM location. The design change also removed two of the eight logs from the center of the facility and replaced the central logs with a line of Ecology blocks oriented perpendicular to the riverbank shoreline, separating the west (Viking warehouse) from the east side (future KFIP warehouses) of the structure, and retaining three staggered logs (a total of six logs) on each side of the central line of Ecology blocks (Figure 4-14). Installing the line of Ecology blocks was apparently in response to a regulatory need to delineate the Puyallup side of the outfall from the KFIP side. The intent was to separate current stormwater flows from the Viking warehouse through the western side of the outfall

(managed by the City of Puyallup through an easement agreement) from future proposed stormwater flows through the east side of the outfall (i.e., from the KFIP warehouses stormwater runoff). The KFIP site is located in unincorporated Pierce County.

Removing the Armor Flex mat from below the OHWM meant that there was no longer a plan for direct in-river impacts. This eliminated a requirement for Section 404/401 permit review by state and federal agencies but did not eliminate the requirement to protect the bank from erosion, as required under state law and County regulations. The previously proposed Armor Flex mat that was originally shown as extending downslope to below the OHWM at the riverbank was replaced by a soil berm at the top of the riverbank covered by a coir mat fabric and planted with willow wands. As discussed above, since 2019, most of the soil berm, coir fabric and willow wands have subsided or been washed away during annual winter floods.

Within the outfall structure, flood sediments have mostly buried the log and rock features in the base that were intended to provide for stormwater energy dissipation. At least one of the previously anchored logs is no longer in place and was carried away during a past flood. Stormwater flows from the Viking site periodically back up behind the flood sediment “dam” at the riverbank. Depending on flood and storm duration, the dammed water backs up enough to flow around the upslope end of the central line of Ecology blocks. This has created seasonally variable, deep erosion channels through the sediment along both sides of the central Ecology blocks, dumping sediment laden water directly into the river with minimal dispersion, detention, or treatment.

As of this writing, City requests to the Applicant asking for structure engineering details specific to this outfall that may be used to assess performance standards have not been met. No specifically defined structural indicators or guidance have been provided that could be used to determine how or whether the engineered outfall structure is performing as designed versus whether some component of the structure is failing now or might fail in the future. As mentioned above, the 2018 HPA Permit required surveyed benchmarks to provide a baseline for assessment of erosion volumes, and to inform future outfall structure monitoring and functional assessments. This baseline information has not yet been provided by the KFIP design team.

Therefore, evaluation of the structural integrity, intent, and function of the outfall structure in its current condition has been and will be based on monitoring, direct observations, and data collection by the EIS team. These direct assessments by the EIS team indicate that the structure is not operating as intended or expected and is degrading. Maintenance and upgrades are needed to ensure the outfall does not further degrade and impact the riverbank and water quality under current and future conditions.

Mitigation and Monitoring

The outfall structure is supposed to have two purposes:

1) Energy dissipation for the maximum flows that are proposed to be discharged from both stormwater pipes (current Viking site outfalls and future KFIP site outfalls) through the outfall structure, down the bank and into the river.
2) Mitigation for critical area and shoreline habitat impacts to the river buffer and shoreline, i.e., to compensate for loss of riverine buffer habitat (vegetation) caused by grading and clearing to construct the outfall structure.

To reduce the likelihood of future failure and potential harm to the outfall and river, and to assist with outfall structure monitoring over time by City and County maintenance staff, a separate engineering design report and monitoring plan for the outfall structure is needed, and should be prepared by a qualified engineer, and monitoring of the structure should be carried out by similarly qualified experts or professionals.

- The engineering report would provide a clear record of design and purpose of each structural component of the outfall and would explain the range of expected impacts of river flood hydraulics, sediment deposition and stormwater discharges. It would also provide guidance as to how much sediment deposition, erosion or loss of riverbank is allowed or expected as part of "normal" outfall facility function.
- The engineering monitoring plan would provide specific performance standards intended to assess or measure changes in energy dissipation performance and structural integrity of the engineered outfall structure over time. The definition of structural component "failure" must be provided, and a contingency plan response would be required.
- Any monitoring work and the associated report intended to assess structural condition and function of the outfall must be carried out and written by a qualified engineer or equivalent professional. If the monitoring indicates degradation or failure, a contingency plan to resolve the problem must be developed.

In contrast, the monitoring work described in the mitigation and monitoring plan (2018 TDMP, Talasea) is designed to assess success or failure in relation to mitigating for loss of shoreline and critical area habitat, as required in Pierce County code due to removing the naturally vegetated riverine buffer in the outfall area as needed to allow for construction of the stormwater outfall.

To meet PCC 18E.40.070 habitat mitigation monitoring requirements (provided below), once the initial mitigation plant installation was reported as complete (Soundview Consultants As-Built Report, SVC 2020), the follow up annual monitoring site visits and reports are intended to determine and document whether the mitigation site has met specific performance standards defined in the 2018 TDMP, such as a minimum required percent cover from native vegetation or minimum required percent survival after a certain time period.

PCC 18E.40.070.3.: Monitoring reports for mitigation projects specific to vegetative restoration or enhancement shall comply with the following:

a. Monitor for a period of time appropriate to the nature of the project (single-family versus commercial) and the complexity of the mitigation project. The majority of monitoring programs will last a minimum of three years and are to be submitted according to the following schedule:

(1) At completion of construction of mitigation project (as-built report);
(2) Thirty days after completion;
(3) Early in the first growing season after construction;
(4) End of the first growing season after construction;
(5) Twice the second year; and
(6) Annually after the second year.

b. Deviation from this schedule may be allowed based upon project specific conditions

The annual monitoring and report preparation needed to meet PCC 18E.40-070 requirements is typically carried out by the Project wetland scientist. Until recently, only the As-Built report had been provided. A combined Year 1 and Year 2 report was submitted to Pierce County in December 2022, which has been reviewed. However, in absence of annual monitoring reports since 2020, the EIS team evaluated the mitigation area conditions during several site visits throughout 2021 and in early 2022, documenting the following:

- Planted and native vegetation losses along the riverbank and within the outfall structure due to scouring impacts from flooding and being buried by sandy flood sediments,
- Die off of installed mitigation plantings just outside the upland perimeter of the outfall structure.
- Expansion of non-native invasive plants in and around the outfall facility (including but not limited to water cress, Japanese knotweed, reed canarygrass and Himalayan blackberry),
- Cloudy and discolored water discharging from the currently active Viking outfall.
  - Section 5.6, page 9 of the Talasea Mitigation and Monitoring Plan (2018) indicated that cloudy water might be a water quality indicator and should be tested to determine the source of the discoloration if observed during the annual monitoring visits.

The loss of planted vegetation intended to provide for habitat replacement, an increase in weedy species cover, and evidence of potential for water quality problems (cloudy water from the Viking outfall) all indicated a need for additional monitoring and testing, and potential failure to meet the performance standards defined in the 2018 TDMP.

The December 2022 Year 1 and 2 Monitoring Report (SVC 2022) agrees with some of the EIS team observations. SVC noted loss of some of the mitigation area plants, and directed KFIP to order and install 57 new plants, with species selected from the approved plant list. SVC reported that those plants were installed in December 2022, but did not describe what specific plants were installed, or in what areas. By

carrying out the replanting work, SVC stated that the mitigation area currently meets Performance standards A1 (at least 6 species of desirable native plants) and A2 (at least 80 percent survival of new plants by the end of Year 2, as supplemented by the recent plantings, which presumably would survive) and Performance standard A3 (at least 20 percent cover by woody species by the end of Year 2).

Objective B, which includes Performance Standards B1 and B2, is specifically described as being a "non-mitigation area", in that it was not intended to meet Critical Areas Rules intended to replace lost habitat functions, but rather is simply plantings that were installed in and near the outfall structure either to provide some water quality treatment or bank stabilization function.

SVC stated that the site meets requirements of Performance Standard B1, which was that 100 percent of the plants within the bioengineered stormwater release area must be alive by the end of Year 1, but they fail to mention loss of most of the planted willow area at the top of the riverbank (which occurred in Year 1), or that at least 10–20 percent of the outfall base is periodically covered with deep sandy flood sediments, which buried some of the originally installed plants in the outfall base during the first winter after planting. For this reason, it does not appear that the site has met requirements of B1, but this Performance standard is not intended to be a habitat mitigation standard.

SVC's ongoing and parallel work with WDFW in relation to the HPA and efforts to control erosion at the riverbank indicates an effort to solve at least some of this deficiency, but it does not address impacts of the repeated sandy flood deposits on outfall vegetation, which effectively eliminate the water quality treatment and dispersion function of the outfall structure.

Performance Standard B2 requires that at least 40 percent of the articulated mat (outfall base and sidewalls) must be covered by vegetation by the end of Year 2, and because the areas not completely covered by sandy flood sediments are mostly vegetated, they appear to have met that minimum standard. However, we note that almost 100 percent of the herbaceous vegetation on the Viking side of the outfall is watercress (a non-native, invasive plant), which should be controlled and removed if possible.

They also noted presence of certain weedy species, specifically reed canarygrass and Japanese knotweed as well as a small area of Himalayan blackberry, which they estimated were less than 1 percent cover in the planted mitigation areas. The EIS team assessment indicated a higher, but still less than 10 percent cover by weedy species within the planted area, but a definite higher percent cover just outside of the planted area, which indicates potential for reinvasion by weedy species later. The monitoring report recommended ongoing weed control and treatment, and specifically described ongoing eradication efforts being undertaken with the knotweed.

In summary, most of the mitigation planting area outside of the outfall structure does appear to be on track to meet the habitat replacement and weed control requirement, but Performance Standard B1 requirements are not met, and cannot be met until the ongoing erosion problems at the riverbank are resolved.

Wetlands

The KFIP Study Area was evaluated for the presence of wetlands in 2016, and a wetland report describing four on-site wetlands was prepared by Soundview Consultants (SVC 2016). In 2021, the EIS team field-checked the results of that work.

Wetlands which were mapped in the past as covering more than half of the floodplain to the south are currently reduced to the three mapped narrow linear wetland depressions (Wetlands A, B, and C), which are located along the base of the high terrace to the east. These three wetlands are fed primarily by groundwater seeping from the upper slope terrace and are mostly isolated from the Puyallup River except during extreme flooding events. Wetland D is located on the high terrace near the southeast corner of the proposed KFIP warehouse complex. The locations of these wetlands in relation to the proposed KFIP Project are shown on Figure 4-15; details are provided in Table 4-9.

What wetland classes occur at the Project site?

Cowardin Classification

- **Palustrine emergent (PEM)**
  Areas dominated by sedges, rushes, grasses, cattails, and bulrushes.
- **Palustrine scrub-shrub (PSS)**
  Areas dominated by woody vegetation less than 20 feet tall.

All four Wetlands are Palustrine Emergent/Palustrine Scrub-Shrub (PEM/PSS) wetlands. Wetlands A, B and C have formed in linear, old oxbow depressions at the toe slope of the high terrace, in the Puyallup River floodplain at the eastern end of the KFIP site. Their hydrology is primarily supported by groundwater seeping from the upslope terrace to the west, but also by direct precipitation during winter months.

Wetland D has formed in a depression on farm and pasture uplands in the southeastern portion of the high terrace, outside of the river floodplain. Wetland D is supported by rising groundwater in winter months and surface water runoff from the south, inflow from drainages that conduct runoff along 80th Street East.

According to the 2016 SVC report, Wetlands A and B were rated as Category III, Wetland C was rated as Category II, and Wetland D was rated as Category IV.

Wetland **Category** ratings range from Category I to IV, highest quality to lowest quality, respectively. The category is determined by scoring, based on the 2015 Western Washington Wetland Rating System, developed by the Washington State Department of Ecology and adopted by Pierce County.

Wetlands A, B, and C were assigned 150-foot buffers, based on Pierce County Code (PCC 18E.30.060). The SVC report described Wetland D as being off site and too small to be regulated or buffered by Pierce County under the PCC 18E.30 (Wetlands). However, subsequent field work and review by EIS team consultants in 2019 and 2020 found that Wetland D was larger (about 3 acres) and about 1 acre of the wetland extended onto the KFIP site (SCJ Alliance, September 2021).

Thus, as required under Pierce County and state wetland protection regulations (administered by Ecology), mitigation will be required if portions of Wetland D and/or its buffers are impacted by the proposed KFIP Project (as is proposed).

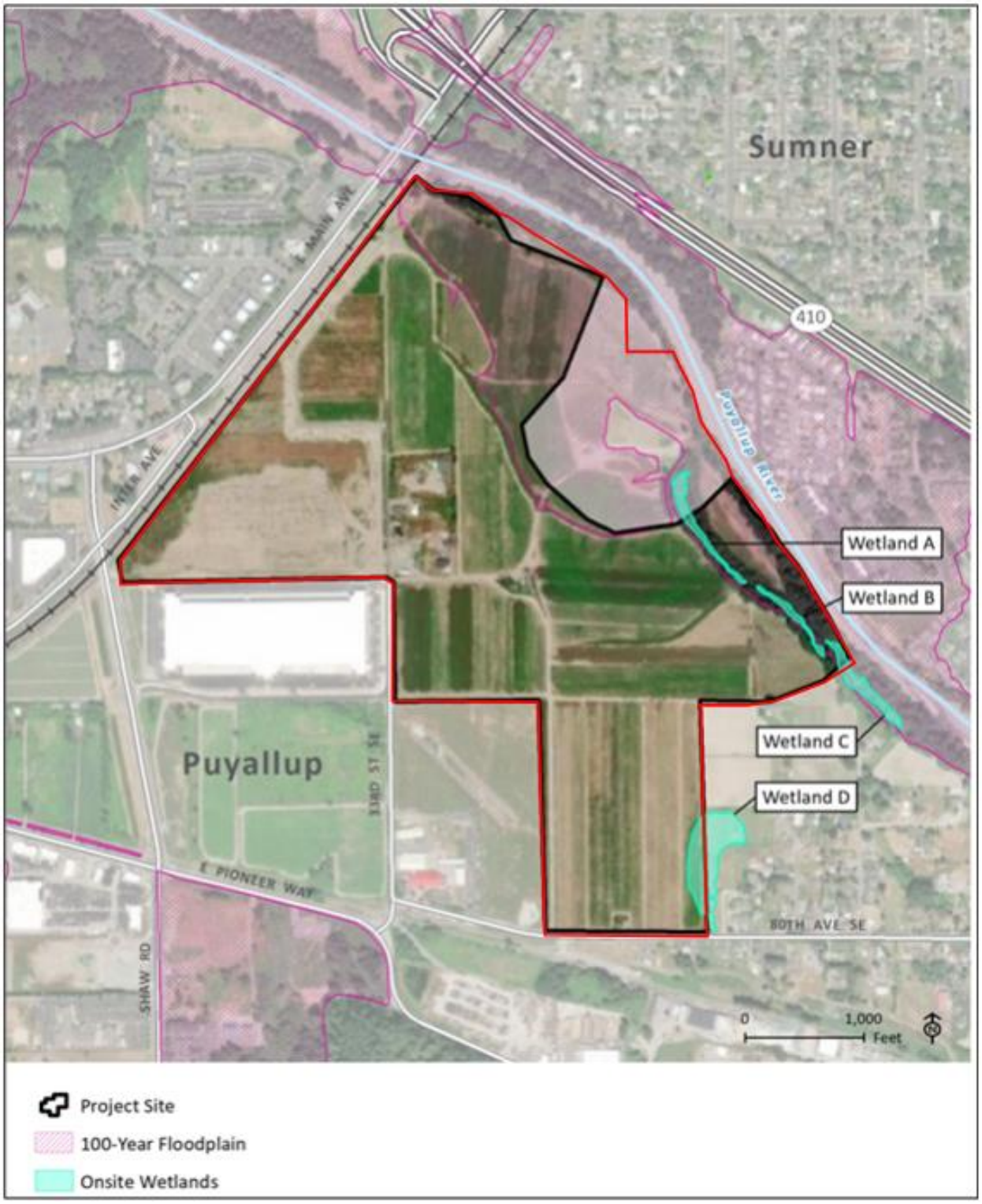

Figure 4-15. On-site Wetlands, floodplain, and farming on the floodplain

Table 4-9. Wetlands at the KFIP Site

Wetland	Type	Category	Buffer (feet)	Wetland Acreage[a]
A	PEM/PSS	III	150	0.6 acres (26,869 square feet) (per SVC 2015)
B	PEM/PSS	III	150	0.26 acres (11,396 square feet) (per SVC 2015)
C	PEM/PSS	II	150	0.72 ac (31,547 square feet total); 0.09 ac on site (3,916 square feet on-site)
D	PEM/PSS	IV	50	3.03 acres (132,237 square feet) (per EIS team 2021)

[a] On-site wetland area for WL A, B and C is from SVC 2015 wetland report; Off-site WL C area and WL-D area is from EIS team, 2021 work

Wetland D was re-rated by the EIS team in 2021 (SCJ Alliance, September 2021). The rating result was a Category IV wetland (in agreement with 2016 SVC report). However, because Wetland D is larger than described in the 2016 Soundview Consultants report, it will be regulated and buffered under Pierce County code with a standard buffer width of 50 ft.

All four wetlands and their buffers are impacted by periodic flooding and by farming practices. Several floods over the past 20-plus years have deposited and transported sediment across the floodplain and scoured the surface, resulting in habitat modifications at Wetlands A, B, and C, which formed in old river flood oxbows. Ongoing farming practices, such as plowing, draining, cropping, and clearing vegetation in the wetland buffers and greater floodplain have removed native plants in most of the floodplain, affecting surface water and associated groundwater systems. The on-site portions of Wetland D and its buffers are plowed and planted to crops every season. Off-site areas to the east are used as seasonal pasture for farm animals.

Floodplains

Most of the floodplain at the KFIP site is a broad, relatively flat terrace with surface elevation ranging from about 50 to 54 feet (KFIP site survey map, stamped 03/23/2021). Survey maps and the USGS river stage gage data (USGS gage 12096505, Puyallup River at E. Main Bridge) indicate that the floodplain surface is about 8 to 10 ft higher than the adjacent Puyallup River surface during periods of low flow in summer months. However, USGS river gage data documents that the river rises and floods across parts of the floodplain surface regularly during winter months (Figure 4-12).

USGS gage data shows that the greater KFIP site floodplain has flooded at least five times since 2015 (elevations above 50 feet), and that the river water surface has risen above 41 to 42 feet elevation (the outfall structure surface elevation) several times each winter. Since outfall construction was completed in 2019, there have been several events that flooded across or through the notched outfall, covering the entire outfall structure with several feet of water. Some of the backwater floods have extended a few hundred feet into the adjacent upslope farm fields. These period floods have deposited three or more feet of sandy sediments within the base of the outfall and at least a few inches of sediment across adjacent farm roads and fields.

A large portion of the on-site floodplain, particularly the areas near the outfall structure, continues to be farmed during summer months. Long-term farming across the on-site floodplain has resulted in loss of

most native vegetation (visible in Figure 4-13). The only remnant native vegetation occurs in a narrow riparian strip along the Puyallup River, about 25 to 50 feet wide, and immediately around the perimeters and terrace backslopes of Wetlands A, B and C. These areas include a mixture of mostly native trees, shrubs, grasses, herbs, and vines, but also include many non-native weedy tree, shrub, and herbaceous species. The deep-rooted woody plants act to hold and trap sediments wherever present. But there is minimal protection from surface water erosion and sediment movement during winter flood events across most of the farmed and cleared floodplain areas near the outfall, and loss of riparian vegetation at the river edge at and directly upstream of the outfall structure has also resulted in an increase in surface water erosion at the riverbank. Floodplain protection rules specifically describe an intent to minimize damage to critical fish and wildlife habitat areas, which includes a need for protection of the riverbank at the edge of the floodplain to control and not increase erosion.

As described above, the stormwater outfall structure was constructed in the floodplain at the northern end of the KFIP site at the edge of the Puyallup River. The outfall structure currently receives runoff from the existing Viking Warehouse facility; The eastern half of the outfall structure is intended to receive future runoff from the KFIP facility.

Future flows to the outfall are intended to include all of the Viking contributing stormwater basin as well as all of the KFIP warehouse site and its contributing stormwater basin. Thus, future flows would be significantly greater than under current conditions.

Despite recent repair efforts (required under the HPA, as discussed above), current conditions indicate ongoing erosion of the riverbank at the edge of the outfall structure and significant annual sediment deposits from flooding within the outfall structure with deeply eroded flow channels which change over time (Figure 4-14[10]). The PCSWDM (Minimum Requirement #4) which requires that the facility be designed, installed, and maintained to use energy dissipation systems and to "*prevent erosion at and downstream of the discharge location.*"

Flood sediment deposition from surface water flooding and subsequent erosion of flood sediments on a floodplain are a natural component of the river flooding and dynamics, and therefore, are not necessarily in violation of the stormwater manual's regulations regarding erosion. However, the outfall is not a natural part of the floodplain, and regulations regarding proper engineering of structures in a floodplain require energy dissipation and erosion control. Stormwater discharges are eroding the bank and falling several feet into the Puyallup River during periods of lower flows. Absence of effective energy dissipation within the outfall base and poor erosion control at the downstream end of the constructed outfall facility appears to be in violation of the PCSWDM regulations (Minimum Requirement #4) related to preventing erosion at the discharge location.

[10] Figure 4.2-8 adapted from Soundview (2020) Sheet C7, As-Built Outfall Facility, showing deep eroded stormwater channels observed during various Viking outfall site visits (blue lines). The erosion channels reform each year in response to new flood deposits and subsequent runoff events.

As discussed previously, an expanded hydraulic analysis is needed to study the interacting effects of hydraulics in the river, the floodplain and from the current and future outfall volumes. This work is needed to determine how these interdependent hydraulic systems would perform together during peak rain fall events, low to high river flows and flooding. Results of this study can be used to determine whether the floodplain functions are adequately protected, and if riverbank stability is ensured. The results should also provide guidance or baseline performance standards to determine whether erosion at the outfall would eventually destabilize the structure, resulting in failure and impacts to the River.

Shorelines

Shorelines on the KFIP site include lands extending landward 200 feet from the OHWM of the Puyallup River, plus any floodplain within 200 ft of the edge of the floodway, and to the outer edge of any associated wetlands within the floodplain. Therefore, the entire floodplain on site to the toe slope of the high terrace, including the floodplain wetlands, is within the regulated Shoreline zone (Figure 4-16). Conditions in the Shoreline Zone (i.e., conditions in the floodplain, floodplain wetlands, and riparian wildlife habitat) have been described above, and in Sections 4.3 Groundwater and 4.4 Plants and Animals. No further discussion is provided.

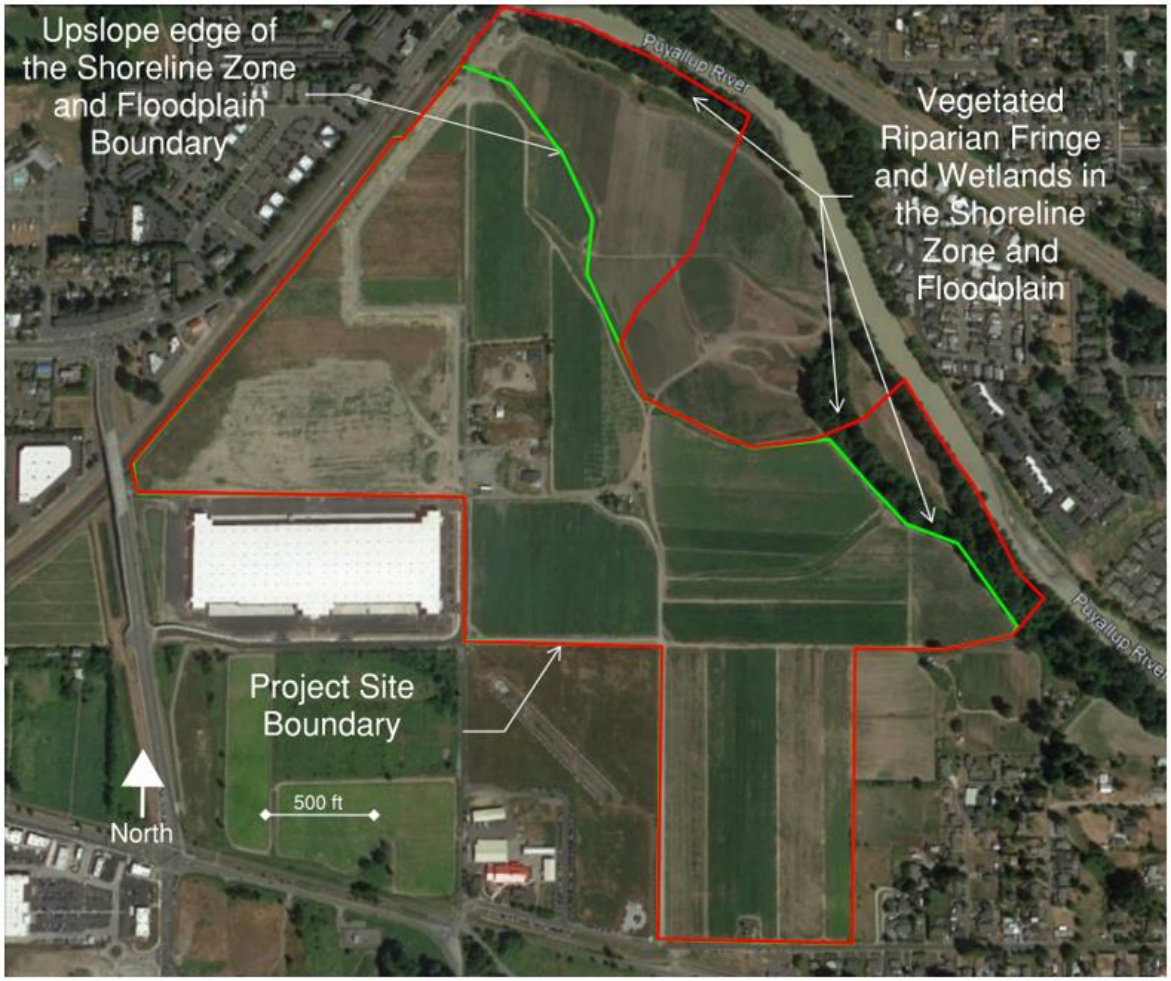

Figure 4-16. Shoreline Zone Boundary at the KFIP Project Site

4.2.4 Impacts

This section describes the potential for environmental impacts related to surface water as a result of KFIP Project construction and operations. It describes the thresholds used to determine whether an impact would be significant. If impacts are significant, the following section discusses measures to mitigate potentially significant impacts, where appropriate.

Methodology

This analysis evaluates potential for construction and operations at the KFIP site to impact surface water resources. Impacts were characterized by comparing existing conditions (described above) with the potential for water quality and water quantity impacts from the KFIP Project as they may affect the Puyallup River and its shoreline zone, including the floodplain, and on-site wetlands. This evaluation was performed by undertaking several sites visit to document conditions, reviewing public reports and public databases, publicly available geographic information system (GIS) mapping layers on land cover, wetlands, and listed species presence; and technical reports prepared for the proposed Project.

The following public records and literature, among others, were reviewed:

- USGS National Water Information System, USGS gages in the Puyallup River near Puyallup, Washington – Parameters Discharge, Gage Height, and Flood Stage
- NRCS Long-Term Climate data, AgACIS for Pierce County – WETS Station: TACOMA NO. 1, WA: 1971–2023
- Pierce County Office of the Hearing Examiner, July 11, 2018, The Puyallup Tribe of Indians v. Director, Pierce Co. Public Works and Knutson Farms, Inc., Running Bear development Partners LLC, and Barghausen Consulting Engineers, Inc. Joint Stipulated Motion to Dismiss the Puyallup Tribe's Appeal (case no. 863309)
- Puyallup River Watershed Assessment (PRWC 2014)
- WDFW's HPA Permit program, including 2018 and 2023 HPAs for the Viking Project
- Climate Change Impact Assessment and Adaptation Options (Puyallup Tribe 2016)

The following technical reports were reviewed (and others):

- Biological Evaluation – Van Lierop Property Stormwater Outfall Project, Talasea Consultants, Inc. (2017)
- Detailed Mitigation Plan (TDMP 2018), Puyallup River Outfall, Talasea Consultants Inc., March 2018
- Critical Areas Assessment Report – Knutson Farms Industrial Park, Soundview Consultants (September 2016, Revised December 2016)
- October 2020: As-Built Report, Technical Memorandum describing baseline site conditions after construction of the outfall and installation of plant materials was complete
- December 2022: Year 1 and 2 Monitoring Report, describing conditions at the Viking Outfall
- May 2023: Memorandum related to HPA and riverbank erosion
- Revised Knutson Industrial Transportation Impact Analysis, TENW Transportation and Engineering Northwest for Michelson Commercial Realty and Development, LLC (2017)
- Barghausen Engineering Project site survey map, stamped 03/23/2021

- Barghausen Engineering *Conceptual Grading and Storm Drainage Plan*, stamped 03/26/2021
- Barghausen Engineering *Offsite Conveyance Analysis Report*, prepared for Michelson Puyallup Partners, LLC, April 2, 2018
- Barghausen Engineering *Offsite Conveyance Analysis Report* for Van Lierop property, prepared for Running Bear Development Partners, March 1, 2018, revised June 14, 2018
- Welch, W.B., Johnson, K.H., Savoca, M.E., Lane, R.C., Fasser, E.T., Gendaszek, A.S., Marshall, C., Clothier, B.G., and Knoedler, E.N., 2015, Hydrogeologic framework, groundwater movement, and water budget in the Puyallup River Watershed and vicinity, Pierce and King Counties, Washington: U.S. Geological Survey Scientific Investigations Report 2015–5068, 54 p., 4 pls. (http://dx.doi.org/10.3133/sir20155068)
- WCI (West Consultants Inc.) August 17, 2021. Knutson Farm Scour Analysis model of the Puyallup River near the BNSF Trestle Bridge, prepared for Viking LLC and Running Bear development Partners, LLC

A significant impact from construction and/or operations would include:

- Injury, death, or harassment of federal or state listed endangered or threatened species from water quality degradation;
- Reduction or loss of on-site wetlands systems over time;
- Erosive impacts to the Puyallup River banks at the Project site from current and planned future direct flow discharges;
- Noncompliance with critical areas regulations and stormwater regulations intended to protect and preserve water quality and quantity in the Puyallup River and its buffers, its riverbank and on-site wetland systems and their buffers; or
- If any the impacts described above cannot be mitigated through compliance with critical areas ordinances or implementation of BMPs.

Impacts Analysis

No Action Alternative

Under the No Action Alternative, the construction and operation of the KFIP Project would not occur. No KFIP-related impacts to surface water resources would result.

The KFIP site floodplain and uplands would continue to be farmed, left fallow or potentially developed differently in the future, as limited or allowed in regulations. If current management does not change, existing water quality impacts to the Puyallup River would not change, meaning that the same agricultural impacts would persist.

The EIS team could find no documentation of a Farm Management Plan for the current agricultural operation, and therefore, cannot document the degree to which the current operation applies BMPs in relation to use of pesticides, herbicides, fertilizers, or other standard agricultural chemicals that might have current impacts to surface water quality. But there is no known exceedance or documented surface water pollution on the KFIP site related to agriculture.

The hydrology sources and current hydroperiods for Wetlands A, B, C, and D would persist with similar volumes and timing. However, the wetlands might become smaller over time from impacts of continued farming and flooding of the floodplain surface and high terrace surface, which causes alluvial and surface runoff sediment to redistribute and collect in depressional areas.

Under the No Action Alternative, floodplain conditions would continue to evolve in response to ongoing farming and flood recurrence patterns. Flooding has increased in frequency over time as upstream areas are developed over time. Riverine erosion and new sediment deposits on the floodplain in combination with ongoing effects of farming, plowing, ditching, and draining would change floodplain surface elevation and terrain over time.

The Shoreline zone, floodplain surface and upland terrace to the southwest would continue to be farmed, and thus would typically be unvegetated in winter months, increasing potential for erosion and sediment movement during flood events. Riparian areas would continue to be influenced by flooding and farming, which affects riparian vegetation, floodplain wetlands, and their buffers.

The existing outfall structure at the north end of the site, which currently serves the Viking warehouse facility, would continue to impact erosion at the Puyallup riverbank as it does under existing conditions, and would continue to be impacted from periodic river flooding and sediment deposition.

Pierce County has designated the KFIP site with an Urban Zone Classification of Employment Center (EC) (*a "concentration of low to high intensity office parks, manufacturing, other industrial*" PCC 18A.10.080) and thus it is possible that other future development within the constraints of this zoning would occur, and agriculture would no longer be the primary land use.

Any increase in future flows as areas within the Viking contributing stormwater basin are developed are likely to increase erosion at the existing outfall structure if no effective corrective actions are taken. The outfall may be subject to enforcement, redesign, or repair if continued erosion results in environmental damage or failure at the riverbank.

Proposed Action

Impacts to surface waters (Puyallup River and floodplain wetlands) from the Proposed Action at the KFIP site would be related to erosion, water quality and water quantity volumes at the stormwater outfall structure, and to changing hydrology conditions and fill impacts to on-site wetlands. KFIP proposes to build seven warehouses and associated pavement and road infrastructure on the site. Stormwater, which previously infiltrated when the site was farmed, would be collected from pavement and roofs surfaces and sent via a piped system into the river. KFIP has agreed to infiltrate roof runoff from four warehouse roofs, intended to support on-site wetland hydrology. Runoff from the rest of the site would be piped to the outfall and into the Puyallup River after meeting the PCSWDM minimum treatment standards (Figure 4-17).

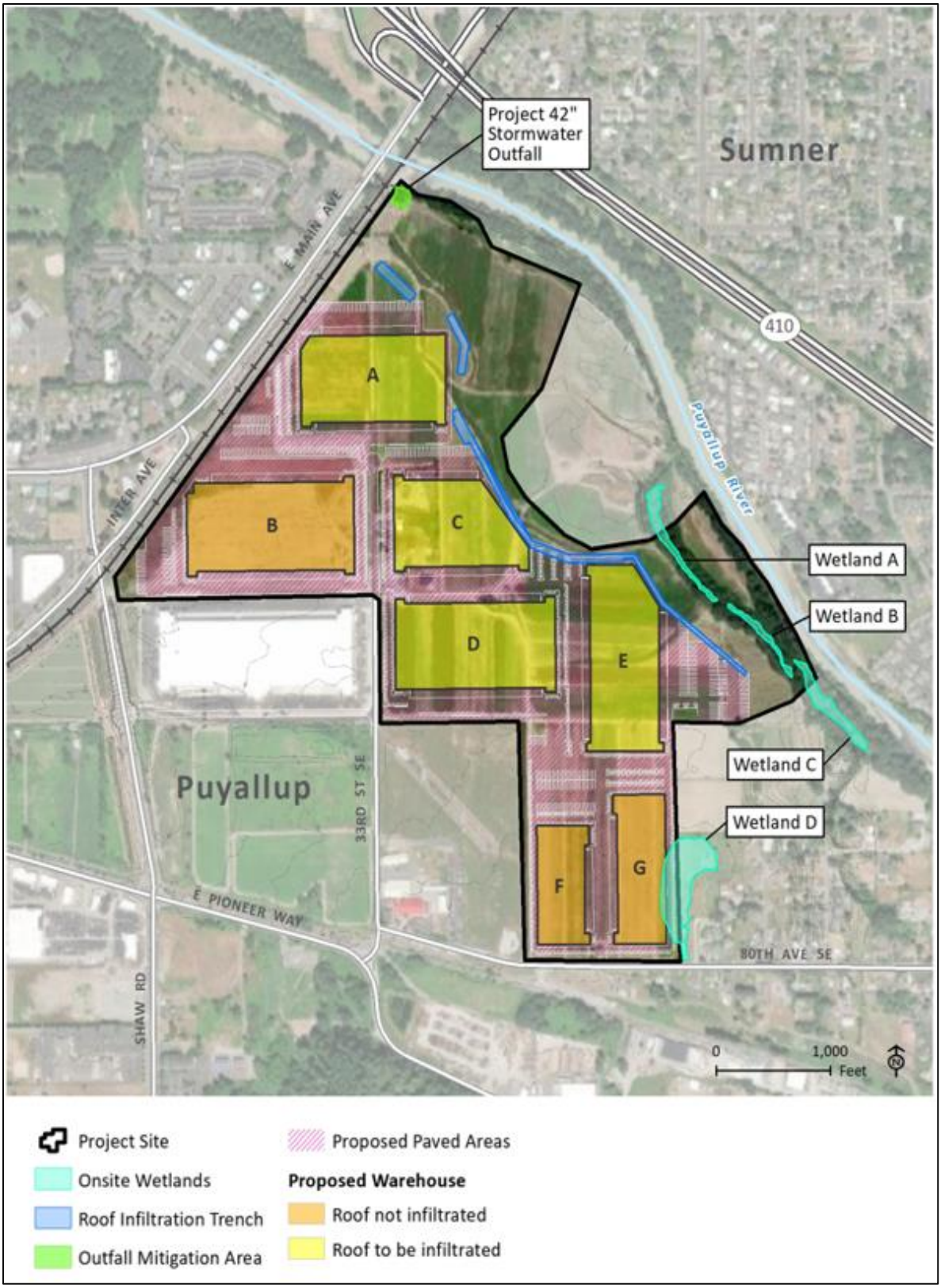

Figure 4-17. March 2021 Proposed Stormwater Outfall (green), Infiltration Trenches (dark blue), and Wetlands (cyan)

However, there is overlap in the schedule between construction and operations phases at this site. The Applicant has indicated that they plan to complete construction over a period of 4 years, with construction starting at the north end of the site (Warehouses A to E), followed by construction of Warehouses F and G. Construction of each warehouse would take 15–18 months, with construction of some warehouses occurring simultaneously to meet the overall 4-year construction schedule. Up to 150 employees would be expected on site at any one time during construction.

Construction of each warehouse would occur in three stages:

1. Grading and filling
2. Installation of on-site utilities
3. Warehouse construction

Construction Impacts

The construction timeline would overlap with operational timelines as the seven warehouses would be constructed one at a time in phases over a period of four years. Construction impacts would be related to uncontrolled surface runoff from areas with bare or unstable soil surfaces, and also from potential spills or leaks of fuels or hydraulic fluid in either paved or unpaved areas when the stormwater management system is not yet fully functional.

For wetland areas, construction impacts would be related to the timing of when surface water is effectively captured and diverted to either the river or to effective, properly designed infiltration facilities, as would be needed to maintain current wetland hydroperiods (as required by law, as described above).

The current KFIP plan shows that the on-site portions of Wetland D (about one acre) and its on-site buffers would be filled during construction phases to build one of the proposed warehouses. More details are provided below.

Puyallup River

During construction on the high terrace, direct impacts to surface water quality could occur from grading, which contributes to erosion and sediment movement; water flows that cause turbidity through erosion; sediment transport downstream of soil disturbance activities; or release of pollutants from construction equipment. Oil, fuel, and other chemicals could inadvertently spill or leak from construction equipment or materials, leading to contamination of surface water through runoff.

Per standard requirements of the construction stormwater permit, a stormwater management plan and a Spill Prevention Control and Countermeasure Plan would be developed to minimize impacts to water quality. BMPs would be implemented consistent with federal, state, and local regulations, including but not limited to: operating procedures to prevent spills; control measures such as secondary containment to prevent spills from entering nearby stormwater pipes that outfall to the River; countermeasures to contain, clean up and mitigate the effects of a spill; construction vehicle storage and maintenance and fueling of construction equipment would be located outside of the floodplain and away from the River and wetlands. With full implementation of the required BMPs, the impacts to Puyallup River water quality from inadvertent spills during construction would be less than significant.

The 42-inch diameter outfall pipe intended to receive future runoff from the KFIP site is already installed at the existing stormwater outfall structure in the floodplain at the northern end of the KFIP site. The outfall structure is currently impacted by collection of sandy river sediment during seasonal river flooding and by channelized erosion of these sediments from stormwater runoff flowing from the Viking facility outfall pipe. Current conditions indicate that increasing future flows to the outfall structure by adding new runoff volumes from the KFIP warehouse complex and from the greater surrounding stormwater basins would significantly increase erosion and instability at the riverbank.

During construction phases as currently proposed, the outfall structure would require regular monitoring, assessment, repair and/or stabilization to avoid further degradation. This monitoring and repair work must fully address impacts from future increased stormwater volumes from the KFIP warehouse complex.

The stormwater outfall system would be completed over time as each new warehouse is built during construction phases. This would result in direct stormwater outfalls to the River prior to the warehouse complex being fully operational. The Project is required to comply with code provisions for the protection of water resources from grading activities and NPDES Construction Stormwater General Permit conditions.

Water quality impacts to the river from recently discovered tire oxidant pollutants (6PPD, Tien et al. 2020) have been documented as having significant lethal effects on salmonids at relatively low concentrations. Stormwater treatments specifically designed to minimize risk from 6PPD are not directly addressed in current BMPs or NPDES permits and are not proposed in the current KFIP stormwater management plan. Without application of specific recommended water quality treatments that address this recently identified surface water pollutant, impacts to Puyallup River water quality and to listed fish species during construction phases could be significant. Mitigation to address this water pollution issue may be required in order to avoid illegal take of listed species.

Water quality impacts from Viking facility runoff or from erosion at the outfall discussed above would need to be addressed prior to or during KFIP construction phases in order to differentiate pre-existing conditions from indications of new water quality impacts during KFIP site construction.

The Talasea Mitigation and Monitoring Plan (TDMP 2018) for the adjacent Viking Warehouse facility and its associated stormwater outfall at the edge of the Puyallup River indicated that during annual monitoring, water quality impacts at the outfall would be assessed qualitatively, using visual indicators such as oil sheens, abnormal water color or odor, stressed vegetation, turbidity, etc. Section 5.6, page 9 of the Talasea Mitigation and Monitoring Plan (2018) indicated that cloudy water might be a water quality indicator and should be tested to determine the source of the discoloration if observed during the annual monitoring visits. However, no water quality testing or qualitative description was reported in the Year 1 and 2 Monitoring report that was submitted to Pierce County in December 2022.

During the EIS team March 2021 site visit, water quality at the existing warehouse facility outfall was visually assessed, to provide a baseline indicator of future potential water quality from the proposed KFIP warehouse complex. The water being emitted from the Viking outfall pipe was cloudy and grey (Figure 4-18). The cloudy water condition did not change as water flowed through the outfall structure, then through deep eroded channels in flood sediments, then finally into the River; therefore, no treatment effect from the outfall structure was apparent. The source of the cloudy condition has not yet been identified, but as indicated in the Talasea Mitigation Plan, should be assessed to determine whether the facility is currently in compliance with water quality standards, and to determine whether this baseline condition is likely to occur or expand with the increase in future runoff from the proposed KFIP warehouse facility.

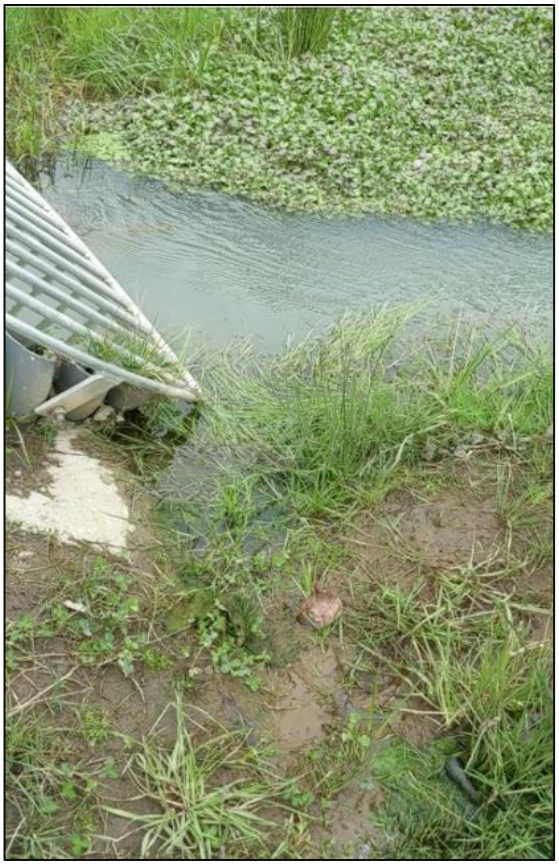

Figure 4-18. Cloudy Water from the Viking Warehouse Outfall, March 2021

Monitoring of planted vegetation in the mitigation area around the outfall may be needed during construction to ensure that the mitigation areas are unaffected by KFIP construction phases, including increases in surface water runoff through the outfall over time.

Under current conditions, much of the installed vegetation along the riverbank below the outfall has been scoured away, and plant survival in other upslope mitigation areas was less than 80 percent until recent replanting work was carried out in December 2022. The replanting work might bring the site into compliance with plant survival requirements, as long as the newly installed plants survive for three additional years.

Additional assessment and replanting of the mitigation area and increased protection of the eroding riverbank may be warranted as flows increase from the KFIP site during construction phases.

Ongoing monitoring performance and structural competence at the outfall structure (as differentiated from the mitigation planting areas) must be carried out by qualified engineers during construction phases, to ensure that the facility does not further degrade. Currently available documentation does not provide any specifically defined engineering performance standards for the outfall structure. This information would be needed by site inspectors when they are evaluating the structure during KFIP construction phases to determine whether it is performing as designed versus failing as stormwater volumes from the KFIP site increase over time. This information is currently lacking but would provide critical guidance on how to address potential structural performance or failure.

Clear engineering guidance is needed to clarify how the A-Jacks at the top of riverbank are critical to the outfall structure stability and function. Other engineering guidance is needed to assess ongoing erosion at the downstream end of the outfall and its impact on the outfall structure function or integrity.

Degradation of the riverbank below the stormwater outfall structure during construction, plus previously described (Section 4.2-3, Listed Species) impacts from unmitigated 6PPD tire oxidant pollutants in the stormwater runoff (which may kill or harm listed salmonid species in the river), in combination with future significant increase in pollution generating impervious area all indicate potential for significant harmful impacts to water quality in the Puyallup River during construction phases as well as during operational phases (discussed below).

As discussed in more detail in Section 4.3 Groundwater, according to the 2018 *Offsite Conveyance Report* for the KFIP site (Barghausen 2018), the estimated future discharge rates for the 5- to 100-year storms ranged between 39 and 73 cubic feet per second (ft^3/s), respectively. Compared to the 1 to 2 ft^3/s late summer groundwater discharge rates to the River estimated from the data provided in Welch, 2015, the KFIP estimated future surface discharge rates during winter months would be 26 to 49 times higher, and those flows would be concentrated through one outfall to the Puyallup River at the north end of the site, rather than spread and infiltrated across the high terrace and floodplain as occurs under current conditions.

By the end of the Construction phase, under the current development plan, the discharge rates of stormwater containing new levels of highly lethal 6PPD pollutants would be significantly greater than current conditions, which would significantly increase current background 6PPD levels in the river near the outfall and downstream, (i.e., would degrade background conditions).

Wetlands

For wetland areas, construction impacts would be related to the timing of when surface water is effectively captured and diverted to appropriately located and designed infiltration facilities, as needed to compensate for reduced surface infiltration on the high terrace and impacts to groundwater recharge (described in more detail in Section 4.3 Groundwater). The wetland hydroperiods for all four on-site wetlands must be maintained throughout construction to avoid adverse impacts and loss of wetland area, and loss of critical wetland functions and values.

On-site wetlands would shrink or be entirely lost unless current hydrology sources are identified and maintained. In order to preserve on-site wetland hydroperiods on the floodplain (Wetlands A, B, and C) and at Wetland D, targeted, properly located and designed wet season infiltration facilities that would capture and infiltrate appropriate volumes of surface runoff are needed to seasonally recharge groundwater in locations that would ensure maintenance of wetland hydroperiods during construction and in the future.

Wetlands A, B, and C

During construction phases, as currently proposed, the KFIP Project would result in loss of at least 50 percent of surface water infiltration on the high terrace, which feeds to groundwater. the primary hydrology source for Wetlands A, B, and C. Protection of wetland hydrology timing and volume is

required under Pierce County stormwater code and the Pierce County Critical Areas Ordinance. Standard avoidance, minimization, and mitigation sequencing review is required by PCC 18E.30.050.

Wetlands A, B and C Water Quality. Direct impacts to water quality could result from grading that contributes to erosion and sediment movement; water flows that cause turbidity through erosion; or release of pollutants from construction equipment. The KFIP Project would be required to comply with code provisions for the protection of water resources from grading activities and Construction Stormwater General Permit conditions.

During construction, grading and clearing work is not proposed within Wetlands A, B, and C or their respective buffers. Standard erosion and sediment control BMPs are required in code, and if fully implemented, would protect the surface water quality of Wetlands A, B, and C. Therefore, as long as these standards are upheld, construction phases of the KFIP Project would be expected to result in less than significant impacts to water quality in the three floodplain wetlands.

Wetlands A, B and C Water Quantity. During construction, surface infiltration (source of groundwater hydrology for Wetlands A, B, and C) would slowly decrease over time as the surface is graded, dewatered, compacted, and paved in preparation for building the warehouses, resulting in less on-site infiltration over time. Temporary disruption of the hydrologic cycle could result in permanent loss of the floodplain wetland areas. As described previously, stormwater regulations require that the wetland hydroperiods are protected. Therefore, additional site design planning and monitoring work is needed to ensure long-term protection and maintenance of wetland hydrology sources and timing during construction.

Per an agreement between the Puyallup Tribe and the developer, the KFIP design was revised in 2018 to include construction of infiltration trenches at top of slope along the eastern edge of the warehouse complex (Figure 4-17). The agreement says that the trenches would infiltrate a minimum volume of "*50% of a 2-year storm event*[11]" collected from four of the new warehouse roofs. It is possible, but unclear, that the current minimum treatment standard in the PCSWDM is the intended minimum requirement per the agreement between KFIP and the Puyallup Tribe.

There was no specific agreement as to when and how the infiltration trenches would be installed, and how the wetland hydroperiod would be maintained throughout construction and operational phases. To ensure that on-site wetlands persist throughout construction phases, there must be no change to the wetland hydroperiods during construction.

As a result of that agreement, the current stormwater management proposal is to infiltrate roof runoff from four of the warehouse roofs in trenches sited along the top of slope at the northeast edge of the high terrace, but only if infiltration is deemed to be feasible from this area. This proposal to infiltrate stormwater is currently the only indication that there is a plan to maintain hydroperiods at Wetlands A,

[11] There is no such storm (50 percent of the 2-year event) described in the PCSWDM. The agreement indicates they will meet the current minimum treatment standard, as defined in the PCSWDM, but this is unclear.

B, and C, as required by law. But it does not provide any protection or assurance that the hydroperiod for remaining portions of Wetland D (directly off site to the east of Warehouse G) would be maintained.

The four roofs account for less than half of the total KFIP impervious surface area, and most of the proposed trenches are not sited hydrologically upslope from the three floodplain wetlands. Field analysis by the EIS team indicates that direct discharge into the Puyallup River of more than half of the runoff volumes from future impervious surfaces at the KFIP site would result in loss of more than half of current floodplain and wetland hydrology volumes and is likely to affect the timing and duration of wetland hydroperiods on site. The current infiltration facility design does not provide modeled data to show how the wetland hydroperiods of the four on-site wetlands would be preserved during construction and long-term operations by this proposal, as required by the PCSWDM.

There is no current permitted or technically documented plan to ensure effective hydrologic support to the on-site wetlands during construction. Hydroperiod studies are needed to define the minimum required flow volumes and timing needed to provide for continuous support and to maintain wetland hydrology in Wetlands A, B, and C.

Any infiltration facilities intended to support wetland hydrology over time must be constructed in advance of other impervious surfaces in the KFIP complex. The infiltration facilities must be fully functional and receiving adequate volumes of runoff throughout construction, prior to completion of the four targeted warehouse roofs. This may require that runoff from other paved or impervious surfaces would be directed to the infiltration facilities until such time as adequate volumes of roof runoff are available.

The current proposal does not ensure effective maintenance of Wetland A, B C and D hydroperiods. Without ongoing monitoring and maintenance of wetland hydrology volumes throughout construction, there would be a loss or reduction in wetland area coverage on-site, a significant impact and counter to County, state, and federal no-net-loss goals and regulations.

Wetland D

An updated wetland delineation was carried out and described in a wetland report by the EIS team (SCJ Alliance, September 2021). The field work and related research, documented that about 1 acre of Wetland D was on site and found that the whole wetland (on- and off-site portions) was about 3 acres, larger than previously described, and was large enough to be regulated and buffered under County regulations and state law (Ecology, Water Pollution Control Act [90.48 RCW]).

As currently proposed, one-acre of Wetland D (about 1/3 of the whole Wetland D area) and its on-site buffer areas would be filled and lost. This would also result in indirect impacts to approximately 2 acres of off-site wetland and buffers (owned by others) by displacing current wetland hydrology, potentially causing flooding by increasing water levels and converting current upland areas to wetlands. There currently is not a mitigation plan describing how the lost wetland and buffer acreage would be replaced on or near the Project site, as required to meet no-net-loss goals and regulatory requirements.

Any proposed fill impacts to Wetland D must be reviewed and permitted by Pierce County under PCC 18E.30.050, and by Ecology (Water Pollution Control Act [90.48 RCW]). The County is expected to conduct standard avoidance, minimization, and mitigation sequencing review as required by PCC 18E.30.050. Depending on results of that review, impacts to Wetland D are not certain to be approved as currently proposed. Site plan modifications may be required if Pierce County determines that impacts to Wetland D and its on-site buffers can and should be avoided based on analysis of avoidance and impact minimization criteria.

Filling one-acre of Wetland D must also comply with the conditions of an Ecology wetland impact permit/certification. (Please see discussion in Section 4.2.2 regarding the recent revisions to the definition of WOTUS). A mitigation and monitoring plan must be permitted and approved by all relevant regulatory agencies prior to final Project permitting and approval, and prior to construction. Installation or construction of approved mitigation actions would typically be required prior to or concurrent with early Project construction phases, as described or limited in the approved permits.

Wetland D Water Quality. Water quality and other functional impacts to off-site portions of Wetland D must also be specifically described and addressed in the not yet developed mitigation plan. Water quality impacts during construction from turbidity or sediment movement when filling the on-site wetland areas must be minimized to reduce the impacts to a less than significant level using appropriate engineering design and erosion control BMPs, in accordance with federal law and County regulations.

Wetland D Water Quantity. The source of Wetland D hydrology is a combination of on-site collection of groundwater and off-site inflows of surface stormwater from the south. Water quantity impacts to off-site portions of Wetland D east of the KFIP Project boundary (owned by others) must be specifically addressed in the not yet developed mitigation plan.

Wetland D Functions and Values. Typically, initial mitigation plan actions—such as planting new native vegetation or installation of mitigation structures—must be substantially completed before KFIP construction is complete, and bonding is required to cover the not yet defined cost of implementation of the mitigation and monitoring plan, including both plant installation and long-term monitoring, reporting and maintenance, as would be defined in the permit.

The site is not located within a currently licensed Pierce County mitigation bank service area; therefore, no mitigation credits may be purchased to meet the “No Net Loss” requirement. Lacking an appropriately designed mitigation plan, the current proposal would result in a net loss of wetland and buffer area on site and would result in significant impacts to wetland and buffer areas off site. These are significant impacts, and are counter to county, state, and federal no-net-loss goals and regulations.

Floodplains

Impacts to floodplain wetlands in relation to ongoing erosion within the outfall and at the riverbank are discussed above. Therefore, the discussion below will address other aspects of potential floodplain impacts.

During construction, no new grading or mobilization activities related to the KFIP warehouse development would occur in the floodplain, and no new impacts to the floodplain are expected until such time as future KFIP site stormwater runoff is directed to the existing outfall on the floodplain.

Under the KFIP proposal, the previous land owner (farmer) can continue to farm on the floodplain[12]. Therefore, current surface water quality and quantity impacts to the Puyallup River and floodplain from existing agricultural activities in the floodplain are not expected to change during construction. Typical farming impacts include soil disturbance from plowing and cultivating, surface erosion, sediment movement and associated translocation of fertilizers, herbicides, and pesticides.

Shorelines

Impacts to the Shoreline zone during construction are the same as what is described above for floodplain impacts, and therefore, no additional discussion is provided.

Operations Impacts

Operations impacts to surface water **quality** under the current proposal would primarily be related to inadequately treated 6PPD pollutants in KFIP storm water runoff being sent to the Puyallup River, with resultant impacts to listed salmonids. Under the Proposed Alternative, according to the KFIP traffic impact study, the maximum net vehicle trips are predicted to be 8,724 per day, as compared to current conditions, with vehicle trips limited to what is needed for day to day farming operations and minimal runoff.

Water **quantity** impacts to the Puyallup River would result from the increase in future stormwater runoff volumes during winter months, which affects timing of inflows to the River and would increase current erosion at the outfall riverbank. Currently, inflows to the river from the site are from surface infiltration and subsequent slow transmission of groundwater over a period of at least several months or more. As a result, the river receives inflows from the floodplain throughout the winter and following summer months. Once 100 percent developed, most site surface runoff would be collected in pipes and redirected to the river within a day or two of the rain event.

Water **quantity** impact to on-site wetlands would be impacted by the location and function of proposed infiltration facilities. These would provide critical hydrology sources to Wetlands A, B, C, and D, as needed, and required to ensure that the wetland hydroperiods are maintained. But neither the current site plan nor mitigation plan describe any long-term monitoring or management of infiltration facilities or wetland hydroperiods. In addition, there is no county or state permit, nor any long-term mitigation and monitoring plan to address proposed fill impacts to on- and off-site portions of Wetland D. Without these mitigation and management plans, the wetlands are expected to degrade or disappear over time.

[12] Page 13, November 2018 Shoreline Hearing Staff Report: "*15. The quit claim dedication area is subject to a lease for a period of ten years allowing Knutson Farms Industrial Park LLC, or its assigns, to use the property dedication area for agricultural purposes in consideration of a lease payment of $3,000 per year.*"

Puyallup River Water Quality

Once the site is developed, an NPDES Industrial Stormwater General Permit will be required, which would include development of an Operations SWPPP. The Operations SWPPPs are intended to identify appropriate BMPs to minimize water quality impacts from stormwater, which have been developed in accordance with the current SMMWW (Ecology 2019), Ecology standards, and PCSWDM requirements. Accidental spills of fuels, solvents and related industrial chemicals during operations should be addressed by a standard safety plan, which is typically required on industrial sites.

However, as mentioned previously, a critical new pollutant that is not directly addressed in the current PCSWDM has been identified in recent research and is recognized by Ecology as an urgent concern. The implications of this new pollutant, 6PPD, are discussed in more detail below.

Under the Proposed Action Alternative, approximately 107 acres of the 131.04 acres of previously permeable farmed surface area would be impervious—roof or pavement (Barghausen Drainage Plan, 03/26/2021). The 2018 *Offsite Conveyance Report* indicates that runoff from 93.57 acres would be sent to the river via the stormwater trunkline (i.e., to the outfall structure); however, that measurement appears to include acres in the floodplain in addition to new impervious surface. The site plan does not appear to include any stormwater capture or drainage systems within the floodplain. Thus, most on-site runoff would bypass the floodplain and would emanate from new pavement or roof surfaces.

As a result of a 2018 agreement between KFIP and the Puyallup Tribes (described previously), the original stormwater management plan (which sent 100 percent of site runoff to the River) was revised with a proposal to infiltrate runoff from approximately 37 acres of roof area, but only if the proposed infiltration was deemed feasible. However, there was no description of how the feasibility determination would be made; no requirement for consideration of other infiltration locations or methods; and no specific language that clarified that the infiltrated stormwater was necessary to ensure long term support to on-site wetlands hydroperiods (as required in law).

Therefore, this infiltration proposal does not solve the 6PPD water quality problem caused by new runoff from paved areas being sent to the river. Per the current PCSWDM, runoff from the rest of the KFIP site—approximately 70–80 acres of paved roads, parking lots, and three warehouse roofs—would only be required to receive the minimum treatment standard, which is equivalent to sand filter treatment of the 6-month/24-hour storm. As discussed previously, sand filters alone do not remove the 6PPD pollutant. The filter media must be amended with organic matter, or some other equivalent chemically sorptive material.

Per the PCSWDM, stormwater runoff volumes greater than the 6-month, 24-hour storm would be sent directly to the Puyallup River without any treatment. Therefore, the PCSWDM treatment standard is not adequate to protect the river from new water quality impacts caused by new KFIP pavement runoff volumes that would include the 6PPD pollutant.

This would result in increases to the current levels of 6PPD in the river and associated increased impacts to listed species.

Salmon populations are decreasing throughout the Puget Sound and the greater Salish Sea. These impacts to listed salmonids have associated impact to apex predators in the Puget Sound, such as the endangered Southern Resident Orcas, which preferentially feed on Chinook, but also eat coho and other salmonids. In June 2022, the Puget Soundkeeper organization initiated notices to sue five municipalities in King County for violating the CWA by not implementing treatment for 6PPD in those watersheds, which have documented high rates of salmon mortality. In August 2023, Earthjustice (https://earthjustice.org/) filed a citizen petition to the USEPA on behalf of the Yurok Tribe, the Port Gamble S'Klallam Tribe, and the Puyallup Tribe of Indians (under section 21 of the Toxic Substances Control Act). The petition asked the USEPA to establish regulations ASAP prohibiting the use of 6PPD in the tire manufacturing processes. 6PPD is used as an antioxidant and antiozonant to prevent tire degradation (Earthjustice, August 1, 2023).

Recent Washington State University (WSU) research publications (Tian et al. 2021) found that tire oxidants (6PPD) in stormwater runoff at very low concentrations result in brain bleeding and other lethal impacts to salmonids passing near outfalls. Khan at al. (2019) documented that *Hyallela Azteca (*a type of krill or small crustacean, a food source for many fish species) consume small floating tire particles, resulting in bioaccumulation downstream. Capolupo et al. (2020) documented toxic levels of tire particulate chemicals in microalgae and mussels from European water bodies (bioaccumulation). Johannessen et al. (2022) documented presence of 6PPDq at toxic levels maintained for over 10 hours after sampled storm events in all samples collected from an urban watershed in Canada. These documented impacts from water bodies throughout the world indicate that 6PPD is in stormwater and the food chain, resulting in direct mortality in some species, and bio-accumulation in other species that are often prey for listed salmonids and other sensitive species.

The fact that stormwater runoff has lethal impacts on salmonids is not new information. But this new research has identified the specific hazardous chemical that causes salmon mortality at very low concentrations. Toxic levels of the 6PPD compound have been documented in waterbodies and animal tissue samples throughout the world by other researchers. This research indicates high potential for significant surface water quality impacts to listed species from minimally treated direct runoff from parking lots and roads.

Soluble forms of 6PPD have been shown to kill coho at concentrations of 0.1u/l (micrograms/liter). Other precipitated or less soluble forms of 6PPD are attached to soil particles or are in the form of tiny floating tire particles, both of which are low density and easily translocated in runoff, and subsequently consumed by small prey species or filter feeders.

The most effective treatment for removing (adsorbing) the soluble form of 6PPD is infiltration through an amended soil or comparable media containing organic matter or another high Cation Exchange Capacity (CEC) material (McIntyre, 2021). A similar treatment option evaluated by Tian et al. (2019) is a compost amended bioswale designed to pond less than an inch of water and to infiltrate most runoff. Less soluble forms of 6PPD (tire particulates) may be physically removed from the water column by filtration through a properly designed sand filter, but should be followed up by chemical filtration through a more sorptive material in order to remove most soluble 6PPD from stormwater runoff.

Because the reported research is relatively new, this information has not yet been directly addressed in current Washington state stormwater management manuals or defined BMPs. However, federal, state, and local laws preclude harm to listed species, and require application of Best Available Science (BAS). Applying current BAS BMPs to the KFIP stormwater management system would significantly decrease potential for increased harm to listed salmonid species in the river and associated species downstream. The currently proposed KFIP stormwater management plan does not meet this standard, creating potential for violation of the Endangered Species Act.

Without proper management, this pollutant carried in new runoff volumes from the KFIP Project site could cause significant new impacts to surface water quality at the outfall and related significant increase in mortal impacts to listed salmonid species in the river.

Puyallup Riverbank Flood and Erosion Impacts

Since completion of the outfall structure in fall 2019, there has been an almost complete failure of the biotechnical bank protection where the outfall discharges to the Puyallup River. In comparison to drone flight footage from December 2019, while the outfall was under construction (Figure 4-19, a duplicate of Figure 4-12 and Figure 4-20), overall, it appears that 5 to 10 feet of bank has subsided or was lost along the riverside edge of the outfall, as was documented in the field during EIS team site visits in 2021, 2022, and 2023.

At the end of the 2018 HPA 3-year monitoring period (end of 2022), WDFW staff met on site with KFIP consultants to verify that riverbank conditions complied with the permit standards. The conditions at the riverbank did not meet the standard described in the 2018 HPA (i.e., it was not stable for at least 3 years, the duration of the monitoring period); it did not withstand the 100-year flood stage (it failed, despite the worst event during the 3-year period being a 25-year stage flood), and more than 80 percent of the newly installed plant materials were lost, scoured away during winter flood events. In response to the bank failure, WDFW filed a Correction Request and prepared a new HPA (2023) with new standards intended to address the new streambank stabilization requirements. KFIP consultants subsequently installed new bank stabilization structures in the failing riverbank directly below the outfall in May 2023—willow root wads anchored by manila rope, a “live willow mattress” and additional willow wands installed in and around the willow mattress (sketch map plan provided in Figure 4-21)—in an effort to stabilize the bank. Based on an assessment of that repair work in June 2023 by EIS team hydraulics and fisheries experts, the new streambank stabilization installation is considered unlikely to survive the significant hydraulic forces of next winter’s floods.

As described previously, the 100-year peak flow on the Puyallup River upstream confluence with the White River (less than 0.5 mile downstream from the outfall) is estimated by FEMA as 43,500 cfs. A 25-year peak flow was documented since completion of the outfall structure (33,500 cfs on February 7, 2020), as reported by the USGS for the Puyallup River at E. Main Bridge (USGS gage 12096505, immediately downstream from the outfall). Thus, the area around the outfall has not yet experienced 100-year flows yet is eroding and failing. It is evident that the original 2018 bank protection installation failed to meet the 100-year peak flow performance standard required under the Project’s HPA permit.

Figure 4-19. Photo above from December 2019, showing flooding as well as willow wands and large boulders on the top of riverbank at the outside edge of the outfall structure. Photo below is from December 2022, showing the riverbank erosion, willow wands stripped away, boulders falling down the slope into the river, and deep sand deposits.

Figure 4-20. December 2019 UAV image annotated with erosional features. The riverbank shown above waterward of the edge of outfall has slumped or eroded back 5-10 feet since this photo was taken.

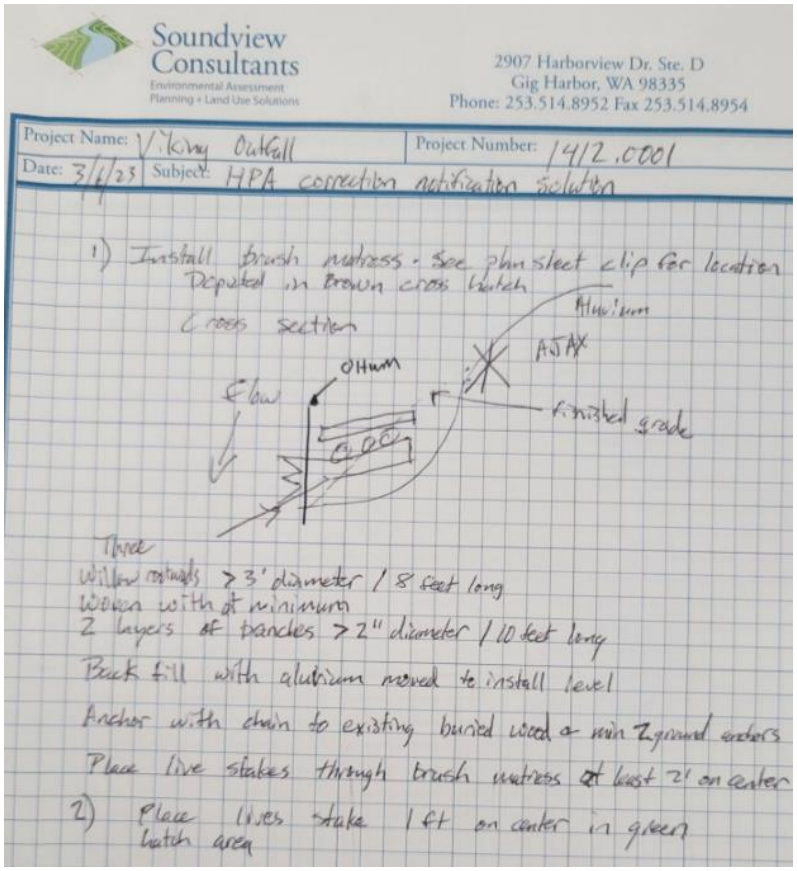

Figure 4-21. Sketch map of riverbank stabilization plan, attached to 2023 HPA documentation.

In addition, as previously described, the new streambank stabilization Project has not defined a new OHWM, as needed to document the new, eroded riverbank location and conditions. Based on Ecology OHWM guidance which indicates that the nearby river gage can be used to define the 2-year river stage considered to equate with the OHWM), the updated OHWM elevation is also expected to be higher in elevation and farther landward than the previously defined OHWM location. These corrections may affect permitting requirements for ongoing streambank stabilization repair work.

Under the Proposed Action, future increased runoff volumes from the KFIP site would greatly increase current flow volumes through the outfall structure, inevitably increasing current erosion at the riverbank below the outfall structure. Sending significantly greater runoff volumes to the outfall in the future when the riverbank is already failing under current conditions would further degrade the outfall system and erode the riverbank. Without significant repair or revision of the outfall structure and properly designed bank stabilization installations, the ongoing erosion would eventually undermine the outfall structure, and result in additional loss of boulders, concrete and other construction materials into the river, a significant impact to water quality and fish habitat.

Outfall Area Habitat Mitigation Area Conditions

An As-Built and Baseline Monitoring Report was prepared by Soundview Consultants (SVC, October 2020), following guidance provided in the approved Talasea 2018 Mitigation and Monitoring Plan (2018 TDMP). Outfall structure functions and condition (as distinct from its various habitat mitigation features) were evaluated in an SVC 2020 report prepared by a Soundview wetland scientist, not by an engineer. The report described outfall structure conditions after its first year of operation, including impacts to the structure from the Puyallup River flooding in February 2020 (winter of 2019/2020, Figure 4-22). SVC described the structure after the February 2020 flood as being "*fully covered with redistributed river sediment*."

Figure 4-22. SVC 2020 photo 9, taken from the north, showing floodwater covering the entire outfall facility in February 2020.

The impacts of repeated flooding and sediment deposition within the outfall and at the riverbank were documented by the EIS Team in March and November 2021 and were further documented during various EIS team site visits in 2022, and in March and June 2023.

When the EIS team visited the KFIP site in March 2021 (after the 2020/2021 winter), they photo documented conditions at the outfall. Photos from the SVC report (dated October 2020 – end of the 2020 growing season) and from the March 2021 EIS team site visit (end of the 2020-2021 winter flood season) are compared in Figure 4-23.

Both Figure 4-23 photos show the concrete A-jacks, which are partially buried in sediment and undercut near the top of slope on the riverbank. The March 2021 EIS team photo (above) also shows about 6-12 inches of new sandy sediment deposits from the 2020/2021 winter floods covering surface vegetation in the outfall base, and also shows that the riverbank vegetation below the A-Jacks (which was planted in September 2020, and can be seen in the lower October 14, 2020, photo) was flattened or scoured away by floodwaters over the previous winter.

Figure 4-23. Similar view above (EIS Team, March 2021) as below (SVC, October 2020).

Photograph 11. Post-construction baseline condition at connection of outfall release area to Puyallup River, from upriver (east). (October 14, 2020).

Photos of the same area in December 2022 (Figure 4-24) showed deep sandy flood deposits 1–3-plus feet deep covering about one third of the base of the outfall near the river in an area extending about 30–40 feet landward from the riverbank. The deep sandy flood sediments completely buried the two most northerly logs in the outfall base and buried several of the central Ecology blocks with more than a foot of sediment. One of the six anchored logs in the outfall base was entirely gone (carried away during a flood event). The coir reinforced soil berm at the riverbank that previously extended 5–10 feet riverward from the edge of the outfall base had slumped or eroded away, as had most of the willow wands intended to stabilize the top of bank.

These photos (as well as river gage data previously presented) document that the outfall structure has flooded every winter since it was installed– during the 2019/2020, 2020/2021, 2021/2022, and 2022/2023 winters. River gage data indicates that regular winter flooding events above the 41–42-foot elevation (outfall base elevation) would continue.

Figure 4-24. December 2022 photo showing deep sandy deposits and eroded riverbank.

As discussed previously, this flood data also brings into question how the OHWM at the river—which according to Ecology guidance (Ecology [F], October 2016) should be relatively close to the 2-year flood stage elevation—was originally defined, and whether it has been revisited and corrected to address changes at the riverbank since construction was completed in 2019.

The outfall structure as well as planted vegetation within the outfall were significantly impacted by sediment from river flooding—an impact that was not anticipated or addressed in the 2018 TDMP (approved mitigation plan). At the end of 2022, most of the previously planted vegetation (willow wands from 2019-2020 plantings) along the riverbank—where sediment loads are highest and scouring impacts are greatest—had not survived and did not meet performance standards of the Talasea mitigation plan or the WDFW 2018 HPA. As described previously, recent (May 2023) repair efforts at the riverbank (required by WDFW under the 2023 HPA) have replaced some of the lost bank stabilization materials, and therefore, may currently meet the 2023 HPA permit requirement. However, based on assessments by EIS team hydraulics engineers and fisheries experts, the stability of the newly installed materials does not appear to be adequate to survive hydraulic impacts from expected flooding in the upcoming 2023–2024 winter. Continued flooding and scouring from the river in combination with erosion impacts from the Viking outfall runoff indicates that the brush mattress, willow wands and other bank stabilization materials associated with recent bank erosion repairs in and around the outfall would most likely be negatively impacted during upcoming winter floods and are not expected to persist.

Analysis carried out by the EIS team hydraulics experts indicates the need for a more robust approach to bank stabilization under current conditions. Erosive impacts to the outfall structure and riverbank would be significantly greater under future increased KFIP runoff volumes.

Mitigation plantings in the upland area away from the riverbank and surrounding the outfall had experienced some mortality and loss, which was addressed in the Year 1 and 2 Monitoring report (SVC 2022) by planting 57 new plants, with species selected from the accepted plant schedule. However, the exact species selected and the areas that were replanted were not identified in the monitoring report, and it is unclear whether site monitoring would continue long enough to document that the new plants have survived to meet the minimum 3-year survival standard defined in the 2018 Talasea Mitigation Plan. If carried out correctly and if the new plants survive for three years, the replanting would compensate for previous mortality and would bring the site into compliance for this growing season by meeting current percent survival performance standards in the habitat mitigation areas away from the riverbank.

Presence of weedy vegetation—Japanese knotweed, reed canarygrass and Himalayan blackberry—was documented and described in the SVC report as being actively managed and controlled to keep percent cover below the 10 percent allowed maximum. However, the non-native invasive watercress that dominates the Viking side of the outfall base was not mentioned or addressed.

The site maintenance directions provided in the December 2022 Year 1 and 2 Monitoring Report for Pierce County indicate that there is an intent to continue monitoring and repairing the mitigation areas until the system is stable. However, the required monitoring period is 3 years, which requires only 1 more year of monitoring (report expected in December 2023) to meet minimum Pierce County regulations. With new plantings, typically a mitigation monitoring period would be extended to ensure that the new plants survive at rates adequate to meet the same standard as described in the original plan.

Because the original 2018 HPA required that the bank be stable after three years, it is assumed that the 2023 HPA repair work would also require 3 years of monitoring following installation. The past and current trajectory of site conditions at the riverbank indicates a high potential for failure of the May 2023 bank stabilization plantings during upcoming rainy season flooding, suggesting that extension of the monitoring periods for both the WDFW HPA permit and the Pierce County mitigation area monitoring work would be prudent until both the outfall structure and the riverbank are deemed stable.

Under current conditions, erosion, and bank failure impacts to at the riverbank adjacent to and near the outfall are significant and would result in a net loss of shoreline, fish habitat, and riparian buffer function.

Wetlands

Wetland water quality. Under the Proposed Action, the KFIP Project would be required to comply with code provisions for the protection of water resources from grading activities and Operational Stormwater Permit conditions. Therefore, minimal impacts to water quality in wetlands are expected during KFIP operation, as long as mitigation plans designed to address potential water quality issues at Wetland D are prepared and followed. During operations, due to required protections of the standard wetland buffers, no

water quality impacts are expected within Wetlands A, B and C or their respective buffers. No untreated surface water would be sent directly to these wetlands and vegetated buffers would remain vegetated , as required in code. The only potential hydrology inputs would be from currently proposed infiltration of roof stormwater runoff, which is typically high quality, particularly after filtration through soil. However, there is no current monitoring plan designed to document water quality at Wetlands A, B, and C.

There is no approved mitigation and monitoring plan for filling Wetland D and its on-site buffer. The mitigation and monitoring plan would be expected to include a plan for protection of water quality in the remaining off-site portions of the wetland (land to the east, owned by others). The proposed fill impacts have not yet been formally described or permitted, and can only occur if permitted and after applying standard mitigation sequencing approaches that demonstrate that the fill is unavoidable and necessary, and that the mitigation actions proposed to compensate for the loss of an acre of wetland and its on-site buffer has been reviewed and approved by the appropriate agencies, including but not limited to Pierce County and Ecology.

Wetlands A, B, and C Water quantity. Under the current proposal, the groundwater source for Wetlands A, B, and C would decrease over time during both Construction and Operational phases as most of the currently permeable KFIP surface area would be paved over a period of several years during Construction phases, while the warehouses are being built and subsequently occupied. This would result in a decrease over time of on-site infiltration and no replenishment of groundwater on the high terrace, where the new warehouses, roads, and parking areas are sited.

As discussed above, despite an agreement to infiltrate roof runoff from four warehouses, the current stormwater management system does not provide details to show that the proposed infiltration is feasible or adequate at the proposed locations, and does not provide an alternate plan to support the wetland hydroperiods if this plan fails. If the proposed infiltration plan is not feasible, that does not relieve KFIP of the requirement to ensure that the on-site wetland hydroperiods are protected during construction and after site development is complete.

Without a clear plan describing how KFIP would incorporate actions into site design to replace the loss of groundwater hydrology sources and timing, and to provide for monitoring to ensure long-term protection of on-site wetland hydroperiods, there is no assurance that the on-site wetlands would persist. Without a clear plan for preserving and replacing lost hydrology sources, Wetlands A, B and C would be expected to get smaller or disappear entirely over time. This outcome is counter to no-net-loss requirements in federal, state and County code and policy.

Wetland D Water quantity. As described previously, there is no current approved permit or mitigation plan that would allow filling one acre of Wetland D (a water quantity loss or displacement) and its on-site buffers. However, because the site plan has not been revised to remove or redesign Warehouse G, this discussion assumes that the current plan is to fill part of Wetland D and its on-site buffer area.

During operations, Warehouse G and its adjacent parking stalls to the east would overlay the on-site portion of Wetland D and its on-site buffers which would have been filled during construction phases.

Warehouse G would be located adjacent to the eastern site boundary, and therefore would directly border the off-site remnant portions of Wetland D with no buffer.

Because the fill would displace about an acre of currently available surface water storage and would fill part of the current surface water inflow pathway to Wetland D from the south, there may be flooding impacts to off-site portions of Wetland D on the neighboring parcel (owned by others) which is located directly east of the KFIP site boundary. These flooding impacts may cause the remaining off-site portions of Wetland D to expand, or may flood parts of the neighboring parcel that have not previously flooded. If not addressed and mitigated in advance to ensure no changes to the pre-development water quantity conditions, the flooding or expanded wetland boundary would impact off-site property owners. There is no current plan to avoid or address this impact.

Wetland D Functions and Values. If fill is permitted, the western edge of the off-site portion of Wetland D would be at the property line, and thus would have no buffer. It would border the directly adjacent warehouse and parking lot. Loss of an acre of wetland typically would require creation of new wetland and buffer area at a higher than 1:1 replacement ratio. But there is no current mitigation or functional replacement plan for either wetland or buffer impacts.

In addition to impacts from loss of about 1/3 of the Wetland D area, the lack of a vegetated buffer for the remaining off-site portions of Wetland D at the property line would exacerbate other negative impacts to the remaining off-site wetland area functions and values and may require additional compensatory buffer mitigation.

There is no current plan to avoid or address these impacts. Without adequate compensatory mitigation, these proposed impacts to wetland functions and values are significant and counter to the no net wetland loss policies of state and county governments.

Floodplains

During Proposed Action operations, the primary long-term impact to the floodplain related to the KFIP Project would be from the stormwater outfall structure and backwater flooding through the outfall, which is discussed in detail above and would continue throughout the operational lifetime of the KFIP facilities.

PCC 18E.70 and PCC 18E.110 both discourage placement of structures on a floodplain, but also require that any structure on the floodplain is properly engineered (i.e., it should be stable and should not cause erosion of the floodplain or riverbank). The outfall structure is clearly degrading, and there is no current proposal to repair, stabilize, redesign and/or relocate portions of the existing outfall structure or other components of stormwater management system to ensure more effective long-term function of the KFIP stormwater management plan. Without implementation of additional engineering assessment, subsequent repair, possible redesign to minimize future KFIP flows through the outfall and regular monitoring, the outfall structure is considered likely to degrade further and result in significant impacts to the riverbank at the edge of the floodplain over time, impacts which would increase during future KFIP operations as a result of more water flowing through the outfall relative to current conditions.

Shorelines

Under the Proposed Action operations, impacts to the Shoreline zone are effectively the same as those to the floodplain, and are discussed above.

Alternative 1 – Rail Transport

Construction and Operations Impacts

Puyallup River, Wetlands, Floodplains, Shorelines

The Alternative 1 proposal, which involves using rail rather than roads in some of the warehouse complex area, is unlikely to have significantly different impacts to surface water than the standard proposal. There might be a slight difference in total impervious surface, but it is assumed that the general approach to stormwater management and the risks would remain the same.

Therefore, the Alternative 1 proposal is likely to result in similar significant impacts to the river, on-site wetlands, floodplain, and shoreline area. Most of those impacts would be initiated during construction phases, but would continue during long-term operations, as described in detail above.

Alternative 2 – Reduced Intensity Alternative

Under WAC 197-11-440(4)(5), an EIS is directed to analyze reasonable alternatives, which "shall include actions that could feasibly attain or approximate a proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation."

As such, Alternative 2 considers the potential impacts that would result if the mitigation measures that reduce the site footprint of the facility, as outlined in Section 3 of this EIS, were adopted by the Applicant (Figure 4-25). Under Alterative 2, the total footprint of the facility would be reduced from about 2.6 million SF to about 1.7 million SF (about 35 percent footprint reduction). The following mitigation measures to reduce intensity would be applied:

- All warehouses would include a minimum 15-foot-wide landscape bed to be provided along the entire length of blank wall facades of buildings.
- Warehouses would not be constructed on lands designated Rural Buffer Residential (RBR) in the City's Comprehensive Plan. The RBR designation reflects development restrictions associated with the shoreline buffer constraint area, the riparian buffer adjacent to the Puyallup River, and the erosion hazard area. This would eliminate Warehouse C and would reduce the footprint of Warehouses A and E.
- Warehouse F would be reduced in size to avoid blocking the prime view corridor from Van Lierop Park.
- Warehouse G would be reduced to avoid fill impacts to on-site portions of Wetland D and its on-site buffer, in accordance with Pierce County Code 18E.40.050.

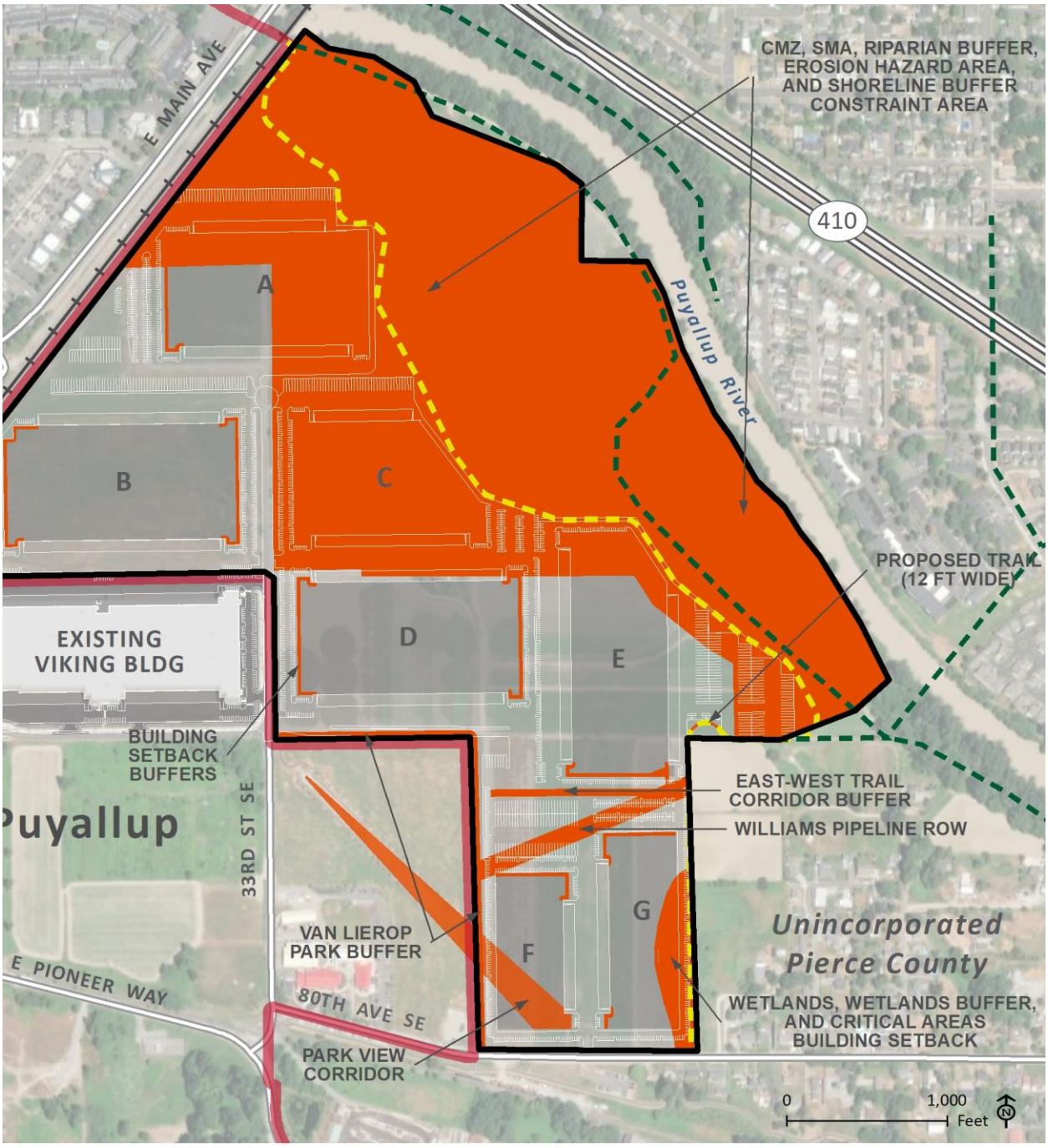

Figure 4-25. Alternative 2 – Reduced Intensity Alternative

Construction Impacts

Construction of Alternative 2 would result in similar but slightly reduced impacts during construction as compared to the Proposed Action. During construction phases, Alternative 2 would result in fewer construction vehicle trips due to the reduced Project size and footprint of the facility. During grading and filling phases, up to 1,270 total construction vehicle trips (or up to 215 trips per day) would be expected. During utilities installation work, up to 100 total construction vehicle trips (or up to 4 trips per day) would be expected. During warehouse construction (which includes building and paving roads and parking areas), up to 1,560 construction vehicle trips (or up to 40 trips per day) would be expected.

Due to Alternative 2's reduced footprint, temporary and permanent impacts analogous to the Proposed Action would occur, but at a smaller scale and farther from some of the environmentally sensitive areas on site—specifically, fill impacts at Wetland D and its on-site buffer—would not occur, and the potential landslide hazard areas near the top of steep slopes at the eastern edge of the high terrace would not be developed.

However, Alternative 2 does not change the current proposal to redirect most site runoff to the Puyallup River, and therefore, does not address ongoing erosion at the riverbank, does not address water quality and listed species impacts from 6PPD pollutants, nor the need to protect and maintain current groundwater-fed hydrology sources for the on-site wetlands. Neither does it propose revegetation of the undeveloped surfaces between the terrace edge and the warehouse zone, which would be expected to become weed-dominated unless properly managed. These impacts to surface water would occur during Construction because the timing of paving and construction of stormwater systems during Construction would overlap with impacts from new warehouse traffic runoff during Operations.

Mitigation actions that may be applied to reduce impacts to groundwater during Construction phases are described in the Mitigation Measures section (4.2.5) below.

Mitigations actions for other impacts associated with a smaller construction footprint were identified and described in other sections of this EIS (Section 4.1, Earth Resources mitigation measures ER-1 through ER-10; Section 4.5, Land Use mitigation measures LU-2 through LU-4; Section 4.6, Recreation mitigation measures REC-2 through REC-3; Section 4.7, Aesthetics mitigation measure AES-1; Section 4.10, Health and Safety mitigation measures HS-1 through HS-5; and Section 4.13, Noise mitigation measures N-1 and N-2).

Operations Impacts

The Operations Impacts associated with Alternative 2 would be similar but slightly less than those described for the Proposed Action, due to the smaller Project area footprint. The number of daily vehicle trips generated by the KFIP warehouse complex under Operational phases for Alternative 2 would be reduced by about 21 percent and the overall impervious surface cover on the high terrace would be decreased by about 33 percent, as compared to the Proposed Action.

Under the Proposed Action, there would be a maximum of 8,724 trips per day. In comparison, Alternative 2 would generate a total of 5,844 trips per day. Alternative 2 would also require up to 1,000

employees/day during operations (i.e., 1000 trips/day from commuting employees). In sum, Alternative 2 would result in a daily traffic volume decrease of about 21 percent.

As a result of the Alternative 2 reduced impacts approach, there would be a reduction in total impervious surface and a decrease in the number of daily traffic trips. But the general approach to stormwater management would remain the same. Impacts to surface water wetlands from lack of hydrology, ongoing riverbank erosion and water quality impacts from 6PPD still remain. Thus, under Alternative 2, wetlands are still expected to become smaller or disappear entirely due to a decrease in infiltration and associated groundwater hydrology volumes. Ongoing erosion at the riverbank is expected to increase as a result of increased runoff from KFIP pavement through the outfall. New impacts to listed salmonids from new inputs of 6PPD laden water from pavement still remain, although would be slightly reduced by having less pavement. These are all significant impacts. Mitigation actions that may be applied to reduce these impacts to surface water are described in the Mitigation Measures section (4.2.5) below.

4.2.5 Mitigation Measures

This section summarizes KFIP impacts and mitigation measures that could be implemented to avoid or minimize surface water impacts of the currently proposed KFIP Project, both during Construction Phases and during full Operational Phases after construction is complete. Prior to initiation of construction, the proponent is expected to obtain the necessary federal, state and local permits and to prepare the appropriate plans that are required to protect surface water, including but not limited to an NPDES Construction Stormwater General permit, a Spill Prevention, Control, and Countermeasure (SPCC) Plan, a construction SWPPP, a federal/state 404/401 permit (for fill impacts to the Puyallup River), a State Water Pollution Control Act (90.48) certification, and an HPA (through WDFW). Plans and reports are expected to show concurrence with the PCSWDM, with relevant Pierce County Development Permit approvals, to comply with conditions of approval.

Construction and Operational Impacts

Impacts during Construction Phases would be from initial clearing, grading, and filling; installation of utilities (trenching and installation or conduit and pipe); stormwater runoff; and work associated with construction and paving of parking lots, roads, and warehouses.

Impacts during Operational Phases would primarily result from methods used to manage stormwater runoff and from traffic, both on and off site. Operational impacts specific to the not yet defined businesses that would operate out of the warehouses are not addressed in this EIS.

Because the timing on Construction phases is planned to overlap during a period of 4 years with Operational Phases, and because some of the operational impacts to surface water would start during construction, the impacts discussion is combined below to simplify and avoid redundant discussion.

Puyallup River

During construction, direct impacts to water quality could occur from grading that contributes to erosion and sediment movement; increased flow volumes on site and to the river that cause turbidity through erosion; sedimentation downstream of soil disturbance activities; or release of pollutants from

construction equipment. As pavement coverage increase, so would runoff volumes, and at some point during the proposed 4 years of construction, excess runoff would be sent to the existing outfall at the river using the same stormwater management systems as are proposed for long-term operational conditions.

With the BMPs required as part of the Construction Stormwater General Permit and SPCC Plan, sediment impacts to Puyallup River from on-site erosion during construction could be reduced. But under the current proposal, potential water **quality** impacts to listed species in the River during both Construction Phases and Operations Phases from the increase in direct flows to the river from paved areas containing the 6PPD pollutant are neither avoided nor minimized. No effective treatment designed to remove 6PPD from the pavement runoff prior to sending it to the river is proposed.

Potential water **quantity** impacts to Wetlands A, B, and C during construction phases and operations phases are neither avoided nor minimized, due to a lack of any information about on-site wetland hydroperiods, as is needed to properly design infiltration facilities that could be used to maintain these wetlands. Potential water quality and quantity impacts to Wetland D are neither avoided nor minimized, due to the lack of any fill permit review and approval process and lack of an associated approved mitigation plan.

Mitigation options that may be applied to reduce long term impacts from the significant increase in on-site stormwater runoff quantities causing an increase in ongoing erosion at the riverbank; from the associated increase in 6PPD pollution to the Puyallup River from the new stormwater runoff volumes; from fill impacts at Wetland D, and from expected degradation of the floodplain outfall structure during construction phases and later during operations phases are discussed below.

SW-1. Evaluate the outfall erosion issues prior to Hearing Examiner hearing and prior to County and Hearing Examiner approval and final KFIP permitting and take corrective action as needed to redesign, repair, or relocate the stormwater outfall structure or components of the Project-wide stormwater management plan in relation to future flow increases from the KFIP Project site. Based on EIS Team field observations of the condition of the outfall in 2020, 2021, 2022, and 2023, portions of the structure appear to be failing or not operating as designed due to scour and erosion from the combined effects of seasonal flooding, sediment deposition, high energy fall and winter river flows and current stormwater discharge. In light of these indications of degradation at the existing outfall location, adding significantly greater future stormwater discharges from KFIP to the outfall could cause additional stress on the system and exacerbate current problems. The existing outfall requires further design evaluation, adaptation, and mitigation measures prior to permitting to determine whether the outfall and eroding riverbank can be effectively stabilized so as to receive new, increased discharge volumes from the KFIP site.

- Evaluate the outfall prior to Hearing Examiner hearing and prior to County and Hearing Examiner approval and final KFIP permitting and take corrective action as needed to meet PCC 18E Performance Standards over time and to be consistent with the Pierce County Comprehensive Plan policies listed in Section 4.2.2 and with the standard for subdivision approval. This mitigation should include:

- Provide a new and updated OHWM elevation report which describes how the OHWM is determined, following standard guidance protocols from Ecology (Ecology [F], 2016).
  - Guidance indicates that the OHWM elevation can be determined by defining the 2-year stage from nearby river gages. Data from the directly downstream E Main USGS 12096505 gage indicates that the 2-year stage is about 42.8 feet NGVD29 (46.29 feet NAVD88). This indicates that the OHWM elevation of 38.5 feet marked on the site design maps is incorrect or outdated.
  - Verifying and updating the location and elevation of the OHWM to reflect current conditions at the riverbank is needed for permit review processes as well as for effective design of outfall or riverbank repairs.
- Prepare a separate monitoring plan specific to the outfall engineering and design intent and performance limits of the current outfall structure.
  - The new monitoring plan prepared by an engineer should consider recent flooding and sediment loads (discussed in Section 4.2.4), high energy river flows, and should provide a clear record of design and purpose of each component of the outfall. The monitoring plan should explain the range of expected impacts of river flood hydraulics during standard and extreme (10 to 100-year storms) flood events, sediment deposition within the outfall, and both current and future stormwater discharge volumes and rates. The plan should provide specific guidance about how much sediment deposition, erosion or loss of planted vegetation is allowed or expected as part of "normal" outfall facility function and should provide maintenance recommendations for repair when the outfall functions are failing to meet defined performance standards.
  - The definition of "failure" must be provided, as well as contingency plans designed to address indications of current failure or imminent failure.
- To ensure that any redesign or repair is adequate, the Project proponent should monitor the structure at least annually in perpetuity, and ideally after each overbank flood event, to ensure that the structure is still safe, intact, and functioning as designed. Regular monitoring would ensure that responses to indications of degradation would be timely and would not wait for serious or catastrophic failures.
- To provide information critical to assessment of outfall function, KFIP should carry out a new scour analysis using current cross sections of the river, since the previous cross section surveys discussed in Section 4.2.3 are now more than 10 years old. The new scour analysis should include assessment of impacts of both current and future flow volumes from upland basins—both Viking (current) and all future indicated basin runoff in the Viking and KFIP contributing basins. The new scour analysis should provide updated feedback as to the type, minimum size, orientation, and extent (along the riverbank) of any proposed riverbank protection or stabilization materials.
- If required based on the updated scour evaluation results, identify, and implement mitigation measures prior to KFIP Project approval and construction to improve the outfall, to eliminate erosion within the outfall and at the riverbank, and to ensure that the outfall

can adequately manage significantly greater future flows from the KFIP Project site as well as future planned regional inflows from upslope basins. This response could include redesigning and/or repairing the outfall, or partially relocating parts of the overall KFIP stormwater management system, and may include the following actions, or other similar responses:

- Design a stormwater conveyance channel that provides for full and effective stormwater runoff energy dispersion prior to reaching the river, and thus safely conveying all current and future flows to the river under the full range of river stages without erosion at the riverbank. This channel should be lined with durable materials such as riprap or concrete, and its energy dissipation function should not be affected by annual flood sediment deposits from the river.
- Evaluate the existing riverbank for the existence and adequacy of toe rock, and design the bank with adequate armor below the OHWM to resist hydraulic impacts of 100-year river flows and upstream flanking erosion risk.
- Outside the re-designed stormwater riverbank spillway described above, design a properly engineered stabilized riverbank, with appropriate slope stability function below the OHWM and native vegetation above the OHWM that can survive the expected periodic high river floods and velocities. At this high energy location, this design may require a combination of hardscape riprap and designed bioengineering structures.
- Design the outfall to accommodate permanent and transient sedimentation from the river without the need for routine maintenance. The current outfall no longer provides for stormwater sheet flow or energy dissipation due to collection of deep sediment and subsequent development of deep erosion channels.

SW-2. Re-evaluate current stormwater management strategy. The current proposal is to send all pavement runoff and runoff from four warehouse roofs to the river. If instead LID practices were broadly applied and if all parking lot and roads runoff were infiltrated using BMPs such as amended soils (as described in research by WSU scientists and others) or infiltrators below the pavement, the potential for significant water quality impacts from 6PPD and water quantity impacts from increased KFIP flows to the outfall would be greatly diminished.

- Re-evaluate the current stormwater management strategy and consider broadly applying LID practices and infiltrating all parking lot and road runoff. This should include:
  - Consider the benefits of reducing future flows to the outfall structure at the northern end of the site, in relation to PCC 18E Performance Standards and the evaluation called for in SW-1.
    - Example concept: If properly engineered and allowed by the reviewing agencies, upslope infiltration facilities could be designed to safely overflow to infiltration trenches or spreaders at the landward edge of the floodplain rather than to the river. This would reduce both water quantity and water quality impacts to the river, and would support the natural floodplain hydrologic systems, including hydrologic support for Wetlands A, B, and C.

- Consider BAS, including broad research on tire chemical impacts on listed salmonids and LID treatment options (discussed in Section 4.2.3). Application of BAS regarding protection of listed fish in the river from documented lethal impacts of 6PPD is consistent with protection of listed species required under federal and local law, and also with Pierce County's Comprehensive Plan policies listed in Section 4.2.2., particularly those for using BAS and adaptive management for critical areas, using LID practices to maintain water quality for fish, and eliminating harm to water quality from stormwater discharges through use of on-site infiltration and other means (Goal ENV-14, Goal ENV-15, Policy ENV-15.3, Policy ENV-5.14, Policy U-32.2).
- Consider overall reduction of site hard surfaces and apply LID techniques as needed to reduce water quality impact concerns, and to maintain current ground water functions and hydrology volumes flowing to the floodplain. This stormwater management approach would also benefit floodplain wetlands.

Wetlands

The groundwater source for hydrology supporting Wetlands A, B and C would decrease as a direct result of an increase in impervious surface on the high terrace—paving and buildings in the future KFIP warehouse complex. This condition in combination with the stormwater management system being designed to capture and send most site runoff directly to the river results in less on-site infiltration and replenishment of groundwater. Proposed infiltration from four warehouse roofs would be sent to top of slope trenches that are mostly sited hydrologically downstream from the floodplain wetlands, and thus may not support wetland hydrology. If these results are left unabated, Wetlands A, B and C are expected to shrink, or even disappear, due to lack of on-site infiltration, the main source of the floodplain wetlands' hydrology. Mitigation Measure SW-2 would minimize the impacts of site surface changes to groundwater functions. However, there is not currently enough information about wetland hydroperiods describing how the wetlands function over the entire water year to confidently design an effective wetland hydrology support strategy.

Protecting wetland hydrology is required in law (PCSWDM), and thus the methods used to provide hydrology to these wetlands as well as to monitor and document that the wetland hydrologic support system works as designed must be fully addressed in the site design and mitigation plans.

SW-3. Hydrogeologist/Geotechnical engineer assessment of steep slopes and location of proposed infiltration facilities.

- As part of permit review and consistent with PCC 18E.80 (Landslide Hazard Areas), a geotechnical engineer or equivalent should evaluate the steep, sandy slopes below the currently proposed infiltration trench locations to determine whether the sandy floodplain terrace slopes would withstand hydraulic loading pressures from the proposed infiltration facilities. This work is intended to ensure that the slopes would not fail and erode to the floodplain below from hydraulic loading impacts, and to ensure stability of the directly adjacent upslope parking, roads, and warehouses' infrastructure. The advisability and impact of the trenches located in landslide hazard areas should be weighed, and application of appropriate setbacks from top of slope

should also be considered. Alternate infiltration facility locations farther from the top of slope may be required to ensure slope stability is protected.

SW-4. Surface and Groundwater Hydrology monitoring prior to final site design and construction in all on-site wetlands to define hydroperiods[13], as needed to develop effective plans to preserve current wetland hydrology, as required in Code.

Assessment of hydroperiod is the technical standard applied to projects with wetland hydrology impacts that require proper management to avoid loss of wetland acreage (No-Net Loss goals). The hydroperiods of the on-site wetlands have not been defined. This information provides a baseline to inform infiltration facility design and location, and to ensure that wetland hydrology volumes and timing of inflows are supported both during and after construction, which is expected to take several years to complete. Site design and scheduling must have a specific plan for providing adequate hydrology during appropriate time periods to the on-site wetlands throughout KFIP construction activities as well as during long-term operations.

- Conduct groundwater and surface water monitoring prior to final KFIP site design and permitting to define the hydroperiod for on-site wetlands (A, B, C, and D), and use the resulting information to put plans in place for providing adequate wetland hydrology during both construction and operation phases.
  - Wait to finalize site design and construction plans until at least one water-year of monitoring is complete, so adequate information is available to ensure that KFIP can redirect on-site stormwater to maintain current hydrology functions (water quality and water quantities) of on-site wetlands and to support off-site remnant portions of Wetland D. Protection of wetland hydrology and avoidance of impacts to wetlands is required by law (PCSWDM, Minimum Req. #4 and PCC 18E.40.050, respectively).
  - Hydroperiod monitoring should take place over at least one wet season and include initial infiltration testing in proposed infiltration areas, and installation of long-term monitoring wells with water level dataloggers in constructed infiltration areas and in wetland areas to determine groundwater levels and document that hydrology timing and volumes are adequate to maintain and preserve historic wetland conditions.
  - Monitoring should also evaluate and define the purpose of each infiltration trench within the context that most of the currently proposed infiltration trench locations are not sited hydrologically upslope from Wetlands A, B and C, and none are proposed near Wetland D. Therefore, the currently proposed infiltration facilities may not provide hydrology at the right locations to effectively support the on-site wetlands but may provide other floodplain benefits.

[13] Wetland Mitigation in Washington State Part 1: Agency Policies and Guidance, Chapter 8.2 and SMMWW (Ecology 2019), Appendix I-C.4 Wetland Hydroperiod Protection

        - There is no current mitigation strategy designed to preserve current hydrology in the remaining off-site portions of Wetland D, as is required by law.
        - If fill of Wetland D is allowed, conduct surface water monitoring in off-site areas of Wetland D to address loss of surface water storage and resultant increased potential for displacement of flood waters on off-site areas to the east.
    - Ensure plans are in place to maintain wetland hydrology and protect wetlands throughout construction.
        - Currently there is no information on how the KFIP Project would preserve wetland hydroperiods during construction, prior to installation of the infiltration trenches and construction of warehouse roofs that are intended to provide stormwater volumes for infiltration (as discussed in section 4.2.4).
        - Properly designed and located infiltration facilities must be in place early in construction phases to ensure that there is no extended lapse in pre-existing wetland hydrology patterns either during construction or during operations.
    - Redesign or relocate infiltration facilities as needed to ensure maintenance of adequate hydrology during construction and long-term operations.

SW-5. Long-term groundwater monitoring during operations to document success of proposed hydrology support. Due to uncertainties about the effectiveness of proposed infiltration trenches to replenish Wetlands A, B, and C:

- Groundwater wells should be maintained and continuously monitored (use of water level dataloggers is indicated) for at least ten years during and after construction is complete to document long term conditions with ground and near-surface water levels in the vicinity of Wetlands A, B, and C, and at Wetland D. Ten years of monitoring is standard under federal and state regulations when mitigation involving proof of wetland hydrology requires verification. The same monitoring would apply to remaining off-site portions of Wetland D, pending development of a mitigation and monitoring plan for the proposed fill.
- Per requirements of the PCSWDM and PCC 18E, compensatory mitigation requirements apply if groundwater replenishment and associated wetland hydrology functions are shown to be reduced over time. This may require redirection of some stormwater runoff volumes from upland areas to infiltration facilities or development of new infiltration facilities.

SW-6. Wetland D impact avoidance.

- If the Project were revised to avoid all impacts to Wetland D and its regulated buffer, no significant impacts would occur to this resource on site.
- The permitting agencies (Pierce County, and Ecology) should determine how the Applicant has properly followed standard mitigation sequencing, including initial avoidance of the impact altogether and site planning design changes needed to avoid or minimize loss of wetland and buffer area at Wetland D.

- The permitting agencies should document if an alternate site plan that does not fill Wetland D still allows for reasonable economic use and if the Project objective can still be fulfilled without fill of and construction over Wetland D of the KFIP site.
- If the mitigation sequencing were to be fulfilled, the Applicant is expected to prepare a mitigation plan and file a JARPA form with Ecology and Pierce County to initiate regulatory review of the current KFIP proposal, which is to fill a portion of Wetland D and its associated on-site buffer.
- If fill of Wetland D and its buffer is permitted by all of the agencies listed above, a final detailed mitigation plan addressing Wetland D fill should be completed and implemented prior to construction, following standard mitigation and minimization sequencing protocols.

SW-7. Mitigation and monitoring plan.

- Depending on the outcomes of SW-6, per PCC 18E and Ecology requirements, a JARPA permit process would require a detailed mitigation and monitoring plan to be developed as conditioned during the review described above. The Plan is required to define the full range of mitigation measures needed to compensate for impacts to the remnant Wetland D, off site to the east, and to mitigate for loss of approximately one-acre of wetland plus associated buffer area impacts on site. To meet no net loss goals, as described in Ecology mitigation guidance (Ecology [F], 2009), the not yet developed mitigation and monitoring plan should evaluate previous wetland and buffer losses to the basin as a whole, and should provide for mitigation at appropriate replacement ratio levels, as described in code, that would replace the lost water quantity, water quality and wetland habitat functions during construction as well as during long-term operations.
  - The Wetland D delineation and report prepared by the EIS Team in 2021 should be used by the permitting agency as a basis for developing an appropriate mitigation and monitoring plan per County mitigation regulatory standards. Additional work and/or reporting may be needed, as required during the permitting and review process.
  - The mitigation plan should determine potential for impacts to adjacent, off-site properties (owned by others) due to the proposed fill action, and the permitting agency should approve a fill design only if the Applicant can show that wetland and upland properties to the east at Wetland D would not be flooded or inadvertently converted to wetlands as a result of bisecting and filling portions of Wetland D on the KFIP site.
  - Surface water inflows from the south that currently support this wetland system must be monitored and realigned to ensure that they still provide adequate hydrology to support the remaining eastern (off-site) portions of Wetland D.
  - During long-term operations, if allowed by the adjacent landowner, the Applicant would typically need to install groundwater wells to monitor hydrology in the remnant Wetland D to ensure that similar wetland conditions persist after construction is complete. The mitigation plan may include improvement of the off-site wetland system, as may be allowed by the adjacent landowner. If not, other mitigation may be required.

- Other contingency mitigation plans may be needed to address potential hydrology source impacts to Wetland A, B, and C, as described above, if monitoring indicates that wetland hydrology is decreasing over time.
- Mitigation for buffer impacts could include revegetation of currently farmed or weedy areas in the floodplain using native plants.
- To meet general requirements of County and federal regulations, related to mitigation timing, at least initial stages of implementation of the mitigation plan should typically be completed prior to final permitting and site design approval.

Floodplains and Shorelines

The existing outfall that was constructed as part of the Viking Warehouse Project is degrading and potentially failing. Mitigation Measure SW-1 above would minimize erosion and sedimentation impacts on water quality in the Puyallup River and erosion impacts in the floodplain.

SW-8. Reduction of on-site erosion and sediment movement.

- Replanting currently farmed or cleared areas in the floodplain upslope from the outfall with native trees and shrubs would act to trap sediment during surface flood events, reducing sediment impacts to the river and to the outfall structure. This approach would also provide for a more effective replacement of lost riverine buffer habitat functions near the outfall as well as lost buffer function at Wetland D.

4.2.6 Significant Unavoidable Adverse Impacts

There are significant adverse impacts to surface water quality and quantity from the current proposal.

- Surface water quality impacts that would result from directing paved areas runoff directly to the Puyallup river without adequate treatment to remove 6PPD tire oxidant pollutants have potential for lethal impacts to listed salmonids in the river. Directing new volumes of stormwater from paved surfaces to the river would increase current levels of the pollutant in the river and thus would degrade water quality relative to the current condition, and thus is expected to increase fish mortality.
- Surface water quality impacts from erosion, sedimentation and potential structural failure of the existing stormwater outfall facility sited on the floodplain at the edge of the Puyallup require repair, redesign, or relocation of some of the outfall functions or associated upland KFIP stormwater management system. This is necessary to reduce or eliminate new impacts to fish habitat in the river, impacts that have resulted from the outfall and riverbank stabilization efforts not addressing hydraulic impacts to the outfall and riverbank from normal seasonal flooding and scouring.
- Surface water quantity impacts to floodplain wetlands would result from redirection of surface water and inadequate infiltration facility design, and is expected to result in loss or decline of the floodplain wetlands surface area.
- Filling at Wetland D would result in direct loss of about one acre of wetland and its associated on-site wetland buffer, in addition to unavoidable impacts to functions and values to the

remaining off-site portions of Wetland D. There is no current fill permit or mitigation plan designed to compensate for those losses.

The current proposal results in significant adverse impacts to surface water systems.