



LOWER GREEN RIVER CORRIDOR FLOOD HAZARD MANAGEMENT PLAN

Draft Programmatic Environmental Impact Statement

Volume II

Appendix F: Cumulative Impacts





Appendix F

Cumulative Impacts

March 2023

TABLE OF CONTENTS

1.	INTRODUCTION	F-1
2.	EVALUATION OF CUMULATIVE IMPACTS.....	F-6
3.	REASONABLY FORESEEABLE FUTURE ACTIONS.....	F-8
3.1	Natural Environment.....	F-8
3.1.1	Downstream Fish Passage at Howard Hanson Dam.....	F-8
3.1.2	Fish Passage at Black River Pump Station.....	F-8
3.1.3	Water Resource Inventory Area (WRIA) 9 Projects on Green River.....	F-8
3.1.4	Climate Change.....	F-9
3.1.5	Total Maximum Daily Load Goals on Green River and Tributaries.....	F-9
3.2	Built Environment	F-10
3.2.1	Continued Planned Development	F-10
3.2.2	Puget Sound Regional Council Vision 2050	F-10
3.2.3	Transportation Infrastructure Plans	F-11
4.	CUMULATIVE IMPACTS	F-13
4.1	Summary of Past and Present Impacts and Proposed Alternatives.....	F-13
4.2	Summary of Impacts of Reasonably Foreseeable Future Actions and Changes	F-17
4.3	Combined Impacts of Reasonably Foreseeable Future Changes and Proposed Alternatives	F-22
4.3.1	Further information on reasonably foreseeable future actions.....	F-23
5.	REFERENCES	F-24

LIST OF FIGURES

Figure 1-1.	Lower Green River Corridor	F-2
Figure 1-2.	Green River Watershed	F-3

LIST OF TABLES

Table 4-1.	Summary of Past and Present Impacts and Impacts of the Proposed Alternatives.....	F-13
Table 4-2.	Impacts of Reasonably Foreseeable Future Changes.....	F-17
Table 4-3.	Summary of the Evaluation of Impacts from Reasonably Foreseeable Actions and Changes	F-21
Table 4-4.	Cumulative Impact Summary	F-22

ACRONYMS AND ABBREVIATIONS

Board	King County Flood Control District Board of Supervisors
cfs	cubic feet per second
CFR	Code of Federal Regulations
CIP	capital improvement plan/program
Corps of Engineers	U.S. Army Corps of Engineers
Corridor	Lower Green River Corridor
District	King County Flood Control District
Ecology	Washington State Department of Ecology
FCD Motion	Flood Control District Motion
HHD	Howard Hanson Dam
I-405	Interstate 405
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
PEIS	Programmatic environmental impact statement
PL	Public Law
Plan	Flood Hazard Management Plan
PSRC	Puget Sound Regional Council
RM	river mile
SEPA	State Environmental Policy Act
SM	shoreline mile
Sound Transit	Central Puget Sound Regional Transit Authority
SR	State Route
TMDL	total maximum daily load
WAC	Washington Administrative Code
WRIA	Water Resources Inventory Area
WSDOT	Washington State Department of Transportation

1. INTRODUCTION

The King County Flood Control District (District) is proposing a Lower Green River Corridor Flood Hazard Management Plan (Plan) for a reach of the Lower Green River and its associated floodplains that occur in portions of the cities of Auburn, Kent, Renton, SeaTac, and Tukwila, as well as unincorporated King County (**Error! Reference source not found.**). The Lower Green River Corridor (corridor) covers approximately 21 river miles (RMs), the equivalent to 42 shoreline miles (SMs), from RM 11 to RM 32. The District is preparing a draft programmatic environmental impact statement (PEIS) that analyzes three alternative approaches to flood risk management in the corridor. The District is a county-wide special purpose district created to provide funding and policy oversight for flood risk reduction capital projects and programs in King County. The goal of the Plan is to provide a long-term approach to reduce flood risks, to address Tribal interests, and to improve fish habitat, while supporting the economic prosperity of the region. In 2014, the District Board of Supervisors (Board) set a provisional level of flood protection for the Lower Green River: a median flow of 18,800 cubic feet per second (cfs), plus 3 feet of freeboard, as measured at the Auburn gage, as the desired level of protection to meet this goal (King County Flood Control District Motion (FCD) 14-09).

The Green River is within the Washington State Department of Ecology's (Ecology's) Water Resource Inventory Area (WRIA) 9. It is 65 miles long between its mouth and the Howard Hanson Dam (HHD) near Palmer in unincorporated King County. As shown in Figure 1-2, it originates from headwaters in the Cascade Mountains in southeastern King County (Upper Green River Subwatershed), flows westward through the Green River Gorge State Park to an alluvial valley in mid-basin (Middle Green River Subwatershed), then turns north near Auburn through a lowland valley (Lower Green River Subwatershed) to the mouth of the Duwamish (Duwamish Estuary Subwatershed). At its confluence with the Black River, the Green River becomes the Duwamish River and continues northward, emptying into Puget Sound's Elliott Bay.

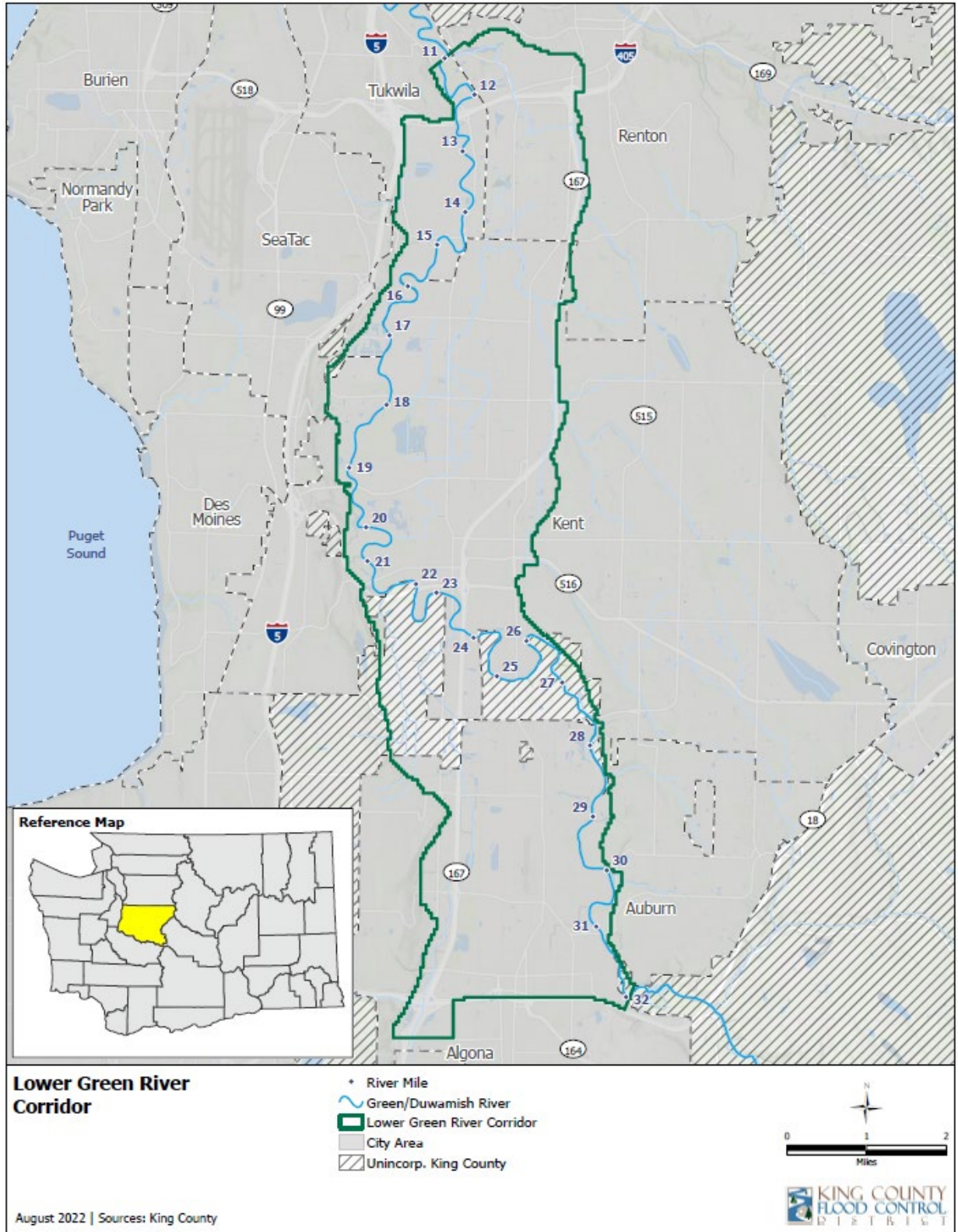


Figure 1-1. Lower Green River Corridor

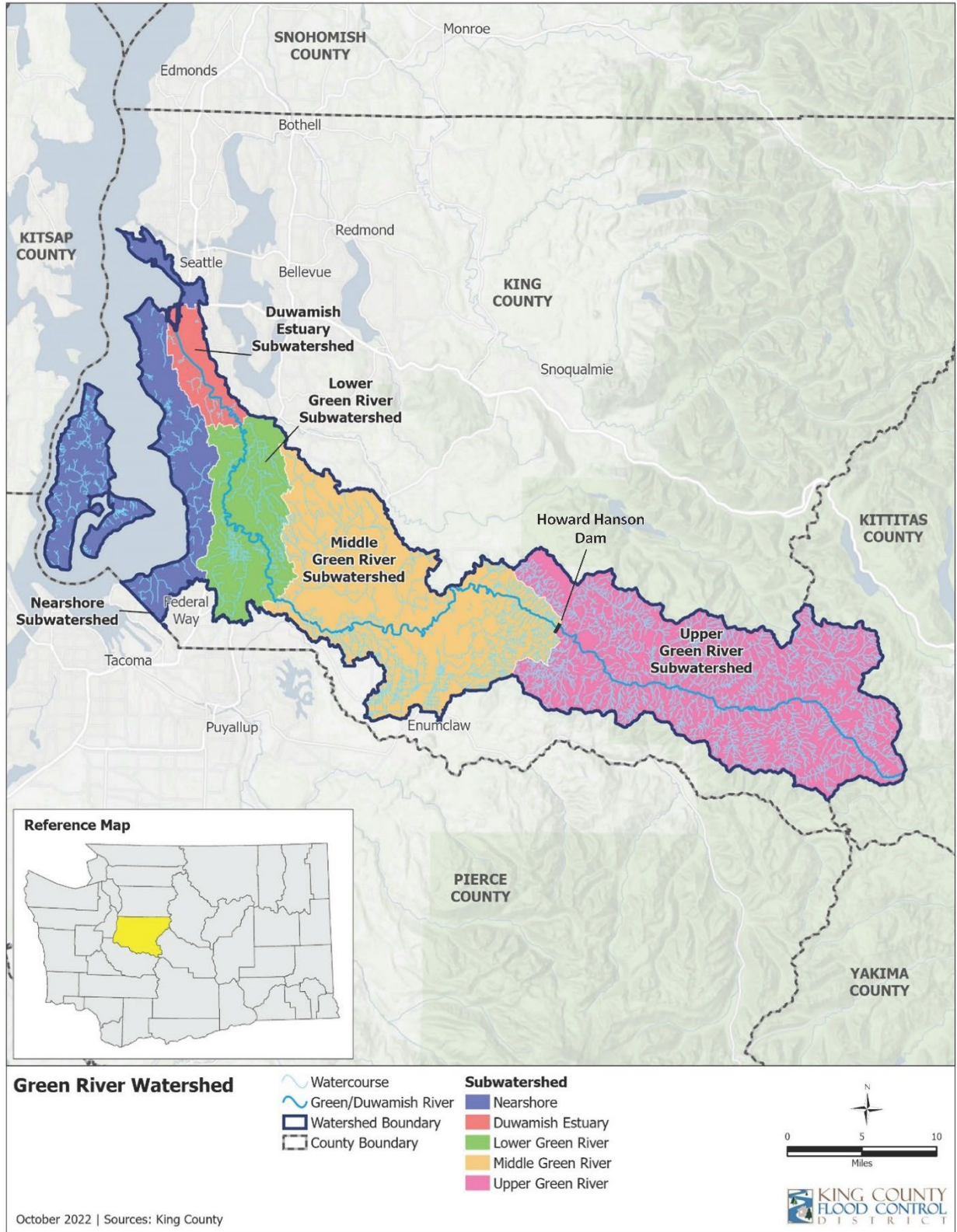


Figure 1-2. Green River Watershed

The information and analysis in the PEIS is based on the following technical appendices:

Appendix A: Alternatives Development describes the main policies and regulations that relate to flood hazard management on the Lower Green River. The appendix briefly explains the need for additional flood hazard management, the proposed alternatives, and how the alternatives were developed. The appendix describes structural and flood proofing approaches to flood management and includes preliminary, planning-level cost estimates.

Appendix B: Natural Environment describes the affected environment, methodologies, potential impacts, and mitigation for elements of the natural environment.

Appendix C: Built Environment describes the methodologies, affected environment, potential impacts, and mitigation for elements of the built environment.

Appendix D: Equity and Social Justice is based on information in appendices B and C and describes disadvantaged populations who experience inequities and how they could be impacted by flooding and flood hazard management.

Appendix E: Tribal Matters describes Tribal treaty rights and interests on the Lower Green River Corridor. The appendix is based on information in appendices B, C, D, and F and describes how Tribal treaty rights and interests intersect with existing conditions on the Green River and the potential impacts of flood hazard management.

Appendix F: Cumulative Impacts describes reasonably foreseeable and potential changes to the environment relevant to the Lower Green River Corridor. These changes are combined with past changes and potential impacts described in appendices B and C to evaluate the potential combined impacts over the 30- to 50-year planning horizon.

Appendix G: Outreach Summary contains outreach efforts during the scoping periods for the PEIS, as well as ongoing outreach and efforts to announce the availability of the draft PEIS.

PEIS Appendix A contains a description of the three alternative approaches to managing flood risk in the Lower Green River Corridor. They are summarized below for readers' convenience.

Alternative 1: Project-by-Project Multibenefit Implementation (No-Action Alternative)

This alternative illustrates how the District would provide flood hazard management on the Lower Green River following established policies and practices without the guidance of an area-specific Plan. Adoption of a Plan for the Lower Green River is the proposed action for the PEIS. This alternative is the benchmark for comparing alternatives.

The District adopted a multibenefit policy in 2020 (FCD Motion 20-07) that would be considered and incorporated to the extent feasible as individual projects were implemented. Flood hazard management projects would be implemented under successive capital improvement plans (CIPs) without guidance from an area-specific Plan for the Lower Green River. Alternative 1 incorporates the CIP approved in FCD Resolution 2021-16 (the 2022 6-year CIP list).

Alternative 2: Systematic Multibenefit Implementation

This alternative would systematically implement the multiple benefits described in FCD Motion 20-07. Implementation would include habitat conservation and fish restoration.

The District would develop an area-specific Plan for the Lower Green River Corridor in collaboration with Tribes, federal and state agencies, local jurisdictions, and stakeholders. The Plan would establish goals and indicators for managing flood hazards, would support a safe and healthy environment for communities along the river, and would conserve and, where possible, enhance aquatic and riparian habitats and conditions to support the recovery of threatened salmon and other species.

The Plan would describe actions the District would take under its authority and would highlight potential partnership opportunities with Tribes, federal and state agencies, local jurisdictions, and stakeholders. The multibenefits described in FCD Motion 20-07 would be systematically advanced in the Plan.

This alternative would introduce the potential use of flood proofing to reduce the effects of flooding, rather than to reduce the risk of flooding.

Alternative 3: Enhanced Systematic Multibenefit Implementation

This alternative would be a substantial shift from the District's current practices. Under this alternative, the District would continue to provide flood hazard reduction, but it would pursue habitat conservation and restoration to a notably greater extent than under either of the other alternatives, while achieving multiple benefits across the Lower Green River.

The District would develop an area-specific Plan for the Lower Green River in collaboration with Tribes, federal and state agencies, local jurisdictions, and stakeholders. This Plan would place a greater emphasis on conserving and restoring habitat for threatened salmon and other species. The Plan would establish goals and indicators for managing flood hazards in a manner that would protect, improve, and restore riparian and aquatic habitats, and it would establish conditions that would support the recovery of threatened salmon and other species. The Plan would describe the actions that the District would take under its authority, and it would highlight potential partnership opportunities with Tribes, federal and state agencies, local jurisdictions, and stakeholders. The multibenefits described in FCD Motion 20-07 would be systematically and rigorously advanced.

With this alternative, the District would maintain enrollment in the Public Law (PL) 84-99 facilities program, but it could, in conjunction with flood hazard management actions, pursue flood management improvements at a scale and design supporting progress towards achieving adopted salmon habitat goals. This alternative would include taking advantage of opportunities to restore habitat functions (e.g., increasing channel capacity to provide backwater or off-channel rearing habitat). With cooperation from local jurisdictions, some adjacent property owners could be provided with incentives to help accommodate these changes.

In addition to flood proofing, this alternative would introduce the potential acquisition of property that would meet certain criteria to preserve floodplain storage.

No Build Scenario

This scenario is included to illustrate the consequences of inaction. The description includes inundation maps and explanations of how the Lower Green River area would be affected by flooding. Because the core mission of the District is managing flood hazards, and this alternative does not provide flood hazard protection throughout the corridor, this scenario is not evaluated in detail as a potential alternative in the PEIS.

Under the No Build Scenario, the District would maintain existing facilities, including PL 84-99 facilities, to meet current requirements. Work would continue on facilities currently under construction. However, projects included in the CIP (2022 6-year CIP) that are not under construction would not proceed. Existing flood hazard management facilities would not be modified to provide the provisional 18,800 cfs level of protection, plus 3 feet of freeboard. No additional flood hazard management actions or related improvements on the Lower Green River would be undertaken.

2. EVALUATION OF CUMULATIVE IMPACTS

State Environmental Policy Act (SEPA) rules include cumulative impacts as one of the types of impacts that must be considered in environmental review (Washington Administrative Code [WAC] 197-11-660). However, a specific definition is not provided in the rules. This evaluation follows a definition developed for the National Environmental Policy Act (NEPA, 40 Code of Federal Regulations [CFR] 1508.1 (g)(3)), which states that cumulative impacts are the result of the proposed action combined with past, present, and reasonably foreseeable actions.

The impacts of past and present actions are described in several places in the PEIS. The past impacts of historical flood hazard management practices and the present impacts of existing flood hazard management plans on the Lower Green River are evaluated in the affected environment sections of Appendices B and C, and the potential impacts of implementing the Plan are evaluated in the impacts and mitigation sections of those appendices.

Appendices B, C, and D provide a cumulative assessment of potential impacts through a programmatic evaluation of the entire corridor and the proposed flood hazard management actions over a 30- to 50-year implementation period. The evaluation in this appendix identifies and briefly describes other reasonably foreseeable actions that could contribute to an overall cumulative impact. Reasonably foreseeable actions are defined as actions or projects included in adopted plans or actions that have been authorized through permits or other approvals but have not yet been completed. Links to additional information on reasonably foreseeable actions are provided at the end of this appendix. Climate change is included as a reasonably foreseeable future change.

Potential impacts from the reasonably foreseeable actions assume that existing regulations and practices will continue and that customary mitigation measures would be applied. The evaluation of cumulative impacts for Alternatives 1, 2, and 3 is relative to the No Build Scenario. This evaluation is qualitative, and it is at a planning level commensurate with the programmatic nature of the action and the planning period of 30 to 50 years. The assessment of potential impacts for each subject considers the action in the context of the Green River and intensity of the impact. In some cases, an action could have both positive and negative impacts. Impacts are evaluated following the SEPA definition as “...effects or consequences of actions...upon the elements of the environment” (WAC 197-11-752).

The reasonably foreseeable actions are evaluated by the same subject matter experts that studied the Lower Green River Corridor and the proposed alternatives. Brief, planning level explanations of their impact evaluation is provided for each subject for each of reasonably foreseeable actions and each of the alternatives. The evaluation relies on the same information provided in Appendices B, C, and D and includes these subjects:

Natural environment:

- Aquatic Resources
- Water Quality
- Hydrology

Built environment:

- Population, Demographics, and Housing
- Social Resources
- Employment and Business

- Agriculture
- Public Services and Infrastructure
- Parks and Recreation
- Historic and Cultural Resources

Cumulative impacts are evaluated using this scale:

- Substantial negative impacts (↓↓↓)
- Moderate negative impacts (↓)
- Both negative and positive impacts (↓↑)
- Moderate positive impacts (↑)
- Substantial positive impacts (↑↑)
- No meaningful impacts or not applicable (↔)

The determination of “substantial” or “moderate” is the opinion of the subject matter expert considering the nature of the impact and context of the corridor.

3. REASONABLY FORESEEABLE FUTURE ACTIONS

3.1 Natural Environment

3.1.1 Downstream Fish Passage at Howard Hanson Dam

The U.S. Army Corps of Engineers (Corps of Engineers) plans to build a facility that will allow juvenile Chinook salmon, coho salmon, and steelhead to safely travel downstream past the Howard Hanson Dam (HHD). (Fish are already collected and trucked around the dam for upstream passage.) Construction is scheduled to begin in 2026 and be complete in 2030. According to the Corps of Engineers, the project will achieve the following:

- Improve access to more than 100 miles of spawning and rearing habitat in the Green River and its tributaries.
- Restore biological connectivity between the upper and lower portions of the Green River basin.
- Improve the abundance and productivity of species listed as threatened or endangered under the Endangered Species Act, including Chinook salmon, steelhead, and Southern Resident killer whales.

In anticipation of the return of salmon and steelhead to the upper watershed, Tacoma Public Utilities and the Corps of Engineers have been working on projects to restore fish habitat upstream of the HHD.

3.1.2 Fish Passage at Black River Pump Station

King County is exploring options for improving upstream and downstream fish passage at the Black River Pump Station in Renton. The existing fish passage and exclusion systems do not meet current federal fish passage design requirements, and they are believed to hinder migration and harm fish. Conceptual approaches for interim modifications and long-term solutions are under review. Following input from Tribes and stakeholders, the concepts will be refined and further developed with a goal of starting to implement improvements in 2025.

3.1.3 Water Resource Inventory Area (WRIA) 9 Projects on Green River

The 2021 Salmon Habitat Plan Update for WRIA 9 identifies nearly 80 proposed habitat restoration projects in the Green/Duwamish watershed (projects in marine nearshore areas outside the Duwamish River estuary are not included in this count). More than half of those projects are in the Lower Green River subwatershed, which largely encompasses the Lower Green River Corridor. Thirteen of those are classified as Tier 1 (high-priority) projects, based on their high potential to contribute substantially to recovery goals. Examples of habitat restoration project types include the following:

- Create backwater, side channel, and off-channel habitat.
- Restore channel complexity and meanders.
- Revegetate riverbanks.
- Add large woody material to create habitat complexity, cover, and refuge.
- Restore floodplain wetlands.
- Restore connections between floodplain wetlands and the river.

- Provide access to tributary rearing habitat.
- Remove revetments.
- Set back existing levees.
- Improve fish passage.

Individually and collectively, these projects are expected to have beneficial effects on a wide range of aquatic resources, including salmon and salmon habitat. Several of the projects are also expected to increase flood storage capacity, reducing the risk of flood damage.

3.1.4 Climate Change

Climate change is expected to exacerbate and prolong naturally occurring stressful environmental conditions. Increasing air temperatures will contribute to the warming of surface waters, degrading habitat quality for fish. Warmer, wetter winters and drier summers will lead to decreased snowpack, diminished summer-season stream flows, and further rises in water temperatures. Increasingly frequent high-intensity storms during winter and spring will likely result in high-flow events that can damage natural resources (for example, by washing salmon eggs out of spawning beds) and the built environment. Warmer, drier conditions, more frequent drought, and a longer fire season is expected to increase both the frequency and the intensity of wildland fires, reducing forest cover and degrading air quality in the region.

Climate change and its effects on temperature, precipitation, storm patterns, and sea level rise have implications for the construction, maintenance, and operation of buildings and infrastructure. Flooding and heat waves can directly impair the performance and longevity of buildings and infrastructure.

Increased precipitation will increase surface runoff from impervious areas and the transport of pollution to the Green River. Increased surface water runoff will also increase the amount of erosion in smaller streams and unprotected banks along the river.

Decreased summer low flows and increased winter high flows are likely to affect the Upper Green River watershed most. Effects on the mainstem below the HHD may be mitigated to some degree by water management in the reservoir. Reservoir management practices are, however, subject to change. Reaches of the Lower Green River that are leveed, even partially, and disconnected from their floodplains are likely to exhibit the greatest impacts in frequency and intensity of winter flows.

3.1.5 Total Maximum Daily Load Goals on Green River and Tributaries

Studies have found that water quality in the Green River and several of its tributaries is impaired. As required by the Clean Water Act, the Washington State Department of Ecology (Ecology) has developed total maximum daily load (TMDL) studies and improvement plans that identify strategies for bringing these waters into compliance with water quality standards. The list below identifies the TMDLs that have been approved or are under development in the Green River basin, along with the water quality parameters addressed in each TMDL.

- Green River—Water temperature (approved)
- Newaukum Creek—Water temperature (approved)
- Soos Creek—Water temperature, dissolved oxygen, fecal coliform bacteria, aquatic habitat (under development)

This list shows that elevated water temperatures are a concern in many areas. Strategies for reducing water temperatures focus on providing more shade in riparian areas and protecting cool groundwater.

Fecal coliform levels can be reduced through repair of faulty onsite septic systems and through public education about proper handling of pet waste.

As these strategies are implemented, the capacity for the Green River and its tributaries to support beneficial uses—such as providing fish habitat and opportunities for recreational uses—will increase. Implementation of the water temperature improvement strategies will lead to an increased amount of vegetative habitat along the stream network, along with an increased emphasis on low-impact development, infiltration of stormwater runoff, and wetland restoration and creation.

Stormwater runoff generally contributes to or is a secondary consideration in the impairments described above. For example, the portion of stormwater runoff that is infiltrated into the ground can support cool water inputs that off-set temperature impacts. Some constituents that contribute to low dissolved oxygen conditions in receiving waters could be in stormwater runoff and be reduced or controlled by stormwater best management practices. Stormwater flow control measures in new or retrofit redevelopment can reduce the potential impacts of erosion and channel modification that impacts or alters aquatic habitat. TMDL implementation plans often includes measures to control the contributing causes from stormwater runoff.

3.2 Built Environment

3.2.1 Continued Planned Development

King County and local jurisdictions (i.e., the cities of Auburn, Kent, Renton, SeaTac, and Tukwila) have the legal authority to approve and implement development projects in and near the Green River. Likely projects include housing, commercial development, infrastructure (transportation and utilities), and recreation facilities. Planning documents—including comprehensive plans, transportation plans, and shoreline master programs—will continue to influence the pace and distribution of these projects. As required by the Growth Management Act, the jurisdictions' shoreline master programs, critical areas ordinances, and stormwater regulations include provisions for limiting the negative effects of new development and other land alterations in floodplains. Compliance with these plans is expected to continue the trend toward focused, high-density development in areas with sufficient infrastructure support, in conjunction with the maintenance of open space and other lands supporting recreational uses.

3.2.2 Puget Sound Regional Council Vision 2050

Over the next 30 years, the population of the central Puget Sound region is expected to grow by more than 1.5 million people. Chapter 1 of this PEIS presents information about anticipated population growth and job growth in the Lower Green River Corridor. To accommodate this growth, the Puget Sound Regional Council (PSRC) recently adopted VISION 2050, a blueprint for growth and transportation investments in King, Kitsap, Pierce, and Snohomish Counties. The plan includes a strategy to focus growth in centers and near transit, with the goal of sustaining and creating different types of urban communities while preserving the region's working resource lands and open spaces. Vision 2050 also does the following:

- Addresses current and past inequities, particularly among communities of color, people with low incomes, and historically underserved communities
- Outlines how state, regional, and local partners can coordinate activities to reduce greenhouse gas emissions in the region and to prepare for climate impacts
- Establishes a coordinated approach to watershed planning to restore the health of Puget Sound

- Contains plans for the protection and enhancement of natural areas

VISION 2050 references and relies on the Regional Open Space Conservation Plan and identifies open space and trails in the corridor.

Over the next several years, cities and counties in the region will be updating their local comprehensive plans. Conformance with the strategies, goals, and targets of Vision 2050 will help the region continue to provide connected communities, opportunity for all, a healthy natural environment, and an innovative, thriving economy. Broadly, these planning efforts are expected to continue the trend toward focused, higher-density development, easing development pressure in areas outside of growth centers.

3.2.3 Transportation Infrastructure Plans

The Central Puget Sound Regional Transit Authority (Sound Transit), the Washington State Department of Transportation (WSDOT), and Amtrak are developing and implementing plans to expand and upgrade transportation systems in the region. Examples of anticipated projects are described below. By increasing the resiliency of the transportation network and expanding options to reduce reliance on single-occupancy vehicles, these improvements are expected to alleviate pressure on transportation systems.

Sound Transit

Anticipated Sound Transit projects in and around the Lower Green River Corridor include the following:

- Access improvements at commuter rail stations in Kent and Auburn
- Expansion of commuter rail service and capacity in south King County and Pierce County
- Expansion of light service southward, to Tacoma
- Expansion of bus rapid transit service along Interstate 405 (I-405) and State Route (SR) 518
- Construction of a new transit center in South Renton

WSDOT

Anticipated WSDOT transportation planning and construction projects in and around the Lower Green River Corridor include the following:

- Puget Sound Gateway Program—Complete critical missing links in the highway and freight network on State Routes 167 and 509, thereby providing essential connections to the Port of Tacoma and the Port of Seattle.
- State Route 167 Master Plan—Identify and address near-term, medium-term, and long-term multimodal transportation needs and strategies along the highway corridor from the Port of Tacoma to Renton.
- State Route 900 (Martin Luther King Jr. Way South) Corridor Study—Assess pedestrian and traveler safety, multimodal access, and environmental needs between 57th Avenue South and the Renton city limits.
- Ultra-high speed rail study—Explore opportunities for the development of a high-speed rail corridor connecting Portland, Seattle, and Vancouver, British Columbia.
- I-5 Study—Work towards the creation of a master plan for the critical I-5 corridor that will meet current and future transportation needs and that will reflect strategic goals such as resiliency, equity, and workforce development.

Amtrak

Amtrak and WSDOT are developing a plan to expand and improve service on the Amtrak Cascades route, which extends from Vancouver, British Columbia, to Eugene, Oregon. Current efforts include identifying travel trends likely to affect ridership and defining options for addressing those trends. The plan will identify future capital improvements as well as service changes.

4. CUMULATIVE IMPACTS

This section evaluates the impacts of past, present, and reasonably foreseeable actions in the Lower Green River Corridor in combination with the impacts of the Plan alternatives to arrive at an assessment of cumulative impacts. Table 4-1 summarizes the impacts of past and present actions in the corridor along with the impacts of the Plan alternatives, while Table 4-2 summarizes the impacts of the reasonably foreseeable actions described in Section 3.1. Table 4-3 presents an overall evaluation of cumulative impacts for each element of the environment relative to the No Build Scenario.

4.1 Summary of Past and Present Impacts and Proposed Alternatives

Table 4-1. Summary of Past and Present Impacts and Impacts of the Proposed Alternatives

	Evaluation	Impact
No Build Scenario		
Aquatic Resources	Status quo would continue. There would be no change to aquatic resources.	↔
Water Quality	There would be no improvement to the current trend of water quality degradation within the study area.	↔
Hydrology	There would be some improvement in overbank flooding.	↑
Population, Demographics, and Housing	No infrastructure improvements would be made that would directly affect housing. Housing units would continue to be at risk of inundation, mostly in Kent and Auburn. This would predominantly affect housing in Very Low and Low Opportunity Areas.	↓↓
Social Resources	Social resources (child care, community centers, library, public Wi-Fi, medical facility, places of worship, Veterans/HHS facilities, and others) would continue to be at risk of inundation, requiring flood proofing or, potentially, relocation depending on depth.	↓↓
Employment and Business	Many businesses would be at risk of inundation, with resulting potential for job loss. Most of these jobs would be in Kent, Renton, and Auburn.	↓↓
Agriculture	Under the No Build Scenario, substantial farmland acreage would be flooded starting at flow levels of 9,900 cubic feet per second (cfs) and rapidly expanding at 11,900 cfs. Flooding depth would increase as higher flood flows occur.	↓
Public Services and Infrastructure	Between two and four fire stations would be affected by 1-foot inundation in Renton and Kent, with two of them also affected at a 4-foot inundation level, which could require relocation and cause access impacts during emergencies. Two police stations would be affected at a 4-foot level in Kent, also requiring relocation of facilities and access/response times impacts. Between four and six schools in Kent and Auburn could be affected by inundation requiring flood proofing, with one school affected beyond 4 feet of inundation in Auburn.	↓↓
Parks and Recreation	About 60% of the total park acreage in the corridor and multiple trails would be affected by inundation.	↓↓
Historic and Cultural Resources	The anticipated inundation could result in a loss of integrity and may damage known cultural resources, including National Register of Historic Places (NRHP) eligible archaeological sites, buildings, structures, and objects. Additionally, due to the larger area potentially affected, flooding events would have an increased potential to damage previously undocumented cultural resources, including unidentified archaeological sites and buildings, structures, and objects that have not yet been evaluated for listing.	↓

More Substantial adverse negative impacts (↓↓)

Some Moderate adverse negative impacts (↓)

Both adverse negative and positive impacts (↓↑)

Some Moderate positive impacts (↑)

More Substantial positive impacts (↑↑)

No meaningful impacts or not applicable (↔)

Table 4-1. Summary of Past and Present Impacts and Impacts of the Proposed Alternatives (continued)

	Evaluation	Impact
Alternative 1: Project-by-Project		
Aquatic Resources	Levee improvements and associated compensatory mitigation would continue in the future. Levee system improvements may not substantially benefit the aquatic environment. Compensatory mitigation for improvements would be intended to offset impacts, not necessarily to lead to substantially improved conditions.	↔
Water Quality	Alternative 1 includes the largest percentage of facility types that would negatively impact water quality and therefore would be expected to result in the greatest negative impacts to water quality compared to the other alternatives.	↓↓
Hydrology	There would be some improvement in overbank flooding.	↑
Population, Demographics, and Housing	Alternative 1 could impact up to 60 housing units directly, with the greatest impacts in Auburn. Alternative 1 would substantially reduce the number of homes and population at risk of inundation compared to the No Build Scenario. Homes and population at risk would be slightly lower compared to Alternatives 2 and 3. The areas most affected would be Kent, Auburn, and unincorporated King County.	↑
Social Resources	Social resources would not be subject to direct impacts. Some facilities would be subject to more than 1 foot of inundation (e.g., childcare, places of worship), requiring flood proofing or relocation. Existing trees and non-motorized facilities within the facility footprint would be impacted, but the modified and new facilities could also incorporate trees and non-motorized access. Impacts under Alternative 1 would be similar to those under Alternatives 2 and 3.	↑
Employment and Business	One structure would likely have direct impacts. Jobs at risk of inundation of greater than 4 feet would be up to 15,000, the lowest of the range of Alternatives 1, 2, or 3 and less than the No Build Scenario.	↑
Agriculture	Alternative 1 would follow the same general trends as described in the No Build Scenario for the six flows. Some improvement in flood reduction benefits would appear likely from the 12,600 cfs flow to the 18,800 cfs flow.	↓
Public Services and Infrastructure	Alternative 1 would not impact fire and police facilities directly by levee improvements, or as a result of inundation. One private school could be impacted by inundation, but no other schools would be affected by levee improvements, inundation to properties, or school access routes. Under Alternative 1, similar to other alternatives, inundation impacts could occur to infrastructure, including airports, parking areas, roads, water, sewer, and stormwater facilities, with Alternative 1 typically at a similar or lower impact than Alternatives 2 and 3.	↓
Parks and Recreation	Under Alternative 1, direct impacts to parks due to levee improvements would be higher under Alternative 1 than Alternative 2 and lower than Alternative 3; direct impacts to trails would be lower under Alternative 1 than Alternatives 2 and 3. Similarly, under Alternative 1 inundation impacts to parks and trails would be lower than Alternatives 2 and 3.	↓↑
Historic and Cultural Resources	Facility work may have some potential to affect cultural resources, particularly archaeological resources located close to the Green River. Projects undertaken under Alternative 1 may limit or mitigate flooding, lowering damage to cultural resources, including both recorded and previously unrecorded archaeological sites, buildings, structures, and objects.	↓↑

More Substantial adverse negative impacts (↓↓)

Some Moderate adverse negative impacts (↓)

Both adverse negative and positive impacts (↓↑)

Some Moderate positive impacts (↑)

More Substantial positive impacts (↑↑)

No meaningful impacts or not applicable (↔)

Table 4-1. Summary of Past and Present Impacts and Impacts of the Proposed Alternatives (continued)

	Evaluation	Impact
Alternative 2: Systematic Implementation		
Aquatic Resources	Systematic implementation of more environmentally friendly levee designs would benefit aquatic resources.	↑
Water Quality	Alternative 2 would fall between Alternative 1 and Alternative 3 in the percentage of facility types that would adversely and beneficially impact water quality. Some space would be available to support vegetation and other outcomes with new, improved, and relocated levees or floodwalls that would be located along the river. Therefore, a moderate benefit to water quality would be likely from Alternative 2 compared to the other alternatives.	↑
Hydrology	Alternative 2 would result in some improvement in overbank flooding.	↑
Population, Demographics, and Housing	Alternative 2 could impact up to 60 housing units directly. It would substantially reduce the number of homes and the population at risk of inundation compared to existing conditions. Homes and population at risk of inundation would be slightly higher compared to Alternatives 1 and 2 but less than the No Build Scenario. The areas most affected would be Kent, Auburn, and unincorporated King County.	↑
Social Resources	Social resources impacted under Alternative 2 would be similar to those for Alternative 1, and they would be in similar locations.	↑
Employment and Business	Up to 16,400 jobs would be at risk of inundation of greater than 4 feet, which is more than Alternative 1 and less than Alternative 3 and less than the No Build Scenario.	↑
Agriculture	Alternative 2 would provide improved drainage and flood proofing, but due to limited elevation differences would have nearly the same impact on the amount of flooded farmland as Alternative 1. Alternative 2 also would have similar characteristics for flood depth and duration as Alternative 1.	↓↑
Public Services and Infrastructure	Alternative 2 would not impact fire and police facilities directly by levee improvements, or as a result of inundation. One private school could be impacted by inundation, but no other schools would be affected by levee improvements, inundation to properties, or school access routes. Under Alternative 2, similar to other alternatives, impacts could occur to infrastructure, including airports, parking areas, roads, water, sewer, and stormwater facilities, with Alternative 2 typically in the range of Alternatives 1 and 3.	↓
Parks and Recreation	Under Alternative 2, direct impacts to parks due to levee improvements would be lower than those under Alternatives 1 and 3; direct impacts to trails would be higher than Alternative 1 and lower than Alternative 3. Similarly, under Alternative 2 inundation impacts to parks and trails would be in the range of Alternatives 1 and 3.	↓↑
Historic and Cultural Resources	Alternative 2 would be similar to Alternative 1 in its potential to affect cultural resources, although the increase in relocation, new construction, and levee extension would have a greater potential to affect previously undocumented cultural resources than Alternative 1, particularly unrecorded archaeological sites near the Green River. By limiting flooding, however, Alternative 2 could lead to less damage to cultural resources than Alternative 1, including both recorded and previously unrecorded archaeological sites, buildings, structures, and objects.	↓↑

More Substantial adverse negative impacts (↓↓)

Some Moderate adverse negative impacts (↓)

Both adverse negative and positive impacts (↓↑)

Some Moderate positive impacts (↑)

More Substantial positive impacts (↑↑)

No meaningful impacts or not applicable (↔)

Table 4-1. Summary of Past and Present Impacts and Impacts of the Proposed Alternatives (continued)

	Evaluation	Impact
Alternative 3: Enhanced Systematic Implementation		
Aquatic Resources	Impacts would be similar to those from Alternative 2, except that this alternative would implement more environmentally friendly projects and, thus, would be expected to provide more benefits to aquatic resources.	↑↑
Water Quality	Alternative 3 would provide more space than the other alternatives to support vegetation and other outcomes with new, improved, and relocated levees or floodwalls; it would potentially acquire undeveloped floodplains for long-term flood storage and preservation of beneficial vegetation along tributaries and in associated wetlands compared to other alternatives. Therefore, Alternative 3 would likely provide the most benefits to water quality compared to the other alternatives.	↑↑
Hydrology	Alternative 3 would eliminate overbank flooding except in agricultural areas.	↑↑
Population, Demographics, and Housing	Alternative 3 could impact up to 70 housing units directly. It would substantially reduce the number of homes and population at risk of inundation compared to existing conditions. Homes and population at risk would be slightly lower compared to Alternative 2 and similar to Alternative 1 but lower than the No Build Scenario. The areas most affected would be Kent, Auburn, and unincorporated King County.	↑
Social Resources	Impacts would be similar to those described for Alternative 1.	↑
Employment and Business	Up to 50 industrial or commercial structures could be affected directly by flood hazard management facilities, compared to one structure affected under Alternatives 1 and 2. Of the three alternatives Alternative 3 would have the highest number of jobs (22,900) affected by inundation.	↓
Agriculture	Alternative 3 would have a comparable impact to that of Alternative 1 on the amount of flooded farmland, except at 11,900 cfs flows where substantially less flooded agricultural land would be expected. There would likely also be less depth of flooding for this flow level.	↑
Public Services and Infrastructure	Alternative 3 would not impact fire and police facilities directly by levee improvements, or as a result of inundation. One private school could be impacted by inundation, but no other schools would be affected by levee improvements, inundation to properties, or school access routes. Under Alternative 3, similar to other alternatives, impacts could occur to infrastructure, including airports, parking areas, roads, water, sewer, and stormwater facilities, with Alternative 3 effects typically the highest among the alternatives.	↓↓
Parks and Recreation	Under Alternative 3, direct impacts to parks due to levee improvements would be greatest of the alternatives and would result in a need to change the type of recreation (e.g., passive or open space instead of active park space); direct impacts to trails would be greater than under Alternatives 1 and 2. Similarly, inundation impacts to parks and trails under Alternative 3 would be the greatest of the alternatives, with an opportunity to replace trails in association with levee designs.	↓↑
Historic and Cultural Resources	Alternative 3 is similar to Alternatives 1 and 2 in its potential to affect cultural resources, although relocation, new construction, levee extension, ground disturbance associated with flood proofing, ground disturbance associated with riparian habitat restoration or improvement, and development, operation, and maintenance activities in areas acquired for flood storage under Alternative 3 would have a slightly greater potential to affect unrecorded archaeological sites located close to the Green River.	↓↑

More Substantial adverse negative impacts (↓↓)

Some Moderate adverse negative impacts (↓)

Both adverse negative and positive impacts (↓↑)

Some Moderate positive impacts (↑)

More Substantial positive impacts (↑↑)

No meaningful impacts or not applicable (↔)

4.2 Summary of Impacts of Reasonably Foreseeable Future Actions and Changes

Table 4-2. Impacts of Reasonably Foreseeable Future Changes

Change	Notes	Impact
Reasonably Foreseeable: Natural Environment		
Downstream fish passage at HHD		
Aquatic Resources	Better juvenile fish passage would lead to reduced mortality, which ideally would lead to an increased number of returning spawners (i.e., increased population size). Juvenile passage through reservoirs is difficult to engineer. Juvenile collection efficiency is typically low. Mortality is reduced from a condition without juvenile downstream passage but is not optimal. For that reason, juvenile fish passage was not evaluated as “most positive impacts.” If juvenile passage is found to be more efficient than typical systems, the rating for this future change could be increased to “most positive impacts.”	↑
Water Quality	Improvements focused only on fish passage are not expected to affect the overall water quality in the river in the long term. There may be short-term risks to water quality that can likely be mitigated through construction best management practices.	↔
Hydrology	Fish passage improvements are not expected to result in changes in flood control.	↔
Population, Demographics, and Housing	These categories would not be affected by fish passage improvements.	↔
Social Resources		↔
Employment and Business		↔
Agriculture		↔
Public Services and Infrastructure		↔
Parks and Recreation		↔
Historic and Cultural Resources		An element of the HHD, the Eagle Gorge Dam Outlet Tower, has been determined NRHP-eligible. Although additional analysis will be required, if the project were to diminish the integrity of this structure, it would have the potential to negatively affect an NRHP-eligible cultural resource. Since this will be a U.S. Army Corps of Engineers project, it will be subject to Section 106 of the National Historic Preservation Act (NHPA).
Fish passage at Black River Pump Station		
Aquatic Resources	Access will be provided to only a small area of beneficial habitat.	↑
Water Quality	No impacts to water quality are anticipated.	↔
Hydrology	No impacts to hydrology or flood control are anticipated.	↔
Population, Demographics, and Housing	These categories would not be affected by fish passage improvements.	↔
Social Resources		↔
Employment and Business		↔
Agriculture		↔
Public Services and Infrastructure		↔
Parks and Recreation		↔
Historic and Cultural Resources		The existing pump station is nearly 50 years old, and it has not been evaluated for listing in the NRHP. Additional research will be required to establish whether the project has the potential to affect cultural resources.
WRIA-9 projects on Green River (all reaches)		
Aquatic Resources	Restoration of all 80 projects will contribute substantially to “necessary future conditions.” Necessary future conditions are the long-range goal of the habitat plan adopted by WRIA-9 intended to support restoration of a viable salmonid population.	↑↑
Water Quality	Most of the features of the habitat improvements associated with the WRIA-9 projects will also be expected to benefit water quality in the river through shading, groundwater recharge, and increased opportunities for hyporheic exchange.	↑↑

More Substantial adverse negative impacts (↓↓)

Some Moderate adverse negative impacts (↓)

Both adverse negative and positive impacts (↓↑)

Some Moderate positive impacts (↑)

More Substantial positive impacts (↑↑)

No meaningful impacts or not applicable (↔)

Table 4-2. Impacts of Reasonably Foreseeable Future Changes (continued)

Change	Notes	Impact
Hydrology	Levee raising and levee construction will substantially improve losses due to overbank flooding in the lower Green River. However, levee setbacks and wetland reconnection will have only a small impact on flood level reductions, as shown by the simulations of Alternatives 1, 2, and 3 (will reduce overbank flooding, but will have little impact on water surface elevations in the lower Green River). If we estimate that 500 acres of overbank storage are created (summing the acreage in 5 of the 13 Tier 1 projects in the 2021 Plan Update and scaling to 13 projects), and we assume 2 feet of additional overbank storage on average, then a flood flow of 10,000 cfs will fill this volume in less than 90 minutes. This will have only a small effect on reducing flood elevations in the channel of the lower Green River or on the design of levees.	↑
Population, Demographics, and Housing	These categories would not be affected by WRIA-9 projects.	↔
Social Resources		↔
Employment and Business		↔
Agriculture	The different projects and locations of projects relative to the agricultural lands along the Green River will have different impacts. Restoring off-channel habitat can be neutral or negative for flood storage on agricultural land. Relocating levees farther away from the river will be positive for agriculture. Placing more woody debris in the river would likely be negative for agriculture. On net, the impacts will likely be slightly negative.	↓↑
Public Services and Infrastructure	No effect is anticipated from the habitat restoration projects; they are unlikely to change the demand or need for public services or infrastructure.	↔
Parks and Recreation	Some WRIA 9 projects will increase visual open space opportunities along the shoreline.	
Historic and Cultural Resources	Additional research will be required to establish whether the project has the potential to affect cultural resources. However, a public process, under state and federal regulations, can avoid or minimize negative effects to cultural resources through consultation and mitigation.	↔
Climate Change		
Aquatic Resources	Climate change will likely lead to reduced snowpack that, in an uncontrolled flow-regime, will lead to lower peak flows during spring runoff and lower base flows during summer low flows. However, flows in the Green River are managed at the HHD and will continue to be managed in the future. Due to flow management, flow regimes downstream of HHD will remain largely unchanged due to climate change, but with increased potential for high flows in the winter. Water temperatures may increase due to climate change, which would have negative impacts.	↓
Water Quality	Climate change will likely continue to exacerbate the poor water temperature conditions in the study area.	↓↓
Hydrology	Flooding is likely to worsen, with the degree of increased flooding dependent on the level of climate change.	↓
Population, Demographics, and Housing	Climate change, including greater extreme precipitation, will cause greater areas of inundation that will affect more housing units and population. Due to extreme heat and greater population and housing in designated areas (e.g., Centers), more people, particularly those in low opportunity areas, could be exposed to extreme heat and could be subject to health impacts.	↓
Social Resources	Similar to population, demographics, and housing, climate change, including greater extreme precipitation, will cause greater areas of inundation affecting more social resources that support residents and businesses.	↓
Employment and Business	Climate change, including greater extreme precipitation, will cause greater areas of inundation affecting more businesses, supporting parking, etc.	↓
Agriculture	Forecasted climate change conditions that cause more intense rainfall events in winter will increase the cost of flood cleanup, a negative for agriculture. Hotter summers will also likely cause shifts in crop selection and will lead to reduced yields, making farming less profitable.	↓
Public Services and Infrastructure	Climate change, including greater extreme precipitation, will cause greater areas of inundation affecting more parkland, transportation facilities, stormwater systems, and other facilities. Emergency service access and access to public services would also be affected by inundation.	↓
Parks and Recreation	Climate change, including greater extreme precipitation, will cause greater areas of inundation affecting more parkland and trail facilities.	↓

More Substantial adverse negative impacts (↓↓)

Some Moderate adverse negative impacts (↓)

Both adverse negative and positive impacts (↓↑)

Some Moderate positive impacts (↑)

More Substantial positive impacts (↑↑)

No meaningful impacts or not applicable (↔)

Table 4-2. Impacts of Reasonably Foreseeable Future Changes (continued)

Change	Notes	Impact
Historic and Cultural Resources	Climate change may result in longer fire seasons and more severe flooding over a much larger area, increasing the magnitude of the direct impacts on cultural resources. For each type of cultural resource (archaeological resources, architectural resources, cemeteries, and TCPs), fires and floods will have the potential to impact the resource by diminishing its integrity.	↓
TMDLs on Green River and tributaries		
Aquatic Resources	TMDLs are intended to reduce temperatures but, due to increases in future impervious surface and other development factors, beneficial temperature reductions will not likely be substantial.	↑
Water Quality	TMDL projects are directly focused on improving water quality and are expected to benefit the water quality in the study area.	↑↑
Hydrology	TMDLs should not increase flood levels, unless remedial actions alter the river's hydrology.	↔
Population, Demographics, and Housing	These categories would not be affected by TMDLs.	↔
Social Resources		↔
Employment and Business		↔
Agriculture		↔
Public Services and Infrastructure		↔
Parks and Recreation		↔
Historic and Cultural Resources		↔
Reasonably Foreseeable: Built Environment		
Continued development in the Green River watershed		
Aquatic Resources	Much of the lower Green River is developed. As redevelopment occurs, improved development standards will lead to marginal improvements to aquatic resources. However, new development occurring primarily in the Middle Green River area, despite improved development standards, will lead to continued degradation of aquatic resources.	↓
Water Quality	Compliance with the Growth Management Act and critical area ordinances will likely continue the trend toward focused, high-density development in growth centers and preservation of open space and other lands supporting recreational uses. This can potentially improve runoff water quality in the historically developed Lower Green River basin, where redevelopment would trigger requirements to install modern stormwater management facilities. However, the likelihood that enough of the Lower Green River basin would be redeveloped to achieve impactful benefits is low. In contrast, growth in the Middle Green River basin through new development in currently vegetated areas (even new development equipped with modern stormwater facilities) will still negatively impact water quality compared to natural conditions.	↓↑
Hydrology	Hydrologic impacts will depend on the level of levee improvements made. If protecting against 18,800 cfs, then overbank flooding should be largely eliminated.	↔
Population, Demographics, and Housing	At the assumed protection level of the District, none of the alternatives would impede the development of designated Centers in regional plans where mixed uses are allowed, including residential uses. The small loss of housing due to inundation would be mostly in the Auburn area under Alternatives 1, 2, and 3, and the number of units would have to be replaced elsewhere in the city and likely in the Green River watershed as it would achieve its residential growth targets. This small amount of housing to be replaced would not substantially add to cumulative concentrations of growth in the watershed.	↔
Social Resources	Social resources are generally located in response to demand of local residents and businesses. Affected social resources in the corridor are assumed to relocate in proximity to their populations served either within the corridor or abutting it.	↔
Employment and Business	The Lower Green River Corridor is planned primarily for employment purposes and assumes flood protection. Renton, Kent, and Auburn have job growth targets above current capacities, and some lands that may be inundated. While designated regional growth or industrial centers are not in areas of inundation under Alternatives 1,2, and 3, other employment areas may experience inundation impacts, and the cities may have to plan carefully for areas of added jobs to meet targets. The intensification of jobs outside of flood inundation areas may mean more concentration of employment elsewhere in the watershed, which may mean more impervious area in the watershed depending on location.	↔

More Substantial adverse negative impacts (↓↓)

Some Moderate adverse negative impacts (↓)

Both adverse negative and positive impacts (↓↑)

Some Moderate positive impacts (↑)

More Substantial positive impacts (↑↑)

No meaningful impacts or not applicable (↔)

Table 4-2. Impacts of Reasonably Foreseeable Future Changes (continued)

Change	Notes	Impact
Agriculture	Development projects in the watershed would result in more impervious coverage and cause added stormwater runoff to reach agricultural land during flood events.	↓
Public Services and Infrastructure	Continued development in the watershed, if conducted in accordance with local plans, may increase demand for public services and infrastructure cumulatively, but this will be anticipated in levels of service and capital plans.	↔
Parks and Recreation	Continued development could mean greater residents and employees with demand for parks and trail services and facilities but this will be anticipated in levels of service and capital plans.	↔
Historic and Cultural Resources	Although additional research is required, increased development could damage recorded and unrecorded cultural resources, disturbing archaeological sites, demolishing historic buildings, and replacing important agricultural farmsteads with new construction. A public process, under state and federal regulations, could avoid or minimize negative effects to cultural resources through consultation and mitigation. However, not all projects may require the same level of consultation.	↓
PSRC Vision 2050		
Aquatic Resources	More strategic and coordinated development could offset negative effects that might be expected from continued development (i.e., unnaturally flashy flow, increased water temperature, less infiltration, and potentially additional toxics in runoff).	↔
Water Quality	More focus on growth centers, the redevelopment of historically untreated developed areas, and the preservation of critical areas will likely slightly improve the trend of water quality degradation in the study area. However, the likelihood that enough of the study area will be redeveloped to the extent needed to achieve impactful benefits is low.	↔
Hydrology	This will depend on the level of levee improvements made. If protecting against 18,800 cfs, then overbank flooding should be largely eliminated.	↔
Population, Demographics, and Housing	Vision 2050 is intended to accommodate projected growth in population, housing needs, social resources, and economic activity.	↔
Social Resources		↔
Employment and Business		↔
Agriculture	Population growth will result in additional development. Similar to the discussion above for continued development, agricultural uses would likely experience increases in stormwater runoff in high rainfall conditions, which is a negative impact.	↓
Public Services and Infrastructure	Vision 2050 includes planning for increased demand on public service and infrastructure.	↔
Parks and Recreation	Continued development could mean more residents and employees and resulting higher demand for parks and trail services and facilities. This will be anticipated in levels of service and capital plans.	↔
Historic and Cultural Resources	Additional research will be required to establish whether proposed projects have the potential to affect cultural resources.	↔
Transportation Infrastructure Plans (includes Sound Transit, Washington State Department of Transportation, AMTRAK)		
Aquatic Resources	Negative effects of new transportation infrastructure (i.e., unnaturally flashy flow, increased water temperature, less infiltration, and potentially additional toxins in runoff) may be offset by beneficial elements of design (i.e., stormwater retrofits, improved fish passage, compensatory mitigation, etc.).	↔
Water Quality	Projects that will replace surfaces in areas of historical development and introduce modern stormwater management facilities to areas previously not treated or undertreated will provide a benefit to water quality. In contrast, projects (even including consideration of required stormwater management facilities) constructed in currently vegetated areas will still adversely impact water quality compared to natural conditions.	↔
Hydrology	New bridges with piers in the water could have some small effect on hydrology.	↔
Population, Demographics, and Housing	Improvements or maintenance could alter local residential access during construction or alter access post-construction.	↔
Social Resources		↔
Employment and Business	Since the corridor is largely planned for employment and business, changes to roads and other infrastructure serving businesses and maintenance of roads serving employment areas would support existing and planned activity.	↔
Agriculture	No impacts to agriculture are anticipated.	↔

More Substantial adverse negative impacts (↓↓)

Some Moderate adverse negative impacts (↓)

Both adverse negative and positive impacts (↓↑)

Some Moderate positive impacts (↑)

More Substantial positive impacts (↑↑)

No meaningful impacts or not applicable (↔)

Table 4-2. Impacts of Reasonably Foreseeable Future Changes (continued)

Change	Notes	Impact
Public Services and Infrastructure	Greater or more frequent inundation could affect planned maintenance and improvement projects on the roads, such as cost or design. Phasing of improvements along or over the river could be affected by the construction of levees. Sound Transit investments are generally located in Centers where inundation would not be expected under Alternatives 1, 2, and 3.	↔
Parks and Recreation	Transportation improvements can provide new non-motorized facilities but can also make access more difficult and less appealing.	↓↑
Historic and Cultural Resources	Additional research will be required to establish whether proposed projects have the potential to affect cultural resources. Typically, transportation projects have the potential to disturb or damage archaeological or built environment resources. However, a public process, under state and federal regulations, can avoid or minimize negative effects to cultural resources through consultation and mitigation.	↔

Table 4-3. Summary of the Evaluation of Impacts from Reasonably Foreseeable Actions and Changes

	Reasonably Foreseeable Changes								Overall Impact
	Natural Environment				Built Environment				
	Downstream fish passage at HHD	Fish passage at Black River Pump Station	WRIA-9 projects on Green River (all reaches)	Climate Change	TMDLs on Green River and tributaries	Continued development in the Green River watershed	PSRC Vision 2050	Transportation Infrastructure Plans	
Aquatic Resources	↑	↑	↑↑	↓	↓	↓	↔	↔	↓↑
Water Quality	↔	↔	↑↑	↓↓	↓↑	↓↑	↔	↔	↓↑
Hydrology	↔	↔	↑	↓	↔	↔	↔	↔	↑
Population, Demographics, and Housing	↔	↔	↔	↓	↔	↔	↔	↔	↔
Social Resources	↔	↔	↔	↓	↔	↔	↔	↔	↔
Employment and Business	↔	↔	↔	↓	↔	↔	↔	↔	↔
Agriculture	↔	↔	↓↑	↓	↓	↓	↓	↔	↓
Public Services and Infrastructure	↔	↔	↔	↓	↔	↔	↔	↔	↔
Parks and Recreation	↔	↔	↔	↓	↔	↔	↔	↓↑	↔
Historic and Cultural Resources	↔	↔	↔	↓	↓	↓	↔	↔	↓

More Substantial adverse negative impacts (↓↓)

Some Moderate adverse negative impacts (↓)

Both adverse negative and positive impacts (↓↑)

Some Moderate positive impacts (↑)

More Substantial positive impacts (↑↑)

No meaningful impacts or not applicable (↔)

4.3 Combined Impacts of Reasonably Foreseeable Future Changes and Proposed Alternatives

Table 4-4 shows the combined (cumulative) impact of foreseeable actions and changes with the impacts of the three alternatives. For convenience the combined impacts of foreseeable actions and changes are repeated from Table 4-3. These are combined with the impacts of each of the alternatives (see Table 4-1) to show the combined cumulative impact for each subject. Overall, Alternative 3 has positive cumulative impacts in more subjects than the other alternatives. Conversely, Alternative 1 has negative cumulative impacts in more subjects than the other alternatives.

Table 4-4. Cumulative Impact Summary

Subject	Combined Impacts of Foreseeable Actions and Changes	Combined Impacts of Foreseeable Changes with:		
		Alternative 1: Project-by-Project	Alternative 2: Systematic Implementation	Alternative 3: Enhanced Systematic Implementation
Aquatic Resources	↓↑	↓↑	↑	↑↑
Water Quality	↓↑	↓↑	↓↑	↑
Hydrology	↑	↑	↑	↑↑
Population, Demographics, and Housing	↔	↑↑	↑↑	↑↑
Social Resources	↔	↑	↑	↑
Employment and Business	↔	↑↑	↑↑	↑
Agriculture	↓	↓↓	↓	↓↑
Public Services and Infrastructure	↔	↑↑	↑↑	↑
Parks and Recreation	↔	↑↑	↑↑	↑
Historic and Cultural Resources	↓	↓↑	↓↑	↓↑

4.3.1 Further information on reasonably foreseeable future actions

Downstream fish passage at HDD

- Howard A. Hanson Dam Additional Water Storage Project Environmental Impact Statement: <https://www.nws.usace.army.mil/LinkClick.aspx?fileticket=vFZtFEqZOQ4%3d&tabid=2743&portalid=27&mid=98790>

Fish passage at Black River Pump Station

- <https://kingcounty.gov/depts/dnrp/wlr/sections-programs/river-floodplain-section/capital-projects/black-river-pump-station.aspx>

WRIA-9 projects on Green River (all reaches)

- WRIA 9 2021 Salmon Habitat Plan Update: https://www.govlink.org/watersheds/9/pdf/2021_PlanUpdate.pdf

Climate change (increased wildfire risk; warmer temperatures, less snowpack)

- Preparing Washington Department of Fish and Wildlife for a Changing Climate: Assessing Risks and Opportunities for Action: <https://doi.org/10.6069/7SNE-M516>
- Climate Change Impacts for Stormwater Management in Puget Sound: https://cig.uw.edu/wp-content/uploads/sites/2/2014/11/TNC_Stormwater_final_3_24.pdf

Meeting all TMDLs on Green River and tributaries

- <https://fortress.wa.gov/ecy/ezshare/wq/WaterQualityImprovement/TMDL/KingCounty.htm>

PSRC Vision 2050 (includes population and employment forecasts)

- Puget Sound Regional Council: <https://www.psrc.org/planning-2050/vision-2050>

Transportation Infrastructure Plans

- Sound Transit: <https://www.soundtransit.org/system-expansion>
- Washington State Department of Transportation: <https://www.wtp2040andbeyond.com/>
- AMTRAK: <https://wsdot.wa.gov/construction-planning/statewide-plans/passenger-rail-plans/amtrak-cascades-service-development-plan>

5. REFERENCES

King County Assessor. 2020. “King County Assessments Data Download.” Accessed August 2020.
<https://info.kingcounty.gov/assessor/datadownload/default.aspx>

City of SeaTac, 2018. Zoning Map. Accessed December 2022.
<https://www.arcgis.com/home/item.html?id=a51bf33abeca4dc89038f61ff36693b6>