Kitsap County Stormwater Comprehensive Plan

Kitsap County
December 22, 2020

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Abbreviations

AKART	all known, available, and reasonable methods of prevention, control and treatment
AM	adaptive management
Assessment	Stormwater Division Assessment
ATV	all-terrain vehicle
B-IBI	Benthic Index of Biotic Integrity
BMP	best management practice
BOCC	(Kitsap County) Board of County Commissioners
CFP	Capital Facilities Plan
CIG	Climate Impacts Group
CIPP	cured-in-place pipe
County	Kitsap County
CWK	Clean Water Kitsap
DCD	(Kitsap County) Department of Community Development
Division	Stormwater Division
DRoPP	Drainage Retrofit on Private Property
DSCR	debt service coverage ratio
Ecology	Washington State Department of Ecology
E&O	education and outreach
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESD	Employment Security Department
ESU	equivalent service unit
ft	foot/feet
ft^2	square foot/feet
FTE	full-time equivalent
GASB	Governmental Accounting Standards Board
GHG	greenhouse gas
GIS	geographic information system
GMA	Growth Management Act
GSI	green stormwater infrastructure
HDPE	high-density polyethylene
HDR	HDR Engineering, Inc.
IDDE	Illicit Discharge Detection and Elimination
ILA	interlocal agreement
in	inch(es)
KCC	Kitsap County Code
KCD	Kitsap Conservation District
KCPW	Kitsap County Department of Public Works
KPHD	Kitsap Public Health District
KPUD	Kitsap Public Utility District
LF	linear foot/feet
LID	low-impact development
LIO	Local Integrating Organization
LOS	level of service
MEP	maximum extent practicable
mm	millimeter(s)
MOU	memorandum of understanding
MRSC	Municipal Research and Services Center
MS4	municipal separate storm sewer system
NA	not applicable
NOAA	National Oceanic and Atmospheric Administration

NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
O&M	operation and maintenance
Phase II Permit	*National Pollutant Discharge Elimination System and State Waste Discharge General Permit for Discharges from Small Municipal Separate Storm Sewers in Western Washington*
PIC	pollution identification and correction
Plan	Stormwater Comprehensive Plan
PNP	Point No Point
PVC	polyvinyl chloride
RCP	Representative Concentration Pathway
RCW	Revised Code of Washington
REET-2	real estate excise tax
RWA	Receiving Water Analysis
SFR	single-family residence/residential
SLR	sea level rise
SMAP	Stormwater Management Action Plan
SOP	standard operating procedure
SRF	State Revolving Fund
SSWM	Surface and Stormwater Management program
STORM	Stormwater Outreach for Regional Municipalities
SWMMWW	*Stormwater Management Manual for Western Washington*
SWMP	Stormwater Management Program
SWPPP	stormwater pollution prevention plan
T&E	threatened and endangered
TMDL	total maximum daily load
UGA	urban growth area
USFWS	United States Fish and Wildlife Service
UW	University of Washington
WDFW	Washington Department of Fish and Wildlife
WDOH	Washington Department of Health
WIFIA	Water Infrastructure Finance and Innovation Act
WRIA	Water Resources Inventory Area
WSDOT	Washington State Department of Transportation
WSSOG	West Sound Stormwater Outreach Group
WSU	Washington State University Kitsap Extension
yr	year(s)

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1 Executive Summary

This Stormwater Comprehensive Plan (Plan) describes how Kitsap County (County) will manage, operate, and finance stormwater-related activities within the unincorporated areas of Kitsap County. The purpose of this Plan is to guide how the County will address surface water and stormwater management needs and requirements, including program management, operation and maintenance (O&M), climate change, capital facilities, and financial elements, while also balancing rates and the financial resources available to the County.

Figure 1–1. *Water as a Resource* policy statement

Kitsap County occupies a unique position in the central Puget Sound region of the state of Washington, located directly between the urban areas of Seattle and Tacoma and the less developed Olympic Peninsula. Kitsap County is one of the most densely populated counties in the state and faces challenges in pollution runoff, impacted flows, and other impacts of development. It is also in a strong position to manage and mitigate these impacts, having a proactive stormwater management program, and early adaptation of practices recommended or required by state and federal regulations. In particular, the County has made early strides in implementing new permit requirements to fulfill its National Pollutant Discharge Elimination System (NPDES) permit for Phase II Western Washington stormwater dischargers (2019–2024). Further, in 2009, the Kitsap County Board of Commissioners (BOCC) passed a "Water is a Resource NOT a Waste Stream" policy, which was reaffirmed and replaced with a broader "Water as a Resource" policy in 2016 (see Figure 1–1). The policy establishes a set of guiding principles to limit pollution in Kitsap County and reserve water as a

resource; these principles are used to facilitate decision making across a wide range of County functions.

The County's stormwater facilities and service area overlap with incorporated Kitsap County cities, except Bainbridge Island (Bremerton, Port Orchard, and Poulsbo). County stormwater collection, conveyance, and treatment facilities also interconnect with Washington State Department of Transportation (WSDOT) highway facilities, tribal lands, and, in some cases, Naval Base Kitsap facilities. Collaborating with regional stakeholders and partners is therefore critical to effective regional efforts to restore and enhance water quality and aquatic habitat and to adapt to climate change. To support this, the County participates in regional work groups, partners with other agencies through the Clean Water Kitsap (CWK) program, regularly engages with tribes to ensure that treaty rights are respected and routinely seeks the expertise of tribal representatives on aquatic habitat and fishery issues, and has facilitated interdisciplinary meetings to engage with other divisions and agencies where coordination of long-range planning is needed.

1.1 History

The County's program was initially developed in the early 1990s to address the challenges of managing stormwater runoff and protecting water quality and respond to regulatory requirements and community needs. At that time, the Stormwater Division (Division) was formed under Kitsap County Public Works (KCPW). Key elements of the formation of the Division were the link between surface water and stormwater and the formation of the partnership between KCPW and other local agencies with the common vision for stormwater management and the protection and restoration of water quality. A utility rate structure, initially adopted in 1994, has been amended over the years with the latest change occurring in 2017.

Overall, the Division is responsible for the operations, maintenance, and management of stormwater infrastructure in the unincorporated areas within Kitsap County. This includes a network of both natural features and constructed facilities that collect, convey, treat, and discharge surface water runoff. Natural features include streams and swales. Constructed facilities include piped systems, culverts, ditches, bioswales, detention facilities, and other quantity and quality control facilities. The County also has heavily promoted the use of low-impact development (LID) techniques to leverage green stormwater infrastructure (GSI) for water quality and quantity (flow) control. Drainage infrastructure is typically guided by topography and flows, without consideration to property ownership, land use, or political boundaries.

1.2 Regulations and Policies

Regulatory drivers for stormwater management in Kitsap County are associated primarily with the *National Pollutant Discharge Elimination System and State Waste Discharge General Permit for Discharges from Small Municipal Separate Storm Sewers in Western Washington*, hereafter referred to as the Phase II Permit. In general, the Phase II Permit describes stormwater program activities and implementation milestones that Kitsap County must follow to comply with the federal Clean Water Act. Under the Phase II

Permit, Kitsap County must develop a Stormwater Management Program (SWMP) that includes activities related to the County's own infrastructure and its role as the local land use authority for the unincorporated area.

Stormwater policies are contained and described within the County's Comprehensive Plan, Level of Service Goals and Standards, and the *Water as a Resource* policy. The County's Environment Policies 3, 6, 17, and 20 apply to stormwater, specifically targeting measurement and categorization, efficient and effective use of natural environments and public financial resources, water quality and quantity, and education and outreach (E&O) to County residents and stakeholders. Additional Capital Facilities and Utilities policies guide decision making of capital improvements. Other policies focus on compliance with regulations, the *Kitsap County Stormwater Design Manual* and LID requirements, and broader stormwater goals and objectives to preserve water as a resource.

The Phase II Permit is issued every 5 years, and the County must demonstrate compliance through written reporting. A compliance audit found that the County is in compliance with all existing Phase II Permit requirements, with several opportunities to improve compliance, largely through documentation of existing programs, policies, and procedures. The latest issuance of the Phase II Permit includes several new requirements, including:

- Stormwater planning, including a Stormwater Management Action Plan (SMAP) requirement
- Source control for existing development including an education, inspection, and enforcement program

The County has already undertaken some of the foundational elements to meeting the source control requirement and has prepared its first SMAP.

1.3 Stormwater Management Action Plan

The Phase II Permit requires a three-part assessment to develop a long-range plan for the management of at least one high-priority basin in the service area:

1. **Receiving Water Assessment** to document and assess existing conditions and information for watershed basins
2. **Receiving Water Prioritization** to determine which receiving waters will receive the most benefit from implementation of water quality improvements and other land/development management actions
3. **Stormwater Management Action Plan** to identify retrofit needs, land management/development strategies and/or actions, targeted enhancement strategies, implementation schedule and budget sources, and an update plan

Through a methodical process designed to meet these requirements, the County identified East Dyes Basin as the focus of its SMAP (process is described in Appendix 3-1). By doing so, it then identified appropriate projects, programs, and best management practices (BMPs) that could be implemented to improve receiving water quality impairments in the basin (see Figure 1–2).

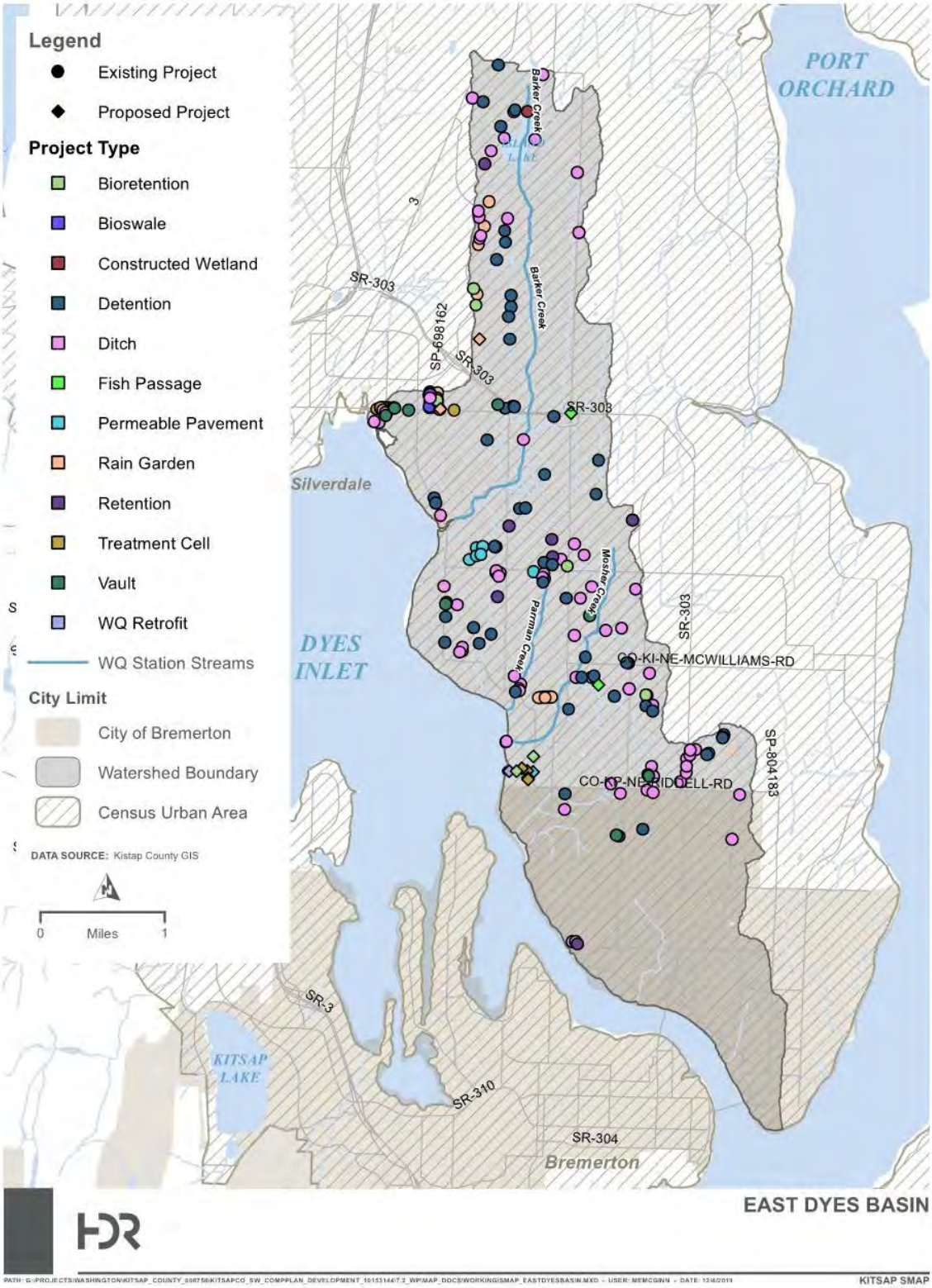

Figure 1–2. Existing and proposed improvements to East Dyes Basin

1.4 Climate Change Assessment

A climate change assessment was completed that investigated both current and projected trends in sea level rise (SLR) and precipitation intensities for Kitsap County. The assessment identified typical at-risk components of the County's system. For SLR, the assessment used 90 percent SLR exceedance estimates over various time horizons, and evaluated stormwater outfall locations expected to be impacted by the given scenarios, identifying several outfalls that may be impacted by the year 2100. Similarly, an evaluation of precipitation changes examined changes to 24-hour precipitation events over future time scales. Nearly all of the projections of future climate change scenarios show an increase in precipitation intensities, particularly at the higher return frequencies (i.e., 100-year). The following recommendations were made to prepare the County for adaptation planning, which is a proactive approach to managing and mitigating the impacts of climate change:

1. Perform recurring inspection and maintenance to support further system resilience efforts.
2. Develop a long-term resilience plan that can vet solutions with the greatest cost-to-benefit ratio in mind.
3. Assess and implement diverse solutions, many of which can serve multiple purposes. These solutions may include:
    a. Modification of design standards
    b. Additional use of GSI and LID
    c. Increased hardening of traditional infrastructure
    d. Protection of wetlands, riparian corridors, and other natural features that attenuate the effects of flooding

1.5 Resource Needs Assessment

The Division is responsible for a wide breadth of services related to stormwater management, much of which is required by law. To determine the Division's ability to meet its regulatory obligations and effectively deliver services, an assessment of resources (staff, equipment, and vehicles) was performed. Specifically, the assessment detailed the functions performed by the Division, including maintenance and other field activities such as E&O and inspection, along with planning activities. It then examined the resources available compared to the estimated body of work, including future needs that are required by the Phase II Permit. While exact quantification of work activities is not currently available through the County's work order management system and other tracking databases, estimates of production capabilities, existing backlog, and new services requiring additional resources were developed using input from County staff and available data. This resulted in a finding that approximately two additional full-time equivalent (FTE) staff may be needed to support E&O activities, and additional safety and training of staff in the field. Additionally, increased data collection and tracking and

expansion of annual planning activities will provide the County with additional information to support further evaluation of resource needs over time.

1.6 Capital Facilities Plan

A major component of the County's stormwater management program is its Capital Facilities Plan (CFP), which constitutes a series of projects that rehabilitate infrastructure, reduce O&M cost by addressing failing infrastructure that requires increasing inspection and maintenance, provide flood protection, and improve water quality and aquatic habitat. Identification and delivery of capital projects is driven by regulatory requirements, such as Growth Management Act (GMA) requirements to support regional growth; projects designed to maintain the County's ability to meet its level-of-service (LOS) goals and the *Water as a Resource* policy; and projects that otherwise improve water quality, customer service, and coordination with other County agencies and divisions. The current CFP draws on past retrofit studies, the results of the recently completed SMAP, and system performance needs. Additionally, projects previously identified but not completed are assessed for inclusion in the next CFP.

The County is limited in the number of projects included in its CFP by the funds available and resources to deliver. As such, the County uses a transparent prioritization framework to assess potential projects and rank them based on their anticipated cost and benefit. Prioritization criteria are composed of the following, with each major category supported by sub-criteria:

- Protect life (100 points maximum)
- Protect property (100 points maximum)
- Protect water quality (100 points maximum)
- Protect sensitive ecological resources (50 points maximum)
- Life-cycle performance (50 points maximum)
- Public outreach/education and citizen involvement (25 points maximum)
- Supplemental criteria (special opportunities, projects having significant sustainability or economic development value, and projects with dedicated external funding sources)

The County's stormwater CFP includes 10 capital projects in the near-term 6-year planning period (2020–2025) at a total cost of $20.9 million (Table 1-1 and Table 1-2). An additional $13.1 million is identified for rehabilitation and replacement of existing traditional stormwater infrastructure (Table 1-3). New project development in the long-term 2026–2036 period will meet or exceed LOS criteria through compliance with applicable regulatory criteria. Other stormwater capital projects in the 2026–2036 period may include regional retrofits of existing traditional stormwater infrastructure using LID BMPs or restoration projects designed to address historical problems resulting in flooding or water quality or other aquatic habitat impairments. The specific schedule, costs, and revenue sources for these 2026–2036 projects will be identified through future 6-year CFP planning processes.

Table 1-1. Near-term CFP projects

Project	Total amount (2020–2022)
Ridgetop Blvd. Green Street Retrofit (aka Ridgetop Phase II)	$1,365,000
Kingston Regional Stormwater Retrofit (aka Kingston Regional)	$1,900,000
Suquamish Regional Stormwater Treatment Facility (aka Suquamish Regional)	$1,960,000
Point No Point (PNP) Tide-Gate Replacement (aka Point No Point)	$34,422
Colchester SW Retrofit/Duncan Creek Culvert Replacement (aka Colchester)	$120,000
Silverdale Way Stormwater Retrofit (aka Silverdale Way [2019 RD project])	$500,000
Old Town Silverdale Water Quality Treatment (aka Bayshore)	$4,364,021
Kingston Washington Blvd.	$200,000
Total	**$10,443,443**

Table 1-2. Long-term CFP projects

Project	Total amount (2023–2025)
Suquamish Regional Stormwater Treatment Facility (aka Suquamish Regional)	$2,000,000
Illahee Regional Stormwater Retrofit	$2,500,000
Tracyton Green Streets Stormwater Retrofit	$1,500,000
Point No Point (PNP) Tide-Gate Replacement (aka Point No Point)	$1,500,000
Colchester SW Retrofit/Duncan Creek Culvert Replacement (aka Colchester)	$2,500,000
Silverdale Way Stormwater Retrofit (aka Silverdale Way [2019 RD project])	$500,000
Total	**$10,500,000**

Table 1-3. Rehabilitation and replacement projects

Renewal activities	2020	2021	2022	2023	2024	2025
Retrofit engineering (engineering)	$387,423	$402,920	$419,036	$435,798	$453,230	$471,359
Stormwater facilities retrofit (construction)	$1,589,353	$1,652,927	$1,719,045	$1,787,806	$1,859,319	$1,933,691
Total	**$1,976,776**	**$2,055,847**	**$2,138,081**	**$2,223,604**	**$2,312,548**	**$2,405,050**

1.7 Financial Assessment

The Division is operated in a financially stable manner in how CFP projects, operations, and programs will be funded over the planning period. Financial sustainability is accomplished through development of a revenue requirement analysis. The revenue requirement structures the Division operations, programs, and CFP project expenditures (application of funds) through an annual timeline compared to projected revenue (available funds). The Division's work is funded almost exclusively through a stormwater fee, with some capital projects funded partially by grants. The stormwater fee is listed on the annual tax bill as "Stormwater Management." This fee is assessed to each developed property and road located within unincorporated Kitsap County. The Division has historically implemented annual adjustments to the stormwater fee to keep up with inflationary cost increases and to meet anticipated Division operations, programs, and CFP project needs. Stormwater fees are established by the BOCC.

Most recently, the Division adopted future stormwater fees for 2021, 2022, and 2023, which will meet the O&M and capital needs of the utility. The stormwater fee adjustments are needed primarily for funding the capital program while maintaining the current LOS and remaining compliant with the utility's Phase II Permit. Grant funding is assumed to mitigate fee impacts. Figure 1–3 shows projected revenues versus expenses through 2025, and the funding source.

Grant funding comes through the Washington State Department of Ecology (Ecology) and annual real estate excise tax (REET-2), and is allocated to specific projects in the CFP, as shown in Table 1-4.

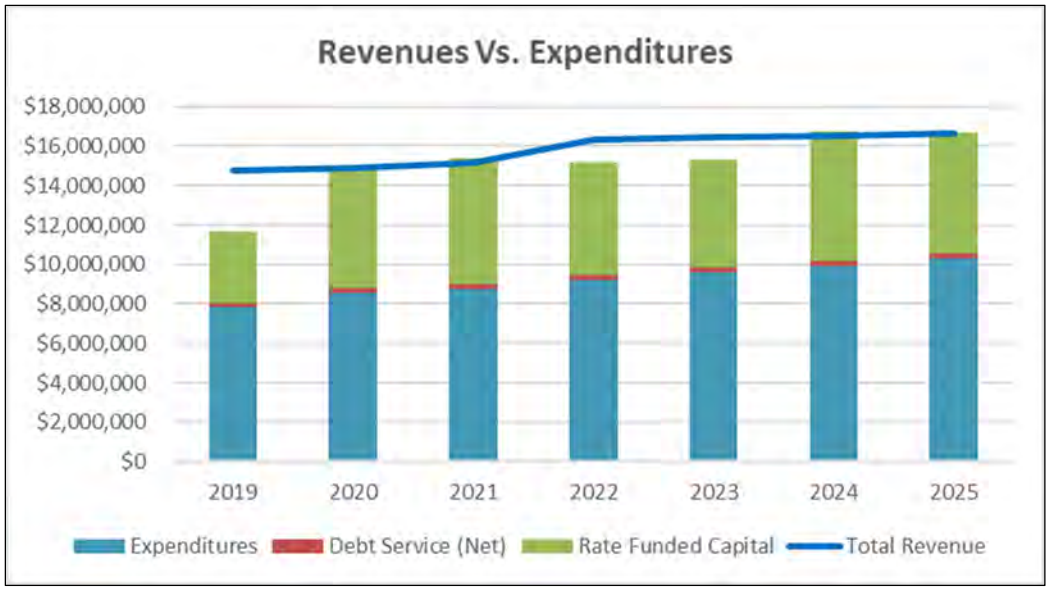

Figure 1–3. Revenues vs. expenditures

Table 1-4. Funding sources for near-term (2020-2022) CFP projects

Project	Total	Grants and other funds	Stormwater Division funding
Ridgetop Blvd. Green Street Retrofit (aka Ridgetop Phase II)	$1,365,000	$911,000	$454,000
Kingston Regional Stormwater Retrofit (aka Kingston Regional)	$1,900,000	--	$1,900,000
Suquamish Regional Stormwater Treatment Facility (aka Suquamish Regional)	$1,960,000	$1,700,000	$260,000
Point No Point (PNP) Tide-Gate Replacement (aka Point No Point)	$34,422	--	$34,422
Colchester SW Retrofit/Duncan Creek Culvert Replacement (aka Colchester)	$120,000	--	$120,000
Silverdale Way Stormwater Retrofit (aka Silverdale Way [2019 RD project])	$500,000	--	$500,000
Old Town Silverdale Water Quality Treatment (aka Bayshore)	$4,364,021	$500,000	$3,864,021
Kingston Washington Blvd.	$200,000	--	$200,000
Total	**$10,443,443**	**$3,111,000**	**$7,332,443**

1.8 Long-Range Planning

The Phase II Permit requires implementation of a stormwater planning program to assist in development of long-range policies and strategies to protect receiving waters. The goal of this Phase II Permit condition is to work toward a better understanding of local long-range planning processes and how the County's policies, strategies, codes, and other measures do, or do not, address probable impacts of increased future stormwater discharges on receiving water health. Stormwater planning also includes an assessment of whether additional stormwater management activities are needed to meet the goals of protecting and restoring beneficial and designated uses (Ecology 2018). The 2019 Phase II Permit reflects that a broader view of planning and implementation is needed to support and advance water quality and habitat restoration needs in the state.

The County will take several steps to continue the development of its long-range plans and expand on previous work. These include:

1. Forming an interdisciplinary team to support the development of coordination long-range plans and policies across different internal Kitsap County departments, external agencies, and stakeholders. Such a team can inform and assist in the development, progress, and influence of the efforts, and is required by the Phase II Permit.
2. Undertaking or expanding long-range planning activities that specifically align to County-level comprehensive planning as required by the GMA. Activities would also include periodic assessment of funding strategies to support needs as they change over time.

3. Conducting annual planning in a way that takes into account longer-range forecasted needs. This would also rely on monitoring of the Division's ability to achieve its past work plans to understand its productivity and where additional resources might be required.

For the first time, the Phase II Permit also specifically identifies opportunities to target enhanced participation of overburdened communities in stormwater activities. The Division has since identified a series of steps to take so that it may understand where and who these communities are, current barriers to participation, and how those barriers might be removed.

1.9 Adaptive Management

The County surface water and stormwater program collects information and makes decisions that affect broad-scale ecosystem processes involving large spatial areas, complex interactions between different biological processes, numerous competing stakeholder interests, and uncertain outcomes. Through these efforts, the County's ability to understand these systems and processes and predict future conditions is continually improving. However, many key system drivers such as climate change, water resource flow differences, and development patterns are highly variable and uncertain. Adaptive management (AM) strategies that are responsive to these uncertainties can therefore be a helpful tool to support decision making because they provide a systematic approach for improving resource management by learning from management outcomes. A typical AM cycle is depicted in Figure 1–4.

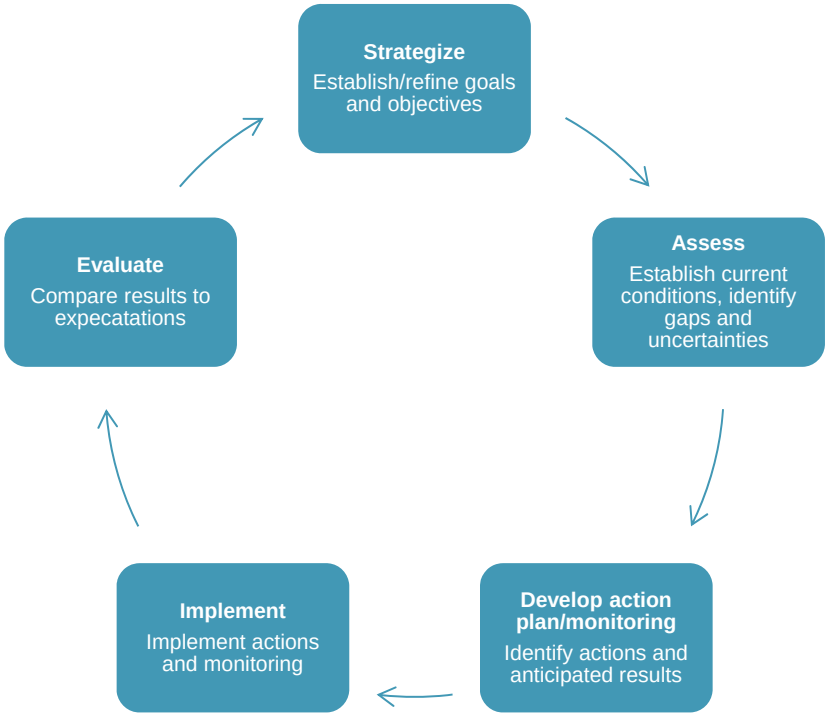

Figure 1–4. The Adaptive Management cycle

Kitsap County currently uses a variety of AM methods, which typically consist of selecting management choices on the basis of the best available information and updating system understanding over time to improve subsequent management choices. However, the use of AM is likely to grow in part because of the increasing rate of complexity in the issues and stressors associated with stormwater management, such as climate change, population growth, changing regulatory requirements, and the continued decline of threatened and endangered anadromous salmon stocks in the Puget Sound region. To take advantage of the benefits AM offers, a larger allocation of financial resources to data collection and assessment processes may be required and can be implemented incrementally over time.

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2 Background

This Stormwater Comprehensive Plan (Plan) describes how Kitsap County (County) will manage, operate, and finance stormwater-related activities within the unincorporated areas of Kitsap County. The purpose of this Plan is to guide how the County will address surface water and stormwater management needs and requirements, including program management, operation and maintenance (O&M), climate change, capital facilities and financial elements, while also balancing rates and the financial resources available to the County.

Kitsap County occupies a unique position in the central Puget Sound region of the state of Washington, located directly between the urban areas of Seattle and Tacoma and the less developed Olympic Peninsula. It is bounded by the Hood Canal on the west, Puget Sound on the east, and Mason and Pierce counties to the south (Figure 2–1). The Kitsap County population estimate (as of 2019) was 271,473 (U.S. Census Bureau 2020), making Kitsap County one of the most densely populated counties in the state with 636 residents per square mile (ESD 2020). Kitsap County has a total land mass of 396 square miles, ranking it 36th in size among the 39 counties in Washington State.

Kitsap County Public Works (KCPW) is responsible for building, operating, and maintaining public stormwater facilities within unincorporated Kitsap County. The KCPW Stormwater Division (Division) operates under an Enterprise Fund that receives its revenues primarily from user fees billed under the authority of Chapters 12.36 and 12.40 of the Kitsap County Code (KCC) and Chapter 36.89 of the Revised Code of Washington (RCW).

2.1 Previous Stormwater Planning Efforts

The Kitsap County Surface and Stormwater Management program (SSWM) was developed in the early 1990s to address the challenges of managing stormwater runoff and protecting water quality. The SSWM program was formed in response to several regulatory requirements and community needs including the following:

- The U.S. Environmental Protection Agency's (EPA's) National Pollutant Discharge Elimination System (NPDES) permit program for stormwater in communities with populations of more than 100,000
- The Kitsap Conservation District's (KCD's) need to seek legislative approval for a fee to fund programs for landowner assistance in developing and implementing agricultural-related water quality best management practices (BMPs)
- The Kitsap Public Health District's (KPHD's) need for stable funding to address public health issues related to shellfish bed closures, failing septic systems, and other water quality complaints
- The Kitsap County Department of Community Development's (DCD's) need for funding for state-mandated watershed planning efforts

Figure 2–1. Vicinity map

In 1993 the Kitsap County Board of Commissioners (BOCC) adopted Ordinance 156-1993, establishing the SSWM program and the Division pursuant to RCW 36.89. Key elements of the ordinance were the link between surface water and stormwater and the formation of the partnership between KCPW and other local agencies with the common vision for stormwater management and the protection and restoration of water quality.

In 2014 SSWM was rebranded to the Clean Water Kitsap (CWK) program, which is a collaborative partnership between the Division, KCD, KPHD, Washington State University Kitsap Extension (WSU), and Kitsap Public Utility District (KPUD) (added as a partner in 2018). The utility rate structure was adopted in 1994 and amended in 1995, 2004, 2006, 2012, and 2017. The rate structure is contained in Chapter 12.40 KCC.

2.2 Regulatory Drivers

Regulatory drivers for stormwater management in Kitsap County are associated primarily with the *National Pollutant Discharge Elimination System and State Waste Discharge General Permit for Discharges from Small Municipal Separate Storm Sewers in Western Washington*, hereafter referred to as the Phase II Permit. In general, the Phase II Permit describes stormwater program activities and implementation milestones that Kitsap County must follow to comply with the United States federal Clean Water Act.

The Washington State Department of Ecology (Ecology) combines both federal NPDES and state waste discharge requirements into a single stormwater permit. This state permit covers discharges from the municipal separate storm sewer systems (MS4s) that Kitsap County owns and operates. It also requires the use of stormwater BMPs to reduce the discharge of pollutants to the maximum extent practicable (MEP). The Phase II Permit is designed to reduce discharges of pollutants from municipal stormwater systems to protect water quality, habitat, and other beneficial uses.

Under the Phase II Permit, Kitsap County must develop a Stormwater Management Program (SWMP) that includes all permit-required activities, implement those activities within the required time frames of the Phase II Permit term, and submit annual reports to Ecology each year to document progress toward completing SWMP implementation. In general, the Phase II Permit affects Kitsap County in the following ways:

1. As the local land use authority for the unincorporated area, the Phase II Permit requires the County to have appropriate codes, regulations, enforcement, and education capacity to reduce water-polluting practices and to increase or promote practices that protect water quality.
2. As a landowner and property manager, the County is responsible to show that its own practices meet regulatory standards.
3. As a regional government, the Phase II Permit requires the County to coordinate with other municipalities and show how departments within the County are coordinated to achieve Phase II Permit compliance.
4. The Phase II Permit requires the County to pay into a statewide water quality and flow monitoring program, or to conduct monitoring within its jurisdictional boundaries.

The Division coordinates compliance with and management of specific Phase II Permit elements including system O&M, structural stormwater controls, training, and public education elements. Several Phase II Permit elements are implemented by other County departments including *Controlling Runoff from New Development, Redevelopment, and Construction Sites* (Stormwater Division in coordination with DCD) and *Illicit Discharge Detection and Elimination (IDDE)* (Stormwater Division in coordination with KPHD).

2.3 Water Resources Policy

In 2009 the BOCC passed a "Water is a Resource NOT a Waste Stream" policy. This policy was reaffirmed and replaced in 2016 with Resolution 134-2016, a broader *Water as a Resource* policy, which recognizes stormwater and surface water runoff as the leading transporter of pollution into Puget Sound and local wetlands, creeks, streams, and rivers. The policy consists of several guiding principles to limit pollution and preserve water as a resource rather than treating it as a waste stream (Figure 2–2). These principles serve as cornerstones for many of the activities carried out by the Division and its partners.

2.4 Purpose of This Plan

This Plan describes how Kitsap County will manage stormwater including policy, regulatory compliance, capital facilities, O&M, and financial elements. This Plan describes programs and capital projects and presents the financial plan to implement recommended program and capital project enhancements. These recommendations will inform the development of the stormwater program annual operating budget and capital facilities program.

Specific objectives of this Plan include:

- Compile and incorporate into this Plan previous studies, plans, and other information associated with current and proposed stormwater systems
- Develop a prioritized list of projects from the current Capital Facilities Plan (CFP)
- Evaluate Division organizational structure and resources relating to current and future needs for NPDES compliance, including staffing, equipment, and funding
- Develop actions for anticipated sea level rise (SLR), increased storm intensities, and other issues related to climate change
- Assess current funding levels and CFP funding sources

Figure 2–2. *Water as a Resource* policy statement

2.5 Plan Development Methodology

This Plan was developed through an incremental planning process that consisted of evaluation of specific individual program elements, assessment of physical study area conditions (water quality, habitat, and other beneficial uses), and preparation of associated reports and technical memoranda. Advanced preparation of Kitsap County's Stormwater Management Action Plan (SMAP) informs future stormwater management actions by the Division and CWK. The SMAP, which is required under the Phase II Permit, resulted in the identification of a priority stormwater basin where future projects and programs would have the potential for greatest ecological lift. The SMAP is summarized in Chapter 3 and is included as Appendix 3-1.

Kitsap County's existing stormwater CFP and regional retrofit plans are the cornerstones of the County's comprehensive approach to stormwater management. These individual assessments were reviewed with County staff and other stakeholders and were used to identify key issues and data gaps and to establish potential priority actions.

2.6 Kitsap County's Comprehensive Stormwater Plan Overview

The content and organization of this Plan are summarized below.

2.6.1 Executive Summary and Background

Chapter 1 is the Executive Summary, encapsulating the main components of this Plan into a condensed section written with elected officials, the general public, and other stakeholders in mind. Chapter 2, Background, includes references to regulatory and surface water management policies that influence management decisions pertaining to stormwater and surface water management. It also provides an overview of this Plan's contents.

2.6.2 Surface Water Policies, Regional Coordination, and Related Planning Activities

Chapter 3, Stormwater Policies, Regional Coordination, and Management Action Planning, consolidates the array of policies, regional coordination, and long-range planning summaries that work together in stormwater management. These polices and planning elements describe the land use and infrastructure goals, objectives, and priorities that establish the foundation for surface water and stormwater planning in Kitsap County. Regional coordination is a mandated component of the Phase II Permit, while other planning efforts both influence and support the Division's implementation of various elements of the stormwater program.

2.6.3 Description of Stormwater System

Chapter 4, Description of Stormwater System, provides a high-level description of the physical infrastructure that makes up unincorporated Kitsap County's stormwater system. This includes traditional infrastructure like pipes and culverts as well as green stormwater

infrastructure (GSI) designed to manage flow and runoff water quality through more natural systems.

2.6.4 Climate Change Assessment

Chapter 5, Climate Change Assessment, provides a summary of the potential effects of a changing climate with stormwater planning and management of stormwater infrastructure. A significant portion of Kitsap County's stormwater infrastructure is affected by SLR and altered precipitation cycle; this chapter provides an overall assessment of how stormwater management agencies can prepare for and adapt to climate change. The chapter relies on information published by the University of Washington (UW) Climate Impacts Group (CIG).

2.6.5 Permit Compliance

Much of what is required in managing a stormwater utility is driven by federal, state, and local regulations. Chapter 6, Permit Compliance, describes an evaluation of the County's activities to meet the 2019–2024 Phase II Permit requirements and identifies SMWP gaps and opportunities. Chapter 6 presents the findings from this analysis, involving a step-by-step review of the County's SWMP as detailed in its Stormwater Annual Plan to Ecology. The comprehensive gap analysis was based on current levels of service (LOSs) compared to SWMP requirements stipulated by the Phase II Permit. Note that many of the requirements reviewed in the 2019–2024 Phase II Permit are new; consequently, Chapter 6 identifies when new requirements take effect so that planning may occur in advance of regulations taking effect.

2.6.6 Stormwater Division Assessment

Chapter 7, Stormwater Division Assessment, provides a review of existing staffing levels, equipment, and other currently available resources. The objective of this analysis is to provide an assessment of the adequacy of the program for meeting future regulatory demands and to identify ways in which the Division may coordinate with other divisions, in particular the Sewer Division, with which it shares equipment and occasionally staff resources.

2.6.7 Capital Facilities Plan

Chapter 8, Capital Facilities Plan, includes the proposed 2020 through 2025 CFP, developed by previous County planning efforts. It also provides an overview of drivers for capital improvements, and how potential projects are identified and prioritized. A description of funding sources for the current list of projects is also included.

2.6.8 Stormwater Utility Financial Assessment

Chapter 9, Stormwater Utility Financial Assessment, assesses if the level of revenue collected through rates is sufficient to implement the prioritized capital facilities and/or stormwater management plan.

2.6.9 Long-Range Planning and Adaptive Management

Chapter 10, Long-Range Planning and Adaptive Management, describes Phase II Permit requirements for long-range planning, and how stormwater management will be addressed as part of long-range County comprehensive land use planning. Adaptive management (AM) techniques that could be used to address areas of uncertainty and risk are also described.

2.7 Public Involvement Conducted for This Plan

Because of the global pandemic caused by the COVID-19 virus that occurred during the development of this Plan, in-person public involvement was not possible. Instead, the Plan will be available on the County's website along with other pertinent documentation related to management of the stormwater system, such as its NPDES Annual Report. A form will be available for those visiting the website to provide input into the Plan. Approval by the BOCC of the final Plan is also required.

3 Stormwater Policies, Regional Coordination, and Management Action Planning

Stormwater-related planning processes and polices are typically developed based on a combination of regulatory requirements and guidance, and local needs and conditions. Regulatory requirements include mandated land use and capital facilities planning under the Growth Management Act (GMA) as well as the specific technical performance requirements of the Phase II Permit (described further in Chapter 6) and state guidance on BMPs and low-impact development (LID[1]) and Ecology's *Stormwater Management Manual for Western Washington* (SWMMWW).

3.1 Growth Management Act

The GMA (RCW 36.70A) requires Kitsap County to adopt plans to "protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water." The GMA also requires counties and cities to include the best available science when developing policies and growth regulations.

The GMA is implemented through the County's Comprehensive Plan. In general, the County's Comprehensive Plan is the centerpiece of local planning and articulates a series of goals, objectives, policies, actions, and standards that are intended to guide day-to-day decisions by elected officials and local government staff. The County's Comprehensive Plan is required under the GMA to address water resources through adequate development regulations, protection of water quality and anadromous fisheries, and conservation and protection of resource lands (MSRC 2020).

The County's Comprehensive Plan also requires consistency of capital facilities—including stormwater—with current and projected land use plans. The stormwater capital facilities element of the County's Comprehensive Plan must include the following information:

- Inventory of existing capital stormwater facilities owned by Kitsap County
- LOS standards for stormwater management
- Forecast of the future needs for stormwater capital facilities based on population growth targets
- Proposed locations and capacities of expanded or new stormwater capital facilities
- A 6-year plan that will finance stormwater capital facilities, within projected funding capacities and including sources of public monies for facilities

[1] Low-impact development is a stormwater and land use management strategy that tries to mimic natural hydrologic conditions by emphasizing the following techniques: conservation, use of on-site natural features, site planning, and distributed stormwater BMPs integrated into a project design (Ecology 2020).

This Plan meets GMA requirements for CFPs and is expected to be adopted (as applicable and as may be amended) as an appendix to the County's Comprehensive Plan.

3.2 Stormwater Policies

The County's stormwater policies are contained and described within the County's Comprehensive Plan (2016), Level of Service Goals and Standards, and the *Water as a Resource* policy. These policies are summarized in the following sections.

3.2.1 Kitsap County Comprehensive Plan (2016)

The Kitsap County Comprehensive Plan (2016) includes multiple goals, policies, and strategies that are directly or indirectly associated with stormwater management. Primary policies affecting stormwater management are contained in the Environment and Capital Facilities sections of the Comprehensive Plan.

Environmental Policies

The 2016 Comprehensive Plan recognizes the importance of protecting the natural environment, while also providing for the needs of the growing number of residents and businesses in Kitsap County. Intact ecosystems, forestlands, shorelines, freshwater systems, and other critical areas all make up the natural environment of Kitsap County. Human-well-being depends on a healthy, natural environment to provide for clean air, clean water, food, and an overall high quality of life (Kitsap County 2016a).

In the 2016 Comprehensive Plan, Kitsap County placed a higher priority on environmental sustainability in public policy. This includes managing the natural environment as an essential asset alongside other assets like roadways, buildings, capital facilities, and revenue (Kitsap County 2016a). Relevant environment policies, because of their impact to land use and water quality, in the 2016 Comprehensive Plan include the following:

- **Environment Policy 3:** Identify, document, and evaluate how the natural environment is measured or categorized in land use, transportation, stormwater utility, parks, and other County plans.
- **Environment Policy 6:** Work toward the implementation of life-cycle cost analyses in County projects and programs to ensure the most efficient and effective use of the natural environment and of public financial resources.
- **Environment Policy 17:** Safeguard the quality and quantity of long-term water supplies by identifying and protecting critical aquifer recharge areas and using LID site planning principles to the greatest extent possible for reducing stormwater runoff.
- **Environment Policy 20:** Provide education to County residents and businesses about the functions and benefits of a healthy ecosystem. This may be through, but not limited to, support of existing efforts with County partners and encouragement of an open public dialogue on natural environment management.

The stormwater program is currently meeting these policy objectives through implementation of monitoring programs, capital facilities planning, and regional environmental education initiatives.

Capital Facilities and Utilities

Capital facilities and utilities goals and policies guide planning, funding, and project decisions for unincorporated Kitsap County. Relevant capital facilities and utilities policies, because of their impact to management and funding of water treatment facilities, in the 2016 Comprehensive Plan include:

- **Capital Facilities and Utilities Policy 5:** Continuously review stormwater regulations and design manuals to ensure that Kitsap County is meeting the most up-to-date BMPs and changes in state and federal stormwater regulations.
- **Capital Facilities and Utilities Policy 6:** Inventory drainage basins through the Stormwater Division of KCPW to investigate existing and future stormwater drainage problems.
- **Capital Facilities and Utilities Policy 14:** Kitsap County, along with cities and special-purposes districts, should develop long-term funding strategies that include, but are not limited to, the following funding options: Existing development pays for the capital improvements that reduce or eliminate existing deficiencies and some or all of the replacement of obsolete or worn-out facilities, and may pay a portion of the cost of capital improvements needed by future development, and payments may take the form of user fees, charges for services, special assessments, and taxes.
- **Capital Facilities and Utilities Policy 15:** The estimated costs of all needed capital improvements should not exceed conservative estimates of revenues from sources that are available to the County under current law.
- **Capital Facilities and Utilities Policy 30:** Participate in regional efforts to achieve total maximum daily loads (TMDLs) for local water bodies as required by the Clean Water Act. Take steps to reduce nonpoint sources of pollution to Puget Sound and other water bodies to achieve compliance.
- **Capital Facilities and Utilities Policy 34:** Use watershed and basin plans as a means to reduce stormwater impacts and nonpoint pollution to develop long-term plans for development and stormwater controls at the watershed level, and to coordinate with neighboring jurisdictions.

The stormwater program is currently meeting these policy objectives through a variety of measures including updates to the *Kitsap County Stormwater Design Manual* (Kitsap County 2020), regional retrofit and basin planning, regional facility development projects, and TMDL corrective action projects designed to meet the water quality goals of each TMDL, such as the Mutt Mitt and Backyard Pet Waste programs to manage fecal coliform runoff.

3.2.2 Level-of-Service Goals and Standards

LOS standards are generally defined as measures of the minimum amount of a public facility that must be provided to meet the community's basic needs and expectations (MRSC 2020).

Stormwater LOS criteria are used as benchmarks to establish and assess the performance of existing facilities and management decisions related to the administration, operation, maintenance, and capitalization of stormwater assets. They are also used to assess whether existing capacity is adequate to handle new development, or to determine what facility improvements will be required to avoid overloading existing facilities. As the community grows in population, LOS standards help to identify facility upgrades necessary to keep pace with growth without compromising service standards.

The goals and objectives of the County's stormwater program reflect LOS expectations for stormwater management facilities. The Stormwater CFP, adoption of the Kitsap County Stormwater Management Ordinance, and watershed planning activities undertaken by DCD all contribute to the public's LOS expectations. Current stormwater LOSs, established in the Kitsap County CFP (Kitsap County 2016b), consist of the following:

- Compliance with the NPDES Stormwater Permit
- Land development compliance with the *Kitsap County Stormwater Design Manual* (Kitsap County 2020)

With adoption of the *Water as a Resource* policy, stormwater LOS expectations in Kitsap County have been expanded beyond these basic regulatory compliance goals to include a broader set of stormwater goals and objectives that generally consist of:

- Preservation of natural hydrology and reduction of stormwater flow volumes
- Reduction of stormwater pollutant loading to groundwater and surface water
- Integration of stormwater practices into the landscape, and utilization of land that supports capital facilities for multiple purposes when feasible

Based on the existing regulatory-focused LOSs, and the broad goals of the *Water as a Resource* policy, the strategic LOS goals for the stormwater program can be defined by the following LOS measures (these LOS measures are aspirational in nature and do not bind the County to any particular course or action):

- Comply with applicable local, state, and federal regulations including Ecology's Phase II Permit
- Coordinate stormwater regulatory review and implementation processes to address the potential impacts of stormwater from future development
- Maintain and, where feasible, reduce peak stormwater flows to streams necessary to prevent flood damage and support stream biological functions

- Maintain and, where feasible, reduce current pollutant loading from stormwater discharges necessary to sustain beneficial uses for humans, fish, and wildlife
- Provide adequate stormwater program funding through an equitable stormwater utility rate structure independent of grant funding sources

These LOS goals are consistent with and comply with the Phase II Permit. These LOS goals are also specifically reflected in the *Kitsap County Stormwater Design Manual* (Kitsap County 2020) as they relate to new development. Land development activities requiring land use approval from Kitsap County are conditioned to meet the water quality, runoff control, and erosion control requirements of the *Kitsap County Stormwater Design Manual*, which was adopted by the BOCC, was amended in 2014, and is currently being revised (Kitsap County 2020). Requirements consist of:

- Using LID/GSI principles, and manage stormwater runoff (quantity and quality) as close to the point of origin as possible
- Minimize the use of conventional stormwater collection (catch basins) and piped conveyance infrastructure
- Use LID/GSI BMPs (e.g., dispersion, infiltration, and reuse) where feasible
- Fit development to the terrain to minimize land disturbance and loss of natural vegetation, especially mature coniferous forest

New development will meet LOS criteria through compliance with applicable regulatory criteria. Other stormwater capital projects may include regional retrofits or restoration projects designed to address historical problems. The specific schedule, costs, and revenue sources for these 2020–2025 projects will be identified through ongoing and future 6-year CFP planning processes (see Chapter 8).

3.3 Regional Coordination

Kitsap County's stormwater facilities and service area overlap with other incorporated Kitsap County cities (Bremerton, Port Orchard, and Poulsbo), except Bainbridge Island. County stormwater collection, conveyance, and treatment facilities also interconnect to Washington State Department of Transportation (WSDOT) highway facilities, tribal lands, and, in some cases, Naval Base Kitsap facilities.

Stormwater management systems and contributing basins often span multiple jurisdictions. Collaborating with regional stakeholders and partners is therefore critical to effective regional efforts to restore and enhance water quality and aquatic habitat and to adapt to climate change. Kitsap County participates in regional work groups like the Water Resources Inventory Area (WRIA) 15 salmon recovery process, Salmon Recovery Council membership, West Sound Watershed Council and Technical Advisory Group, and Puget Sound Partnership Local Integrating Organization (LIO).

The County coordinates with the Suquamish Tribe and Port Gamble S'Klallam Tribe to ensure that treaty rights are respected, and the County routinely seeks the expertise of tribal representatives on aquatic habitat and fishery issues. The County also participates in a regional West Sound Stormwater Managers Group attended by the cities of

Bremerton, Poulsbo, Port Orchard, Port Townsend, Sequim, and Bainbridge Island. This group discusses surface water and stormwater-related issues including Phase II Permit regulations, water quality monitoring, and education and outreach (E&O) collaboration.

3.4 Stormwater Management Action Planning

The Phase II Permit requires Kitsap County to use a watershed-scale approach to stormwater management and develop a prioritization process and criteria to select areas and projects to address impacts caused by existing development. This requirement reflects the following two key Ecology findings (2018a):

- Water quality and aquatic habitat in western Washington State cannot be maintained without considering land use and how the landscape is developed.
- Addressing stormwater impacts from new development and redevelopment at the site and subdivision scale will not adequately address legacy impacts from previous development patterns and practices, nor will it serve to protect water quality.

To address these findings, stormwater programs must include a SMAP process, that the County has completed, that includes the following elements:

- An inventory of local receiving waters and summary of available information about the contributing watershed areas.
- Prioritization of basins to identify the contributing watershed areas where implementation of stormwater retrofit projects will provide the greatest benefit to the receiving waters.
- Development of a SMAP for at least one high-priority area that identifies tailored stormwater management actions, including stormwater facility retrofits (new facilities or upgrades to existing facilities), a proposed implementation schedule, and budget sources. The SMAP must identify (1) short-term actions (i.e., actions to be accomplished within 6 years), (2) long-term actions (i.e., actions to be accomplished within 7 to 20 years), and (3) a process to adaptively manage the SMAP.

The initial inventory and SMAP are summarized in the following sections. They were developed to meet the Phase II Permit requirement concurrently with this Plan. Findings from the SMAP are intended to support current and future planning, CFP, retrofit, and E&O activities. The full report is included in Appendix 3-1.

3.4.1 Study Area

The SMAP study area focused on watersheds greater than 1 square mile draining to water bodies within the county, excluding incorporated areas. The County does not complete stormwater quality work outside of County-controlled areas. Stormwater management in incorporated areas is covered under individual city MS4 permits.

Physical Setting

Kitsap County is located on the western side of Puget Sound, about 15 miles west of Seattle. The county lies within WRIA 15, which encompasses all of Kitsap County and portions of Mason, Pierce, and King counties (comprised of Vashon Island).

The Kitsap County shoreline covers approximately 218 miles, with numerous bays and inlets and other coastal land forms, including spits, bluffs, lagoons, tide flats, stream and tidal deltas, and rocky outcrops. With no large rivers or mountains containing snowpack, Kitsap County streams are relatively short in length and carry surface pollutants from stormwater runoff rapidly to its surface waters.

There are total of 27 primary basins in the county. These basins typically include a combination of surface water streams and built stormwater system infrastructure.

3.4.2 Receiving Water Analysis

The goal of the Receiving Water Analysis (RWA) is to describe the County's receiving waters, beneficial uses, types of potential impacts of urbanization and land use activities on those receiving waters, and how this information will be used to guide basin prioritization.

These activities result in a countywide inventory that identifies conditions in a list of candidate basins that are to be considered in the more detailed prioritization process. In general, the RWA consists of identification of the parameters and data sources used to assess water quality, water flow, and aquatic life habitat conditions in freshwater and marine shoreline areas.

Beneficial-Use Assessment

The beneficial-use assessment identified key uses and status of water quality and habitat conditions to support those uses in each basin, shown in Table 3-1. Evaluation of beneficial uses as described in Table 3-1 for each basin was completed using a relative prioritization scoring for each variable, with a higher priority score associated with a higher assigned point value.

Table 3-1. Summary of data sets and beneficial uses for RWA

Data category	Beneficial use	Data sets used in RWA
Water quality	• Aquatic life • Shellfish harvesting: recreational • Shellfish harvesting: commercial • Primary contact recreation	• Ecology 303(d) List • KPHD PIC data • KPHD marine ambient monitoring data • KPHD stream ambient monitoring data
Water flow	• Aquatic life • Water supply • Salmonid habitat	• Ecology Watershed Characterization • KPUD stream flow monitoring
Habitat	• Aquatic life • Salmonid habitat • T&E listed ESA species • Forage fish spawning • Wildlife habitat	• WDFW SalmonScape GIS • WDFW Fish Barrier Inventory GIS • Puget Sound Benthos B-IBI Dataset • Ecology Watershed Characterization • Kitsap County GIS • WDFW Forage Fish Spawning GIS • NOAA and USFWS Critical Habitat
Shellfish and finfish consumption	• Shellfish harvesting: recreational • Shellfish harvesting: commercial • Finfish harvesting: recreational	WDOH Commercial Shellfish and Beach Closure GIS [a]
Land use	Water quality, water flow, and habitat	• Kitsap County Zoning GIS • Kitsap County Transportation GIS (road miles) • Kitsap County Parks GIS • Land cover and impervious surfaces • Census urbanized areas • Population • Incorporated areas and UGAs
Stormwater infrastructure	Water quality, water flow, and habitat	• Kitsap County Asset Management System • Kitsap County Zoning GIS

B-IBI = Benthic Index of Biotic Integrity.
ESA = Endangered Species Act.
GIS = geographic information system.
NOAA = National Oceanic and Atmospheric Administration.
PIC = pollution identification and correction.
UGA = urban growth area.
USFWS = United States Fish and Wildlife Service.
WDFW = Washington Department of Fish and Wildlife.
WDOH = Washington Department of Health
a. WDOH 2019.

3.4.3 Basin Prioritization

Basin prioritization was based on the beneficial-use/impairment criteria that help to quantify pressure of development. Each of the analyzed basins was assigned a priority score for each criterion, with a higher priority score associated with a higher assigned point value. Scoring was divided into four classifications: Land Use, Jurisdiction, Aquatic Resources, and Water Quality/Basin Health.

The highest-priority basin was selected by summing point values from each criterion. From this process, East Dyes was selected as the priority basin. Scoring breakouts for all basins are shown in the SMAP, located in Appendix 3-1. The prioritized basin is shown in Figure 3–1.

3.4.4 Basin Characterization and Opportunities

Once identified, the priority basin was characterized for its opportunities to improve water quality impairments. Improvement opportunities include capital projects (in the case of the East Dyes basin, projects are already identified in the current CFP; see Chapter 8 for more information), maintenance changes, and behavior change programs involving E&O and engagement BMPs. Once identified, improvement opportunities should be incorporated into near-term actions and long-range planning activities.

Figure 3–1. Prioritized basin

4 Description of Stormwater System

The stormwater system provides service for 208,595 square miles of unincorporated area within Kitsap County. The existing drainage system consists of a network of natural features and constructed facilities that collect, convey, treat, and discharge surface water runoff. Constructed facilities include piped systems, culverts, ditches, bioswales, detention facilities, and other quantity and quality control facilities.

Stormwater infrastructure is typically concentrated in areas of medium- to high-density development. Locations of Kitsap County–owned assets are shown in Figure 4–1. The County maintains digital records of the stormwater system through geographic information system (GIS) map layers and its work order management system for tracking inspections and assets. In general, Kitsap County has three types of drainage facilities:

- Conveyance network
- Flow-control facilities
- Stormwater quality treatment systems

Drainage infrastructure is typically guided by topography and flows, without consideration to property ownership, land use, or political boundaries. The conveyance network includes all natural (streams and swales) and constructed open channels (swales and ditches), as well as piped drainage systems (including catch basins and conveyance structures) and culverts. These systems may be located on private property, County-owned properties, or within the County right-of-way.

The system owned by Kitsap County consists of about 246 miles of piped conveyance, ranging from 4 to 120 inches in diameter; approximately 11,306 catch basins; and more than 670 water quality treatment systems.

4.1 Built Assets: Conveyance Network

A breakout of pipe length by diameter is provided in Table 4-1 and a breakout of pipe length by material is provided in Table 4-2. Knowing the length of drain pipe by size and material is helpful for planning asset management renewal and replacement in building a sustainable O&M program.

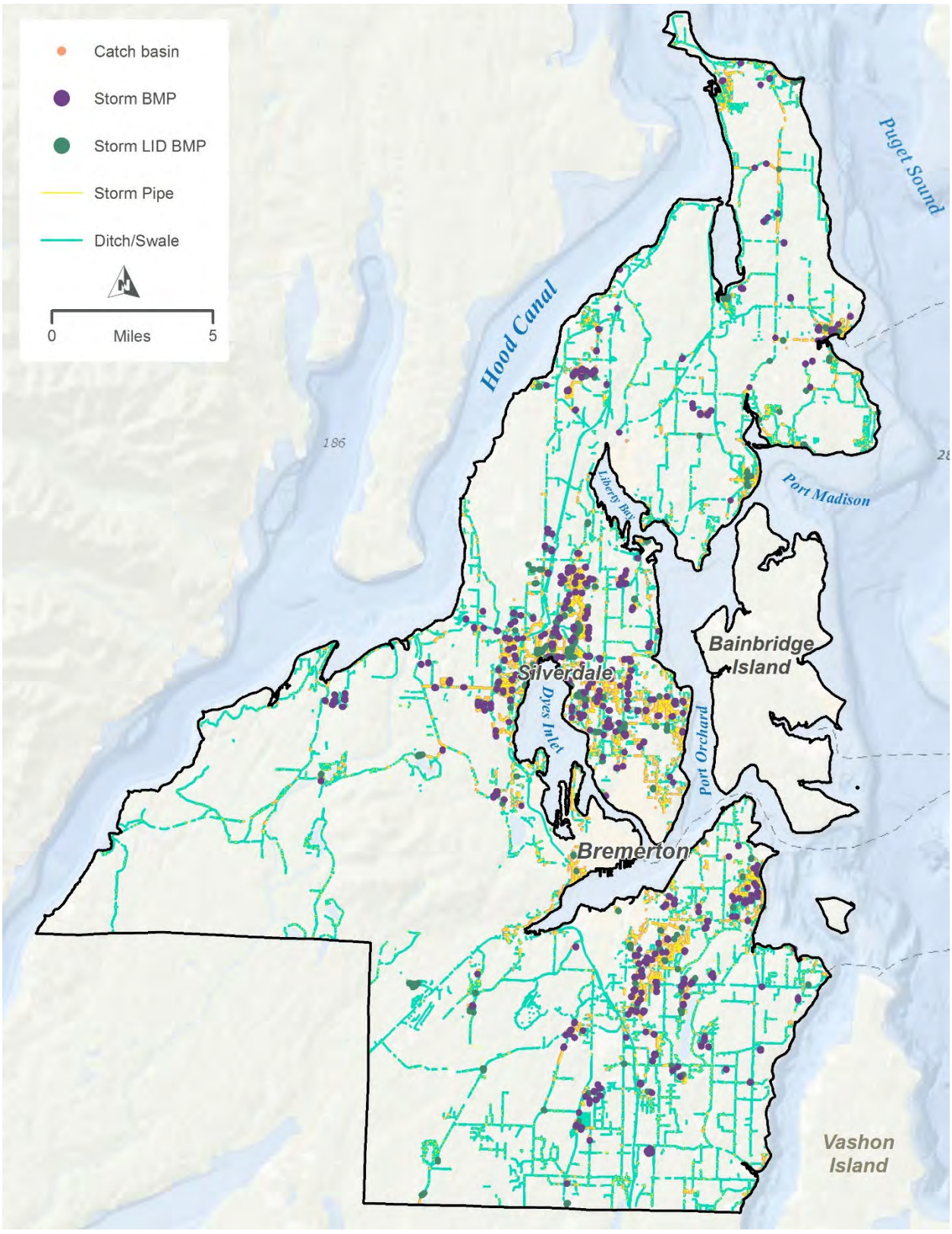

Figure 4–1. Stormwater infrastructure overview

Table 4-1. Storm drain pipe length by diameter

Pipe diameter (in)	Length (ft)
4	3,246
6	14,971
8	37,597
10	7,403
12	866,509
15	56,440
18	223,613
21	5,457
24	56,101
30	13,319
36	11,960
42	1,492
48	1,707
60	39
72	882
96	178
108	40
120	209
Unknown	41
Total	**1,301,202**

Table 4-2. Storm drain pipe length by material

Pipe material	Length (ft)
Aluminum	28,511
Corrugated metal	584,981
Concrete	272,944
Corrugated plastic	348,110
Ductile iron	5,042
HDPE	41,025
PVC	19,151
Unknown	1,439
Total	**1,301,202**

HDPE = high-density polyethylene.
PVC = polyvinyl chloride.

4.2 Built Assets: Flow Control/Water Quality Treatment Facilities

Flow control facilities include infiltration facilities, retention and detention ponds, tanks, vaults, and bioretention systems. The purpose of these facilities is to reduce the rate of

stormwater flow from a specific site or area to reduce the potential for localized flooding, minimize flow damage to natural water courses, and prevent downstream erosion problems. These facilities are designed to hold a volume of runoff based on the amount of impervious area and a specific design storm event.

Stormwater quality treatment facilities include water-quality (wet) ponds, bioretention swales, infiltration facilities, and bioretention systems. The purpose of these facilities is to remove a certain type and/or amount of pollutant from the runoff before it is discharged into a water body or collection system or dispersed over the ground for infiltration. Stormwater facilities for the County are summarized in Table 4-3. Figure 4–2 shows an example of a stormwater facility located within the county.

Table 4-3. Current stormwater facility inventory

Type	Quantity
Bioretention cell	92
Bioswale	12
Constructed wetland	4
Detention dry	260
Detention wet	2
Enhanced ditch	11
Filterra	29
Infiltration trench	-
Modular wetland	2
Permeable pavement	28
Rain garden	21
Retention	75
Tanks	102
Vaults	32

Figure 4–2. Stormwater facility located within Kitsap County

5 Climate Change Assessment

A climate change assessment was completed that investigated both current and projected trends in precipitation intensities for Kitsap County.

This chapter provides a summary of the potential effects of a changing climate with stormwater planning and management of stormwater infrastructure. A significant portion of Kitsap County's stormwater infrastructure is affected by SLR and an altered precipitation cycle; this chapter provides an overall assessment of how stormwater management agencies can prepare for and adapt to climate change.

Based on prior climate change impact analysis and assessment produced by the National Oceanic and Atmospheric Administration (NOAA), UW, EPA, Seattle Public Utilities, King County, HDR Engineering, Inc. (HDR), and numerous other entities, typical at-risk components of the Kitsap County stormwater system were identified.

5.1 Sea Level Trends and Sea Level Rise for Kitsap County

The nearest and most appropriate tide gauge in the region is located in Seattle at the Seattle–Bremerton ferry terminal on Elliott Bay, with a period of record from 1899 to 2018. Recorded sea level trend at this location is shown in Figure 5–1. This graph shows an average yearly SLR of 2.06 millimeters per year (mm/yr) or 0.081 inch per year (in/yr), or 1 inch every 12.3 years. Thus, at the very minimum, this rate of SLR should be the baseline for which planning should consider.

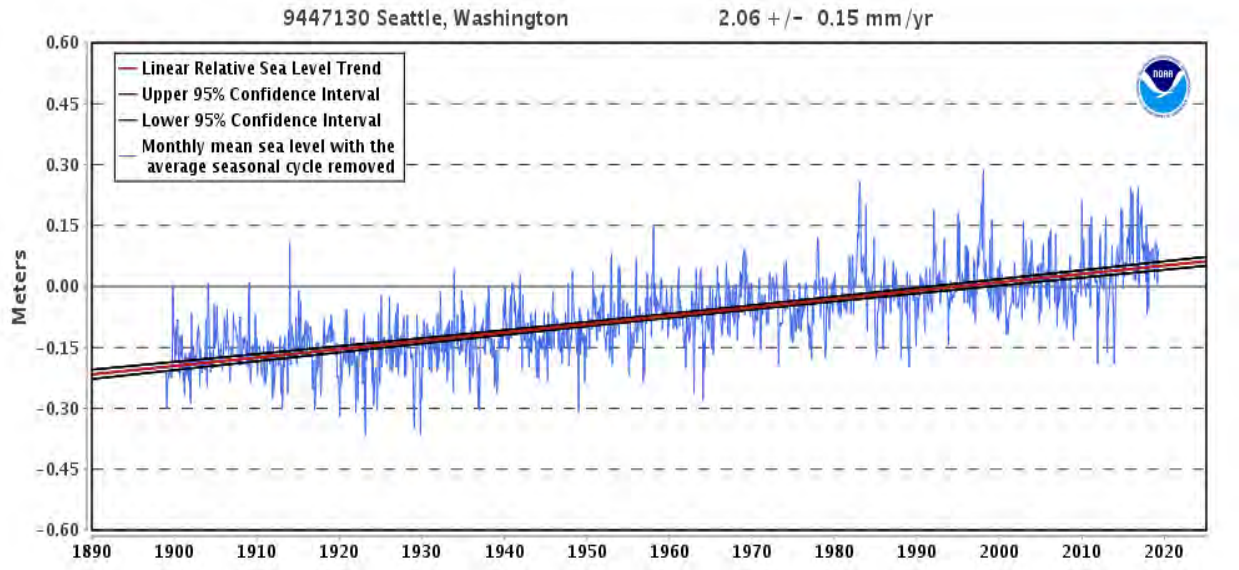

Figure 5–1. Observed sea level trend at Seattle, Washington showing rise, 1899–2018

A recent study of SLR was completed by the Washington Sea Grant and the UW CIG. To make determinations as to the impact of SLR on the County's stormwater infrastructure, the 90 percent SLR probability of exceedance estimates from this study were used to identify and quantify potential future inundation levels at specific outfall locations provided by the County.

The UW CIG study provided projections for two climate (emissions) scenarios: Representative Concentration Pathway (RCP) 4.5 and RCP 8.5. RCP 4.5 projects a reduction scenario in which a significant greenhouse gas (GHG) mitigation policy is implemented, and RCP 8.5 calls for very high GHG emissions without additional efforts to constrain emissions. This study provided projected SLR data for Kitsap County for the years 2030, 2050, and 2100.

Tables for SLR for each scenario at the listed years are provided in Appendix 5-1, Climate Change Assessment. Using the table data and data provided by the County containing geospatial data associated with the stormwater outfalls, an analysis was completed to determine which outfalls had elevations less than the six SLR RCP scenarios (RCP 4.5 and RCP 8.5 for 2030, 2050, and 2100). Figure 5–2 through Figure 5–7 identify the stormwater outfall locations that are expected to be impacted by the given SLR scenarios at the future time steps.

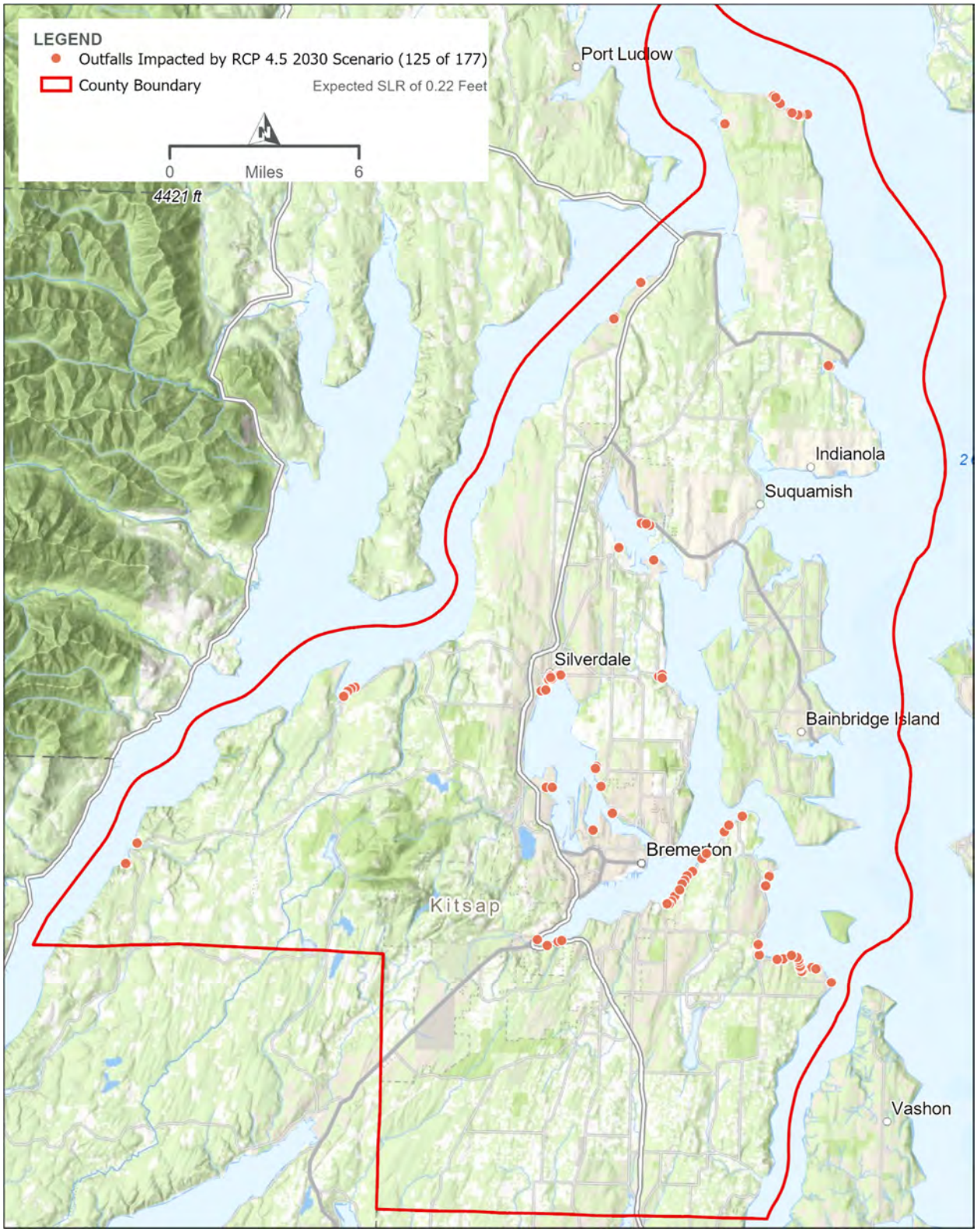

Figure 5–2. Locations of outfalls impacted by the RCP 4.5 SLR scenario by 2030 in Kitsap County

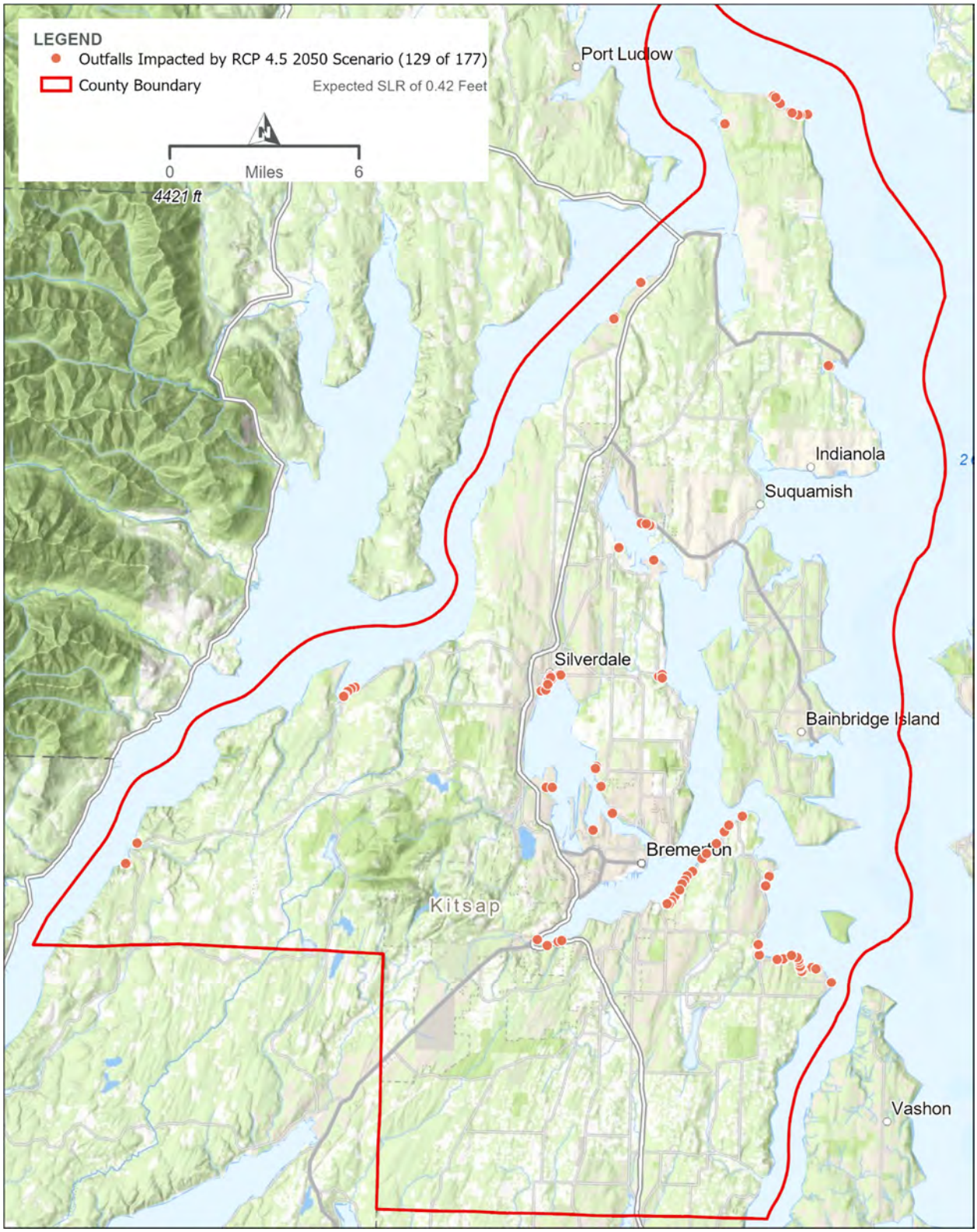

Figure 5–3. Locations of outfalls impacted by the RCP 4.5 SLR scenario by 2050 in Kitsap County

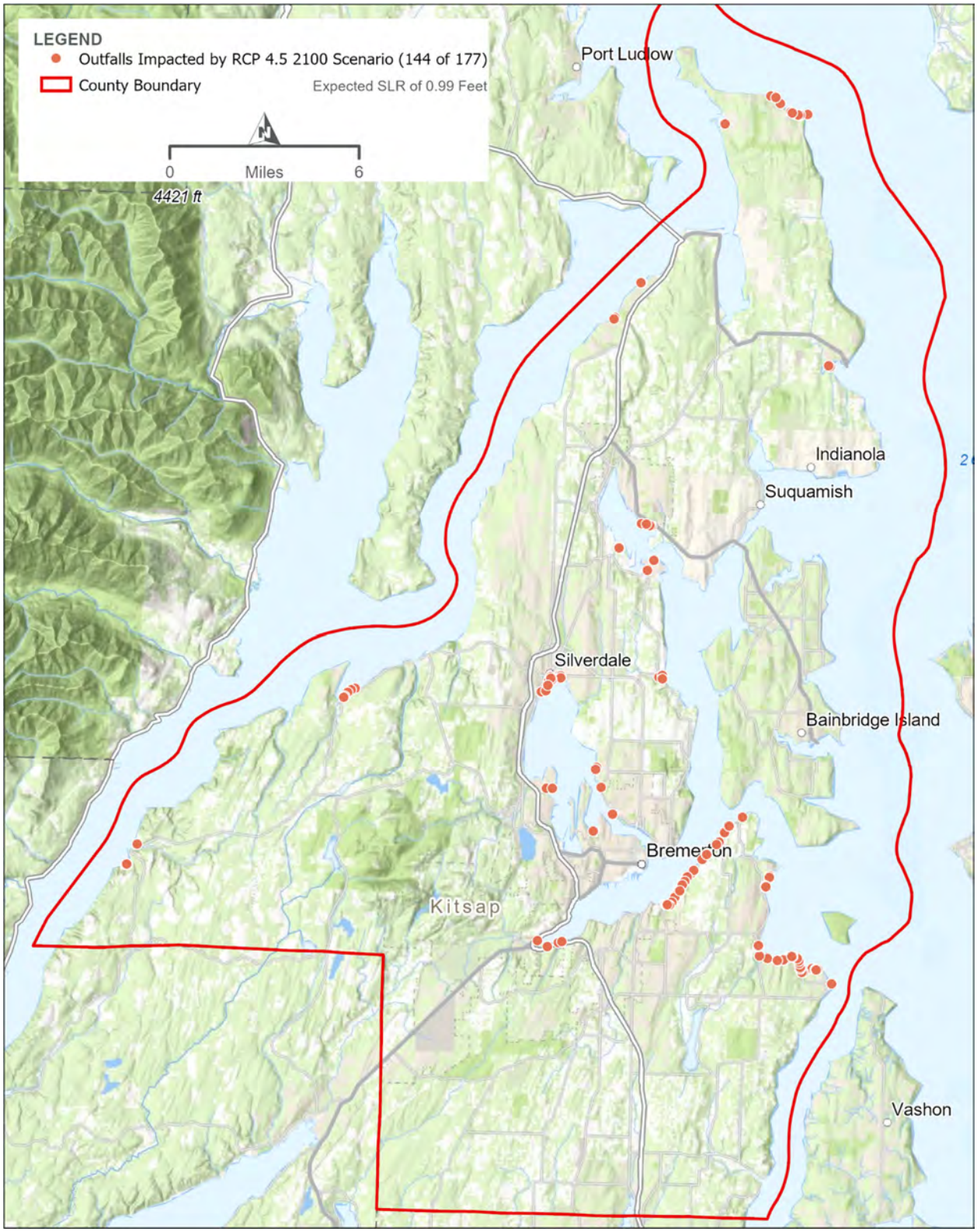

Figure 5–4. Locations of outfalls impacted by the RCP 4.5 SLR scenario by 2100 in Kitsap County

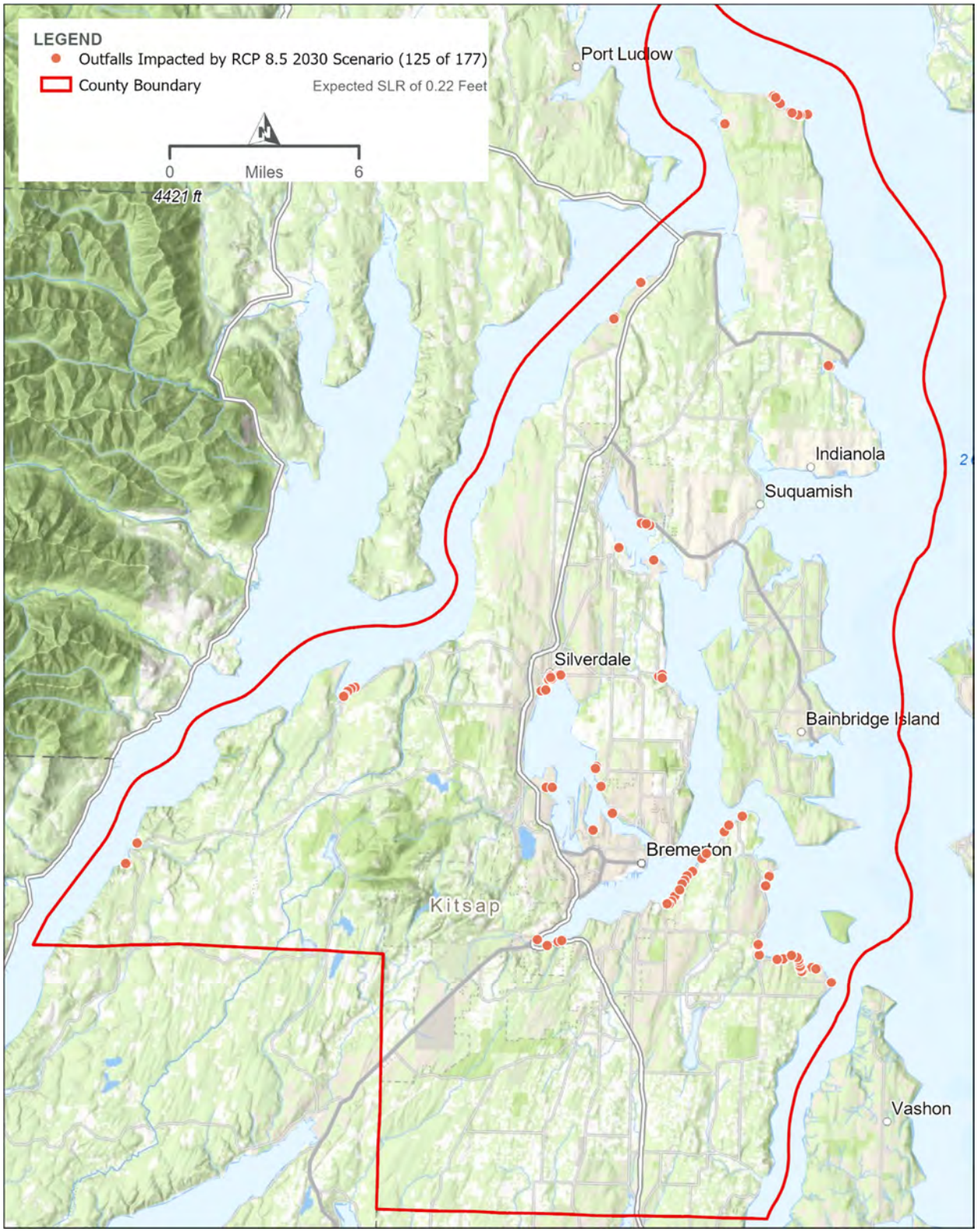

Figure 5–5. Locations of outfalls impacted by the RCP 8.5 SLR scenario by 2030 in Kitsap County

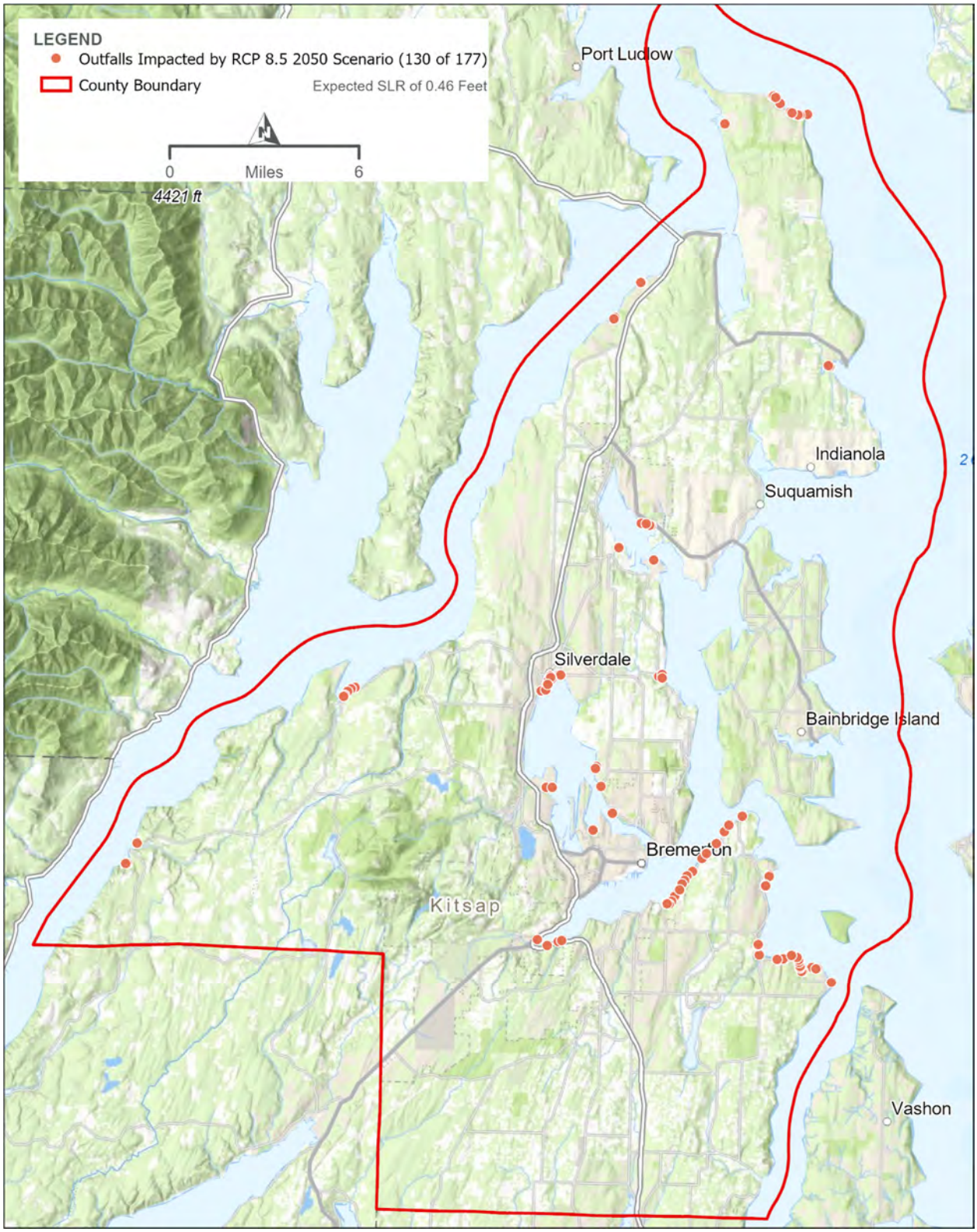

Figure 5–6. Locations of outfalls impacted by the RCP 8.5 SLR scenario by 2050 in Kitsap County

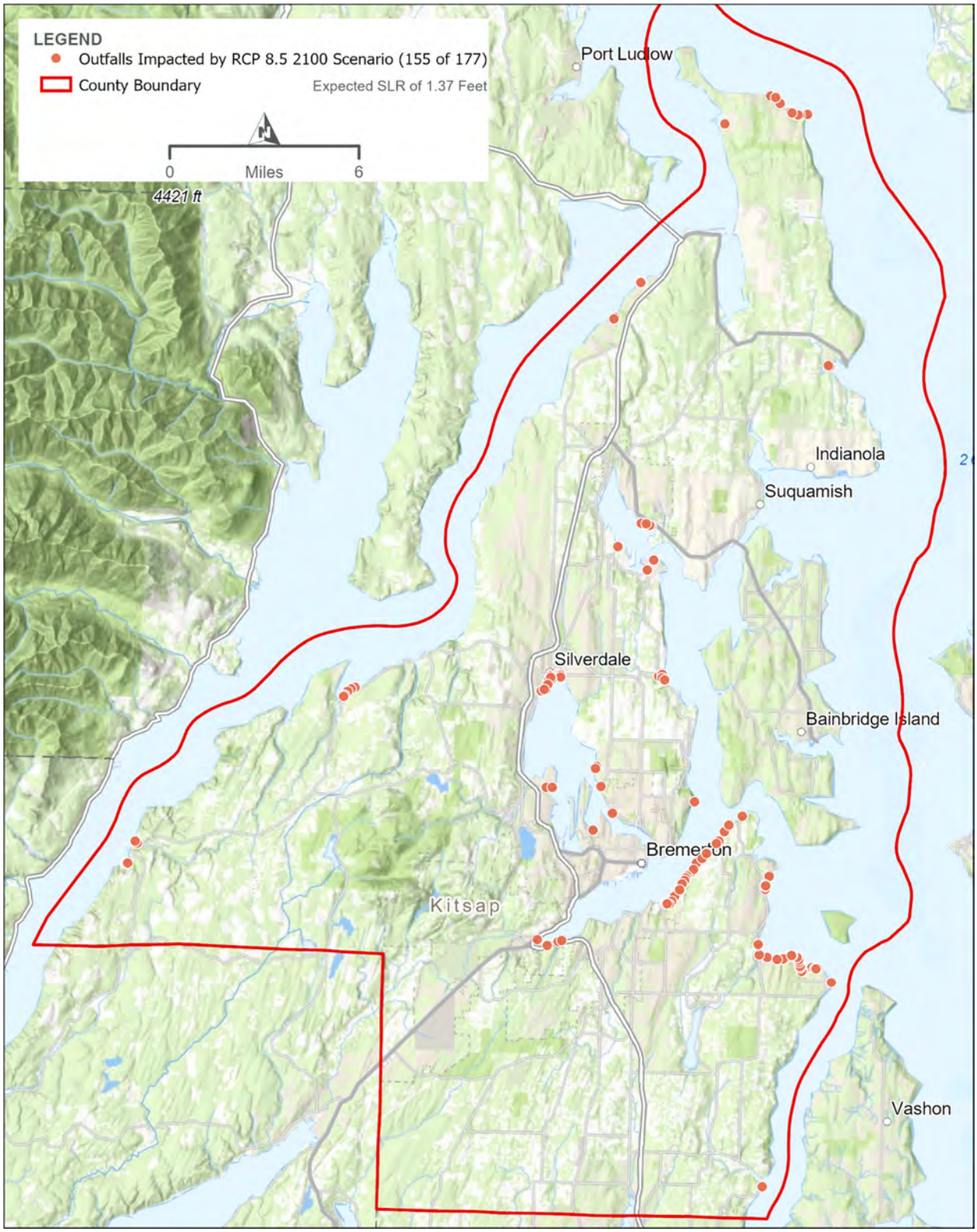

Figure 5–7. Locations of outfalls impacted by the RCP 8.5 SLR scenario by 2100 in Kitsap County

5.1.1 Historical Trends and Changes in Precipitation

Similar to the discussion of SLR, changes in precipitation intensities should begin with an understanding of the long-term historical trend in this parameter over Kitsap County. The long-term historical trend in 24-hour maximum annual precipitation at Bremerton, Washington, from 1900 to 2018 is shown in Figure 5–8. The trend shows precipitation increasing by 50 percent over this period from a value of 2 inches in a 24-hour period to a value of 3 inches in a 24-hour period. This trend, like the trend in SLR, should be considered the baseline for continued change in the coming years.

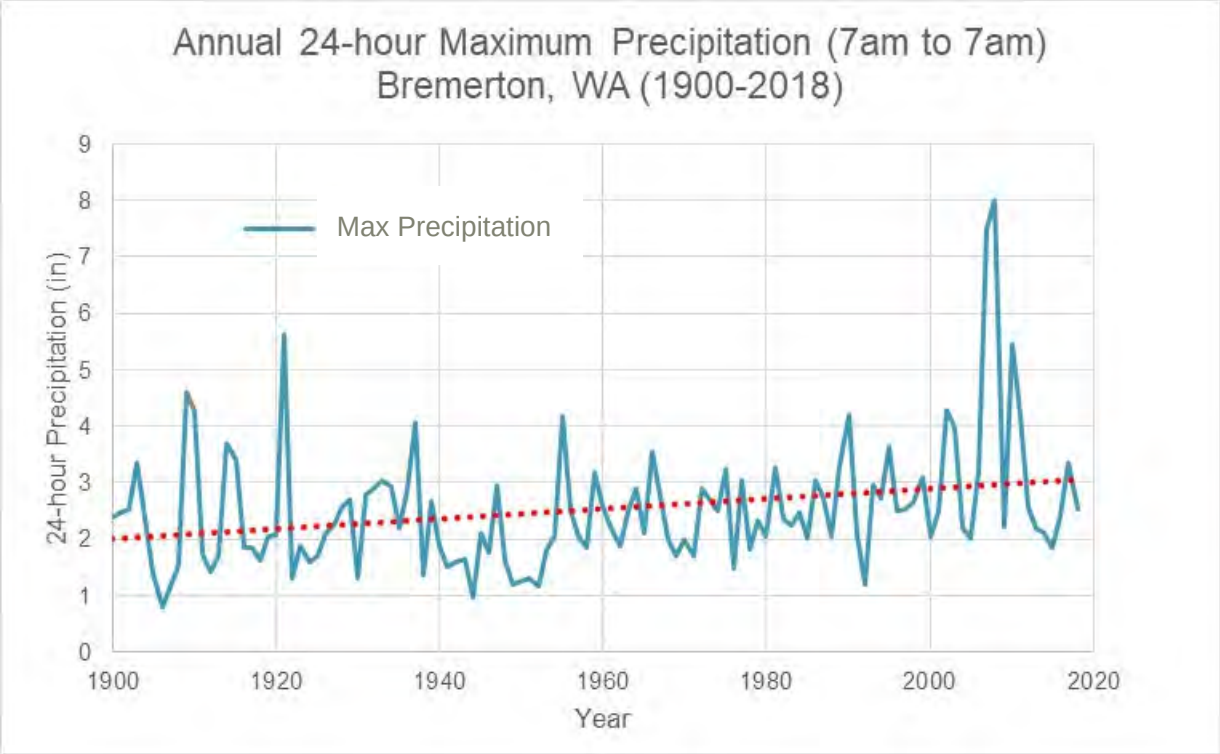

Figure 5–8. Annual 24-hour maximum precipitation at Bremerton, Washington

5.1.2 Projected Trends and Changes in Precipitation

The UW CIG recently developed a study titled *Regional Model Projections of Heavy Precipitation for Use in Stormwater Planning* (CIG 2019). These future climate projections indicate that the historical trend in increasing precipitation intensities in western Washington is likely to continue and, consequently, produce more intense hydrologic extremes. Although this study did not specifically identify a location in Kitsap County for investigation of future trends in heavy precipitation, it is reasonable to use the data from the Seattle-Tacoma International Airport, 8 to 10 miles to the east-southeast of southern Kitsap County, as a proxy for this study as they both reside in the same climate region as identified as the Interior Lowlands (Schaefer et al. 2009).

Figure 5–9 through Figure 5–11 show the projected change (RCP 4.5 and 8.5 scenarios) in 24-hour precipitation at this location as a percentage of the climatological mean from 1980 to 2009 at the future time scales of 2030, 2050, and 2080. It is apparent that the projections of changes in future 24-hour precipitation amounts will be anything but stationary. With the exception of the 2030 RCP 8.5 scenario, each of the projections of future climate scenarios shows an increase in precipitation intensities, particularly at the higher return frequencies (i.e., 100-year).

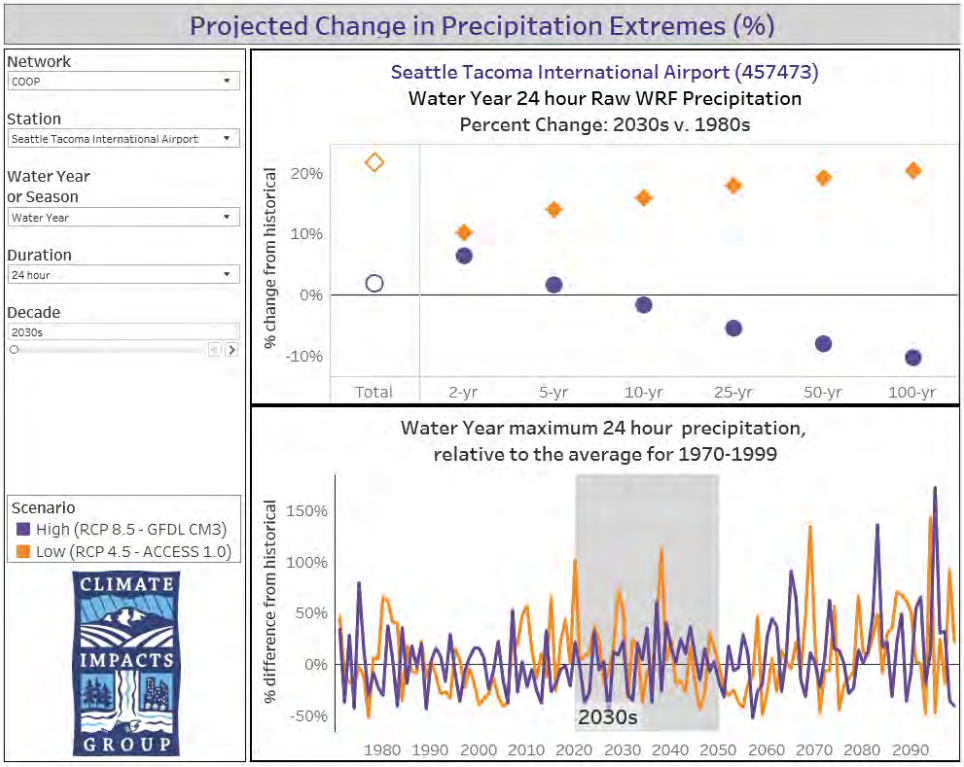

Figure 5–9. Projected change (in percent) of 24-hour precipitation at Seattle-Tacoma International Airport by 2030 relative to the 1980–2009 climatological mean

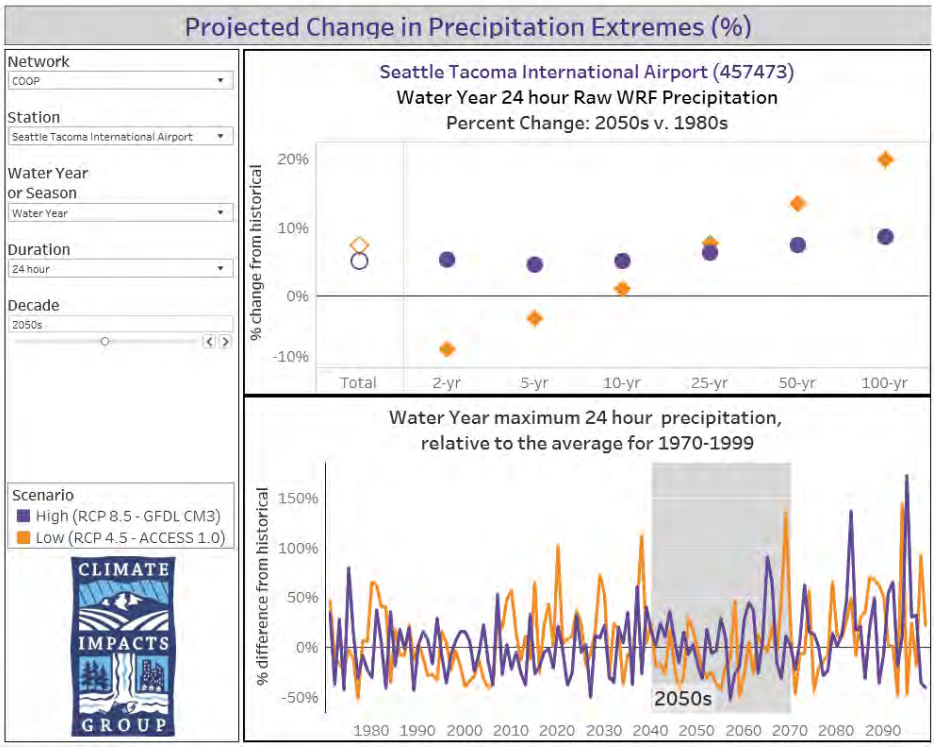

Figure 5–10. Projected change (in percent) of 24-hour precipitation at Seattle-Tacoma International Airport by 2050 relative to the 1980–2009 climatological mean

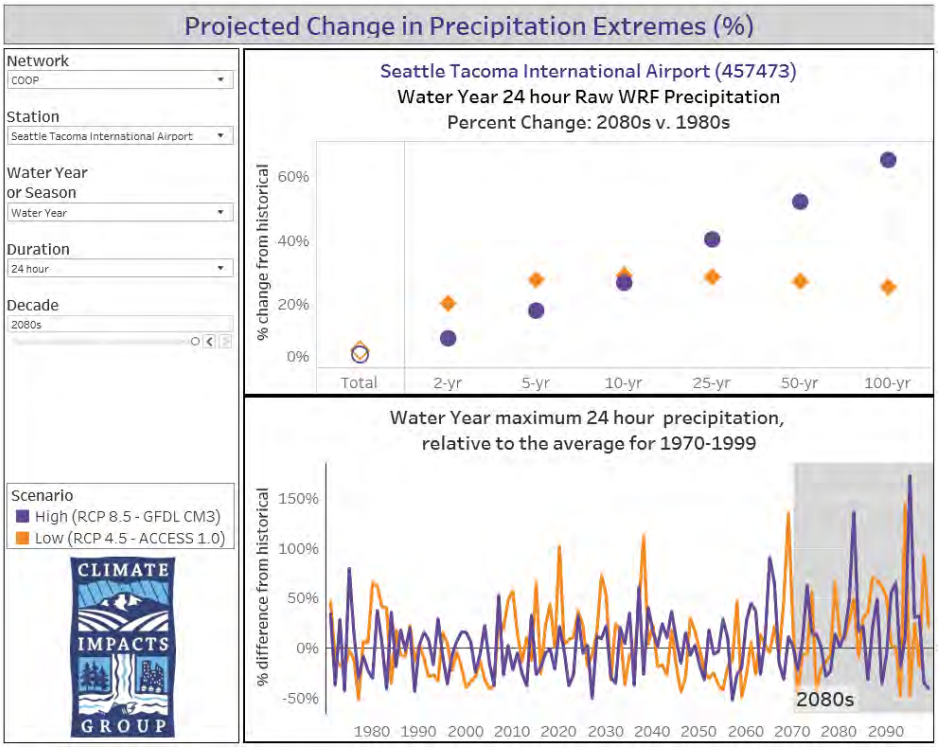

Figure 5–11. Projected change (in percent) of 24-hour precipitation at Seattle-Tacoma International Airport by 2080 relative to the 1980–2009 climatological mean

5.2 Recommendations

Investigation of both the current and projected climate influences on Kitsap County stormwater infrastructure determined that observed change is already occurring, while projected changes indicate the need for adaptation planning. SLR, although not nearly on the order of what is expected to occur on the East Coast of the United States, was found to be a factor concerning stormwater outfalls. Changes in precipitation intensities have shown a steady increase, particularly for 24-hour storm events, in the historical record and projected changes are expected to extend this trend.

A detailed accounting of risk, consequences, and system component criticality associated with the findings of this investigation is recommended to enable a cost-to-benefit analysis of remediation and/or adaptation measures for the County's stormwater system that would provide for increased system resilience and longevity. This cost-to-benefit analysis could take into account the following recommendations for specific actions that should promote stormwater resilience over time within Kitsap County. Recommendations are listed below in general order of efficacy and importance:

1. Inspection and maintenance should be a primary consideration before any attempt to increase system resilience is undertaken. In many cases, recurring system issues or problematic infrastructure is the result of a malfunction of the system due to a maintenance issue or a fault in system integrity. These should be inspected and remedied before making a system resilience plan.
2. System resilience does not occur overnight. It is a holistic undertaking that is generally incremental and requires a long-term stormwater resilience plan that is implemented with the greatest cost-to-benefit in mind. This long-term plan will provide for a vetting process of the stormwater resilience solutions that are listed in item 3 below.
3. Stormwater infrastructure resilience solutions can come in all shapes and sizes, and often can serve dual-purpose roles within the community. These can include the following:
    - Modifying conveyance design standards to increase capacity of new infrastructure over time by updating design storm volumes to factor in climate change for pipe sizing, increasing the use and number of grated inlets for improved efficiency of getting runoff into the conveyance network, and/or modifying hydraulic freeboard standards for built pipe networks to accommodate anticipated changes in precipitation volumes.
    - Using GSI/LID solutions such as bioretention, green spaces, stormwater capture and recharge designs, and stormwater retention/detention ponds/wetlands to minimize runoff volumes that protect downstream resources
    - Identifying areas where traditional hardening of stormwater infrastructure is the best solution—for example, planning for and installing pump stations in areas to protect critical outfalls from flood risk and other types of gray infrastructure
    - Enhancing codified protections for critical areas such as wetlands, riparian corridors, and other natural features that attenuate the effects of flooding

The design of stormwater infrastructure is based on an underlying assumption that the probability distribution of precipitation events is statistically stationary. This assumption may no longer be valid, resulting in uncertainty about the future performance of systems constructed under this paradigm. Such uncertainty emphasizes the importance of developing a focused and dedicated vulnerability assessment of the County's stormwater system.

Additional incorporation of changes in precipitation patterns into modeling can also help the County understand how these changes impacts areas of the system differently. Specifically, the use of storm transpositioning within the stormwater model for the County can provide a means to better understand the impact of increased precipitation intensities in the region. This methodology utilizes high resolution gauge-adjusted radar rainfall (GARR) storm reconstructions (precipitation grids) that occurred within the same climatological region and transposes them over the County so that an understanding of their impacts can be gained. These "What if?" scenarios will allow the County to model precipitation events of various recurrence intervals and intensities so that system vulnerabilities can be identified and remediated.

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6 Permit Compliance

Kitsap County is one of 80 western Washington municipalities that are regulated by the Phase II Permit, issued by Ecology under authority of the EPA's NPDES program. The County's original Phase II Permit was issued in 2007 by Ecology, as was the case for the other regulated jurisdictions in western Washington. The Phase II Permit is reissued every 5 years. The County's current Phase II Permit, reissued on August 1, 2019, expires on July 31, 2024.

This chapter provides an overview of the Phase II Permit and evaluates the County's SWMP for compliance.

6.1 NPDES Stormwater Permit Overview

Like all NPDES permits in western Washington, Kitsap County's Phase II Permit is organized into Special Conditions and General Conditions, and with compliance it allows the regulated jurisdiction to discharge stormwater runoff from its MS4 to the waters of the state. As a Phase II Permit condition, each calendar year the County updates and publishes a SWMP that describes the County's programs and documents how it meets the conditions of the Phase II Permit. The County's current SWMP is available on its website: https://www.kitsapgov.com/pw/Pages/pubs_resources.aspx.

General Phase II Permit conditions describe what actions a Permittee must take to meet Phase II Permit requirements and the Special Conditions section describes how to implement the Phase II Permit conditions. Special Conditions are specific to each Permittee. The Special Conditions sections are listed in Table 6-1 according to the current Phase II Permit released in August 2019, and are further described below.

Table 6-1. Phase II Permit Special Conditions

Phase II Permit section	SWMP Special Condition
S1	Permit Coverage Area and Permittees
S2	Authorized Discharges
S3	Responsibilities of Permittees
S4	Compliance with Standards
S5	Stormwater Management Program
S6	Stormwater Management for Secondary Permittees (not applicable to Kitsap County)
S7	Total Maximum Daily Load (TMDL)
S8	Monitoring and Assessment
S9	Reporting and Record Keeping

S1. Permit Coverage Area and Permittees

Special Condition S1 designates the areas in western Washington subject to the conditions of the Phase II Permit. It includes areas located west of the eastern boundaries of the following counties: Whatcom, Skagit, Snohomish, King, Pierce, Lewis, and Skamania. This Phase II Permit is applicable to owners or operators of regulated small MS4s.

S2. Authorized Discharges

Special Condition S2 authorizes the discharge of stormwater to surface waters and groundwaters of the state from MS4s owned or operated by each Permittee covered under this Phase II Permit, in the geographic area covered pursuant to Special Condition S1.

S3. Responsibilities of the Permittees

Special Condition S3 formally declares the responsibility of each Permittee for compliance with the terms of this Phase II Permit for the regulated small MS4s that they own or operate.

S4. Compliance with Standards

Special Condition S4 details applicable water quality standards and methods for achieving the standards. In summary this section:

- Prohibits the discharge of toxicants to waters of the state
- Provides instructions to Permittees on specific actions they must take when a discharge occurs that is in violation of the Permit
- Allows Permittees to use practices that reduce the discharge of pollutants to the MEP
- Allows Permittees to use all known, available, and reasonable methods of prevention, control and treatment (AKART) to prevent and control pollution of waters of the state of Washington
- Outlines actions each Permittee can take to remain compliant when prohibited discharges are unintentionally discharged to waters of the state

S5. Stormwater Management Program for Cities, Towns, and Counties

Special Condition S5 states that each Permittee will develop and implement a SWMP that includes a set of actions and activities the Permittee will undertake to meet the objectives of the NPDES program.

S6. Stormwater Management Program for Secondary Permittees

Special Condition S6 is not applicable to Kitsap County as the County is not listed as a secondary Permittee.

S7. Compliance with Total Maximum Daily Load Requirements

Special Condition S7 states that Permittees that have an applicable TMDL approved for stormwater discharges from MS4s must meet all requirements as specified in Appendix 2 of the Phase II Permit for individual TMDLs.

S8. Monitoring and Assessment

Special Condition S8 describes the requirements for a permitted jurisdiction to conduct water quality monitoring of its MS4 discharge.

S9. Reporting Requirements

Special Condition S9 standardizes reporting requirements for all regulated jurisdictions.

Regulatory details of operating a SWMP are contained in Special Conditions S5, S7, S8, and S9 of the SWMP. The program evaluation and gap analysis are specific to these sections of the SWMP.

6.2 Stormwater Management Program Gap Analysis

The evaluation and gap analysis of the County's SWMP are focused on Special Conditions S5, S7 (TMDL requirements), S8 (monitoring), and S9 (reporting). Special Conditions S1 through S4 are not part of the evaluation and Special Condition S6 is for secondary Permittees and therefore does not apply to the County. Special Condition S5 includes a set of "Special Conditions" for agencies responsible for operating an MS4. The responsible agencies implement the Special Conditions that will programmatically achieve the goals of the Phase II Permit.

Special Condition S5 is subdivided into Parts A, B, and C. Part A is the rules section of the Phase II Permit stating that jurisdictions shall prepare a SWMP. Part B states the objectives and standards that the SWMP must meet. Part C lists the activities required in the SWMP and is divided into eight subsections. Special Conditions S7, S8, and S9 are also included in the gap analysis. Table 6-2 lists the Special Conditions of the Phase II Permit included in the evaluation.

Table 6-2. Phase II Permit Special Conditions and program components analyzed

Special Conditions number	Special Condition
S5.A	Stormwater Management Program
S5.B	Discharge Reduction
S5.C.1	Stormwater Planning
S5.C.2	Public Education and Outreach
S5.C.3	Public Involvement and Participation
S5.C.4	MS4 Mapping and Documentation
S5.C.5	Illicit Discharge Detection and Elimination (IDDE)
S5.C.6	Controlling Runoff from New Development, Redevelopment, and Construction
S5.C.7	Operations and Maintenance
S5.C.8	Source Control Program for Existing Development
S7	Compliance with Total Maximum Daily Load Requirements
S8	Monitoring and Assessment
S9	Reporting Requirements

6.2.1 Stormwater Management Program Evaluation

HDR reviewed 75 individual Phase II Permit requirements in Special Condition S5 and additional conditions in Special Conditions S7, S8, and S9. To assess possible program gaps with respect to these requirements, HDR reviewed publicly available information from the County's existing SWMP, O&M manuals, and the County's website, and called on County staff when additional details were needed. The information gathered was compared to the requirements of the Phase II Permit to identify program gaps. In some instances, compliance gaps were not identified; however, recommendations to strengthen compliance documentation were made. The following sections summarize the findings of the gap analysis for each subsection of Special Condition S5. New Phase II Permit requirements are also discussed.

S5.A Stormwater Management Program

Under the Phase II Permit, cities, towns, and counties are required to develop and implement a SWMP. The SWMP functions as the written record of how they are complying with the Phase II Permit and includes all reporting requirements outlined in the Phase II Permit. The County provides its annual SWMP on its website.

During analysis it was found that the County could improve program compliance in the following three areas:

- **S5.A.3(a):** Track the cost or estimated cost of development and implementation of each component of the SWMP.
- **S5.A.3(b):** Track the number of inspections, follow-up actions as a result of inspections, official enforcement actions, and types of E&O activities as required by

the respective program component. This information shall be included in the Annual Report.

The Annual Report currently contains information about the number of inspections, official enforcement actions, and types of public E&O activities. It is recommended that the County expand its tracking mechanisms for inspections to include follow-up actions as well as new activities as required by each program in the SWMP and add this to the Annual Report.

- **S5.A.5(a)i:** Coordinate among the Kitsap County incorporated cities of Bremerton, Port Orchard, and Poulsbo that are covered under their own municipal stormwater Phase II Permits to included documented agreements that clarify roles and responsibilities for the control of pollutants between physically interconnected MS4s covered by a municipal stormwater permit.

Formal mechanisms, such as memorandums of understanding (MOUs) or other documentation, were not found. It is recommended that the County include text regarding MOUs with other jurisdictions in the SWMP.

The County will need to work toward a new requirement under the 2019 Phase II Permit: developing coordination mechanics among departments within each jurisdiction to eliminate barriers to compliance.

S5.B Discharge Reduction

KCC, Title 12: Storm Water Drainage, and Chapter 12.20: Storm Water Management, have regulations requiring new and/or redeveloping properties to implement stormwater BMPs that reduce discharge of pollutants and mitigate increased flow rates and volumes. The regulations also require implementation of BMPs during construction that reduce impacts to receiving water from construction practices. To that end, the County's SWMP reduces the discharge of pollutants to the MEP, and meets state AKART requirements.

S5.C.1 Stormwater Planning

A Stormwater Planning Program is a new requirement under the 2019 Phase II Permit. The intention of this Phase II Permit program is to inform and assist in the development of policies and strategies as water quality management tools to protect receiving waters.

New requirements for which the County will need to develop programs are as follows:

- Create an interdisciplinary team to inform and assist in the development, progress, and influence of the Stormwater Planning Program.
- Respond to Stormwater Planning Annual Report questions to describe how anticipated stormwater impacts on water quality were addressed, if at all, during the 2013–2019 Phase II Permit term
- Submit a report or add to the Annual Report (e.g., MS4 report card) to describe how water quality is being addressed, if at all, during this Phase II Permit term in updates to the Comprehensive Plan (or equivalent) and in other locally initiated or state-

mandated, long-range land use plans that are used to accommodate growth or transportation.

- Annually assess and document any newly identified administrative or regulatory barriers to implementation of LID principles or LID BMPs, and the measures developed to address the barriers. If applicable, the report shall describe mechanisms adopted to encourage or require implementation of LID principles or LID BMPs. While this may be done periodically as part of the County's LID manual update, consider a process to support the annual reporting requirement.
- Review, revise, and make effective codes, rules, standards, or other enforceable documents to incorporate and require LID principles and LID BMPs.
- Document and assess existing information related to local receiving waters and contributing area conditions to identify receiving waters that will benefit from stormwater management planning. Submit a watershed inventory and include a brief description of the relative conditions of the receiving waters and contributing areas.
- Prioritize and rank identified water basins that would benefit from implementation of stormwater facility retrofits and management actions to reduce pollutant loading and address hydrologic impacts from existing development.
- Develop a SMAP for at least one high-priority area.

S5.C.2 Public Education and Outreach

The County's Public E&O program uses a variety of forums and presentation media within the KCPW Stormwater Division, as well as collaboratively through the CWK partnership with WSU, KPHD, KCD, KPUD, and neighboring municipal Permittees (KCPW 2019a).

The following initiatives are included in the County's public E&O program, with further detail being provided in the Stormwater Management Plan available online:

- Backyard Pet Waste pilot campaign through the West Sound Stormwater Outreach Group (WSSOG)
- Kitsap Community Mutt Mitt program
- Storm Drain Marker program
- WSSOG Spills Happen campaign
- Salmon in the Classroom, sponsored by the Clear Creek Task Force, Silverdale Kiwanis Club, CWK, KPUD, United Van Lines, Suquamish Tribe, and Air Management Solutions
- Kitsap Water Festival

The County's public E&O program has one gap:

- **S5.C.3.b:** The SWMP and Annual Report are to be posted on the website by May 31 of each year.

It is recommended that the County put the Annual Reports online each year and check that links are still accurate from year-to-year.

The County will need to work toward meeting compliance with the following three additional requirements that were added to the 2019 Phase II Permit:

- By July 1, 2020, choose new target audience and behavior change.
- By February 1, 2021, develop a strategy and schedule to achieve at least one of the following:
    - To more effectively implement the existing behavior change program
    - To expand the existing program to a new target audience or BMPs
    - For a new target audience and BMP behavior establish a change campaign
- By March 31, 2024, evaluate and report on the changes in understanding and adoption of targeted behaviors resulting from the implementation of the strategy and any planned or recommended changes to the program.

S5.C.3 Public Involvement and Participation

The County offers public involvement and participation opportunities by soliciting input from the public regarding all stormwater management projects or plan developments. The County uses an online public comment portal to solicit comments. One gap was identified with regard to the SWMP and Annual Report:

- **S5.C.3.b:** The SWMP and Annual Report are to be posted on the website by May 31 of each year.

The 2019 Annual Report was not found on the public website. It is recommended that the County put the Annual Reports online each year.

S5.C.4 MS4 Mapping and Documentation

MS4 mapping and documentation is a new requirement under the 2019 Phase II Permit. Stormwater infrastructure is managed through the Cartegraph software system and meets requirements of the new Phase II Permit.

Data that are currently provided that fall under the new Phase II Permit include the following:

- Known MS4 outfalls and known MS4 discharge points
- Receiving waters other than groundwater
- Stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee
- Geographic areas served by the Permittee's MS4 that do not discharge stormwater to surface waters

- Tributary conveyances to all known outfalls and discharge points with a 24-inch nominal diameter or larger, or an equivalent cross-sectional area for non-pipe systems
- Connections between the MS4 owned or operated by the Permittee and other municipalities or public entities
- All connections to the MS4 authorized or allowed by the Permittee after February 16, 2007

S5.C.5 Illicit Discharge Detection and Elimination

An Illicit Discharge Detention and Elimination (IDDE) program is a special condition in the Phase II Permit that requires agencies operating an MS4 system to implement a program to address the issue of illicit stormwater discharges. The County's IDDE program meets all requirements of the 2015 Phase II Permit. New conditions under the 2019 Phase II Permit will be addressed ahead of deadlines specified by the permit.

New requirements for this Phase II Permit are as follows:

- Create procedures for reporting and correcting or removing illicit connections, spills, and other illicit discharges when they are suspected or identified per the standards of KCC Chapter 12.30
- On average, 12 percent of the MS4 should be field screened each year and these percentages must be tracked annually
- Submit data for all illicit discharges investigated during the previous calendar year

S5.C.6 Controlling Runoff from New Development, Redevelopment, and Construction

The County's permitting process requires plan review and site inspections for development and redevelopment projects. The County requires that stormwater site plans be designed in accordance with current editions of Ecology's SWMMWW and the *Kitsap County Stormwater Design Manual* (Kitsap County 2020).

A new requirement, effective August 1, 2019, states that the program shall make available links to Construction and Industrial Stormwater General Permit Notice of Intent (NOI) forms.

S5.C.7 Operations and Maintenance

Phase II Permit conditions stipulate that County maintenance standards must be equal to those in the SWMMWW. It also requires that standards be developed for practices that are not covered by the SWMMWW. Rigorous inspection schedules and maintenance standards are required, and stormwater pollution prevention plans (SWPPPs) are required for certain categories of municipal sites.

Evaluating the County's maintenance and inspection manuals yielded a determination that besides including records of inspections, maintenance/repair activities, and enforcement actions, the County is meeting permitting requirements.

S5.C.8 Source Control Program for Existing Development

A source control program for existing development is a new requirement under the 2019 Phase II Permit. New requirements are as follows:

- Implement a program to prevent and reduce pollutants in runoff from areas that discharge to MS4s
- Adopt an ordinance, or other enforceable documents, requiring the application of source control BMPs for pollutant-generating sources associated with existing land uses and activities
- Establish an inventory that identifies publicly and privately owned institutional, commercial, and industrial properties that have the potential to generate pollutants to the MS4 and implement an inspection program for the identified properties
- Implement a progressive enforcement policy that requires sites to comply with stormwater requirements within a reasonable period
- Train staff who are responsible for implementing the source control program

S7 Compliance with Total Maximum Daily Load Requirements

TMDL requirements are in place for fecal coliform bacteria at Sinclair and Dyes inlets. The County is meeting permitting and reporting requirements.

S8 Monitoring and Assessment

Water quality monitoring requirements of MS4 discharges are outlined in the Phase II Permit. The following two gaps were identified:

- **S8.A.2:** No later than December 1, 2019, all Permittees shall notify Ecology in writing which option for regional status and trends monitoring the Permittee chooses to carry out during the duration of this Phase II Permit.
    - Selection has not been verified in the SWMP. It is recommended that the County add documentation of its selection to the SWMP Annual Report.
- **S8.B.2:** No later than December 1, 2019, all Permittees shall notify Ecology in writing which option for effectiveness and source identification studies the Permittee chooses to carry out during this Phase II Permit cycle.
    - It is recommended that the County add the written notification to Ecology as an appendix to the SWMP Annual Report of the intended choice for SWMP effectiveness and source identification studies.

S9 Reporting Requirements

The Phase II Permit standardizes reporting requirements for all regulated jurisdictions. One gap was found in the program:

- **S9.D:** Annual report for cities, towns, and counties

- It is recommended that the County provide the SWMP and Annual Reports online for at least 5 years and check links for accuracy to ensure documents continue to be available and searchable.

6.2.2 Phase II Permit Compliance Strategies and Recommendations

Full details of the Phase II Permit gap analysis are provided in Appendix 6-1. The result of the program review was that 8 possible program improvements pertaining to the 2015 Phase II Permit Special Condition requirements were identified and 22 new requirements in the 2019 Phase II Permit. Table 6-3 is a summary of identified gaps.

Table 6-3. Gap analysis summary

Special Conditions number	Gap	Compliance improvement recommendation
S5.A.3.a	The County does not track all related costs or estimate the costs of the SWMP.	Develop a system for tracking all related costs and estimated costs related to the SWMP.
S5.A.3.b	*Existing requirement with new conditions.* The SWMP Annual Report aggregates and describes some inspections, enforcement actions, and public E&O activities; however, it does not track each of these items individually as required by the Phase II Permit, nor is it tracking follow-up actions.	Develop a tracking software program, begin tracking follow-up actions as a result of inspections, and include this information in the SWMP Annual Report.
S5.A.5.a.i	Coordination mechanisms clarifying roles and responsibilities for the control of pollutants between physically interconnected MS4s covered by a municipal stormwater permit.	Include text regarding MOUs with other jurisdictions in the SWMP.
S5.C.1.a	The County does not have an interdisciplinary team to inform and assist the development, progress, and influence of the SWMP.	In progress: the County has begun the process of identifying an interdisciplinary team and has held two initial meetings. Membership of the team is comprised of: • Clean Water Kitsap Partnership Management Team (KPHD, KCD, WSU – Kitsap Extension, KPUD) • Kitsap County Water Policy Implementation Committee (Kitsap County Stormwater Division, Sewer Utility Division, Roads Engineering Division, Roads Maintenance Division, DCD, Parks Department, Facilities Maintenance Division, Special Projects Division) Beginning in 2021 or sooner, include in the Annual Report to Ecology meeting minutes and decision logs "SWMP Committee" meetings to demonstrate cross-departmental coordination. Establish meeting frequency, roles and responsibilities, and a team charter.
S5.C.1.b	*This is a new requirement for the 2019 Phase II Permit.* The County must respond to new questions in the Annual Report about how water quality impacts were addressed.	Submit the 2020 SMAP to Ecology.
S5.C.1.c	*This is a new requirement for the 2019 Phase II Permit.* The County does not currently include a description in the Annual Report describing how County codes are reviewed for LID requirements.	Include in the Annual Report a description of how the County's codes are linked to the 2020 *Kitsap County Stormwater Design Manual* where LID requirements are provided.
S5.C.2.a.ii	*This is a new requirement for the 2019 Phase II Permit.* The County does not currently conduct an evaluation of the effectiveness of the ongoing behavior change program.	Develop and implement an annual survey that measures the effectiveness of the County's E&O campaigns.
S5.C.3.b	Annual reports are not posted on County's website.	Update website with most recent SWMP Annual Report and maintain links for continued access.

Special Conditions number	Gap	Compliance improvement recommendation
S5.C.5.d	*This is a new requirement for the 2019 Phase II Permit*. The County does not currently screen or track 12% of the MS4 in the field annually.	Develop standard operating procedures (SOPs) explicitly describing how outfall field screening occurs and include in the Annual Report a copy of the tracking data.
S5.C.6.d	*This is a new requirement for the 2019 Phase II Permit*. Directions to forms relevant to the Construction Stormwater General Permit NOI are not available on the County's website.	Add an active link to the Construction Stormwater General Permit NOI form to the County's DCD website.
S5.C.8.a	*This is a new requirement for the 2019 Phase II Permit*. The County does not have a source control program to meet upcoming Phase II Permit requirements.	Prepare a source control program report that describes how the County developed its program and includes SOPs for staff who implement the program.
S5.C.8.b.i	*This is a new requirement for the 2019 Phase II Permit*. The County does not have a source control program to meet upcoming Phase II Permit requirements.	Verify that existing County ordinances meet the standard to require the application of source control BMPs for pollutant-generating sources or update the ordinance as necessary by 8/22/2022, with the development of SOPs describing how the program will be implemented.
S5.C.8.b.ii	*This is a new requirement for the 2019 Phase II Permit*. Establish an inventory that identifies publicly and privately owned institutional, commercial, and industrial properties that have the potential to generate pollutants to the Permittee's MS4.	Include in the Annual Report the County's methods for identifying said properties.
S5.C.8.b.iii	*This is a new requirement for the 2019 Phase II Permit*. The County does not have a documented inspection program for sites identified pursuant to S5.C.8.b.ii.	Include in the Annual Report documentation in the form of SOPs, job descriptions, or other similar document describing how the County's source control inspection program functions.
S5.C.8.b.iv	*This is a new requirement for the 2019 Phase II Permit*. The County does not yet have a progressive enforcement policy explicitly targeting the source control program.	Modify County enforcement code language to include the source control program.
S5.C.8.b.v	*This is a new requirement for the 2019 Phase II Permit*. The County does not yet have a training program explicitly focused on the source control program.	Develop a training program and records retention plan that document staff training for the source control program.
S8.A.2	Compliance strengthening recommendation.	Include a copy of the County's notification to Ecology in the SWMP Annual Report.
S8.B.2	Compliance strengthening recommendation.	Include a copy of the County's notification to Ecology in the SWMP Annual Report.
S9.D	Compliance strengthening recommendation.	Recommend that the County provide the SWMP and Annual Reports online for at least 5 years.

6.3 Resource Analysis

An assessment of the Division was completed to evaluate program drivers, current staff resources, activities currently performed, and future needs. Chapter 7, Stormwater Division Assessment, contains the full evaluation for further detail. The objective of the resource analysis is to estimate full-time equivalent (FTE) resources needed to close SWMP gaps and/or implement new strategies to strengthen SWMP compliance. The resource analysis results shown in Table 6-4 show cumulative resource demand by each Phase II Permit year. For example, in 2020 the amount of work required to meet the Permit requirements and to address identified gaps is estimated to take about 1.17 FTEs. In 2021, the resource demand decreases to less than 1 FTE, so it is presumed that if an FTE were added in 2020, that FTE addition is sufficient to meet the demand for 2021 and 2022. However, a resource will need to be added in 2021 if one is not added in 2020. About 1.5 additional FTEs are recommended to meet the resource demands for 2023. Because the 2023 and 2024 resource demands are slightly greater than 2 FTEs, the County may need to redistribute existing workloads to make up the difference or consider the addition of a third FTE. If new resources cannot be added in a given year, it is recommended that the annual work plan is reviewed and activities related to permit compliance are prioritized so that current FTE workloads may be adjusted to focus on permit compliance. Anything “de-prioritized” should be tracked and added back into future work plans when resources are available.

Table 6-4. Gap analysis resource estimate

Year	FTE
2020	1.17
2021	0.82
2022	1.08
2023	1.22
2024	1.14

The details of the time estimates needed for each SWMP gap compliance work item are shown in Chapter 7, Stormwater Division Assessment. For surface and stormwater utility budgeting purposes, the costs for each SWMP compliance activity were also included in the resource estimate.

Based on this analysis, the addition of 1 FTE is recommended for 2020 and 1 additional FTE to be added in 2023.

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7 Stormwater Division Assessment

This section presents the Stormwater Division Assessment (Assessment), including background, methodology, program drivers, current staff resources, activities currently performed, and future needs.

7.1 Background

The Phase II Permit requires local governments to manage and control stormwater runoff so that it does not pollute downstream waters (Ecology 2019). In 2019 the Phase II Permit updated regulatory requirements to Special Conditions S5C.1: Stormwater Planning, S5C.2: Public Education and Outreach (E&O), S5C.4: MS4 Mapping, S5C.5: Illicit Discharge Detection and Elimination (IDDE), S5C.7: Operations and Maintenance, S5C.8: Source Control Program for Existing Development, and S8: Monitoring and Assessment. Updated requirements are covered more thoroughly in Chapter 6. These updates have prompted County staff to evaluate compliance readiness with these new requirements at their current staffing levels, using on-hand equipment, while at the same time complying with existing Phase II Permit requirements and continuing to deliver current LOSs.

The objective of this Assessment is to review existing staffing levels, equipment, and other currently available resources to provide an assessment of the adequacy of these resources to meet updated regulatory requirements and the resulting changes to the scope of the County's stormwater capital, maintenance, and E&O and Phase II Permit compliance (non-maintenance field activities) programs. The analysis focused on the staffing and equipment required to meet production needs and did not review opportunities to improve efficiency as a means of impacting production.

7.2 Methodology

In performing this Assessment, HDR reviewed the Division's maintenance, source control, and public E&O activities to estimate workload requirements and the resources required to perform work associated with regulatory compliance and maintaining current LOS. HDR compared these estimated resource requirements to available resources to determine where gaps in staff and equipment may exist in meeting these new regulatory requirements and existing LOSs.

To support the Assessment, HDR used the information from the Division, shown in Table 7-1, to provide background context and, where possible, to quantify workload requirements and available resources, such as personnel and equipment. In addition, HDR conducted interviews with Division staff to document current functions performed, Phase II Permit-driven work, and known backlog and other issues.

Table 7-2 documents the dates of the interviews and the staff HDR interviewed.

Table 7-1. Stormwater system background data

Source	Description	Format
Organizational chart	KCPW Stormwater Division organizational chart	PDF
Stormwater utility equipment list	List of all equipment currently owned by the Division	Excel
Annual retrofit projects list	List of all retrofits planned through 2022	Excel
2020 Stormwater Division budget	Breakout of operating budget for 2020	Excel
2020–2025 Stormwater Division budget projection	6-year KCPW Stormwater Division budget projection	Excel
Asset inventory	Inventory of stormwater facilities, pipes, inlets, and tide gates	Excel
Activities per asset	List of activities conducted by staff from 2018–2019 organized by program and asset	Excel
2020 Scopes of Work	Scopes of Work for activities and contributions planned for CWK partners	Excel/Word

Table 7-2. Stormwater system interviews

Date	Description	Attendees
2/28/2019	In-person	Chris May, *Senior Program Manager Stormwater (former)* Angela Gallardo, *Stormwater Division Asset Manager (former)* Teresa Platin, *HDR Project Manager (former)* Brian Ward, *HDR Project Manager (former)*
1/16/2020	In-person	Doug Benoit, *Sewer Division Construction Supervisor* Steve Downing, *Maintenance and Operations Supervisor* Michele Filley, *Retrofit Program Supervisor* Sarah Olson, *IDDE Lead* Michelle Perdue, *Monitoring and Outreach Program Manager* Ken Tallman, *Green Infrastructure Crew Supervisor* Elizabeth Lowell, *HDR Task Lead* Brian Ward, *HDR Project Manager (former)*
1/23/2020	Phone	Michelle Perdue, *Monitoring and Outreach Program Manager* Elizabeth Lowell, *HDR Task Lead* Meaghan McGinn, *HDR Analyst*

7.3 Program Drivers

This section describes the updated Phase II Permit requirements potentially impacting Division resources, as well as the County's current LOS requirements. Both of these requirements provide a foundational understanding of potential future needs.

7.3.1 Phase II Permit Requirements

Several new requirements were added to the updated Phase II Permit, which went into effect on August 1, 2019. New Phase II Permit requirements have historically increased the amount of reporting that municipalities must submit to show compliance with Phase II Permit requirements. Currently, Division staff are responsible for inspections and

maintenance of both County-owned stormwater assets and facilities as well as private systems that are inspected by the County to meet MS4 requirements, IDDE work, and E&O initiatives. New requirements to the Phase II Permit that impact staff workloads are summarized in Table 7-3. The table excludes any new requirements for which the County is already in compliance. Full details of the Phase II Permit analysis and program compliance status are provided in Appendix 6-1.

Table 7-3. New Phase II Permit requirements impacting Kitsap County staff

Permit section	Description
	Comprehensive Stormwater Planning
S5.C.1.a	Stormwater Planning Interdisciplinary team. Convene an interdisciplinary team to inform and assist in the development, progress, and influence of this program.
	Public Education and Outreach (E&O)
S5.C.2.a.ii.(c)	Each Permittee shall take at least one of the following actions: • Develop a strategy and schedule to more effectively implement the existing behavior change program • Develop a strategy and schedule to expand the existing program to a new target audience or BMPs • Develop a strategy and schedule for a new target audience and BMP behavior change campaign
S5.C.2.a.ii.(d)	Begin to implement the strategy developed in c.
S5.C.2.a.ii.(e)	Evaluate and report on the changes in understanding and adoption of targeted behaviors resulting from the implementation of the strategy and any planned or recommended changes to the program in order to be more effective; describe the strategies and process to achieve the results. Use results to continue to direct effective methods and implementation of the ongoing behavior change program.
	Illicit Discharge Detection and Elimination (IDDE)
S5.C.5.d.(i)(a)	Complete field screening for an average of 12% of the MS4 per year. Track total percentage annually beginning 8/1/2019.
	Source Control Program for Existing Development
S5.C.8.a	Each Permittee shall implement a program to prevent and reduce pollutants in runoff from areas that discharge to MS4s: i. Application of operational and structural source control BMPs, and, if necessary, treatment BMPs/facilities to pollutant-generating sources associated with existing land uses and activities ii. Inspections of pollutant-generating sources at publicly and privately owned commercial and industrial properties to enforce implementation of required BMPs to control pollution discharging into the Permittee's MS4 iii. Application and enforcement of local ordinances at sites, identified pursuant to S5.C.8.b.ii, including sites with discharges authorized by a separate Phase II Permit iv. Practices to reduce polluted runoff from the application of pesticides, herbicides, and fertilizer discharging into MS4s owned or operated by the Permittee
S5.C.8.b.ii	Permittees shall establish an inventory that identifies publicly and privately owned institutional, commercial, and industrial properties that have the potential to generate pollutants to the Permittee's MS4. The inventory shall include: a. Business and/or properties identified based on the presence of activities that are pollutant generating b. Complaint-based response to identify other pollutant-generating sources, such as mobile or home-based businesses and multifamily properties

Permit section	Description
S5.C.8.b.iii	Permittees shall implement an inspection program for sites identified pursuant to S5.C.8.b.ii: a. Inventory of businesses b. Annual completion of inspections of 20% of businesses/sites c. Inspect 100% of sites identified through credible complaints d. Complaint inspections may go toward the 20%
S5.C.8.b.v	Permittees shall train staff who are responsible for implementing the source control program to conduct these activities. The ongoing training program shall cover the legal authority for source control, source control BMPs and their proper application, inspection protocols, lessons learned, typical cases, and enforcement procedures. Follow-up training must be provided as needed to address changes in procedures, techniques, requirements, or staff. Permittees shall document and maintain records of the training provided and the staff trained.

The Phase II Permit compliance evaluation included an analysis of FTEs and monetary needs required to close identified compliance gaps. Some gaps have ongoing programmatic resource demands while others are considered one-time events. The one-time events are assumed to be addressed with existing resources and therefore do not contribute toward the final FTE calculation. One FTE is equivalent to the annual number of hours an employee works in 1 year, or 2,080 hours. Assumptions were made on staff hour rates, annual days off, and productivity based on HDR professional judgment based on experiences with past agencies as well as discussions and reviews by County staff and are summarized in Table 7-4.

Table 7-4. Rate analysis assumptions

Assumption	Unit	Value
Average hourly rate [a]	Dollars	175
Hours per page [b]	Hours	4
Annual days off	Days	25
Timespan	Calendar year	1
Start date	Date	8/1/2019
End date	Date	7/31/2024
Budget start date	Year	2020

a. Discussion and review by County staff.
b. HDR professional judgment and agency experience.

The ongoing programs have time estimates divided into “development” time estimates and “ongoing maintenance” time estimates for the years in the planning period. Many Phase II Permit gaps exist because of new requirements scheduled to take effect on different dates within the Phase II Permit window (2019–2024); therefore, the FTE estimate is also sensitive to the implementation date.

Time estimates used in the analysis are based on the type of program work that is needed. Each Phase II Permit gap was categorized into one of the following five compliance gap categories:

- Compliance tracking
- Not applicable (NA)
- Policy development and implementation
- SWMP evaluation
- SWMP documentation

These categories helped to establish basic assumptions describing the work, which became the basis for the estimated number of hours necessary to address the identified gaps. Table 7-5 shows the various categories and descriptions used in the resource model.

FTE needs are summarized in Table 7-6.

Table 7-5. Phase II Permit compliance categories

Type of compliance measure	Description
Compliance tracking	Data collection and capture for reporting purposes
NA	Additional resources not expected (level of effort to achieve compliance is negligible)
Policy development and implementation	Documentation of strategies, procedures, etc. and training and execution as needed
SWMP evaluation	Assessment of current practices for impact
SWMP documentation	Formal documentation to meet regulatory requirement

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Table 7-6. FTE requirements to comply with Phase II Permit

Permit section	Compliance date	Type	Development hours [c]	Maintenance hours [a,c]	Development cost [b]	Maintenance cost [b]	Development FTE	Maintenance FTE	FTE per year				
									2020	2021	2022	2023	2024
S5.A.3.a	8/1/2019	The County shall track the cost or estimated cost of development and implementation of each component of the SWMP. This information shall be provided to Ecology upon request.	1,040	520	$182,000	$91,000	0.50	0.25	0.75	0.25	0.25	0.25	0.25
S5.A.3.b	8/1/2019	The County shall track the number of inspection, follow-up actions as a result of inspections, official enforcement actions, and types of public E&O activities as required by the respective program component. This information shall be included in the Annual Report.	213	173	$37,333	$30,333	0.10	0.08	0.19	0.08	0.08	0.08	0.08
S5.A.5.a.i	Immediate	Coordination mechanisms clarifying roles and responsibilities for the control of pollutants between physically interconnected MS4s covered by a municipal stormwater permit.											
S5.C.1.a	8/1/2020	The County shall convene an interdisciplinary team to inform and assist in the development, progress, and influence of this program.	56	304	$9,800	$53,200	0.03	0.15	0.17	0.15	0.15	0.15	0.15
S5.C.1.b.i(a)	3/31/2020	The County shall respond to the series of Stormwater Planning Annual Report questions to describe how anticipated stormwater impacts on water quality were addressed, if at all, during the 2013–2019 Permit term.	40	0	$7,000	$0	0.02	0.00	0.02	0.00	0.00	0.00	0.00
S5.C.1.b.i(b)	3/31/2022	The County shall submit a report responding to the same questions included in S5.C.1.b.i(a), to describe how water quality is being addressed, if at all, during this Permit term in updates to the Comprehensive Plan (or equivalent) and in other locally initiated or state-mandated, long-range land use plans that are used to accommodate growth or transportation.	40	0	$7,000	$0	0.02	0.00	0.00	0.00	0.02	0.00	0.00
S5.C.1.c.ii	12/31/2023	The County shall review, revise, and make effect, rules, standards, or other enforceable documents to incorporate and require LID principles and LID BMPs. A summary of results must be submitted with the Annual Report no later than 3/31/2024, and list participants, codes, rules, standards, and other enforceable documents revisions and existing requirements that incorporate and require LID principles and BMPs.											
S5.C.2.a.ii(c)	2/1/2021	E&O program—behavior change (at least one of the following): • Develop a strategy and schedule to more effectively implement the existing behavior change program • Develop a strategy and schedule to expand the existing program to a new target audience or BMPs • Develop a strategy and schedule for a new target audience and BMP behavior change campaign	100	0	$17,500	$0	0.05	0.00	0.00	0.05	0.00	0.00	0.00
S5.C.2.a.ii(d)	4/1/2021	Begin to implement the strategy developed in c.	0	520	$0	$91,000	0.00	0.25	0.00	0.25	0.25	0.25	0.25
S5.C.2.a.ii(e)	3/31/2024	The County shall evaluate and report on changes in understanding and adoption of targeted behaviors resulting from implementation and any planned or recommended changes for the program to be more effective, and describe strategies and process to achieve results. Use results of evaluation to continue to direct effective methods of implementation of ongoing behavior change.	40	104	$7,000	$18,200	0.02	0.05	0.00	0.00	0.00	0.00	0.07
S5.C.3.b	Immediate	The County shall post the SWMP and Annual Report on its website by May 31, each year.											

Permit section	Compliance date	Type	Development hours [c]	Maintenance hours [a,c]	Development cost [b]	Maintenance cost [b]	Development FTE	Maintenance FTE	FTE per year				
									2020	2021	2022	2023	2024
S5.C.5.d	8/1/2019	Each Permittee shall implement an ongoing program designed to detect and identify non-stormwater discharges and illicit connections in the Permittee's MS4. The program will include: (i). Procedures for conducting investigations of the Permittee's MS4, including field screening and methods for identifying potential sources. Procedures may also include source control inspections. (a) Complete field screening for an average of 12% of the MS4 per year. Track total percentage annually beginning 8/1/2019. (ii). A publicly listed and publicized hotline or other telephone number for public reporting of spills and other illicit discharges. (iii). An ongoing training program for all municipal field staff who, as part of their normal job responsibilities, might come into contact with or otherwise observe an illicit discharge and/or illicit connection to the MS4, on the identification of an illicit discharge and/or connection, and on the proper procedures for reporting and responding to the illicit discharge and/or connection. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements, or staffing. Permittees shall document and maintain records of the trainings provided and staff trained.	0	0	$0	$0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S5.C.8.b.i	8/1/2022	Permittees shall adopt an ordinance, or other enforceable documents, requiring the application of source control BMPs for pollutant-generating sources associated with existing land uses and activities.	560	0	$98,000	$0	0.27	0.00	0.00	0.00	0.27	0.00	0.00
S5.C.8.b.ii	8/1/2022	Permittees shall establish an inventory that identifies publicly and privately owned institutional, commercial, and industrial properties that have the potential to generate pollutants to the Permittee's MS4. The inventory shall include: • Businesses and/or properties identified based on the presence of activities that are pollutant generating (refer to Appendix 8). • Complaint-based response to identify other pollutant generating sources, such as mobile or home-based businesses and multifamily properties.	40	0	$7,000	$0	0.02	0.00	0.00	0.00	0.02	0.00	0.00
S5.C.8.b.iii	1/1/2023	The County shall implement an inspection program for sites within the inventory that shall include: (a) Inventory of businesses (b) Annual completion of inspections of 20% of businesses/sites (c) Inspection of 100% of sites identified through credible complaints (d) Complaint inspections that may go toward the 20%	120	416	$21,000	$72,800	0.06	0.20	0.00	0.00	0.00	0.26	0.20
S5.C.8.b.iv	1/1/2023	Permittee shall implement a progressive enforcement policy that requires sites to comply with stormwater requirements within a reasonable period.	120	180	$21,000	$31,500	0.06	0.09	0.00	0.00	0.00	0.14	0.09
S5.C.8.b.v	1/1/2023	Permittees shall train staff who are responsible for implementing the source control program to conduct these activities. The ongoing training program shall cover the legal authority for source control, source control BMPs, and their proper application, inspection protocols, lessons learned, typical cases, and enforcement procedures. Follow-up training must be provided as needed to address changes in procedures, techniques, requirements, or staff. Permittees shall document and maintain records of the training provided and the staff trained.	64	32	$11,200	$5,600	0.03	0.02	0.00	0.00	0.00	0.05	0.02
S8.A.2	12/1/2019	Regional status and trends monitoring: participation in collective fund requires payment c and notification (August 2013–July 2018) by 12/1/2019 and annual payments by August 15 beginning in 2020.					0.00	0.00	0.00	0.00	0.00	0.00	0.00

Permit section	Compliance date	Type	Development hours [c]	Maintenance hours [a,c]	Development cost [b]	Maintenance cost [b]	Development FTE	Maintenance FTE	FTE per year				
									2020	2021	2022	2023	2024
S8.B.2	12/1/2019	SWMP effectiveness and source identification studies: participation in collective fund requires payment c and notification (August 2013–July 2018) by 12/1/2019 and annual payments by August 15 beginning in 2020.					0.00	0.00	0.00	0.00	0.00	0.00	0.00
S9.D	3/21/2020	Annual report for cities, towns, and counties. Each Annual Report shall include the following: 1. Copy of current SWMP 2. Annual Report form 3. Attachments to Annual Report 4. Notice of reliance on another governmental entity to satisfy obligations if applicable 5. Certification and signature 6. Notification of annexations, incorporations, or jurisdictional boundary changes	0	80	$0	$14,000	0.00	0.04	0.04	0.04	0.04	0.04	0.04
Total									1.17	0.82	1.08	1.22	1.14

a. If maintenance hours are shown, it is expected they will continue beyond 2024 (not shown in table). For the purposes of rate projections, all maintenance costs should carry forward beyond 2024. Development costs are one-time and should be included only in the year shown.
b. Cost is calculated based on an assumed loaded hourly rate of $175.
c. New requirement with no hours estimates assumes that achieving compliance can be done with minimal additional hours from existing staff.

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7.3.2 Stormwater Division Levels of Service

The County has design, customer, and Phase II Permit LOS requirements, which impact staffing and resource requirements.

The Phase II Permit establishes runoff control requirements for the stormwater system from a designated return-period storm that will be maintained for county residents as improvements are made. According to the *Kitsap County Stormwater Design Manual*, Conveyance System Analysis and Design, the County's existing stormwater system has been designed for a 100-year event (Kitsap County 2020). Maintaining this is essential for managing stormwater and minimizing flooding events during storms.

Customer LOSs include customer complaint response times and follow-up activities, as well as timelines for construction activities. Maintenance for facilities is usually conducted to an aesthetic level, which includes mowing approximately 500 ponds/swales twice per year. Storm drainage systems are maintained through pipe flushing in response to customer complaints and the findings of MS4 inspections. For construction, potholing is to be completed within 3 to 4 weeks and catch basins are to be adjusted to grade right after paving activities are complete. Two 2-person crews are available, with interns assisting in the summer, to complete customer LOS requirements.

Permit-defined LOSs are summarized in Table 7-7.

Table 7-7. Phase II Permit requirements impacting LOS

Permit section	Description	Existing/new requirement?
	Illicit Discharge Detection and Elimination (IDDE)	
S5.C.5.d.(i)(a)	Complete field screening for an average of 12% of the MS4 per year. Track total percentage annually beginning 8/1/2019.	New
	Controlling Runoff from New Development, Redevelopment, and Construction Sites	
S5.C.6.c	The program shall include a permitting process with site plan review, inspection, and enforcement capability to the following standards: (i) Site plan review (ii) Pre-clearing/construction inspection (iii) Inspection of sites during construction (iv) Inspection of treatment and flow control facilities during construction (v) Inspection upon completion (vi) Compliance determined by achieving 80% of required inspections during Permit term	Existing
	Operations and Maintenance	
S5.C.7.a.(ii)	Maintenance shall be performed for the following standards unless there are circumstances beyond the Permittee's control, when an inspection identifies an exceedance of the maintenance standard, maintenance shall be performed for the following standards: • Within 1 year for typical maintenance of facilities, except catch basins • Within 6 months for catch basins • Within 2 years for maintenance that requires capital construction of less than $25,000 If the agency is unable to perform the inspections because of circumstances beyond its control, the agency shall document the circumstances.	New
S5.C.7.c	(i) Each Permittee shall implement a program to annually inspect all municipally owned or operated permanent stormwater treatment flow control BMPs/facilities. Permittees may reduce the number of inspections based on maintenance records to double the length of time between the proposed inspection frequency. (ii) Spot checks of potentially damaged permanent stormwater treatment and flow control BMPs/facilities after major storm events and repairs as appropriate. (iii) Inspection of all catch basins and inlets owned or operated by the Permittee every 2 years. (iv) Compliance is determined by achieving at least 95% of required inspections.	Existing
S5.C.7.f	Implement a SWPPP for all heavy equipment maintenance or storage yards, and material storage facilities owned or operated by the Permittee in areas subject to this Permit that are not required to have coverage under the Industrial Stormwater General Permit or another Phase II Permit that authorizes stormwater discharges associated with the activity. ii. Annual inspections and documentation	Existing

Permit section	Description	Existing/new requirement?
Source Control Program for Existing Development		
S5.C.8.a.(ii)	Inspections of pollutant-generating sources at publicly and privately owned commercial and industrial properties to enforce implementation of required BMPs to control pollution discharging into the Permittee's MS4.	New
S5.C.8.b.(iii)	Permittees shall implement an inspection program for sites identified pursuant to S5.C.8.b.ii: (a) Inventory of businesses (b) Annual completion of inspections of 20% of businesses/sites (c) Inspect 100% of sites identified through credible complaints (d) Complaint inspections may go toward the 20%	New

7.4 Current Resources

This section describes current Division resources, including staff, vehicles, and equipment.

7.4.1 Staff

The Division has 39 budgeted positions split among the Monitoring, Outreach, Retrofit, and Operations programs. The organizational chart of the Division is shown in Figure 7–1below.

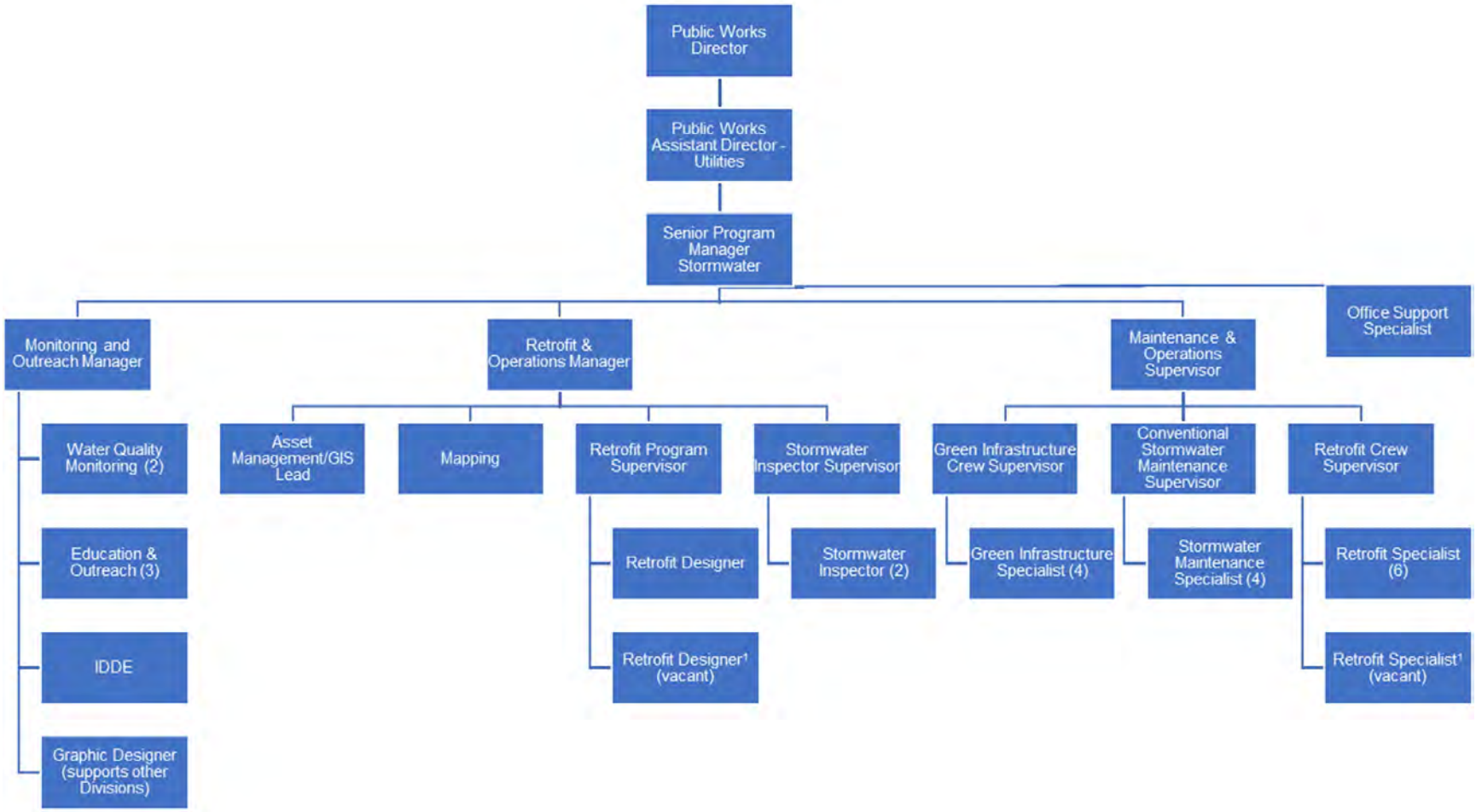

Figure 7–1. Kitsap County Stormwater Division Organizational Chart

At the time of this Assessment, two vacancies were present; both positions are frozen and filling will not occur.

HDR did not analyze if the County is experiencing high systemic vacancy rates because of high turnover or difficulty in filling open positions. However, based on experience working with agencies similar to the County, common recruitment and staff retention challenges are often observed. At the management and supervisory levels, vacancies are often difficult to fill. Senior positions can take 6 or more months to fill because of a limited pool of such candidates. Agencies may look nationally to draw a larger pool, which can add cost to attract talent to a new location. Internal promotion can help fill vacancies, but are most successful when a succession plan is in place before the vacancy occurs.

At the staff and crew levels, recruiting and retention is often impacted by economic conditions; during strong economies positions can be harder to fill, and staff may leave shortly after being hired once certain high-demand skills and licenses (e.g., commercial driver's license) are obtained.

Recommendations for the use of currently vacant positions are included in Section 7.6, Future Needs.

Additional help to full-time staff is provided by inmates, provided through the Department of Corrections, and interns. Inmates are hired to help with GSI work through the use of a Department of Corrections work program that trains County inmates in landscaping to improve future employment prospects upon release. Interns are hired in the summer months to assist with E&O, inspections, and monitoring.

7.4.2 Vehicles and Equipment

Equipment and vehicles are shared with the Public Works Sewer Division. An evaluation of the Sewer Division resources and the breakout of equipment is available in a separate technical memorandum. Sewer Division review found that there is very little redundancy in vehicles and equipment. Certain vehicles that are required for construction projects, like dump trucks, limit production because of availability. Few spares are available when complex equipment such as Vactor trucks are down for maintenance and repairs. Available vehicles and equipment are summarized in Table 7-8.

Table 7-8. Available Stormwater Division equipment

Asset	Quantity	Typical use
Trailer	13	Maintenance/retrofit
Car	3	Monitoring/inspection/E&O/general use
Truck	18	Maintenance/retrofit/monitoring/inspection
Van	2	Monitoring/inspection/E&O
All-terrain vehicle	1	Monitoring/inspection
Water tank	1	Retrofit
Dump truck	7	Retrofit
Blower	1	Maintenance
Mower	4	Maintenance
Sweeper	1	Maintenance/retrofit
Excavator	4	Retrofit
Tractor/backhoe	1	Maintenance/retrofit
Tractor	1	Maintenance/retrofit
Vactor truck	4	Maintenance
Roller	1	Retrofit
Dozer	1	Retrofit
Front loader	1	Retrofit
Plow/sander	1	Maintenance
Plow/dump truck	1	Maintenance

Source: Kitsap County 2019.

7.5 Activities Currently Performed

Division staff currently perform an array of maintenance, capital planning and delivery, and non-maintenance field activities.

The County tracks several of these activities in the Cartegraph work order management system. HDR reviewed Cartegraph data and categorized non-maintenance, maintenance, or other activities, as shown in Figure 7–2 below. Other activities include tasks such as locates, potholing, fabrication, and adjusting-to-grade tasks. Capital planning, E&O, and administration tasks are not tracked in Cartegraph and are not shown in the figure. This represents the relative percentage of each activity count and does not reflect the time and resources needed to complete the activity, which may significantly alter the percent allocations.

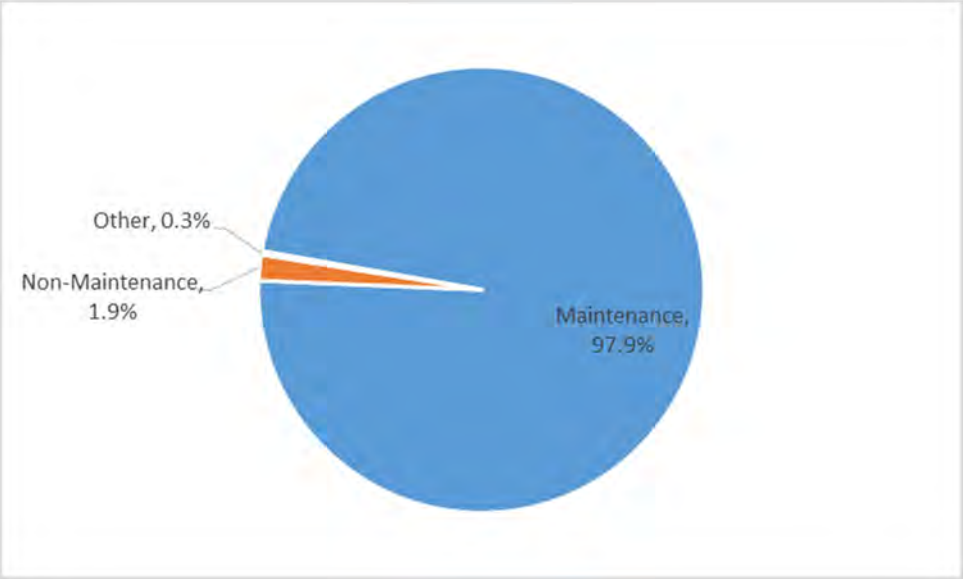

Figure 7–2. Percentage of Stormwater Division activity categories, 2018–2019

7.5.1 Capital Planning and Delivery

The CFP, discussed in further detail in Chapter 8, is an additional component of the GMA mentioned under LOS requirements. It requires entities to identify capital improvements and associated funding needed to support the County's land use plan and growth targets. The CFP contains an inventory of each facility and associated service, LOS standards, revenue projections, and capital costs, and descriptions of how facilities are to be funded.

The Division currently coordinates with the Road Maintenance Division on approximately one to three CFP projects per year. A project manager in the Road Maintenance Division manages project delivery, including 30-60-90 design review and permitting for each plan set for large capital projects that rely on consultant resources, while Division staff perform stormwater design for repairs, replacements, and retrofits that are to be performed in-house.

New requirements in the updated Phase II Permit require that new stormwater facilities must incorporate GSI. Part of the GSI initiative being conducted by the County is pond naturalization projects, with the aim to naturalize approximately 2 percent of stormwater treatment facilities per year. The County's intent is to develop a rating process to identify candidate facilities to be naturalized through targeted pollutants being traced during water quality monitoring and historical flooding.

Additionally, new projects are identified through either inspections or other means and a determination is made if the project is a maintenance, restoration, replacement, or retrofit project. New retrofit projects are rolled into the annual retrofit projects plan, which has shown an increase from 27.5 working days to 132.5 working days from 2019 to 2020. Currently no additional FTEs have been identified to support this work; however, the retrofit work plan is fairly new, and this growth may be a result of the process development.

7.5.2 Cured-in-Place Pipe Work Plan

As part of a new work plan, the County has identified several pipes requiring rehabilitation to extend their life and ensure continued conveyance with flooding and collapse risk. Cured-in-place pipe (CIPP) lining is a method of trenchless rehabilitation and restoration used to repair existing pipes, extending the life cycle of underground pipes that are otherwise very costly to excavate and replace. The County is looking at a programmatic CIPP capital project for completing CIPP lining throughout the system. Initial analysis resulted in 23,500 linear feet (LF) of pipe identified as candidates for rehabilitation using CIPP lining.

To determine how to move such a program forward, two evaluations were completed on the cost of the CIPP program. The first evaluation was on completing the work in-house (i.e., using County staff and equipment). The in-house program was estimated to have a startup cost of $600,000 (capital equipment investments and a storage facility) and annual operating costs (materials and staff resources) of $400,000, for a program total of $1 million for the first year. The analysis did not include training costs and the costs associated with the time required for onboarding new employees.

The second evaluation was the cost of contracting the work on an annual basis. The initial annual program cost estimate was $145 per LF, as reflected in the most recent contract bid proposal, for a total initial annual operating cost of $248,000.

Material costs for both the in-house and outsourced (i.e., contracted) scenarios were based on the assumption that the lined pipes would be 12 inches in diameter. Only 57 percent of pipes that the County has identified for CIPP lining over the next 4 years are 12 inches in diameter. Most of the remaining pipes are larger than 12 inches in diameter and would increase project costs for both scenarios.

Cumulative costs for the two programs between 2020 and 2031 are shown in Figure 7–3, assuming 2.5 percent annual inflation for materials and staff wages for the next 10 years. Program costs for completing the work in-house are higher compared to contracting the work. The difference in cost between these two programs is amplified when compounding inflation is applied.

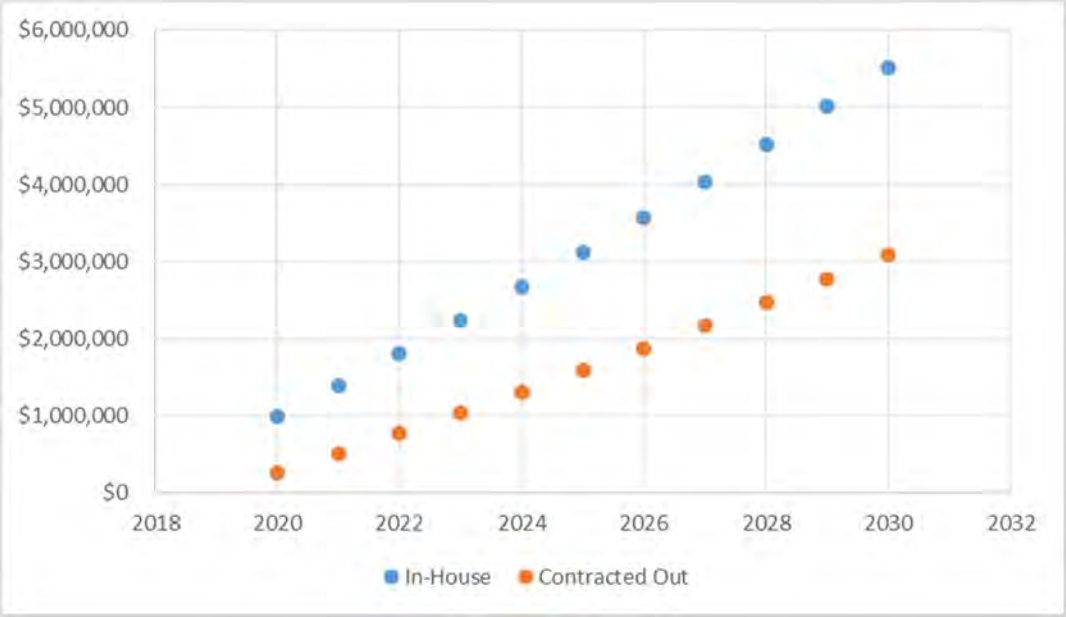

Figure 7–3. CIPP project lifetime costs assuming 1,500 LF of replacement per year with 2.5% inflation

Based on this analysis, the County intends to develop a contracted CIPP lining program, which would require a line item in the CFP for an annual budget for CIPP lining. Individual projects (pipe segments) would not be required; rather, a capital program would allocate funds for a certain amount of linear feet per year, and each year the County would identify the pipe segments to include based on risk, other work in the area such as pavement overlays, etc. This is further described in Chapter 8, Capital Facilities Plan.

At this time, staff believe that a CIPP lining program could be managed with existing resources.

7.5.3 Non-Maintenance Field Activities

Non-maintenance activities include E&O and monitoring-related activities. The main drivers for non-maintenance activities are Phase II Permit and LOS commitments. The percentage of Phase II Permit-related non-maintenance activities performed and tracked in Cartegraph is shown in Figure 7–4.

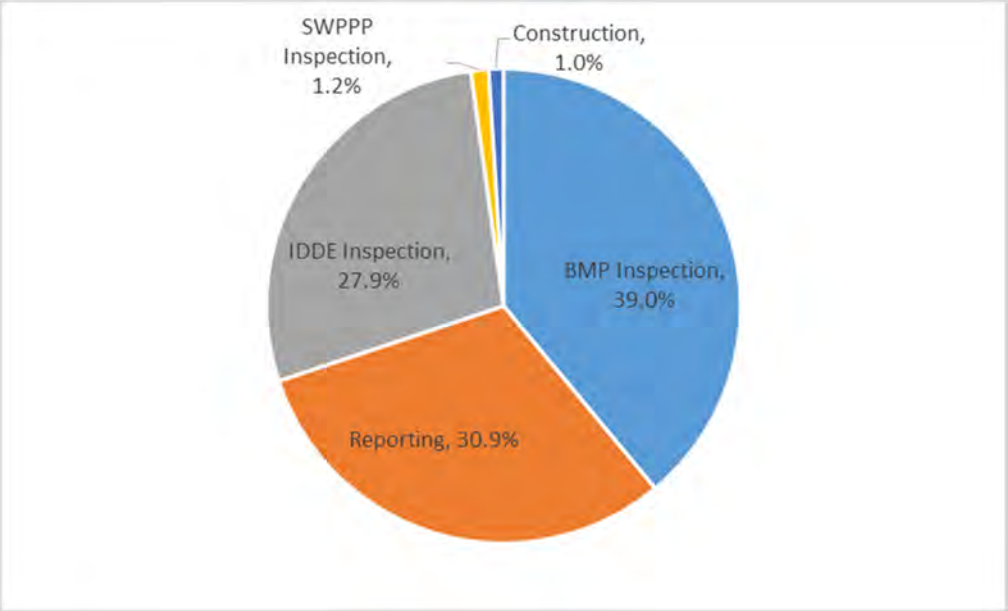

Figure 7–4. Percentage of non-maintenance activities conducted, 2018–2019

The County partners with CWK, a partnership between the County and KPHD, KCD, KPUD, and WSU, to provide public E&O and monitoring related to its Phase II Permit. Working through these partnerships, each organization implements aspects of the Phase II Permit based on scopes of work and interlocal agreements (ILAs) that are updated annually with each budget cycle, and are reimbursed through direct payment from CWG or by County staff labor.

Additionally, the County participates in the WSSOG, a partnership between the County and MS4 jurisdictions around the Kitsap Peninsula that are responsible for stormwater management in incorporated areas. The County contributes funds and staff resources to the WSSOG based on scopes of work and ILAs that are updated every 3 years. Relative funding fluctuates between ILA terms, with the relative percentage of funding decreasing as portion of the County are incorporated by cities. Programs that each partner leads are shown in Table 7-9.

Table 7-9. Partnership programs

Partner	E&O	Monitoring	Partnership benefits
Kitsap Public Health District	Septic workshops	• Water quality • Pollution detection • Shellfish • Bacterial pollution • Septic systems	• Funding • Staffing resources
Kitsap Conservation District	• Agricultural assistance program • Backyard habitat program • Rain Gardens and More program		• Funding • Staffing resources
Kitsap Public Utility District		• Stream gauge • Rainfall gauge	• Funding • Staffing resources
Washington State University Kitsap Extension	• Stream Stewards program • Salmon Docents program • GSI program		• Funding • Staffing resources
West Sound Stormwater Outreach Group	• Backyard Pet Waste campaign • Puget Sound Starts Here campaign • Spills Happen campaign • Natural Lawn Care campaign • Mutt Mitt Program		• Staffing resources • Regional reach
Clean Water Kitsap (Kitsap County)	• Storm-Drain Marker program • Salmon in the Classroom • Kitsap Water Festival • National Public Works Week • STORM partnership	• Water quality	• Funding • Staffing resources

The County currently has three staff members who contribute 2.5 FTEs toward communications and marketing, events and youth programs, and behavior change programs. In addition to the County-led E&O and water quality programs, County staff perform construction outreach, lead the WSSOG, represent Kitsap County and the WSSOG on the Stormwater Outreach for Regional Municipalities (STORM) steering committee, and perform specialty projects. An additional staff member provides graphic design work for these initiatives. The Division funds this FTE position, which works across the four utility divisions and bills time by fund.

Additional staff provide support to IDDE Permit activities, stormwater management inspections, and Phase II Permit compliance reporting. IDDE Permit activities cover Ecology reporting, assisting construction inspectors on sites discharging water, investigating illicit discharges to receiving water, and conducting annual illicit discharge training for the Division. Stormwater management inspections are required annually for County-owned facilities (e.g., solid waste facilities) and for privately owned businesses that have stormwater BMPs. These two tasks have Phase II Permit-required reporting that needs to be submitted to Ecology or included in the Annual Report. Currently, staff in this work group are responsible for preparing for new Phase II Permit-required activities like source control inspections.

During summer months two college-level interns or summer help are hired from mid-May to mid-September to assist with E&O inspections and monitoring. Duties encompass assisting with E&O events and activities, inspecting Mutt Mitt stations, conducting IDDE dumpster inspections, delivering Puget Sound Starts Here materials, installing storm drain markers, and monitoring water quality. Because of the seasonal nature of the E&O work, some work in water quality monitoring programs (water quality, habitat surveys, and benthic surveys), storm drain markers, and maintenance of Mutt Mitt stations does not occur in some years to meet E&O schedules.

Under the new Phase II Permit requirements, the County has chosen to adopt a new behavior and target audience rather than make changes to the existing behavior, which has reached maintenance mode. The natural yard care campaign pilot will take place in 2020, and County staff believe it is likely that a new behavior change program will come out of this analysis. The current behavior change program addressing pet waste in public areas (Mutt Mitt program) will continue and new capacity from staff will be needed to carry both programs forward.

7.5.4 Maintenance Activities

Maintenance performed by the County encompasses both Phase II Permit-mandated inspections and maintenance needed to keep stormwater systems in a functioning capacity. In addition, maintenance is performed above minimum to meet LOS standards. This Assessment is not intended to gauge maintenance needs for the system beyond what is required by the Phase II Permit, nor does it look at the quality of maintenance being performed. Percentage of maintenance activities performed is shown in Figure 7–5. Note that staff report that when performing inspections, maintenance and repairs are often performed at the same time. This work is not captured separately from "infrastructure inspections." Similarly, the information provided from Cartegraph includes task counts, not hours or cost spent on a particular activity. Not all tasks performed by maintenance staff are currently tracked in Cartegraph. For example, maintenance staff may be requested to provide maintenance or operational support at County solid waste transfer stations; this is not tracked in Cartegraph.

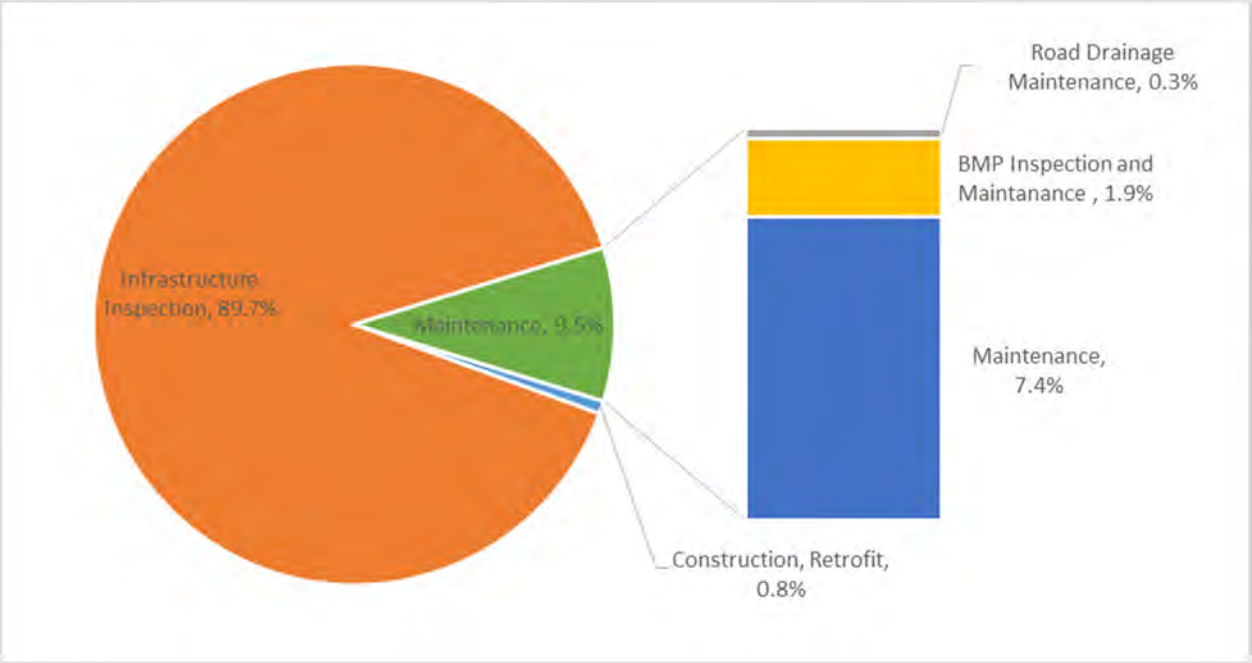

Figure 7–5. Percentage of maintenance activities conducted, 2018–2019

Stormwater assets require maintenance to ensure proper function. Regular maintenance helps assets to operate at their optimal level and protect receiving waters from the pollutants they are intended to control.

A limited number of assets are being inspected with the maintenance being deferred for a variety of reasons. This is the case only for the larger stormwater facilities, with sediment removal from some facilities not occurring regularly and some assets being inspected to continue qualification as a stormwater facility but maintenance not occurring.

The County has more than 23,000 catch basins, half of which are inspected annually. As staff are already at the location for the inspection, current practices are to clean catch basins at the same time, exceeding Phase II Permit requirements. Most inspections and maintenance activities take place in spring and summer. During the wetter, winter months maintenance activities tend toward the reactive side based on immediate needs.

Finally, maintenance crews inspect pipelines. Currently there is not a code-based system for rating pipe condition based on these inspections, and defects are not consistently described. Updating the inspection rating system will support better decision-making.

Stormwater assets within the county, and their associated Phase II Permit-required production levels for maintenance crews, are summarized in Table 7-10 below.

Table 7-10. Kitsap County stormwater assets

Asset	Quantity	Unit	Governing Phase II Permit inspection requirement	Required Phase II Permit inspection	Average number of assets that must be visited per month [a]
Green roofs	1	Each	S5.C.7.c	Annually	1
Storm basin (pond/vault/tank)	494	Each	S5.C.7.c	Annually	42
Storm inlet (catch basins)	23,143	Each	S5.C.7.c.(iii)	All every 2 years	965
Storm pipe (all materials)	195	Miles	S5.C.5.d.(i)(a)	12% MS4 annually	2 (miles)
Tide gates	17	Each	S5.C.5.d.(i)(a)	12% MS4 annually	1
Low-impact development (LID)					
Bioretention cells	106	Each	S5.C.7.c	Annually	9
Bioretention swale	12	Each	S5.C.7.c	Annually	1
Enhanced ditches	30	Each	S5.C.7.c	Annually	3
Filterras (tree box filters)	29	Each	S5.C.7.c	Annually	3
Grass swales	168	Each	S5.C.7.c	Annually	14
Modular wetlands	4	Each	S5.C.7.c	Annually	1
Permeable pavements	28	Each	S5.C.7.c	Annually	3
Rain garden	21	Each	S5.C.7.c	Annually	2

Source: Kitsap County 2019.
a. Values rounded to whole number.

7.6 Future Needs

For the past 7 years the Division has met annually to plan work and strategize on activities using Lean Six Sigma methodologies. It is intended that the Division may use the information from this Assessment when considering workload planning, to determine additional information to collect related to workload and resource needs, and to inform appropriate policies related to the prioritization of work and scheduling practices.

Based on the information available and assessing the new Phase II Permit requirements, along with the existing County LOS, it appears likely that the County will need to hire staff to meet SWMP requirements. These findings are built upon several assumptions that should be verified. These assumptions can be verified as more operating data are captured in Cartegraph.

This Assessment found very little redundancy or “backup” in both staffing levels and vehicles and equipment. For staffing, there are 38 budgeted positions within the Division, 33 of which are currently filled and 5 of which are vacant, with resources (both staff and equipment) shared between the Stormwater and Sewer Divisions. A backlog of non-Phase II Permit-required work has occurred in storm drain markings, Mutt Mitt

inspections, pervious pavement testing, benthic survey, and habitat survey activities within the past year even with staff working at capacity. The County is meeting all Phase II Permit-required inspection activities.

It is intended that this Assessment be used as a starting point for the Division to determine additional information to collect, determine appropriate policies dictating prioritization of work, and review planning and scheduling practices. In particular, the Division may wish to identify high-volume activities not currently tracked in Cartegraph, determine whether it is worth tracking some or all of these activities, and move forward with implementing processes to track selected activities. The County could use these data to confirm assumptions used in this analysis, identify seasonal work trends, help establish time-to-complete windows for proactive work, and aid planning and scheduling of work.

HDR's recommendations for changes to Division staffing and changes to practices are summarized in Table 7-11.

Table 7-11. Stormwater Division staffing recommendations

Recommendation	Justification/explanation
Workload planning	
Annual planning	The Division's current annual work planning process has been effective at establishing priorities, identifying potential future workload constraints, and developing a system to track operating and LOS targets. For example, the Annual Retrofit Project List helps staff plan for work over the course of a year. Similarly, staff resource commitments are tracked for several Phase II Permit-driven E&O activities. It is recommended that this practice continue; additionally, the Division may consider establishing check-ins timed in advance of new Phase II Permit requirements coming into effect, as well as the Phase II Permit update schedule, so that it may adjust schedules as needed and plan for near-term changes to workload.
Planning and scheduling process documentation	Currently staff from the Stormwater and Sewer Divisions work together on a weekly and daily basis to coordinate staff and equipment resources that may be impacted by absences, seasonal workload, storm events, and other drivers. Work that may be delayed by emergent issues is tracked by supervisors, which has been effective. Documentation of coordination processes may be beneficial to both programs to help both train new staff and provide some redundancy, and to quantify constraints and bottlenecks that may be alleviated by additional resources.
Staffing recommendations	
Additional intern support	The existing backlog of the summer intern work could be solved by adding either a spring or summer intern or an additional FTE. A spring intern would be able to assist on the E&O events as the current FTE is fully encumbered and has no work capacity to manage solo events. The difficultly of bringing on a spring intern is that this opportunity would be limited to local candidates. An additional summer intern would help to offset the large E&O events that occur outside of regular hours.

Recommendation	Justification/explanation
1 FTE for E&O Phase II Permit compliance	The County is evaluating a new behavior change program: natural lawn care. To implement this program while maintaining the existing Mutt Mitt program and covering other E&O activities, 1 additional FTE will likely be needed. Entities of a similar size typically have up to 3 staff to implement E&O requirements of the Phase II Permit. The 2019 Phase II Permit requires that businesses contributing to the MS4 stormwater system must be visited and inspected to proactively help manage stormwater. Based on early planning efforts, Division staff estimate that approximately 450 privately owned businesses will need source control inspections. It is assumed that a single FTE working only on inspections can visit approximately 2 sites per day. Based on the Phase II Permit requirement that 20% of businesses be visited, approximately 90 site visits will be required, In addition, it is assumed that 1% of businesses will require following inspections and/or enforcement. The County has already begun the planning work to support the source control program, including inventorying businesses and developing outreach materials. At this time, the County intends to cover this Phase II Permit requirement with existing resources. In addition, existing E&O staff may be able to contribute to source control activities as needed. Finally, current staff resources are operating at full potential with little capacity to perform additional tasks without lowering LOS. The 2019 Phase II Permit update also identifies several additional documentation requirements, which will add to administrative tasks currently being performed by existing resources. Though this documentation is currently expected to take between approximately 0.5 and 0.75 FTE per year based on estimates provided in Table 7-6, this has not been included in this recommendation as it may be that some of this documentation may be streamlined by using automated systems like Cartegraph. Additionally, if a new safety/training coordinator position at the KCPW level is hired, as is currently under consideration, available staff may have more capacity to focus on documentation of Phase II Permit compliance.
1 FTE for safety/training	In addition to work already being performed by the Division, the current Phase II Permit increases requirements in both training and training documentation needs. Often if there is not a designated resource, training, and even more commonly tracking of training for documentation/auditing, can be delayed as workloads become compressed. A dedicated resource can also go beyond required training, and conduct after-incident investigations and perform analysis of incident reports (including near-misses if those are tracked) to move into more proactive identification and alleviation of safety concerns. For example, it has been observed that utilities with such a function will identify causes of minor accidents and change policies to significantly reduce the number, and subsequently the cost, of vehicle accidents.

Recommendation	Justification/explanation
Additional FTEs for GSI inspection and maintenance	The 2019 Phase II Permit introduced new requirements for incorporating GSI facilities. This new requirement may result in increased GSI maintenance that is not offset by reductions in maintenance of conventional stormwater infrastructure. Additionally, the County's program to naturalize ponds will create additional GSI for maintenance; this may or may not be offset by reductions in conventional maintenance. County staff report that crews are at capacity with existing inspection and maintenance requirements, and seasonal maintenance backlogs are occurring. It is likely that this may cause additional backlog, or a decline in existing LOS over time. In addition, as infrastructure ages, it requires more frequent inspection and maintenance prior to any capital renewal such as rehabilitation or replacement. If renewal is delayed, this results in an even greater maintenance need. As the County's system ages, this may impact the ability to maintain the system with existing crews. The County may consider hiring additional crew to maintain and inspect GSI as the amount of inventory of this type of infrastructure grows. It should be evaluated whether, over time, crews inspecting and maintaining conventional stormwater infrastructure can transition to GSI. It is recommended that the County also use work orders and tasks in Cartegraph in order to track corrective maintenance needs, customer complaints, work completion, and new assets over time (year-over-year, etc.) to determine how workload is changing and what implications this has on staffing needs.
Data collection practices	
Crew time tracking	Configure Cartegraph to allow for tracking of all crew time by activity, including activities not directly related to inspection and maintenance of the stormwater system. Add any asset-specific work activities to Cartegraph as a work order or task type. For non-asset-specific activities there are several options for tracking time, such as creating general work order types. This will help the Division more accurately estimate actual availability to perform core and ancillary services.
Category tracking	Several activities tracked with Cartegraph are generalized such that types of assets cannot be distinguished. Recommend splitting these into distinct categories, particularly in the case of GSI maintenance and conventional maintenance, so that activity durations can be better tracked and used to inform staffing needs over time.
Phase II Permit compliance tracking	The 2019 Phase II Permit requires the tracking of numerous Phase II Permit-related activities. The Division is currently tracking some Phase II Permit-related activities in Cartegraph; recommend that it explore the potential to meet additional tracking and reporting requirements this way to reduce the burden on staff.

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8 Capital Facilities Plan

A major component of this Plan is the presentation of an updated CFP with a series of projects that rehabilitate infrastructure, reduce O&M cost by addressing failing infrastructure that requires increasing inspection and maintenance, provide flood protection, and improve water quality and aquatic habitat.

Capital facilities generally have a long useful life and are defined as capital assets that typically include land, machinery, and buildings, and are further defined as assets whose benefits are realized over future fiscal periods (Kitsap County Auditor 2014). Capital facilities planning does not cover regular operation and maintenance, but it does include major repair (requiring design and/or consultant/contractor support), rehabilitation, or reconstruction of facilities that require engineering design.

The County's Stormwater CFP focuses on correction of drainage problems that are not likely to be financed by the County's road fund, and improvement of water quality and associated beneficial uses. The objective of the capital program element is to secure enough funding to construct projects that address identified water quality problems, publicly owned fish passage barriers, and serious flooding problems located both within and outside of County rights-of-way.

The County's stormwater CFP includes 10 capital projects in the near-term, 6-year planning period (2020–2025) at a total cost of $22.9 million, as shown in Table 8-3 and Table 8-4. An additional $13.1 million is identified for rehabilitation and replacement of existing traditional stormwater infrastructure (see Table 8-4). New project development in the long-term (2026–2036) period will meet LOS criteria through compliance with applicable regulatory criteria. Other stormwater capital projects in the 2026–2036 period may include regional retrofits of existing traditional stormwater infrastructure using LID BMPs or restoration projects designed to address historical problems resulting in flooding or water quality or other aquatic habitat impairments. The specific schedule, costs, and revenue sources for these 2026–2036 projects will be identified through future 6-year CFP planning processes.

This chapter describes the drivers of the CFP, project identification and prioritization, and the currently funded and identified CFP projects. Funding sources are summarized, and more fully described in Chapter 9, Stormwater Utility Financial Assessment.

8.1 Capital Program Drivers

This section describes capital program drivers, including the GMA, LOS and Phase II Permit requirements, water quality, and special considerations.

8.1.1 Growth Management Act

The GMA specifies that the capital facilities element should consist of (1) an inventory of existing capital facilities owned by public entities, (2) a forecast of the future needs for capital facilities, (3) the proposed locations and capacities of expanded or new capital

facilities, (4) a 6-year capital facilities plan that will finance capital facilities within projected funding capacities and clearly identifies sources of public money for such purposes, and (5) a requirement to reassess the land use element if probable funding falls short of existing needs (RCW 36.70a.070 (3)). The GMA and its impacts to the stormwater program are described further in Section 3.1.

8.1.2 Level of Service and Phase II Permit Requirements

The goals and objectives of the County's Stormwater Program reflect desired LOS for stormwater management facilities (see Section 3.2.2). LOS criteria include maintaining compliance with the County's Phase II Permit as well as implementing the County's *Water as a Resource* policy. The Stormwater CFP describes the capital projects that are to be implemented to support meeting these LOS criteria. This includes implementation of actions/projects that are associated with the SMAP (Appendix 3-1), as well as projects that may be identified through other studies and assessments (see Section 8.2, Project Identification and Prioritization).

8.1.3 Water Quality

Kitsap County monitors many marine and freshwater bodies for water quality impairments that impact beneficial uses such as recreation, edible fish, shellfish harvesting, and habitat for aquatic species. Stormwater runoff can impair water quality and beneficial uses in these water bodies. As such, stormwater facilities or retrofits may be identified to improve water quality in specific water bodies with impairments, or to protect high-quality water bodies to sustain beneficial uses.

8.1.4 Special Considerations

Some projects may be identified for inclusion in the CFP when special circumstances are identified. This may include repeat or chronic flooding identified through customer complaints and other public comment, regional projects in coordination with other agencies, or projects with an opportunistic component, such as an opportunity to address a need in the right-of-way when work is being done by another County department at the same time.

8.2 Project Identification and Prioritization

Project identification and prioritization serves as the main conduit for how capital money is spent to achieve water quality and aquatic habitat improvements, care for existing infrastructure, and deliver LOS targets and Phase II Permit requirements. Often, project identification occurs in conjunction with other County divisions and departments, as well as with input from external stakeholders. Prioritization of projects is critical to determining which projects will have the highest impact for money spent, and is needed to communicate to elected officials, the general public, and other groups on the decision-making rationale. Kitsap County uses multiple resources and methods to identify the range of potential projects that make up the CFP. These include both prior studies and assessments, as well as program staff knowledge of existing and emerging problem locations and system replacement needs.

8.2.1 Water Quality Retrofit Studies

The County has conducted several studies to determine opportunities and needs for water quality/LID retrofits in existing developed areas. In general, these studies help the County define specific problems and identify alternatives and program-specific capital projects to address water quality, habitat, and flooding issues. In some cases, projects that are identified may be carried out by other Divisions on non-stormwater assets, but stormwater benefits are generated. The County's five existing retrofit studies are summarized below.

East Bremerton and East Port Orchard Retrofit Study

This regional retrofit project targeted the East Bremerton and East Port Orchard urban growth areas (KCPW 2019b). Projects generally proposed use of GSI that used LID BMPs.

The East Bremerton portion of the plan addresses water quality and drainage issues primarily within the East Dyes Inlet basin area. Five potential sites were evaluated and the following two sites were proposed for projects:

- The Tracyton Green Streets project, which consists of a combination of permeable-pavement parking, bioretention cells, ditch retrofit, proprietary treatment facilities, and sidewalk additions
- The Bellpark and Virginia project, which consists of mid-block and end-of-block curb bulb-out bioretention cells along NE Bellpark Drive and Virginia Street to provide enhanced water quality treatment for stormwater runoff from approximately 1 acre of existing impervious area

The following two projects were proposed in the East Port Orchard portion of the project area:

- The Lund project would retrofit existing ditches on SE Lund Avenue between Harris Road SE and Jackson Avenue SE with bioretention swales that will provide enhanced water quality treatment for stormwater runoff from approximately 2 acres of existing impervious surface.
- The Beach project would retrofit existing ditches with bioretention and would expand the roadway prism to add a shoulder/bike lane along the Sinclair Inlet-Port Washington Narrows water's edge.

Silverdale LID Retrofit Study

Silverdale represents the most urbanized center in unincorporated Kitsap County. To improve water quality and stream habitat, LID stormwater retrofit opportunities at 59 locations were investigated (KCPW 2013b). Analysis included drainage area, risk, property impacts, stormwater treatment, and ancillary benefits.

Multiple retrofit projects have been implemented in the Silverdale area to date including the following:

- Silverdale Way proprietary stormwater treatment systems

- Duwi'eq Stormwater Treatment Wetland
- Whispering Firs Stormwater Park
- Ridgetop Boulevard stormwater improvements
- Old Town Silverdale and Bayshore Drive stormwater improvements

Kingston Stormwater Retrofit Plan

The Kingston regional plan proposes to treat 93 acres of central Kingston with a centralized vault system (KCPW 2012a). The Kingston plan proposes a connection charge for new development and redevelopment that uses this system, which will be implemented in the 2020–2022 period.

Manchester Stormwater Retrofit Plan

The Manchester Retrofit Plan evaluated 1.7 square miles of developed area in the Manchester and Colchester areas of Kitsap County for both conveyance and water quality improvements. A total of 45 retrofit projects were analyzed based on hydrologic function, life-cycle costs, and community benefits (KCPW 2012b). In 2016 the County constructed the Manchester Stormwater Park, which treats stormwater from roads, parking lots, commercial property, and residential areas from approximately 100 acres of the Manchester urban area.

North Kitsap Stormwater Retrofit Plan

The North Kitsap plan evaluated 87 sites for LID water quality improvements in the communities of Keyport, Suquamish, and Indianola. These sites were prioritized to six projects that included a combination of bioretention swales, sidewalk additions, ditch improvements, and permeable-pavement retrofits (KCPW 2013a). Keyport improvements were implemented in 2015–2016, and Suquamish improvements are planned for 2020–2025.

8.2.2 SMAP Basin Improvement

The SMAP requirement of the 2019 Phase II Permit requires that for the identified priority watershed basin, permittees identify "a description of the stormwater facility retrofits needed for the area, including the BMP types and preferred locations." The SMAP was completed in 2019 identifying retrofit opportunities through existing retrofit studies in the East Bremerton/East Port Orchard and Silverdale areas. In the future, the County may include additional analyses to identify additional capital projects. The SMAP is summarized in Section 3.4 and included in its entirety as Appendix 3-1.

8.2.3 System Performance Needs

Through maintenance activities, routine inspections, and response to complaints from the public, the County may identify areas of the system that are not performing as desired, not meeting the designed LOS, or have deteriorated to the point of failure. In this

case, a structural improvement, through either a rehabilitation or replacement of an asset or assets, will be required.

8.2.4 Project Prioritization Criteria

The County uses a set of points-based prioritization criteria to rate and rank identified projects to help determine which projects will be included in the 6-year CFP. The number of projects is limited by available funding, so the highest-priority projects are typically included in the CFP until funding limits are reached. Projects that fall below funding levels are typically rolled forward for reconsideration in future prioritizations and 6-year updates to the CFP. Table 8-1 describes the County's project rating criteria. This criteria are reviewed and adjusted periodically to reflect changes in regulatory requirements, funding sources, and resource management priorities.

Table 8-1. CFP prioritization criteria

Criterion	Points
Protect life (100 points maximum)	
Reduce threat to human safety, health, or welfare	
Project does not reduce risk to human safety, health, or welfare	0
There is a small risk to public safety, health, or welfare (e.g., water over roadway, which may result in a minor accident or event)	25
Significant risk to public safety, health, or welfare (e.g., failure may result in sinkhole or other public hazard, flooding may result in serious driver, pedestrian, other road user accidents, causing serious injury)	50
Imminent risk to public safety, health, or welfare (e.g., a sinkhole or other public hazard has occurred, or could cause critical injury or death)	75
Problem frequency	
No threat to human safety, health, or welfare	0
Problem occurs infrequently (i.e., once every 5–10 years or during a >100-year event)	10
Problem occurs periodically (i.e., 1–3 times per year)	20
Problem frequently occurs regularly (>3 times per year)]	25
Protect property (100 points maximum)	
Severity: private property damage during general flooding resulting from drainage problems	
No private property flooding	0
Yard or field flooding	5
Basement, driveway, or garage flooding	10
Flooding affects ability to occupy private dwelling or significantly damages structure	25
Severity: Existing drainage problem causing detrimental impact to public facilities	
No public facility or roadway flooding	0
Flooding or erosion does not impact integrity of public roadway or facility	5

Criterion	Points
Flooding or erosion of public roads or facilities, which leads to minor damage/repair needs	10
Flooding or erosion impacts public roadway integrity/function requiring major rehabilitation or replacement or results in periodic road closures	25
Problem frequency (private property and/or public facilities)	
No private property or public facility flooding	0
Problem occurs infrequently (i.e., once every 5–10 years (>100-year event)	5
Problem occurs periodically (i.e., 1–3 times per year	10
Problem occurs regularly (>3 times per year)	25
Population reach of proposed improvements	
No private property or public facility flooding	0
Improvements would benefit <25 residents or motorists or impact up to 5 acres, (whichever is greater)	5
Improvements would benefit 25 to 100 residents or motorists or impact between 5 and 20 acres (whichever is greater)	10
Improvements would benefit >100 residents or motorists or impact greater than 20 acres (whichever is greater)	25
Protect water quality (100 points maximum)	
Project does not provide water quality benefits	0
Proposed project is not required by Phase II Permit to provide water quality improvements, but minor incidental water quality improvements are likely (i.e., in currently unimpaired water bodies)	5
Proposed project treats runoff from pollutant-generating surfaces, resulting in moderate improvements to water quality (i.e., improvements to 1–2 current impairments)	10
Proposed project treats runoff from pollutant-generating surfaces, resulting insignificant improvements to water quality (i.e., improvements to multiple impairments)	25
Proposed project resolves a significant known water quality problem in a priority basin and results in a correction of a violation of state or federal water-quality standards	50
Completion of the project is required under court order (lawsuit), as part of regulatory compliance, or as directed by EPA, Ecology, WDFW, KCHD, or other regulatory authority	100
Protect sensitive ecological resources (50 points maximum)	
Proposed project provides no benefit to ecological resources	0
Proposed project results in incidental improvement to natural resources (e.g., design includes minimum Phase II Permit-required measures for resource protection)	5
Proposed project provides moderate improvements to natural resources by protecting threatened structures, or preventing undermining of stream banks, or severe channel down-cutting	10

Criterion	Points
Proposed project is explicitly designed for improvements to natural resource assets.	25
Proposed project resolves a significant known environmental problem and/or may result in a correction of a violation of state or federal regulations (e.g., ESA)	50
Life-cycle performance (50 points maximum)	
Proposed project addresses an asset or group of assets that are low criticality (consequence of failure) are nearing end of life or have failed	5
Proposed project addresses an asset or group of assets that are medium criticality (consequence of failure) are nearing end of life or have failed	10
Proposed project addresses an asset or group of assets that are high criticality (consequence of failure) nearing end of life	25
Proposed projected addresses an asset or group of assets that are high criticality (consequence of failure) and have already failed	50
Public outreach/education and citizen involvement (25 points maximum)	
Proposed project provides opportunities for public engagement and comments or E&O using the County's standard methods of public engagement.	5
Proposed project has explicit plans for advertising and receiving public comments or direct E&O opportunities based on BMPs.	10
Proposed project has explicit plans for advertising and receiving public comments. Finished projects results in ongoing public E&O component.	25
Supplemental criteria	
A special opportunity (e.g., a project that may "piggyback" on another project in the right-of-way, or a project in partnership with another jurisdiction) to implement a high-priority project exists that will be lost if immediate action is not taken to implement the project.	10
The project supports *Water as a Resource* policy goals and/or has been identified as having significant sustainability value. This includes: • Preservation of natural hydrology by preventing the creation of stormwater runoff • Conservation of groundwater resources through infiltration • Reduction in pollutant loading of groundwater and surface water by reducing surface flow volumes and incorporation of non-polluting products or processes • Use of land for multiple purposes by maintaining forest and open space, integrating stormwater management features into the landscape, and encouraging practices that can be used for purposes beyond just stormwater management • Education opportunities on how the public's actions can impact water quality	10
The project supports economic development by solving a regional stormwater problem affecting an area identified for growth in Comprehensive Plan.	10
The project has dedicated grant funding, has the potential for grant funding support, or has other external funding sources.	10
The project provides an opportunity to work jointly with City or tribal governments or other federal, state, or local government entities.	10

Example Application of Prioritization Criteria

The current prioritization criteria and framework are additive, with one metric per criterion selected for a project. For supplemental criteria, more than one option may be selected. An example rating of select criteria for two projects in the current CFP is shown in Table 8-2. This demonstrates how the criteria are applied to different circumstances, and how projects of a different nature score differently for certain criteria. A full scoring of both projects is provided in Appendix 8-1.

Table 8-2. Example project prioritization rating of sample criteria

Criterion	Points	Kingston regional score	Detail	Suquamish regional score	Detail
No public facility or roadway flooding	0				
Flooding or erosion does not impact integrity of public roadway or facility	5	5	Minor undersized conveyance and localized ponding		
Flooding or erosion of public roads or facilities leads to minor damage/repair needs	10			10	High bank outfalls require periodic maintenance
Flooding or erosion impacts public roadway integrity/function, requiring major rehabilitation or replacement or results in periodic road closures	25				
Protect sensitive ecological resources (50 points maximum)					
Proposed project provides no benefit to ecological resources	0				
Proposed project results in incidental improvement to natural resources (e.g., design includes minimum Phase II Permit-required measures for resource protection)	5				
Proposed project provides moderate improvements to natural resources by protecting threatened structures, or preventing undermining of stream banks, or severe channel down-cutting	10	10	Provides some ecological benefits through water quality treatment and management of development		
Proposed project is explicitly designed for improvements to natural resource assets	25			25	Project includes specific habitat improvements along outfall

Criterion	Points	Kingston regional score	Detail	Suquamish regional score	Detail
Proposed project resolves a significant known environmental problem and/or may result in a correction of a violation of state or federal regulations (e.g., ESA)	50				

Considerations for Future Revisions to Prioritization Criteria

The prioritization criteria will be refined periodically in response to regulatory changes, funding opportunities and constraints, and resource management objectives. The following considerations may therefore be useful for future updates to the prioritization criteria:

- Consider updating the scoring framework so that category and criteria weighting is separate from points allocations. This would put a percent "weight" on different categories/criteria based on importance (alignment with County goals, LOSs, customer expectations, etc.). It would also provide a mechanism to track how weighting affects scores.
- Consider an analysis of the cost of flooding on various types of private infrastructure. For example, field flooding is currently scored lower than other types of flooding; however, the economic losses that might occur could be significant.
- Consider incorporating outsized impacts (positive and negative) on overburdened, minority, and/or low-income communities. This may require additional analysis to determine the location and types of communities, an understanding of barriers faced by such communities, and other environmental justice considerations.
- Consider external factors that may impact the realization of predicted project benefits. For example, a water quality improvement project on land that may be redeveloped in the near future may not be as beneficial if such redevelopment would require developers to employ BMPs (at their cost).
- Assess updates to the Phase II Permit to determine their impact to the prioritization criteria and weights. For example, the 2019 Phase II Permit's requirement to identify a high-priority watershed basin may be added to the prioritization criteria such that a project in this basin receives additional points.

8.3 Current CFP Project List

The following sections describe the County stormwater 6-year CFP including both near- and longer-term projects.

8.3.1 Near-Term Projects

Near-term projects, listed in Table 8-3, are those that are funded in 2020, 2021, and 2022.

Table 8-3. Near-term CFP projects

Project	Total amount (2020–2022)
Ridgetop Blvd. Green Street Retrofit (aka Ridgetop Phase II)	$1,365,000
Kingston Regional Stormwater Retrofit (aka Kingston Regional)	$1,900,000
Suquamish Regional Stormwater Treatment Facility (aka Suquamish Regional)	$1,960,000
Point No Point (PNP) Tide-Gate Replacement (aka Point No Point)	$34,422
Colchester SW Retrofit/Duncan Creek Culvert Replacement (aka Colchester)	$120,000
Silverdale Way Stormwater Retrofit (aka Silverdale Way [2019 RD project])	$500,000
Old Town Silverdale Water Quality Treatment (aka Bayshore)	$4,364,021
Kingston Washington Blvd.	$200,000
Total	**$10,443,443**

8.3.2 Longer-Term Projects

Long-term projects are approved, with funding estimates in place for 2023, 2024, and 2025. This includes projects that carry over from 2022. These projects are listed in Table 8-4.

Table 8-4. Long-term CFP projects

Project	Total amount (2023–2025)
Suquamish Regional Stormwater Treatment Facility (aka Suquamish Regional)	$2,000,000
Illahee Regional Stormwater Retrofit	$2,500,000
Tracyton Green Streets Stormwater Retrofit	$1,500,000
Point No Point (PNP) Tide-Gate Replacement (aka Point No Point)	$1,500,000
Colchester SW Retrofit/Duncan Creek Culvert Replacement (aka Colchester)	$2,500,000
Silverdale Way Stormwater Retrofit (aka Silverdale Way [2019 RD project])	$500,000
Total	**$10,500,000**

8.3.3 Other Projects

In addition to near- and long-term water quality retrofit opportunities and new stormwater infrastructure, the County performs rehabilitation and replacement of its existing infrastructure. These projects typically replace or repair existing stormwater infrastructure that is at or near the end of its useful life and/or near structural failures. These projects may include water quality retrofits but are often associated with collection and conveyance system replacement. Project costs include both engineering and construction. These projects are listed in Table 8-5.

Table 8-5. Rehabilitation and replacement projects

Renewal activities	2020	2021	2022	2023	2024	2025
Retrofit engineering (engineering)	$387,423	$402,920	$419,036	$435,798	$453,230	$471,359
Stormwater facilities retrofit (construction)	$1,589,353	$1,652,927	$1,719,045	$1,787,806	$1,859,319	$1,933,691
Total	**$1,976,776**	**$2,055,847**	**$2,138,081**	**$2,223,604**	**$2,312,548**	**$2,405,050**

The County has identified several other projects for which inclusion in the current CFP is still under consideration, including:

- Illahee Regional Stormwater Improvements
- West Kingston Stormwater Conveyance Improvements

8.4 Capital Funding Plan Implementation

CFP projects have been historically funded by a combination of stormwater fees and grants (REET-2 and Ecology grant funding). Table 8-6 shows funding sources for the current CFP have been identified for near-term projects.

Table 8-6. Funding sources for near-term (2020–2022) CFP projects

Project	Total	Grants and other funds	Stormwater Division funding
Ridgetop Blvd. Green Street Retrofit (aka Ridgetop Phase II)	$1,365,000	$911,000	$454,000
Kingston Regional Stormwater Retrofit (aka Kingston Regional)	$1,900,000	--	$1,900,000
Suquamish Regional Stormwater Treatment Facility (aka Suquamish Regional)	$1,960,000	$1,700,000	$260,000
Point No Point (PNP) Tide-Gate Replacement (aka Point No Point)	$34,422	--	$34,422
Colchester SW Retrofit/Duncan Creek Culvert Replacement (aka Colchester)	$120,000	--	$120,000
Silverdale Way Stormwater Retrofit (aka Silverdale Way [2019 RD project])	$500,000	--	$500,000
Old Town Silverdale Water Quality Treatment (aka Bayshore)	$4,364,021	$500,000	$3,864,021
Kingston Washington Blvd.	$200,000	--	$200,000
Total	**$10,443,443**	**$3,111,000**	**$7,332,443**

Further information on funding balance and revenue requirements for the County's CFP are contained in Section 9.2.

Several grants and low-interest loans are available through a number of agencies for stormwater-related projects, some of which the County has already received funding through, including:

- **Department of Ecology Combined Water Quality Funding:** Directs applicants to a variety of funding programs available from Ecology. This includes the Clean Water State Revolving Fund (SRF), stormwater financial assistance grants, etc. Through this program, a single application is submitted, and is directed by Ecology to the most appropriate grant/loan program. https://ecology.wa.gov/About-us/How-we-operate/Grants-loans/Find-a-grant-or-loan/Water-Quality-Combined-Funding-Program
- **Puget Sound Partnership, curator of the Puget Sound National Estuary Program:** Several funding sources for pollution prevention from urban stormwater runoff, protection, and restoration of habitat, and shellfish bed recovery. https://www.psp.wa.gov/NEP-overview.php
- **EPA offers low-interest loans through the Water Infrastructure Finance and Innovation Act (WIFIA)** for projects that quality for Clean Water SRF. Note minimum project sizes are in place. https://www.epa.gov/wifia
- **Washington State maintains a database of grants and loans available through state agencies**, which can be sorted by type of program. Relevant funds to the County are under “Environmental, Water, & Energy.” Note, grants/loans listed under Ecology are included in the Combined Water Quality Funding process. https://www.wafunddirectory.wa.gov/environmental/

9 Stormwater Utility Financial Assessment

This chapter summarizes the financial assessment of Kitsap County's Stormwater Division and demonstrates how the Division will fund its planned CFP projects. The objective of the financial assessment is to determine if the level of revenue collected through stormwater fees is sufficient to implement the prioritized CFP projects and the Division operations and programs.

The financial assessment demonstrates that the Division is operated in a financially stable manner and how CFP projects, operations, and programs will be funded over the planning period. Financial sustainability is accomplished through development of a revenue requirement analysis. The revenue requirement structures the Division operations, programs, and CFP project expenditures (application of funds) through an annual timeline compared to projected revenue (available funds).

The financial assessment in this study followed general industry guidelines for developing stormwater fees. The fees must generate enough revenue to be self-supporting and financially viable, without undue discrimination toward or against any customer.

9.1 Past and Present Financial Status

KCPW's Stormwater Division protects people, property, and natural resources by reducing flooding, stormwater runoff, and stormwater pollution. The stormwater fee is listed on the annual tax bill as "Stormwater Management." This fee is assessed to each developed property and road located within unincorporated Kitsap County. The Division has historically implemented annual adjustments to the stormwater fee to keep up with inflationary cost increases and to meet anticipated Division operations, programs, and CFP project needs.

Stormwater fees are established by the BOCC. The fee is charged on a per unit basis called an equivalent service unit (ESU). The single-family residence (SFR) fee is equal to 1 ESU, which is defined as 4,200 square feet (ft^2) of impervious area. The stormwater fee for commercial properties is based on the measured impervious surface area divided by the square footage of one ESU (4,200 ft^2 of impervious surface area).

Washington State law (RCW 36.89.080) states that stormwater control facilities are "of general benefit to all of the residents" and are necessary to "protect life and property throughout the county." Stormwater fees fund a variety of services and projects that reduce the impacts of flooding and water pollution. Stormwater fees are also used to fund regional stormwater treatment facilities as follows:

- Public E&O activities to help inform residents about what they can do to reduce stormwater runoff and keep water clean
- Water quality protection by preventing pollution from reaching Puget Sound through inspections and monitoring, as well as spill prevention and response

- Drainage improvements by building new and improving existing stormwater facilities to reduce flooding, improve water quality, increase fish passage, and provide habitat
- Water resource planning by operating and maintaining more than 225 miles of stormwater pipes, more than 11,000 storm drains/catch basins, more than 600 stormwater ponds, and numerous other activities that manage the flow of stormwater runoff

The stormwater fee also funds the CWK program and CWK partner agencies. Each partner has an area of expertise and implements programs to address nonpoint sources of pollution in Kitsap County stormwaters. CWK partners include KPHD, KCD, WSU, and KPUD.

The Division regularly conducts financial self-assessments by matching operating and CFP project needs to revenues. This financial assessment review strives to maintain a high LOS to its stormwater customers while still maintaining adequate reserve balances. Table 9-1 provides the Division's historical available funds and application of funds from 2010 to 2018.

Table 9-2 provides the Division's available funds to application of funds for budget 2019 and 2020, and projected 2021 to 2025.

Table 9-3 includes projected additional FTEs based on Chapters 6 and 7 of this Plan, which discussed an evaluation of compliance with the Phase II Permit requirements. The evaluation of compliance included an analysis of FTEs and monetary needs required to close identified compliance gaps. The compliance gaps are divided into "development" time estimates and "ongoing maintenance" time estimates for the years in the planning period. Development FTEs are one-time costs and included only in the year shown. Maintenance FTEs are expected to continue beyond 2024 (not shown in Table 6-4). Cost is calculated based on an assumed loaded hourly rate of $175. Table 9-3 shows a summary of the total FTEs and monetary needs by year.

Table 9-1. Stormwater Utility historical available funds to application of funds, 2010–2018

Table values in real dollars	2010	2011	2012	2013	2014	2015	2016	2017	2018
Available funds (revenue)									
Rate revenue	$8,019,642	$8,019,642	$8,019,642	$8,559,647	$8,961,778	$9,421,356	$9,938,382	$10,455,408	$11,029,881
Other revenue	0	0	0	0	0	0	0	0	0
Total available funds	$8,019,642	$8,019,642	$8,019,642	$8,559,647	$8,961,778	$9,421,356	$9,938,382	$10,455,408	$11,029,881
Application of funds (expenses)									
Operations and maintenance	$4,954,708	$5,236,091	$5,284,009	$5,548,079	$5,465,100	$5,763,766	$6,221,302	$6,921,583	$7,527,968
Taxes	120,295	120,295	120,295	128,395	134,427	141,320	149,076	156,831	165,448
Debt service	233,370	233,370	233,370	212,837	211,566	299,804	212,955	213,530	213,530
CFP projects	1,871,126	1,803,183	1,879,191	2,465,441	2,612,764	2,630,165	2,002,971	1,977,044	1,928,347
Total application of funds	$7,179,499	$7,392,939	$7,516,865	$8,354,752	$8,423,857	$8,835,055	$8,586,304	$9,268,988	$9,835,293
Balance/(deficiency) of funds[a]	$840,143	$626,703	$502,777	$204,895	$537,921	$586,301	$1,352,078	$1,186,420	$1,194,588

a. Summation of table may reflect rounding errors because of decimal points.
Source: KCPW-provided actuals.

Table 9-2. Stormwater Utility available funds to application of funds for budget 2019 and 2020, projected 2021–2025

Table values in real dollars	Budget 2019	Budget 2020	2021	2022	2023	2024	2025
Available funds (revenue)							
Rate revenue	$12,063,932	$12,685,989	$13,346,961	$14,594,200	$15,276,874	$15,382,829	$15,489,845
Other revenue	2,700,000	2,215,000	1,811,000	1,700,000	1,153,333	1,153,333	1,153,333
Total available funds	$14,763,932	$14,900,989	$15,157,961	$16,294,200	$16,430,207	$16,536,163	$16,643,178
Application of funds (expenses)							
Operations and maintenance	$7,622,193	$7,951,991	$8,261,768	$8,575,538	$8,911,076	$9,269,096	$9,641,484
O&M: development added FTEs	0	236,600	18,200	112,840	54,600	7,280	0
O&M: maintenance added FTEs	0	189,280	280,280	280,280	389,480	407,680	407,680
Taxes	180,959	190,290	200,204	218,913	229,153	230,742	232,348
Debt service	214,645	223,659	232,605	241,910	251,586	261,649	272,115
Asset replacement fund	233,100	233,100	233,100	233,100	233,100	233,100	233,100
CFP projects	3,417,449	5,896,198	6,179,868	5,538,081	5,223,604	6,312,548	5,905,050
Total application of funds	$11,668,346	$14,921,118	$15,406,026	$15,200,662	$15,292,599	$16,722,096	$16,691,778
Balance/(deficiency) of funds[a]	$3,095,586	($20,129)	($248,065)	$1,093,538	$1,137,608	($185,933)	($48,600)

a. Summation of table may reflect rounding errors because of decimal points.
Source: KCPW-provided budget, 2019 and 2020.

Table 9-3. Stormwater Utility projection of additional FTEs

Table values in real dollars	2020	2021	2022	2023	2024	2025
Total additional FTEs[a]						
Development FTEs	0.65	0.05	0.31	0.15	0.02	0.02
Maintenance FTEs	0.52	0.77	0.77	1.07	1.12	1.12
Total additional FTEs	**1.17**	**0.82**	**1.08**	**1.22**	**1.14**	**1.14**
Additional O&M[b]						
Development added FTEs	$236,600	$18,200	$112,840	$54,600	$7,280	$0
Maintenance added FTEs	189,280	280,280	280,280	389,480	407,680	407,680
Total additional O&M	**$425,880**	**$298,480**	**$393,120**	**$444,080**	**$414,960**	**$407,680**

a. FTEs based on Table 6-4 of this report.
b. FTE dollars based on Table 6-4 and estimated loaded hourly rate of $175.

The revenues shown in Table 9-2 were calculated based on the adopted fees plus 1 percent growth. Future years after the 2023 annual stormwater fee of $130.00 per ESU are based on the 2023 fees and 1 percent annual growth projections. No further adjustments to the stormwater fee are assumed after 2023. The expenditures are based on 2020 budget plus an annual 3 percent inflation factor. The CFP projects are based on this document's project plan from 2020 to 2025.

The revenues in Table 9-2 are based on the adopted annual stormwater fees as follows:

- 2020 annual stormwater fee $110.00 per 1 ESU (4.8 percent increase)
- 2021 annual stormwater fee $115.00 per 1 ESU (4.5 percent increase)
- 2022 annual stormwater fee $125.00 per 1 ESU (8.7 percent increase)
- 2023 annual stormwater fee $130.00 per 1 ESU (4.0 percent increase)

Figure 9–1 below depicts the adopted stormwater fees through 2023.

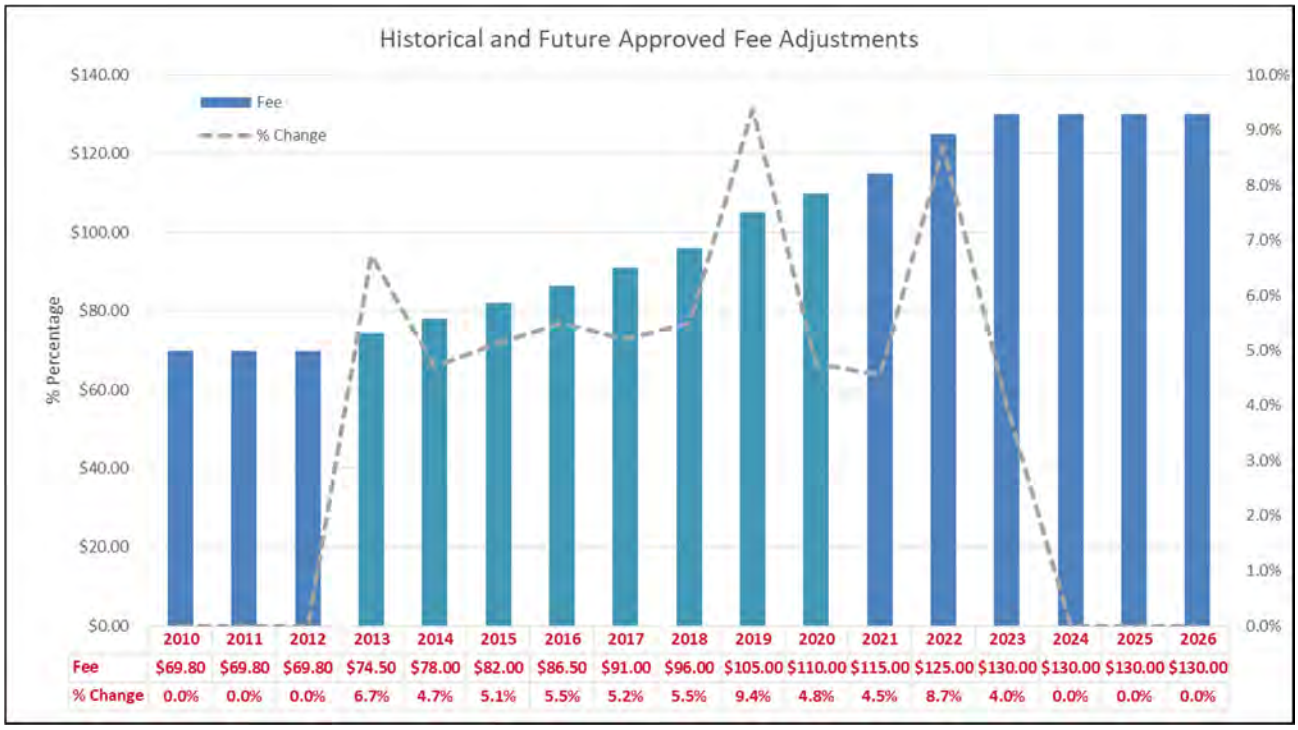

Figure 9–1. Historical and future approved fee adjustments

9.1.1 Revenue Requirement (Cash Basis)

Financial assessment of utilities is based on a “cash-flow” approach, also known as the “cash basis” methodology. The cash basis methodology is a generally accepted methodology in the setting of rates (fees) for a utility. This approach matches revenue (available funds) with expenses (applications of funds) on an annual basis such that, over the planning period, revenue will be equal to the utility’s expenses over the long term. In the “cash basis” methodology, a utility’s total revenue requirement is composed of O&M expenses, taxes/transfer payment, rate-funded CFP projects, and debt service payments. A net total revenue requirement is calculated by subtracting miscellaneous revenues from the total revenue requirement.

Table 9-4. Overview of the “cash basis” methodology

+	O&M expenses
+	Taxes/transfer payments
+	Rate-funded CFP projects
+	Debt service payments (P + I)
=	**Total revenue requirement**
-	Miscellaneous revenues
=	**Net total revenue requirement**

The revenue requirement (available funds less application of funds) also isolates key financial metrics to compare the utility's performance. The financial metrics provide an understanding of the current financial status of the utility to help guide the financial planning of the utility. The financial metrics are based on specific policies of the utility for capital facility funding and setting minimum reserve levels. The revenue requirement along with the financial metrics indicates the level/adequacy of rates (fees) established by the utility. The adequacy and sufficiency of the rates (fees) supports decisions around capital facility funding and financing, the level of replacement capital, adequacy of funds for operations, and debt service coverage ratios (DSCRs) of the utility.

9.1.2 Financial Metrics

Several key financial metrics are reviewed in a financial assessment in the areas of reserve levels and debt management. Financial policies are important because they help guide the utility's management into the future in a prudent and sustainable manner. Bond rating agencies also consider strong financial policies as favorable when assessing the utility's bond rating. The following financial policies were incorporated into the analyses:

- **Self-sufficient Enterprise Fund:** The Governmental Accounting Standards Board (GASB) defines an Enterprise Fund as a fund that operates a business-like activity and is funded primarily by user fees such as stormwater fees. Because of the Division's distinction as a Proprietary-Enterprise Fund, it must be self-sustaining and recover its operating and capital costs. Enterprise Funds should stand on their own and should not be subsidized by another fund.
- **Reserve levels:** Reserve balances are necessary to cover current costs as well as future CFP expenditures. Adequate cash reserves help the utility run smoothly and maintain stable fees in the future. Reserves provide day-to-day funding of operations and the balance must be sufficient to cover the utility's bills, payroll, and unexpected costs. The Division targets 120 days of O&M expense or 33 percent annual O&M expense.
- **System reinvestment funding:** The purpose of system reinvestment funding is to provide for the replacement of aging system facilities to ensure sustainability of the system for ongoing operations. Typically the level of funding approximates annual depreciation expense. However, annual depreciation does not fully recover costs to replace assets over time. Simple straight-line depreciation will recover only the cost of the asset's original cost at the time it was installed or constructed. The Division has shown an annual average of $2.0 million in retrofit engineering projects.
- **Debt service coverage ratio:** Typically the minimum coverage requirement on outstanding revenue bonds is 1.25 times annual revenue bond debt service, using the net revenues of the utility. The Division does not currently have any large long-term borrowing.
- **Debt management:** A typical general debt management policy is to maintain debt service below 25 percent of the total utility budget. The Division does not currently have any large long-term borrowing.

9.1.3 Sources of Funds

RCW 35.67.020 authorizes cities to “to fix, alter, regulate, and control the rates and charges for their” systems of sewerage, defined in RCW 35.67.010 to include stormwater management.

Other important RCW sections include 35.67.025, which specifies that all public property “shall be subject to rates and charges for storm water control facilities to the same extent private persons and private property are subject to such rates and charges,” and 90.03.525, which limits the imposition of stormwater fees and charges on state highways.

The Division revenue for stormwater system operations is derived from rate revenue for Kitsap County roads, WSDOT, the U.S. Navy, schools, and largely stormwater fees for residential and non-residential customers. Other revenues in addition to the rate revenue are grants, REET-2 tax and Ecology funding, interfund revenue, and educational cooperative funds. Figure 9–2 shows that the vast majority of the Division operating fund’s revenue is received through fee revenue collections.

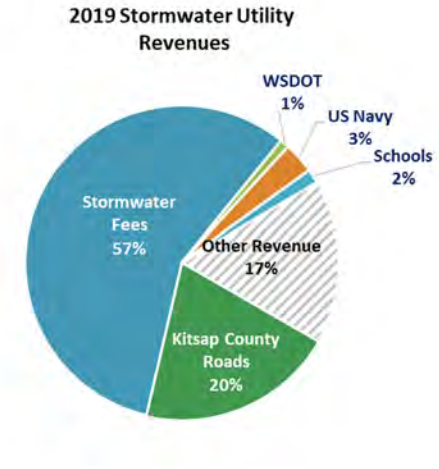

Figure 9–2. Surface water utility revenues

CFP projects have been funded by a combination of available sources, stormwater fees, and grants (annual REET-2 and Ecology grant funding). The analysis assumed no utilization of low-interest loans or revenue bonds.

9.1.4 Application of Funds

The Division incurs a variety of expenditures including operations and maintenance, CFP project funding, debt service, and taxes.

Operations and Maintenance

O&M expenses comprise a variety of costs associated with the day-to-day operations of the Division. Salaries, benefits, supplies, and utilities are a few of the largest O&M expenses, which are included in the various programs of the Division. For this analysis a 3 percent annual inflation factor was used to project expenditures by program. Figure 9–

3 shows each of the programs listed that compose the O&M required to operate the Division.

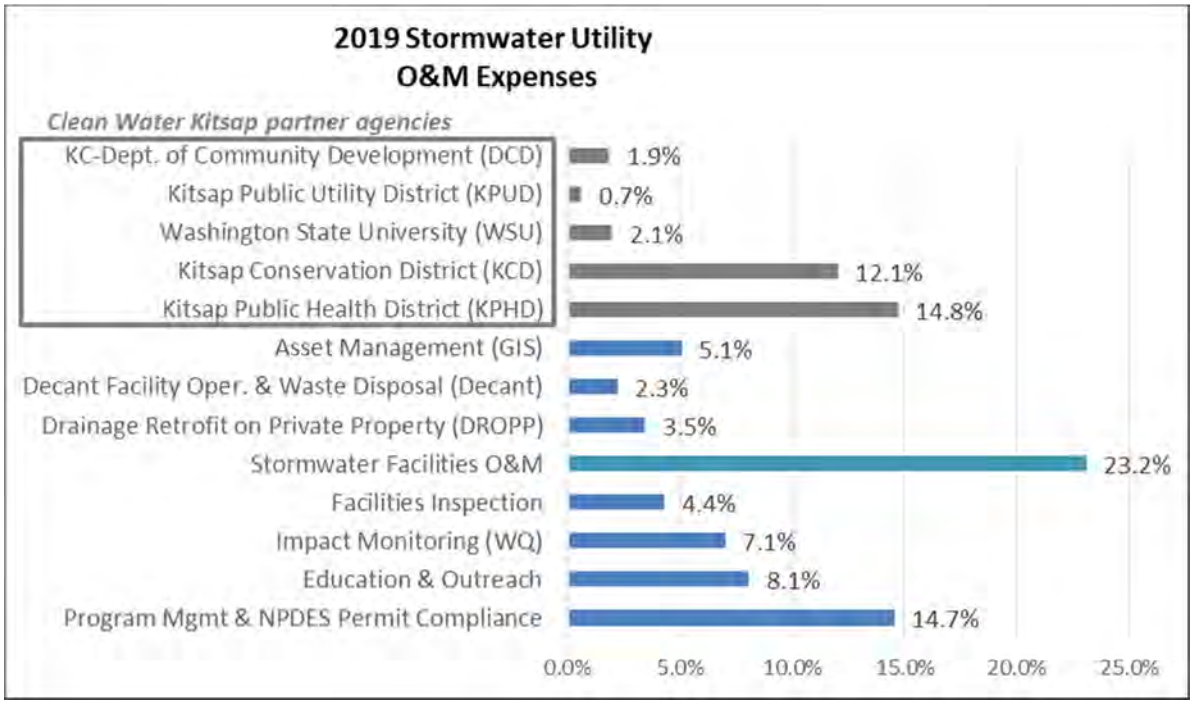

Figure 9–3. 2019 Stormwater Division O&M expenses

Taxes

The Division pays a state tax of 1.5 percent, which is charged to all stormwater fees. Because the state tax is calculated as a percentage of revenue, when fees are increased, additional state taxes are incurred equal to 1.5 percent of the overall rate increase.

CFP Project Funding

CFP projects are funded in many ways: through stormwater fee revenues, impact fees, reserves, or long-term debt in the form of loans or bonds. Often several means of funding CFP projects are employed for a variety of reasons. At times CFP project funding mechanisms are restricted to certain uses such as funding CFP-related projects or possibly loans secured for particular projects. Bonds can also be restricted to what is stated they were going to fund with the bonds at the time the bond was issued.

CFP Projects Funded through Stormwater Fee Revenue. Some stormwater utilities choose to fund their CFP projects entirely through current service fees and reserve funds, but this practice is relatively rare because utilities are often discouraged from holding excess cash balances. Most utilities use a mix of capital funding mechanisms such as current fees, reserve funds, and debt. The amount of CFP projects that a utility funds through stormwater fees is typically indicative of the financial health of the utility. The Division has been able to fund CFP projects through a combination of stormwater fees and grants without any large debt obligations.

Debt Service. Debt service is the payment of principal and interest on debt issued by the utility. Often when a utility issues debt the issuer imposes covenants on the utility to ensure that the utility is sufficiently financially sound to be able to repay the debt. One common covenant imposed is a DSCR, which is commonly stipulated at 1.25 for revenue bonds. This means that, after expenditures and taxes are paid, the utility has revenue equal to 125 percent of the debt service remaining. This financial statistic ensures that the utility is not spending all of its revenue on operations.

$$\frac{Revenue - \ expenditures - \ taxes}{Debt\ service} => 1.25$$

The level of debt is critical because the proportion of debt to revenue—DSCR—is one financial statistic that determines the utility's capacity to borrow additional funds as well as the overall bond rating. The Division currently has one minor debt obligation for its portion of the Public Works Annex building.

9.2 Capital Facilities Plan Funding and Projected Financial Results

As mentioned earlier, a major component of a CFP is how it will be funded. To adequately determine how a CFP will be funded a financial assessment must be undertaken. A financial assessment, while not necessarily as comprehensive as a full rate (fee) study, has similar objectives and methods. While there are a few generally accepted methods for conducting a financial assessment, the Division has historically used the cash basis for determining the revenue requirement. This analysis has also used the cash basis to be consistent with past analyses.

The cash-basis revenue requirement analysis is the comparison of projected revenue (sources of funds) and revenue requirements (applications of funds) to determine if the revenue is sufficient to responsibly manage the Division. The components of a cash-basis revenue requirement are available funds or revenue, compared to operations and maintenance, taxes, CFP projects, debt service, and change in working capital or application of funds. Figure 9–4 shows the revenue requirement by spending type in 2019. Below is a summary of the projected cash-basis revenue requirement for the Division (Table 9-5).

Table 9-5. Overview of the Stormwater Utility cash-basis revenue requirement

+	**Available funds (revenue)**
	✓ Rate revenues (stormwater fees)
	✓ Other revenues (grants)
	✓ Capital reserves
	✓ Long-term debt issues
=	**Total available funds**
	Application of funds
+	Surface water O&M expenses
	✓ Program management and Phase II Permit compliance
	✓ Education and outreach
	✓ Impact monitoring (water quality)
	✓ Facilities inspection
	✓ Surface water facilities O&M
	✓ Drainage Retrofit on Private Property (DROPP)
	✓ Decant facility and waste disposal (decant)
	✓ Asset management (GIS)
	✓ KPHD
	✓ KCD
	✓ WSU
	✓ KPUD
	✓ DCD
+	Taxes
+	CFP projects funded through fees
+	Debt service (P + I) existing and future
±	Change in working capital
=	**Total application of funds (revenue requirement)**
	Available funds – application of funds
=	**Balance (deficiency) of funds**

CFP projects funded through fees and debt service are the two areas where the CFP funding plan affects the revenue requirement. In a CFP funding plan if there are assumed bond issues, then this will increase the debt service in addition to an increased level of capital funding through stormwater fees. The central purpose of this analysis is to develop a funding strategy for the CFP developed for this Plan. The CFP used for this analysis is a real-dollar representation of the CFP developed in the earlier section of this Plan. Table 9-6 is the CFP by project, escalated to real dollars. Table 9-7 is the funding plan for the CFP.

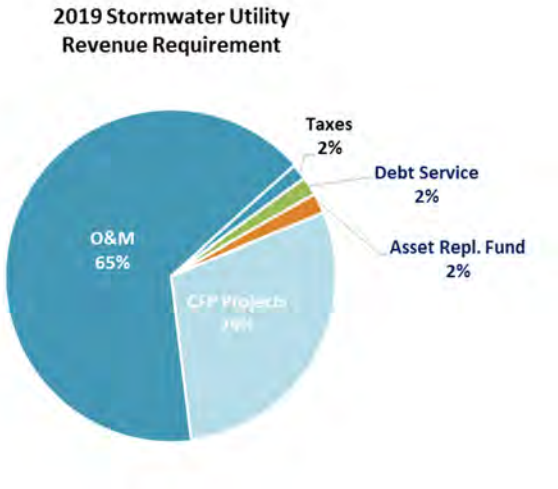

Figure 9–4. 2019 Stormwater Division revenue requirement

Table 9-6. Summary of Capital Facilities Plan projects, 2019–2025

Table values in real dollars	2019	2020	2021	2022	2023	2024	2025
Retrofit engineering projects							
Capital project engineering	$113,601	$0	$0	$0	$0	$0	$0
CFP projects	0	0	0	0	0	0	0
Retrofit engineering	353,531	387,423	402,920	419,036	435,798	453,230	471,359
Stormwater facilities retrofit	1,450,317	1,589,353	1,652,927	1,719,045	1,787,806	1,859,319	1,933,691
Total retrofit projects	$1,917,449	$1,976,776	$2,055,847	$2,138,081	$2,223,604	$2,312,548	$2,405,050
CFP projects							
Capital projects	$1,500,000	$0	$0	$0	$0	$0	$0
Ridgetop Blvd. Green Street Retrofit	0	1,365,000	0	0	0	0	0
Kingston Regional Stormwater Retrofit	0	500,000	0	1,400,000	0	0	0
Suquamish Regional Stormwater Treatment Facility	0	500,000	460,000	1,000,000	2,000,000	0	0
Illahee Regional Stormwater Retrofit	0	0	0	0	0	1,500,000	1,000,000
Tracyton Green Streets Stormwater Retrofit	0	0	0	0	0	500,000	1,000,000
Point No Point (PNP) Tide-Gate Replacement	0	34,422	0	0	500,000	1,000,000	0
Colchester SW Retrofit/Duncan Creek Culvert Replacement	0	120,000	0	0	500,000	1,000,000	1,000,000
Silverdale Way Stormwater Retrofit	0	500,000		0	0	0	500,000
Old Town Silverdale Water Quality Treatment	0	700,000	3,664,021	0	0	0	0
Kingston Washington Blvd. project	0	200,000	0	0	0	0	0
Total CFP projects	$1,500,000	$3,919,422	$4,124,021	$2,400,000	$3,000,000	$4,000,000	$3,500,000
Transfer to capital reserve	$0	$0	$0	$1,000,000	$0	$0	$0
Total CFP projects[a]	**$3,417,449**	**$5,896,198**	**$6,179,868**	**$5,538,081**	**$5,223,604**	**$6,312,548**	**$5,905,050**

a. Summation of table may reflect rounding errors because of decimal points.

Source: KCPW-provided CFP.

Table 9-7. Summary of Capital Facilities Plan project funding sources, 2019–2025

Table values in real dollars	2019	2020	2021	2022	2023	2024	2025
Total retrofit projects	$1,917,449	$1,976,776	$2,055,847	$2,138,081	$2,223,604	$2,312,548	$2,405,050
Total CFP projects	1,500,000	3,919,422	4,124,021	2,400,000	3,000,000	4,000,000	3,500,000
Transfer to capital reserve	0	0	0	1,000,000	0	0	0
Total CFP project needs	$3,417,449	$5,896,198	$6,179,868	$5,538,081	$5,223,604	$6,312,548	$5,905,050
Less other funding							
Annual stormwater CFP funding	$1,917,449	$4,896,198	$4,568,868	$4,038,081	$4,270,271	$5,359,215	$4,951,717
Annual grants (REET-2 and Ecology)	1,500,000	1,000,000	1,611,000	1,500,000	953,333	953,333	953,333
Debt issues	0	0	0	0	0	0	0
Total CFP project funding sources[a]	**$3,417,449**	**$5,896,198**	**$6,179,198**	**$5,538,081**	**$5,223,604**	**$6,312,548**	**$5,905,050**

a. Summation of table may reflect rounding errors because of decimal points.

Source: KCPW-provided CFP.

Table 9-8 on the following page shows the revenue requirement analysis, which is a balanced operations budget for the 6-year CFP as well as a plan for collecting the revenue necessary to maintain cash flow stability of daily operations. For this analysis the Division's 2020 budget was used as a starting point for projecting both revenue and the revenue requirement. Beyond 2020 all expenditures are factored with an annual increase of 3 percent (inflation estimate).

The revenue requirement analysis is designed around several assumptions including the Division's existing proposed stormwater fee adjustments schedule from the recent 2020 stormwater fee adjustment to $110.00 per ESU (4.8 percent), to next year's adjustment to $115.00 per ESU (4.5 percent) in 2021, $125.00 per ESU (8.7 percent) in 2022, and $130.00 per ESU (4.0 percent) in 2023. The impact to the stormwater fee for an average single-family customer is a cumulative increase of $20.00 per ESU ($130.00 - $110.00 = $20.00) from 2020 to 2023.

Table 9-8. Stormwater Utility summary of revenue requirement analysis, 2019–2025

Table values in real dollars	2019	2020	2021	2022	2023	2024	2025
Available funds (revenue)							
Rate revenue	$12,063,932	$12,685,989	$13,346,961	$14,594,200	$15,276,874	$15,382,829	$15,489,845
Other revenue	2,700,000	2,215,000	1,811,000	1,700,000	1,153,333	1,153,333	1,153,533
Total available funds	$14,763,932	$14,900,989	$15,157,961	$16,694,200	$16,430,207	$16,536,163	$16,643,178
Application of funds (expenses)							
Operations and maintenance	$7,622,193	$7,951,991	$8,261,768	$8,575,538	$8,911,076	$9,269,096	$9,641,484
O&M: development added FTEs	0	236,600	18,200	112,840	54,600	7,280	0
O&M: maintenance added FTEs	0	189,280	280,280	280,280	389,480	407,680	407,680
Taxes	180,959	190,290	200,204	218,913	229,153	230,742	232,348
Debt service	214,645	223,659	232,605	241,910	251,586	261,649	272,115
Asset replacement fund	233,100	233,100	233,100	233,100	233,100	233,100	233,100
CFP projects	3,417,449	5,896,198	6,179,868	5,538,081	5,223,604	6,312,548	5,905,050
Total application of funds	$11,668,346	$14,921,118	$15,406,026	$15,200,662	$15,292,599	$16,722,096	$16,691,778
Cumulative balance (deficit) of funds	$3,095,586	($20,129)	($248,065)	$1,093,538	$1,137,608	($185,933)	($48,600)
Cumulative balance (deficit) as a percentage of fees	-25.7	0.2%	1.9%	-7.5%	-7.4%	1.2%	0.3%
Approved rate adjustments	**9.4%**	**4.8%**	**4.5%**	**8.7%**	**4.0%**	**0.0%**	**0.0%**
Annual residential bill [a]	$105.00	$110.00	$115.00	$125.00	$130.00	$130.00	$130.0
Annual change ($)	9.00	5.00	5.00	10.00	5.00	0.00	0.00
Cumulative change (%)	9.00	14.00	19.00	29.00	3400	34.00	34.00

Note: Table may reflect rounding errors because of decimal points.

a. 2018 bill was $96.00 adjusted to $105.00 in 2019 or 9.4% increase ($9.00 / $96.00 = 9.4%).

Source: KCPW budget, 2019 and 2020.

Table 9-9. Summary of financial metrics, 2019–2025

Table values in real dollars	2019	2020	2021	2022	2023	2024	2025
Debt service coverage ratio (target 1.25)	19.85	18.41	19.72	22.35	22.63	20.90	19.14
Debt service as a percentage of rev. req. (target < 25%)	1.8%	1.5%	1.5%	1.6%	1.6%	1.6%	1.6%
Operating reserve fund							
Beginning fund balance	$1,000,000	$4,095,586	$4,075,457	$3,827,393	$4,920,931	$56,058,539	$5,7872,606
Additions	3,095,586	(20,129)	(8248,065)	1,093,538	1,137,608	(185,933)	(48,600)
Uses	0	0	0	0	0	0	0
Ending fund balance	$4,095,586	$4,075,457	$3,827,393	$4,920,931	$6,058,539	$5,872,606	$5,824,006
Days of O&M (target = 120 days)	196	178	163	200	236	221	212
Asset replacement fund							
Beginning fund balance	$1,000,000	$1,233,100	$1,466,200	$1,699,300	$1,932,400	$2,165,500	$2,398,600
Additions	233,100	233,100	233,100	233,100	233,100	233,100	233,100
Uses	0	0	0	0	0	0	0
Ending fund balance (target = $1M)	$1,233,100	$1,466,200	$1,699,300	$1,932,400	$2,165,500	$2,398,600	$2,631,700

Note: Table may reflect rounding errors because of decimal points.
Source: KCPW-provided reserve balances and targets.

Several of the Division's financial metrics are contained in Table 9-9 on the previous page. The table shows that DSCR is high because the Division has no significant borrowing. The Division has one minor outstanding borrowing issue for the Public Works Annex, which is a low debt service payment. The DSCR fluctuates from year to year depending on the level of outstanding debt and the revenue including assumed rate adjustment in any year. A good target DSCR should target 2.0, meaning the funds remaining after subtracting O&M and taxes, and should be twice the annual debt service payment. Rating agencies consider 2.0 as a very strong DSCR. The results show that the Division is substantially above this range. The Division's maximum debt service as a percentage of revenue requirement is also well below typical industry targets of 25 percent through the analysis period. The target balance for the operating fund is 120 days of O&M. The reserve also fluctuates from year to year depending on the timing of capital facility projects. The analysis indicates that the Division is estimated to be above the minimum and as high as 236 days of O&M expense. The asset management fund exceeds the $1 million target, and on an annual basis the ending fund balance is not expected to drop below the Division's ending fund balance target. It should be noted that the asset management fund does not show replacement expenditures, which are likely to occur throughout the period.

9.3 Assessment of the Stormwater Fees

Given the Division's scheduled stormwater fee adjustments, it should be able to adequately fund the capital program and run its operations in a sustainable manner. The Division bills its customer on an annual basis through property taxes. The existing stormwater fee structure consists of a flat fee per ESU. No stormwater fee is applied to undeveloped, forest, and park lands. Fees for other types of nonresidential parcels are based on estimated or measured impervious surface.

- **Single-family residence** charges are based on 1 ESU. The 2020 unit rate for 1 ESU is $110.00 per year.
- **Multifamily residences** (duplexes, triplexes, and four-plexes) are charged the number of dwelling units times the unit rate.
- **Nonresidential parcels** (which includes apartments, commercial, industrial, and institutional uses) are charged according to the estimated or measured impervious surface area divided by the square footage of one ESU, rounded to the nearest ESU but not less than one, times the unit rate. One ESU = 4,200 ft^2.

Example: A parking lot with 1 acre of impervious surface area would be charged 10 ESUs *(the value is rounded to the nearest whole number):*
1 acre (43,560 ft^2) divided by 1 ESU (4,200 ft^2) = 10 ESU

Table 9-10 provides a historical perspective of the Division's stormwater fees from 2010 to today's 2020 existing fee of $110.00 (January 2020). The stormwater fees have increased from $69.80 per ESU to $110.00 per ESU or a total of $40.20 per ESU ($110.00 - $69.80 = $40.20) from 2010 to 2020. This equates to a 58 percent accumulated increase over this period ($40.20 / $69.80 = 58 percent).

Table 9-10. Historical stormwater fees, 2010–2020

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Stormwater fee	$69.80	$69.80	$69.80	$74.50	$78.00	$82.00	$86.50	$91.00	$96.00	$105.00	$110.00
Change ($)	$0.00	$0.00	$0.00	$4.70	$3.50	$4.00	$4.50	$4.50	$5.00	$9.00	$5.00
Change (%)	0.0%	0.0%	0.0%	6.7%	4.7%	5.1%	5.5%	5.2%	5.5%	9.4%	4.8%

As is illustrated in Table 9-10 the Division has adopted stormwater fees as needed to keep up with rising O&M and capital needs. The Division has also adopted stormwater fee adjustments for 2021, 2022, and 2023 to maintain the current LOS and regulatory mandates, build more stormwater infrastructure, and improve water quality programs. The Division's stormwater fees will increase from 2020 of $110.00 per ESU to $130.00 per ESU in 2023, or an increase of $20.00 per ESU ($130.00 - $110.00 = $20.00) or an increase of 18 percent from 2020 levels ($20 / $110.00 = 18 percent). Table 9-11 shows the 2021, 2022, and 2023 stormwater fees.

Table 9-11. Adopted future stormwater fees, 2021–2023

	2021	2022	2023
Stormwater fee	$115.00	$125.00	$130.00
Change ($)	$5.00	$10.00	$5.00
Change (%)	4.5%	8.7%	4.0%

9.4 Summary

The results of the analysis show that the Division adopted future stormwater fees for 2021, 2022, and 2023 will meet the O&M and capital needs of the utility (Figure 9–5). The stormwater fee adjustments are needed primarily for funding the capital program while maintaining the current LOS and remaining compliant with the utility's Phase II Permit. This analysis assumes grant funding to mitigate fee impacts. Other alternative funding sources, like long-term borrowing, were not assumed during the analysis period. If the grant funding sources were not to happen then alternative funding sources such as long-term borrowing may need to occur, which could increase future overall stormwater fee adjustments.

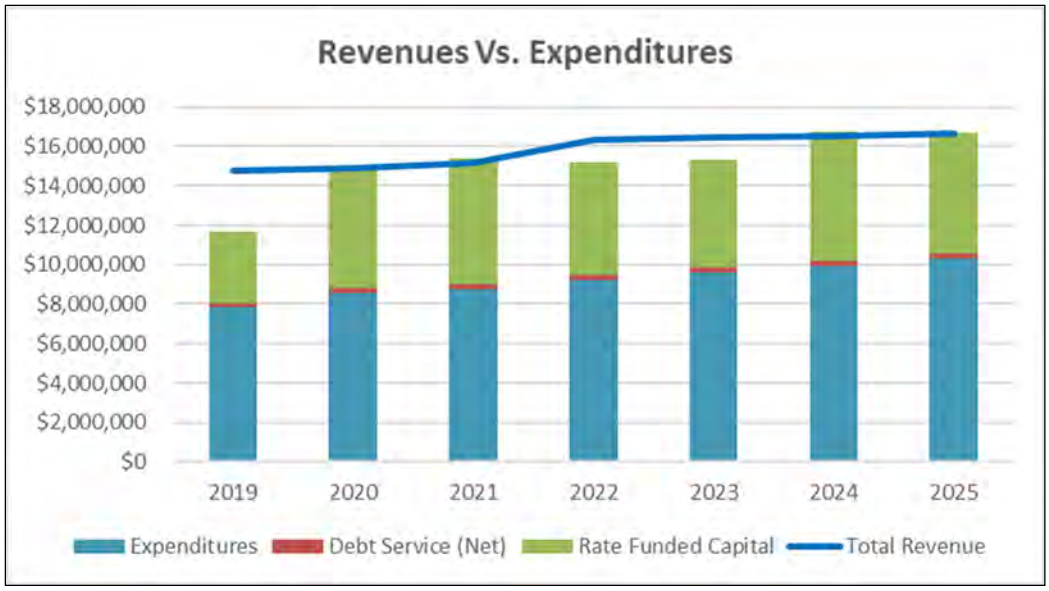

Figure 9–5. Revenues vs. expenditures

10 Long-Range Planning and Adaptive Management

The Phase II Permit requires implementation of a stormwater planning program to assist in development of long-range policies and strategies to protect receiving waters. The goal of this Phase II Permit condition is to work toward a better understanding of local long-range planning processes and how the County's policies, strategies, codes, and other measures do, or do not, address probable impacts of increased future stormwater discharges on receiving water health. Stormwater planning also includes an assessment of whether additional stormwater management activities are needed to meet the goals of protecting and restoring beneficial and designated uses (Ecology 2018).

The 2019 Phase II Permit reflects that a broader view of planning and implementation is needed to support and advance water quality and habitat restoration needs in the state. Policies that promote compact development, reduced impervious surfaces, and improved water infiltration help communities meet both the GMA through the County-level Comprehensive Plan as well as stormwater management requirements. Closer integration of long-range planning and stormwater management is seen as essential for meeting the dual goals of accommodating growth while protecting the environment (Ecology 2018).

The SWMP Annual Report to Ecology required by the 2019 Phase II Permit includes expanded reporting requirements for Permittees to document interdisciplinary planning and coordination among intra-agency departments for the integration of stormwater planning into other departmental plans. Annual Reports must be developed and submitted by Permittees starting in 2021. These reports are to describe how stormwater needs and limitations are informing long-range planning. This reporting process is not intended to create a parallel planning to ongoing long-range planning or Comprehensive Plan updates; rather, the analysis describes how planning processes take into account, consider, and evaluate stormwater and water quality, including:

- How, or if, stormwater-related water quality and watershed protection are being addressed in revisions to the County's Comprehensive Plan
- How water quality and watershed protection are being addressed in revisions to other locally initiated, state-mandated long-range land use, transportation plans, or other plans used to prepare and accommodate population needs

Additionally, the Phase II Permit acknowledges the need for planning efforts to incorporate a broad audience. The 2019–2024 iteration of the Phase II Permit identifies opportunities to more holistically engage overburdened communities in campaigns related to general awareness and public involvement and participation.

Section 3.1 describes how stormwater and watershed elements are currently addressed in the Comprehensive Plan and associated Water as a Resource policy. The following sections describe strategies for how the County may meet future long-range planning requirements of the Phase II Permit.

10.1 Interdisciplinary Team and Stormwater Planning Annual Reports

Comprehensive planning and stormwater management are regulated under different laws and overseen by different County departments. Interagency coordination is therefore needed and the Phase II Permit requires the County to convene by August 2020 an interdisciplinary team to conduct and coordinate the comprehensive planning program effort. Team makeup is to include representatives from the stormwater program, long-term planning, transportation, parks and recreation, and scientific and technical experts (Ecology 2018). Table 10-1 represents a potential interdisciplinary team composition for Kitsap County that would be responsive to the Phase II Permit requirement.

Table 10-1. Stormwater planning program interdisciplinary team

Team member	Agency
Stormwater Program Manager (Chair)	Kitsap County Public Works
Stormwater Asset Manager	Kitsap County Public Works
Community Long-Range Planning	Kitsap County DCD
Development Engineering	Kitsap County DCD
Environmental Programs	Kitsap County DCD
Roads Department Design and Capital Projects	Kitsap County Public Works
Parks Planner	Kitsap County Parks

In addition, the interdisciplinary team may include other non-County agencies that influence stormwater-related water quality and watershed protection, such as non-County members of the CWK program (see Table 10-2).

Table 10-2. Non-County interdisciplinary team members

Team Member	Agency
Agricultural and backyard water quality impacts	Kitsap Conservation District
Water quality monitoring	Kitsap Public Utility District
Stream health and habitat; GSI	Washington State University Kitsap Extension
Regional behavior change programs	West Sound Stormwater Outreach Group (WSSOG)
Environmental Health	Kitsap Health District
Tribal Representatives	Suquamish and/or Port Gamble S'Klallam Tribes

10.2 Long-Range Planning Recommendations

Recommendations related to long-range planning requirements reflect both Phase II Permit compliance dates and interagency coordination needs. The most recent County Comprehensive Plan was adopted in 2016, and under the GMA, plan updates are required every 8 years. Comprehensive plans typically require 18 months to develop and adopt, so initiation of the comprehensive planning process in the 2021–2022 period may be anticipated. Initial work elements of the interdisciplinary team may include the following tasks:

- Identify the County's expected schedule and process for Comprehensive Plan update
- Identify specific elements of the Comprehensive Plan that are applicable to the stormwater planning requirement
- Perform initial scoping of the 2021 Stormwater Planning Report
- Develop the 2021 Stormwater Planning Report work plan and schedule such that it coordinates with both Phase II Permit compliance dates and Comprehensive Plan development

It is expected that this Plan will be used as an important component in support of the stormwater planning process required under the Phase II Permit.

Additional chapters of this Plan describe additional long-range needs and planning activities that may influence or be impacted by updates to the County's Comprehensive Plan.

10.2.1 Funding

Many stormwater capital and maintenance activities are driven by capacity and water quality needs in the county. To meet the goals of protecting and restoring beneficial and designated uses new activities may be required, new types of GSI will replace traditional stormwater infrastructure, flow and water quality treatment capacity may be expanded, etc. In addition, E&O activities and behavior change programs may be implemented. As such, funding requirements and the County's funding strategy should be evaluated as an element of long-range planning. This is described further in Chapter 8, Capital Facilities Plan, and Chapter 9, Stormwater Utility Financial Assessment.

10.2.2 Stormwater Management and Operations Programs

Both the Stormwater Management and Operations programs conduct day-to-day activities that fulfill many of the requirements of the 2019 Phase II Permit and GMA and corresponding County Comprehensive Plan. Currently the Division conducts planning annually to develop a Business Plan for work groups in the division, including coordination of Business Plan goals and targets between work groups. Chapter 7, Stormwater Division Assessment, describes annual planning further. In years that align with the County comprehensive planning process (both in anticipation of, and following), annual planning may take into account both what is needed to update the County Comprehensive Plan, and impacts such updates will have on day-to-day activities.

10.3 Overburdened Communities

The 2019–2024 Phase II Permit defines overburdened communities as follows:

> Minority, low-income, tribal, or indigenous populations or geographic locations in Washington State that potentially experience disproportionate environmental harms and risks. This disproportionality can be as a result of greater vulnerability to environmental hazards, lack of opportunity for

> public participation, or other factors. Increased vulnerability may be attributable to an accumulation of negative or lack of positive environmental, health, economic, or social conditions within these populations or places. The term describes situations where multiple factors, including both environmental and socio-economic stressors, may act cumulatively to affect health and the environment and contribute to persistent environmental health disparities.

By establishing a process for inclusion of overburdened communities in Kitsap County's stormwater management program, the County may build general awareness on impacts of stormwater and LID principles and BMPs with these communities. It can also include opportunities for public involvement and participation in the decision-making process in updating the SMAP and SWMP. At the time of this report, the County is performing work to identify who and where these communities are, and what their barriers to participation might be. This will allow the County to then establish goals related to overburdened community engagement, and develop an implementation strategy for awareness and inclusion campaigns. The County may periodically review and update its approach, and also explore inclusion of considerations for overburdened communities in other aspects of its services, such as capital project prioritization and education and outreach.

10.4 Adaptive Management

Adaptive management (AM) is a systematic approach for improving resource management by learning from management outcomes (Figure 10–1). The objective of AM is to promote understanding of how natural resource systems work and respond to management actions, and thereby improve management decision making. AM acknowledges uncertainty about how resource systems function and therefore seeks to learn while doing, using scientific information gained by past actions to inform future decisions (Epanchin-Niell et al. 2018).

Generally, AM processes are warranted when reducing uncertainty is likely to lead to changes in management that could substantially improve outcomes (that is, if there is a high value of the information that may be learned) (Epanchin-Niell et al. 2018). AM is considered particularly well suited for water resource management where outcomes are responsive to management decisions (such as a regional treatment facility or habitat restoration) but there is uncertainty about outcomes of alternative decisions (type and size of treatment, effect on receiving water, species recovery, etc.) (Horne et al. 2018).

The County surface water and stormwater program collects information and makes decisions that affect broad-scale ecosystem processes involving large spatial areas, complex biophysical interactions, numerous competing stakeholder interests, and uncertain outcomes. Through these efforts, the County's ability to understand these systems and processes and predict future conditions is continually improving. However, many key system drivers such as climate change, water resource flow regimes, and development patterns are highly variable and uncertain. AM strategies that are responsive to these uncertainties can therefore be a helpful tool to support decision making.

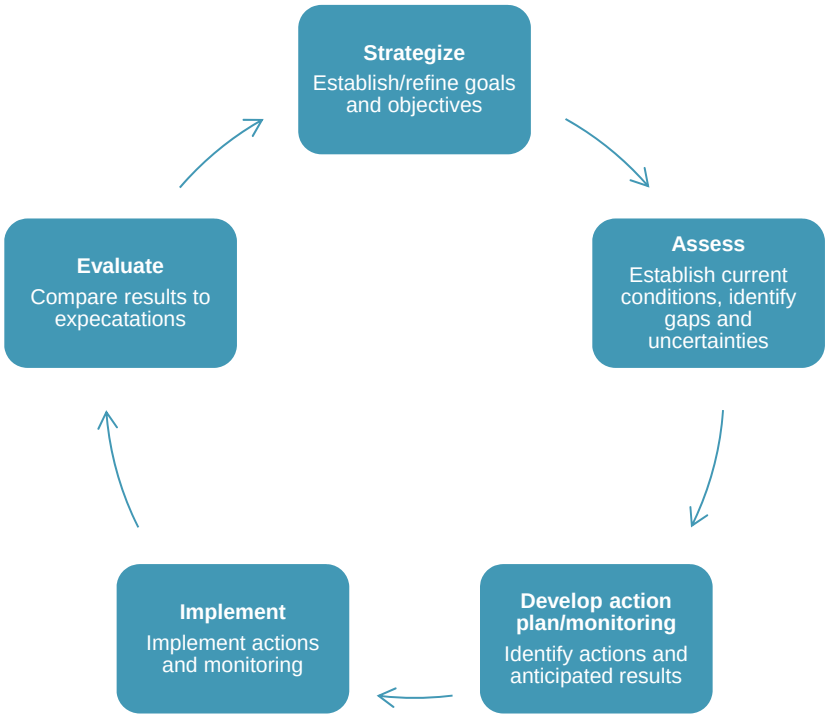

Figure 10–1. The Adaptive Management cycle

10.4.1 Current Use of Adaptive Management Methods

From an operational perspective, AM simply means the iterative application of learning by doing and adjusting management on the basis of what is learned. This typically entails monitoring and evaluation, as well as collaboration with key stakeholders. Kitsap County currently uses a variety of AM methods, which typically consist of selecting management choices on the basis of the best available information and updating system understanding over time to improve subsequent management choices. Examples of current AM tools used by Kitsap County include:

- Using long-term ambient water quality monitoring performed by KPHD to identify trends and emerging problems, and to document performance of corrective actions
- Ongoing Benthic Index of Biotic Integrity (B-IBI) monitoring, which consists of quantitative measurements of the biological condition of streams to identify trends in stream health
- Targeted BMP performance monitoring such as the UW study of the Manchester Stormwater Park regional water quality treatment facility to evaluate costs and benefits of specific treatment alternatives

The above activities generate information about the impacts of management actions, and then use the results to update knowledge and adjust management actions. This leads to improved understanding of resource responses and more focused management actions.

10.4.2 Considerations for Future Use of Adaptive Management Methods

Adaptive management is a relatively recent development in water resources management (Epanchin-Niell et al. 2018). The use of AM is likely to grow in part because of the increasing rate of complexity in the issues and stressors associated with stormwater management, such as climate change, population growth, changing regulatory requirements, and the continued decline of threatened and endangered anadromous salmon stocks in the Puget Sound region.

The challenge confronting stormwater managers is to make informed decisions in this complex environment. Key questions and uncertainties to be addressed may include:

- How and where can water quality and habitat be improved and sustained in an environment of continued population growth and development?
- How is climate change influencing precipitation patterns and intensity and how can flooding and erosion be managed in the long term given climate change uncertainties?
- How much SLR will occur in Kitsap County and what is the role of the Stormwater Division in addressing climate change issues?
- What are appropriate stormwater infrastructure design criteria relative to changing regulatory drivers and climate change risks?
- Where and what are the actions that are likely to provide optimal water quality and habitat benefits?
- What is the range of costs necessary to meet the future climate change and resource protection needs and how do those costs relate to current and long-term utility financial plans?

Management of problems like these increasingly involves a collaborative systems approach with explicit and agreed-upon objectives, management alternatives, and analytical approaches that can identify the most appropriate management strategies.

10.4.3 Adaptive Management Recommendations

Adaptive management typically relies on teams of scientists, engineers, and managers to identify and evaluate resource problems in quantifiable terms. This process-based approach recognizes that information for our decisions is almost always incomplete (Horne et al. 2018).

An effective AM process for stormwater management requires both stakeholder collaboration and collection of technical data. This reflects the broad range of variables associated with stormwater management that typically warrants participation of multiple stakeholders for both knowledge sharing and negotiation. In the former, stakeholders add to knowledge for decisions. In the latter, stakeholder processes may become a forum for negotiating diverse objectives, including what kinds of information will be collected, how it will be used, and what resources are the highest priority for action.

The County has developed several effective data collection activities that support AM processes. These activities evaluate natural system responses to uncertainty variables, as well as performance of specific management actions and include:

- Long-term ambient monitoring programs that provide valuable feedback data on ecological response to stressors and management actions including the KPHD water quality monitoring program and BIBI monitoring
- Monitoring the performance and effectiveness of specific large-scale BMPs such as the Manchester Stormwater Park and Whispering Firs Stormwater Park

These activities provide valuable feedback on system response to management decisions, and the effectiveness of specific management actions.

The County could consider several measures if expansion of the AM approach is desired. A central AM requirement is an emphasis on resource assessment. This is based on the need to apply lessons learned from experience, data analysis, and fine-tuning project implementation. This typically requires more data collection, numerical models, and scientific analysis to develop and evaluate management options and past choices. More emphasis on AM may therefore require a larger allocation of financial resources to data collection and assessment processes.

As a practical matter, an AM approach is often implemented incrementally and in phases. This reflects that organizations often do not have the technical, financial, or institutional resources to fully implement and support AM processes. A first step is often the decision to use an AM approach for the organization. Following this decision, data can then be collected and evaluated in a structured manner consistent with both AM intent and the financial resources available. Initial AM measures could include formalizing management goals and outcomes for monitoring programs, developing specific cost/benefit objectives for treatment facilities, investing in staff training in AM techniques, and developing plans for how to collaborate with key stakeholders in ongoing resource assessment processes.

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Stormwater Management Action Plan

Kitsap County Stormwater Comprehensive Plan
Appendix 3-1

Kitsap County
December 22, 2020

Report also submitted as a stand-alone document, June 25, 2020

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Stormwater Management Action Plan

Stormwater Basin Planning and Prioritization

Kitsap County

December 22, 2020

Originally submitted June 25, 2020

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Abbreviations

ac	acre(s)
BFS	Basin Fact Sheet
B-IBI	Benthic Index of Biotic Integrity
BMP	best management practice
C	coho
CFP	Capital Facilities Program
County	Kitsap County
CRP	Capital Roads Project
Ecology	Washington State Department of Ecology
ESA	Endangered Species Act
FC	fall chum
ft	foot/feet
GIS	geographic information system
HDR	HDR Engineering, Inc.
Herrera	Herrera Environmental Consultants, Inc.
ID	identifier
KCPW	Kitsap County Public Works
KPHD	Kitsap Public Health District
LID	low-impact development
LWD	large woody debris
mi	mile(s)
MS4	municipal separate storm sewer system
NA	not available
ND	no data
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
Permit	Western Washington Phase II Municipal Stormwater Permit
PIC	pollution identification and correction
RCCT	resident coastal cutthroat trout
RWA	Receiving Water Assessment
SEEK	Sharing Environmental Education Knowledge
SH	steelhead
SMAP	Stormwater Management Action Plan
SR	State Route
SWCP	Stormwater Comprehensive Plan
SWMP	Stormwater Management Plan
T&E	threatened and endangered
TIP	Transportation Improvement Program
TSS	total suspended solids

UGA	Urban Growth Area
USFWS	United States Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife
WDOH	Washington Department of Health
WQ	water quality
WSDOT	Washington State Department of Transportation

1 Introduction

In December 2018 Kitsap County (County) contracted HDR Engineering, Inc. (HDR) to develop a Stormwater Comprehensive Plan (SWCP) to meet Western Washington Phase II Municipal Stormwater Permit[1] (Permit) regulatory requirements and County goals for Kitsap County's Stormwater Program.

The 2019 version of the Permit has expanded requirements in Section S5, Special Conditions for Stormwater Management Program for Cities, Towns, and Counties, that include provisions requiring comprehensive stormwater planning. As such, Kitsap County Public Works (KCPW) is positioning itself for March 31, 2023, compliance with this new provision by developing an SWCP that is based in part on the requirements included in the 2019 Permit.

2 Background

The municipal separate storm sewer system (MS4) permits issued by the Washington State Department of Ecology (Ecology) require local jurisdictions to implement a wide range of programmatic stormwater management actions to protect beneficial uses of receiving waters. The 2013 Permit launched Stormwater Action Monitoring and Planning for a corresponding receiving water monitoring program to broadly inform if conditions are becoming better or worse, what best management practices (BMPs) are effective, and how to incorporate the latest science and the most effective approaches.

For the 2013 Permit, Phase I counties were the first to develop watershed-scale stormwater planning strategies that would accommodate planned growth in a developing watershed and still maintain hydrologic water quality conditions that fully support "existing uses" and "designated uses" through a stream system. The Permit requirements focused on the scale and detail of modeling and planning to bring into focus the needs of the stream system.

Models from all Phase I counties projected that riparian restoration and large amounts of additional stormwater detention and infiltration are needed to improve receiving water conditions (Ecology 2019b). Because of these findings, the 2019 Permit was expanded to include Phase II counties for developing a planning requirement, focusing on prioritizing a sub-watershed basin where stormwater management programs and capital projects, if implemented, could have measurable effects on water quality.

Effective August 1, 2019, among many new requirements, the Permit requires Permittees to include stormwater planning activities in their annual Stormwater Management Program reports. Reportable planning actions include the following:

[1] National Pollutant Discharge Elimination System and State Waste Discharge General Permit for discharges from Small Municipal Separate Storm Sewers in Western Washington (https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Municipal-stormwater-general-permits/Western-Washington-Phase-II-Municipal-Stormwater).

- A requirement to convene an interdisciplinary team to inform and assist in the development, progress, and influence of the (stormwater) program at informing the Permittees' comprehensive planning efforts
- Documentation of how coordination with other long-range plan updates that describe how stormwater management needs and protection/improvement of receiving water health are (or are not) informing the planning update processes and influencing policies and implementation strategies
- A continuation of existing code-related requirements to implement low-impact development (LID) principles
- Preparation of a Stormwater Management Action Plan (SMAP)

The County has prepared several stormwater plans over the years, including the North Kitsap Low Impact Development Retrofit Implementation Plan (HDR 2013), Silverdale Low Impact Development Retrofit Plan (Herrera 2013), East Bremerton and East Port Orchard Retrofit Plan (RKI 2019), and Kingston Regional Facility Plan (currently in development). Each plan resulted in targeted projects to improve water quality and address flooding; however, with issuance of the 2019 Permit, Ecology is requesting that stormwater comprehensive planning "inform and assist in the development of policies and strategies as water quality management tools to protect aquatic resources." The projects identified in the aforementioned plans could be considered for implementation if they are located within the priority basin.

This SMAP provides guidance on comprehensive watershed planning. Ecology recognizes that many jurisdictions are already actively planning stormwater investments and actions to accommodate future growth in a way that minimizes impacts to receiving waters and beneficial uses. This SMAP is intended to coordinate with other local planning efforts.

This SMAP was prepared in accordance with Ecology's draft SMAP Guidance (Ecology 2019b), which guides Permittees on selecting the highest-priority drainage basin for implementing management action plans for improving water quality conditions in receiving waters. What follows is a description of applicable County policies and the methods and analyses used for developing the County's SMAP.

2.1 Kitsap County Policies

In addition to Permit requirements, the County has developed a series of guiding principles to limit contribution to pollution and preserve water as a resource. These policies are as follows:

- Preserve natural hydrology by preventing the creation of stormwater runoff and ensuring that the runoff is free of pollutants
- Conserve groundwater resources through infiltration, conservation, and pursuing alternative sources for non-drinking water
- Reduce pollutant loading of groundwater and surface water by reducing surface flow volumes and incorporating non-polluting products or processes wherever possible

- Use land for multiple purposes by maintaining forests and open space, integrating stormwater management features into the landscape, and encouraging practices that can be used for purposes beyond just stormwater management
- Refine management to reflect the latest technology and innovations by searching for scientific research and market advances, and integrating findings into operations and regulations
- Educate employees, customers, citizens, and contractors on how their actions can impact water quality
- Provide incentives to promote actions that support these principles

Several programs have been developed to help accomplish these objectives; these programs are listed in Table 2-1.

Table 2-1. Kitsap County programs for improving water quality

Program	Water quality initiative
Adopt-A-Road, Beach, Trail, or Park	Reduce pollutant loading of groundwater and surface water.
Sharing Environmental Education Knowledge (SEEK)	Educate employees, customers, citizens, and contractors on how their actions can impact water quality.
Mutt Mitt stations	Reduce pollutant loading of groundwater and surface water.
“Can the Grease” kit	Reduce pollutant loading of groundwater and surface water.
Waste reduction and recycling	Reduce pollutant loading of groundwater and surface water.

2.2 Washington State Department of Ecology Policies

The 2019 Permit requires local jurisdictions to prioritize spending and direct strategic investments or effort to those basins and catchment areas where improvement can be most readily achieved and the benefits can be seen on a fairly near-term timeline.[2] This requirement essentially serves as the objective statement for the SMAP, which focuses addressing impacts and helps to answer the following questions:[3]

- How can existing stormwater problems be most strategically addressed?
- How can water quality goals be accomplished while still meeting future population and density targets?

Permittees are to use local information related to receiving water and contributing area to prioritize a basin, 1 to 10 square miles in area, for planning and provide a tailored set of strategies or actions to protect or improve water quality for the prioritized basin.

[2] Information draft framework for new Phase I and Phase II MS4 permit long-term MS4 planning section.

[3] Stormwater Management Action Planning Guidance.

3 Study Area

Kitsap County is located on the Kitsap Peninsula within the Puget Sound region of Washington State. It encompasses most of the peninsula, including Bainbridge Island and Blake Island. The County encompasses a total area of 566 square miles, of which 395 square miles are land and 171 square miles are water. In 2019 the population was 271,473, (United States Census Bureau. 2020) with an average population density of 687 residences per square mile.

The study area focused on watersheds greater than 1 square mile draining to water bodies within the county, excluding incorporated areas. (The County does not complete stormwater quality work outside of County-controlled areas. Stormwater management in incorporated areas is covered under individual city MS4 permits.)

Identifying the priority basin involved the following two-step process, described further in the Sections 3.1 and 3.2:

1. Conduct a Receiving Water Assessment (RWA) that determined the influence and relative contribution of the County's jurisdictional area on the receiving water. For Phase II permittees, like Kitsap County, the urbanized areas and designated Urban Growth Areas (UGAs) are required to be included in this step. The outcome of the RWA is a list of stormwater basins to be prioritized in Step 2.
2. Prioritize Basins. Basins identified in Step 1 were prioritized based on the water quality conditions in the respective receiving waters. Receiving waters conditions were assessed by identifying the beneficial uses and desired water quality conditions in each and the highest priority was given to basins with the following characteristics:
    - Moderate to high levels of impairment
    - Where municipalities can exert a greater influence on land management decisions and project implementation decisions
    - Where regional rehabilitation efforts are also focused
    - Where stormwater is directly discharged to Puget Sound convergence zones

3.1 Receiving Water Assessment

The goal of the RWA is to describe the County's receiving waters, beneficial uses, types of potential impacts of urbanization and land use activities on those receiving waters, and how this information will be used to guide basin prioritization.

The objective of the RWA is a countywide inventory that identifies conditions in a list of candidate basins that are to be considered in the more detailed prioritization process (see Section 3.2). The general scope of the RWA and associated prioritization process follows that recommended in SMAP guidance (Ecology 2019b), as follows:

- Delineate all of the basins and receiving waters in Kitsap County jurisdiction for watersheds that have areas between 1 square mile and about 20 square miles
- Perform a relatively rapid assessment of existing information about beneficial uses and associated conditions in each watershed

- Assess the relative current and potential future influence of the County's stormwater system on each receiving water
- Evaluate and summarize the information to narrow the list of basins/receiving waters that are to be advanced to a more detailed prioritization analysis

In general, the RWA consists of identification of the parameters and data sources used to assess water quality, water flow, and aquatic life habitat conditions in freshwater and marine shoreline areas.

Figure 3-1. Analyzed basins

3.1.1 Basin Delineation

The initial step in the RWA was to delineate all basins in Kitsap County jurisdiction, shown in Figure 3-1 above. A total of 27 basins were identified, with 22 basins selected for more detailed RWA, shown in Table 3-1. Five basins were eliminated from the RWA because of their location in very rural, lightly developed watersheds that are outside the census urbanized area and have little stormwater infrastructure or influence. Basin boundaries were delineated using Kitsap County's previously delineated basin boundaries.

Table 3-1. Summary of basins and receiving waters

Basin	Basin size within Kitsap (ac)	Fully within Kitsap County?	Primary streams	Marine receiving waters
Kingston	4,909	Yes	Kingston Creek	Appletree Cove
			Carpenter Creek	Puget Sound
Miller Bay	8,829	Yes	Grovers Creek	Miller Bay
			Indianola Creek	Port Madison Bay
Liberty Bay	13,570	Yes	Dogfish Creek	Liberty Bay
			Johnson Creek	Ni Se Ka Bay
			Big Scandia Creek	Dogfish Bay
			Little Scandia Creek	
			Lemolo Creek	
			Bjorgen Creek	
			Sam Snyder Creek	
Clear Creek	5,124	Yes	Clear Creek	Dyes Inlet
West Dyes	7,433	Yes	Strawberry Creek	Dyes Inlet
			Ostrich Creek	Ostrich Bay
			Phinney Creek	Oyster Bay
				Phinney Bay
				Port Washington Narrows
East Dyes	7,388	Yes	Barker Creek	Dyes Inlet
			Mosher Creek	Port Washington Narrows
	6,947	Yes	Steele Creek	Port Orchard Bay

Basin	Basin size within Kitsap (ac)	Fully within Kitsap County?	Primary streams	Marine receiving waters
Port Orchard Passage			Enetai Creek	Burke Bay
			Illahee Creek	
Central Hood Canal	19,765	Yes	Big Beef Creek	Hood Canal
			L. Anderson Creek	Seabeck Bay
			Seabeck Creek	
Chico Creek	10,424	Yes	Chico Creek	Chico Bay
Gorst Creek	6,159	Yes	Gorst Creek	Sinclair Inlet
Wright Creek	3,038	Yes	Wright Creek	Sinclair Inlet
Beach Drive	3,924	Yes	Beaver Creek	Port Orchard Bay
				Rich Passage
				Clam Bay
Long Lake	8,632	Yes	Salmonberry Creek	Yukon Harbor
			Curley Creek	
Blackjack Creek	14,045	Yes	Blackjack Creek	Sinclair Inlet
			Anderson Creek	Port Orchard Bay
			Ruby Creek	
			Ross Creek	
			Annapolis Creek	
			Karcher Creek	
Gamble Creek	12,286	Yes	Gamble Creek	Gamble Bay
			Martha John Creek	Hood Canal
			Bear Creek	
			Middle Creek	
			Little Boston Creek	
Upper Hood Canal	12,071	Yes	Kinman Creek	Hood Canal
			Lofall Creek	

Basin	Basin size within Kitsap (ac)	Fully within Kitsap County?	Primary streams	Marine receiving waters
			Jump off Joe Creek	
			Devils Hole Creek	
			Cattail Creek	
Foulweather Bluff	6,725	Yes	Hawks Hole Creek	Hood Canal
			Eglon Creek	Puget Sound
Suquamish	4,157	Yes	Klebeal Creek	Agate Pass
			Cowling Creek	Port Madison Bay
Yukon Harbor	5,702	Yes	Duncan Creek	Yukon Harbor
Olalla	7,597	No	Olalla Creek	Colvos Passage
Burley Lagoon	8,723	No	Burley Creek	Burley Lagoon
			Purdy Creek	
Minter Bay	6,741	No	Minter Creek	Minter Bay

Basin Fact Sheets (BFSs) were created for each of the basins shown in Table 3-1 using Kitsap County geographic information system (GIS) data. Each BFS shows land use information, streams, basin areas, road density, and other relevant summary information. These BFS were used in the prioritization described in the following sections for land-based criteria. Individual BFSs are provided in the Appendix.

3.1.2 Assessment of Receiving Water Conditions

The RWA compiled and reviewed a variety of available information to describe general conditions within each basin. This information and the associated data variables were identified based on a combination of designated beneficial uses and available data sets, consistent with both National Pollutant Discharge Elimination System (NPDES) permit guidance (Ecology 2019b) and guidance from *Building Cities in the Rain* (Washington Department of Commerce 2016). Table 3-2 summarizes data sets relative to beneficial uses.

Table 3-2. Summary of data sets and beneficial uses for RWA

Data category	Beneficial use	Data sets used in RWA
Water quality	• Aquatic life • Shellfish harvesting: recreational • Shellfish harvesting: commercial • Primary contact recreation	• Ecology 303(d) List • Kitsap Public Health District (KPHD) pollution identification and correction (PIC) data • KPHD marine ambient monitoring data • KPHD stream ambient monitoring data

Data category	Beneficial use	Data sets used in RWA
Water flow	• Aquatic life • Water supply • Salmonid habitat	• Ecology Watershed Characterization • Kitsap PUD stream flow monitoring
Habitat	• Aquatic life • Salmonid habitat • T&E listed ESA species • Forage fish spawning • Wildlife habitat	• WDFW SalmonScape GIS • WDFW Fish Barrier Inventory GIS • Puget Sound Benthos B-IBI Dataset • Ecology Watershed Characterization • Kitsap County GIS • WDFW Forage Fish Spawning GIS • NOAA and USFWS Critical Habitat
Shellfish and finfish consumption	• Shellfish harvesting: recreational • Shellfish harvesting: commercial • Finfish harvesting: recreational	WDOH Commercial Shellfish and Beach Closure GIS [a]
Land use	Water quality, water flow, and habitat	• Kitsap County Zoning GIS • Kitsap County Transportation GIS (road miles) • Kitsap County Parks GIS • Land cover and impervious surfaces • Census urbanized areas • Population • Incorporated areas and UGAs
Stormwater infrastructure	Water quality, water flow, and habitat	• Kitsap County Asset Management System • Kitsap County Zoning GIS

WDOH = Washington State Department of Health

[a] WDOH 2019.

As shown in Table 3-2, data used in the RWA consisted of a combination of state and local data sets. Kitsap County GIS data, which include a variety of local, state, and national data sets, were used extensively in the analysis. Ambient and project-specific water quality data collected by the Kitsap Public Health District (KPHD) over the past 10 years were a primary data source for the water quality analysis. Ecology's *Puget Sound Watershed Characterization* (Ecology 2019a) data were also used to assess a variety of beneficial uses for receiving waters.

3.1.3 Beneficial-Use Assessment

The beneficial-use assessment identified key uses and status of water quality and habitat conditions to support those uses in each basin. This consisted of evaluation of beneficial uses as described in Table 3-2 for each basin using a relative prioritization scoring for each variable, with a higher priority score associated with a higher assigned point value, as follows:

- **Excellent:** Beneficial use not impaired. For example, a basin where all stream and marine ambient water quality monitoring data meet applicable standards would be rated "Excellent."
- **Good:** Beneficial use impaired in part, or in limited areas. For example, a basin where 90 percent of stream and marine ambient water quality monitoring data meet applicable standards would be rated "Good."
- **Fair:** Beneficial use is impaired, but still complies with a portion of standard or criteria. For example, water quality monitoring data that meet Part 1 but not Part 2 of the fecal

coliform standard, or that have a portion of the receiving water in “conditional” shellfish harvest status, would be rated “Fair.”

- **Poor:** Beneficial use is significantly impaired. Examples would be basins where multiple ambient water quality monitoring stations do not meet water quality standards.

3.2 Basin Prioritization

Basin prioritization was based on the beneficial-use/impairment criteria that help to quantify pressure of development. Each of the analyzed basins was assigned a priority score for each criterion, with a higher priority score associated with a higher assigned point value. Scoring was divided into four classifications: Land Use, Jurisdiction, Aquatic Resources, and Water Quality/Basin Health. Explanations for scoring of the ranking criteria are provided in the sections below. Point values for the classifications of the top four basins are shown in Figure 3-2 through Figure 3-5. All basin prioritization scores are shown in Table 3-3.

The highest-priority basin was selected by summing point values from each criterion. From this process, East Dyes was selected as the priority basin.

3.2.1 Beneficial-Use/Impairment Criteria

Beneficial uses are codified uses that provide the public’s right to enjoy the beneficial uses of specific property or, in the case of the SMAP, of natural resources. Impairment criteria are metrics to use for assessing the condition of beneficial uses. Described below are the impairment criteria used for the SMAP.

Land Use

Impervious

Percent impervious for each of the basins was calculated from land cover GIS data obtained from the Puget Sound Watershed Characterization Project (Ecology 2019a). The percent impervious was then compared to the Puget Sound Benthic Index of Biotic Integrity (B-IBI) versus percent impervious chart to determine the lowest percent impervious for each of the B-IBI ranges for Very Poor (10–16), Poor (18–26), Fair (28–36), Good (38–44), and Excellent (45–60). A classification of Excellent was assigned a priority score of 1 and a classification of Very Poor was assigned a priority score of 5.

Zoning

Percentage of zoning classification for each of the basins was calculated from zoning classification GIS data provided by the County. Priority scoring was based on likelihood for the zoned classification to contribute to decreased water quality. The more likely a basin was to contribute to decreased water quality, the higher the priority score was.

Census Urban Area

Percentage of the basin within a census urban area was calculated from GIS data provided by the County. This metric was used to evaluate the likelihood of increased water quality

concerns because of increased impervious area. A higher priority was assigned to basins with a higher percentage of area located within a census urban area.

Jurisdiction

Urban Growth Area

UGAs are areas with densities sufficient to permit the urban growth that is projected to occur in the county for the succeeding 20-year period. These areas are experiencing urban growth but are still within County control. Percentage of the basin within a UGA was calculated from GIS data provided by the County. A higher priority was assigned to basins with a higher percentage of UGA.

City Boundary

Percentage of a basin outside of a city boundary was calculated from GIS data provided by the County. The County is not able to implement management strategies within city boundaries, so a higher priority was assigned to basins with a higher percentage outside of a city boundary.

Aquatic Recreation

Shellfish Harvesting

Shellfish harvesting prioritization scoring was based on harvesting area classification and the reason for the classification. Areas that had restricted or prohibited harvesting because of nonpoint pollution were assigned a higher priority than areas with a conditional classification.

Hatcheries

Hatchery prioritization scoring was based on the presence of hatcheries of terminal fisheries within the basin. Basins with these features were assigned a higher priority.

Swimming Beaches

Swimming beaches were used as a measure of the number of swimmable waters. Data regarding the locations of swimming beaches were obtained from the KPHD 2019 swimming beach list. A higher prioritization was assigned to basins with a higher number of beaches.

Water Quality/Basin Health

Marine Water Quality

Marine water quality was analyzed on compliance with the fecal coliform standard. Data on compliance were obtained from the KPHD 2017 Annual Water Quality Report (KPHD 2017). A higher priority score was assigned to basins that failed both parts of the fecal coliform standard.

Stream Water Quality

Similar to marine water quality, stream water quality was analyzed on compliance with the fecal coliform standard. Data on compliance were obtained from the KPHD 2018 Annual Water Quality Report (KPHD 2018). A higher priority score was assigned to basins that failed both parts of the fecal coliform standard.

Hydrology

Hydrology data for the streams in the county was pulled from the Ecology 2019 Watershed Characterization (Ecology 2019a). The study rated the level of importance maintaining overall water flow processes in a non-degraded setting, with ranks of Low, Moderate, Moderate High, and High. A higher priority score was assigned to basins with streams that were rated High.

Stream B-IBI Trend

Stream B-IBI trend is based on the overall scores at the monitoring station closest to receiving streams within the county. Scores are associated with the rankings of Very Poor, Poor-Fair, Fair-Good, Good-Excellent, and Excellent.

Fish Habitat

Fish habitat analysis was based on the number of salmonid species and number of listed salmonid species present per basin. Data for this criterion were obtained from the Stream Habitat and Fish Summary table within the Ecology 2019 Watershed Characterization (Ecology 2019a). Higher priority was given to basins with the relative highest number of salmonid species with the relative highest number of listed salmonid species.

3.2.2 Basin Rating Results: Top Four Priority Basins

The following figures show the results of scoring each basin against the beneficial-use/impairment criteria. Summary data for all basins are presented in Table 3-3.

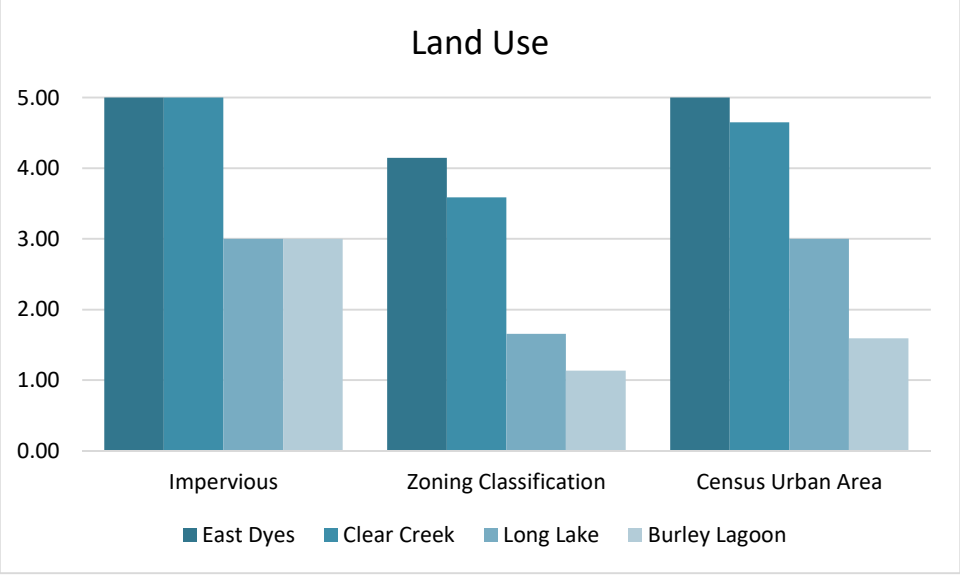

Figure 3-2. SMAP prioritization scoring for land use

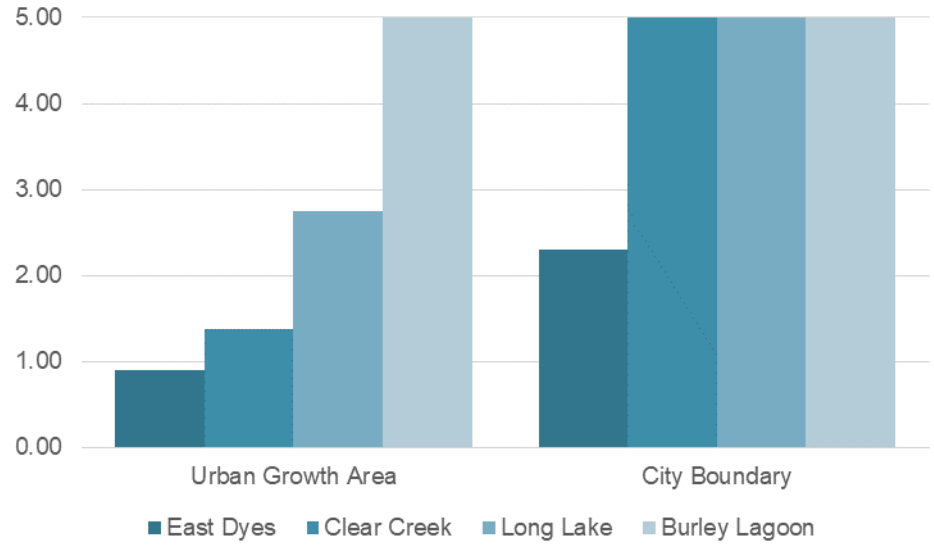

Figure 3-3. SMAP prioritization scoring for jurisdiction

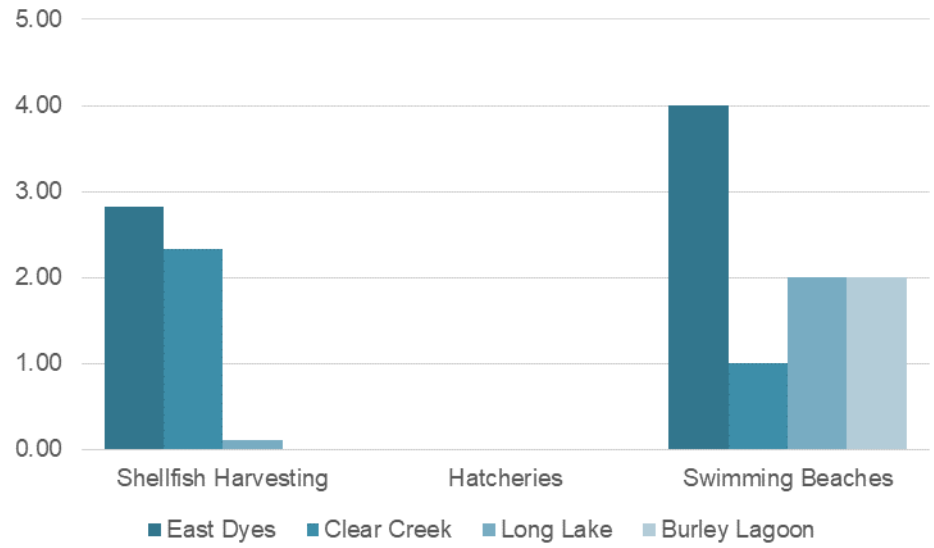

Figure 3-4. SMAP prioritization scoring for aquatic resources.

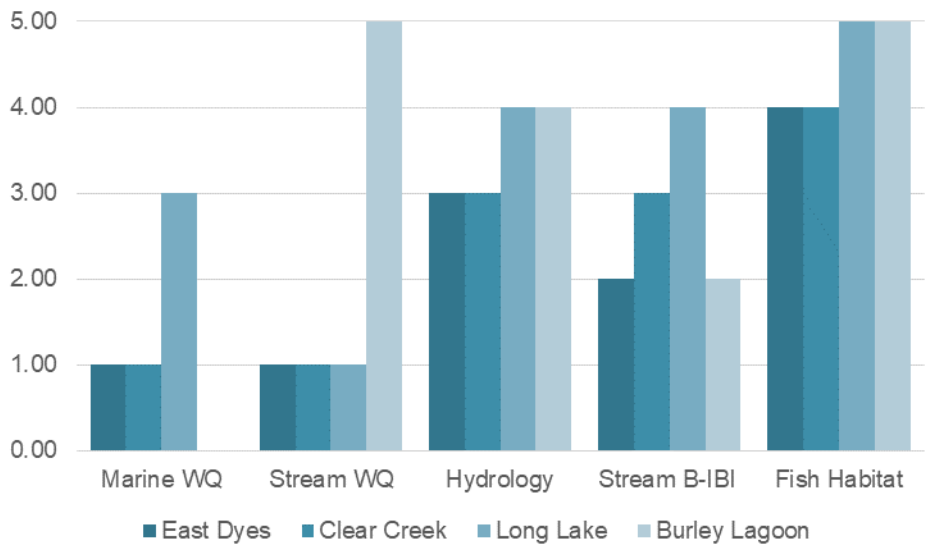

Figure 3-5. SMAP prioritization scoring for water quality/basin health

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Table 3-3. Basin prioritization summary

Basin	Sum	Land use			Jurisdiction		Aquatic recreation			Water quality/basin health				
		Impervious	Zoning classification	Census urban area	UGA	City boundary	Shellfish harvesting	Hatcheries	Swimming beaches	Marine WQ	Stream WQ	Hydrology	B-IBI [a]	Fish habitat
East Dyes	35.17	5	4.15	5.00	0.90	2.31	2.82	0	4	1	1	3	2	4
Clear Creek	34.95	5	3.59	4.65	1.37	5.00	2.34	0	1	1	1	3	3	4
Long Lake	34.51	3	1.65	3.00	2.74	5.00	0.11	0	2	3	1	4	4	5
Burley Lagoon	33.73	3	1.14	1.59	5.00	5.00	0.00	0	2	0	5	4	2	5
Miller Bay	31.69	2	1.78	1.82	4.97	5.00	0.11	5	2	1	3	4	0	1
Kingston	31.63	3	1.93	1.80	1.55	5.00	0.34	5	1	1	1	5	1	4
Beach Drive	30.84	5	1.95	5.00	3.85	5.00	0.04	0	2	1	1	3	2	1
Minter Bay	30.53	3	1.47	0.95	5.00	5.00	0.11	5	2	0	3	4	0	1
Upper Hood Canal	30.35	2	3.35	5.00	0.89	4.00	0.11	0	2	1	5	3	3	1
Gamble Bay	30.28	2	2.04	1.06	5.00	5.00	0.18	0	4	1	3	1	2	4
Liberty Bay	29.70	4	2.33	3.09	3.87	2.33	0.08	0	2	1	3	2	2	4
Suquamish	29.35	2	3.35	5.00	0.89	5.00	0.11	0	2	1	1	3	3	3
Yukon Harbor	29.35	2	3.35	5.00	0.89	5.00	0.11	0	2	1	3	3	3	1
Gorst	27.74	2	3.80	1.16	2.87	0.73	0.18	0	4	1	3	3	2	4
Chico Creek	27.56	2	2.83	1.14	3.96	2.52	0.11	0	5	1	1	3	1	4
PO Passage	27.24	2	3.35	5.00	0.89	3.89	0.11	0	2	1	3	3	0	3
Blackjack	26.96	5	3.50	4.19	2.51	1.13	0.63	0	2	1	1	3	2	1
West Dyes	26.80	2	3.35	5.00	0.89	1.45	0.11	0	5	1	1	3	3	1
Central Hood Canal	26.68	2	1.55	1.13	3.89	5.00	0.11	0	1	1	1	3	2	5
Olalla	26.06	2	1.05	0.90	5.00	5.00	0.11	0	2	1	3	3	0	3
Foulweather Bluff	25.67	2	1.25	1.00	5.00	5.00	0.42	0	4	0	0	1	2	4
Wright Creek	23.07	2	3.35	5.00	0.89	0.71	0.11	0	2	1	1	3	3	1

[a] Kitsap County 2016. B-IBI Report. Prepared by Herrera Environmental Consultants.

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4 Priority Basin Characterization and Existing Condition

The East Dyes basin consists of several residential and agricultural parcels that were developed before implementation of the Permit. As such, they were grandfathered in and provide little to no stormwater runoff mitigation. Most opportunities for improvement are presented along the various streams located within this basin. Existing habitat within the various creeks is summarized in the following sections.

4.1 Barker Creek

Barker Creek originates at Island Lake and flows more than 3 miles (mi) to Dyes Inlet. Hoot Creek is the major tributary to Barker Creek. The most complete habitat assessment of Barker Creek is from the 2003 *Salmonid Refugia Report* (May 2003), which is summarized in Table 4-1 below.

Barker Creek supports runs of chum and coho salmon, as well as cutthroat trout. There is also limited, but consistent utilization by Chinook salmon and steelhead trout reported in the lower mainstem. The lower mainstem of Barker Creek is contained within a relatively deep ravine. Instream habitat conditions between Barker Creek Road and Nels Nelson Road are generally very good. There is a balanced pool-riffle channel configuration and a moderate level of instream large woody debris (LWD) and habitat complexity. Streambank stability is generally good, with only minor fine sediment deposition in spawning gravels. The riparian corridor in this segment of the creek is mainly intact, with several stands of mature conifers (cedars and hemlocks) located throughout the riparian zone.

From Nels Nelson Road to Waaga Way, there is generally good spawning and rearing habitat. The riparian corridor is largely intact, although encroachment by development and road crossings has degraded habitat conditions. LWD is lacking in this section of the creek.

The floodplain of Barker Creek, upstream of Nels Nelson Road, is also impacted by development including areas where the streambanks have been armored. This area historically was a broad wetland zone (patches of riparian wetland still remain), but encroachment has likely eliminated access to most historical floodplain areas. Riparian condition is generally good from Nels Nelson Road to Waaga Way/State Route (SR) 303. Upper Barker Creek (upstream of Waaga Way/SR 303) and the Hoot Creek tributary are considered critical contributing areas to Barker Creek.

As shown in Table 4-1, the Hoot Creek tributary to Barker Creek is impacted by multiple (31) public and private barrier culverts. Hoot Creek is listed as a Type F stream and supports anadromous salmonid use (winter steelhead, coho, and fall chum) to barrier culverts at SR 303, and resident trout populations above SR 303 (WDFW 2019). Intermittent flow in Hoot Creek upstream of SR 303 prevents fish passage during low flow conditions, and multiple historical ditching and development projects have degraded both instream and riparian habitat conditions in this segment (Haring 2000).

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Table 4-1. Summary of available freshwater salmonid habitat information

Stream	Stream type/ length (ft)		Length	Basin size	Fish use	Fish passage barriers			Land use (percent)		County area	Urban zones	Habitat evaluation			Diver-sity	Produc-tivity
	F	Ns/ p	(mi)	(ac)	Species [a]	KCPW	WSDOT	Pvt.	Developed	Forested	(percent)	(percent)	Wet-lands	Flood-plains	In-stream	Score [b]	Score [b]
Narrows Creek	0.4	0.6	1	154	None	0	0	0	33	67	33	100	NA	Low	ND	3	1
Pahrmann Creek	0.9	0.7	1.6	281	RCCT	0	0	0	55	43	94	100	Mediu m	Low	High	3	1
Mosher Creek	3.3	0.6	3.9	1,050	FC, RCCT	2	0	0	60	40	100	100	High	Low	Medium	3	1
Stampede Creek	0.9	0.7	0.2	210	RCCT	0	0	0	66	34	100	72	NA	Low	Low	3	1
Unnamed Stream 1	0.0	0.4	0.4	76	None	0	0	0	22	78	100	80	NA	NA	ND	ND	ND
Barker Creek	7.4	5.2	12.6	2,322	SH, FC, C, RCCT	4	5	22	49	51	100	60	High	High	ND	5	4

Stream and habitat data source: East Kitsap Steelhead Habitat Evaluation Project (Kitsap County 2017). Prepared for West Sound Watersheds Council.
Fish passage barrier data source: WDFW 2019.
[a] RCCT = resident coastal cutthroat trout; FC = fall chum; SH = steelhead; C = coho.
[b] Qualitative analysis from May 2003. Maximum diversity score is 7, and maximum productivity score is 5. Median combined score for all Kitsap County = 8.
ND = no data. NA = not available.

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4.2 Mosher Creek

Little information is available on Mosher Creek habitat conditions. Haring (2000) identifies habitat conditions as generally fair to good, with partial fish passage barriers present at Tracyton Boulevard and Central Valley Road. Mosher Creek supports coho and resident coastal cutthroat trout.

4.3 Pahrmann Creek

Little information is available on Pahrmann Creek habitat conditions. Haring (2000) identifies habitat conditions as generally poor, with incised channel, little LWD, and limited riparian vegetation. Salmonid use is limited to resident coastal cutthroat trout.

4.4 Stampede Creek

Little information is available on Stampede Creek habitat conditions. Haring (2000) identifies habitat conditions as generally poor, with little LWD and riparian vegetation. Salmonid use is limited to resident coastal cutthroat trout.

4.5 Narrows Creek

No information was available on Narrows Creek habitat conditions except for the potential presence of a barrier culvert at the mouth of the stream (Haring 2000). Salmonid use is limited to resident coastal cutthroat trout.

5 Needs and Opportunities

Strategically, this SMAP addresses existing problems and lays out a plan to meet future population and density targets while protecting resources. Through the basin prioritization analysis, the East Dyes basin showed opportunities for improvement for shellfish harvesting, swimming beaches, and habitat restoration. The County has completed several retrofit studies, which provided insight to the location of previously identified problem areas within the East Dyes basin. Locations of the projects are shown in Figure 5-1. Projects were split into existing or proposed if they have currently been completed or are yet to be completed, respectively. Proposed projects were investigated to verify that they met the SMAP objectives; locations are shown in Figure 5-2. Table 5-1 provides additional information on project type and data source.

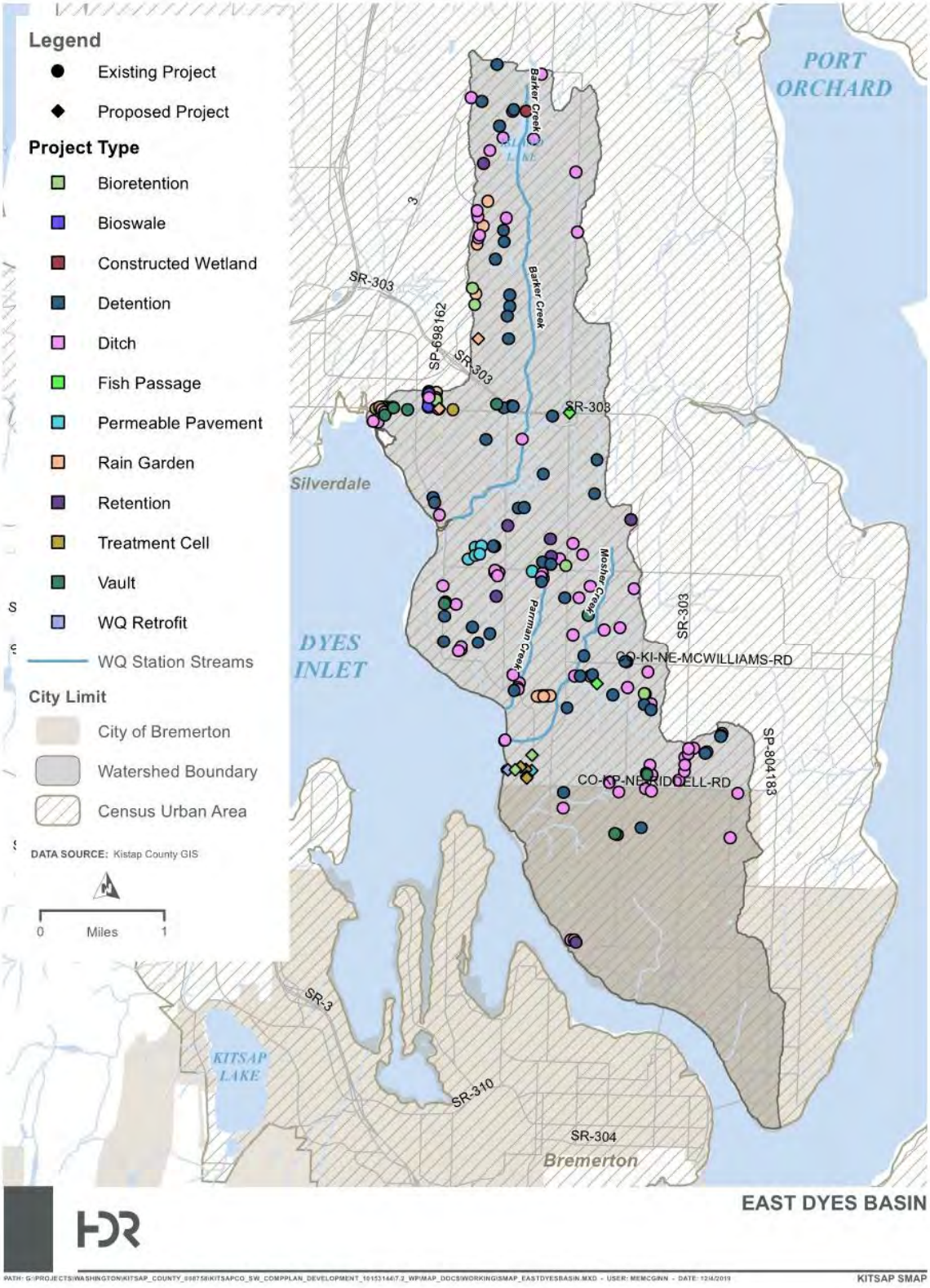

Figure 5-1. Existing and proposed LID/BMPs

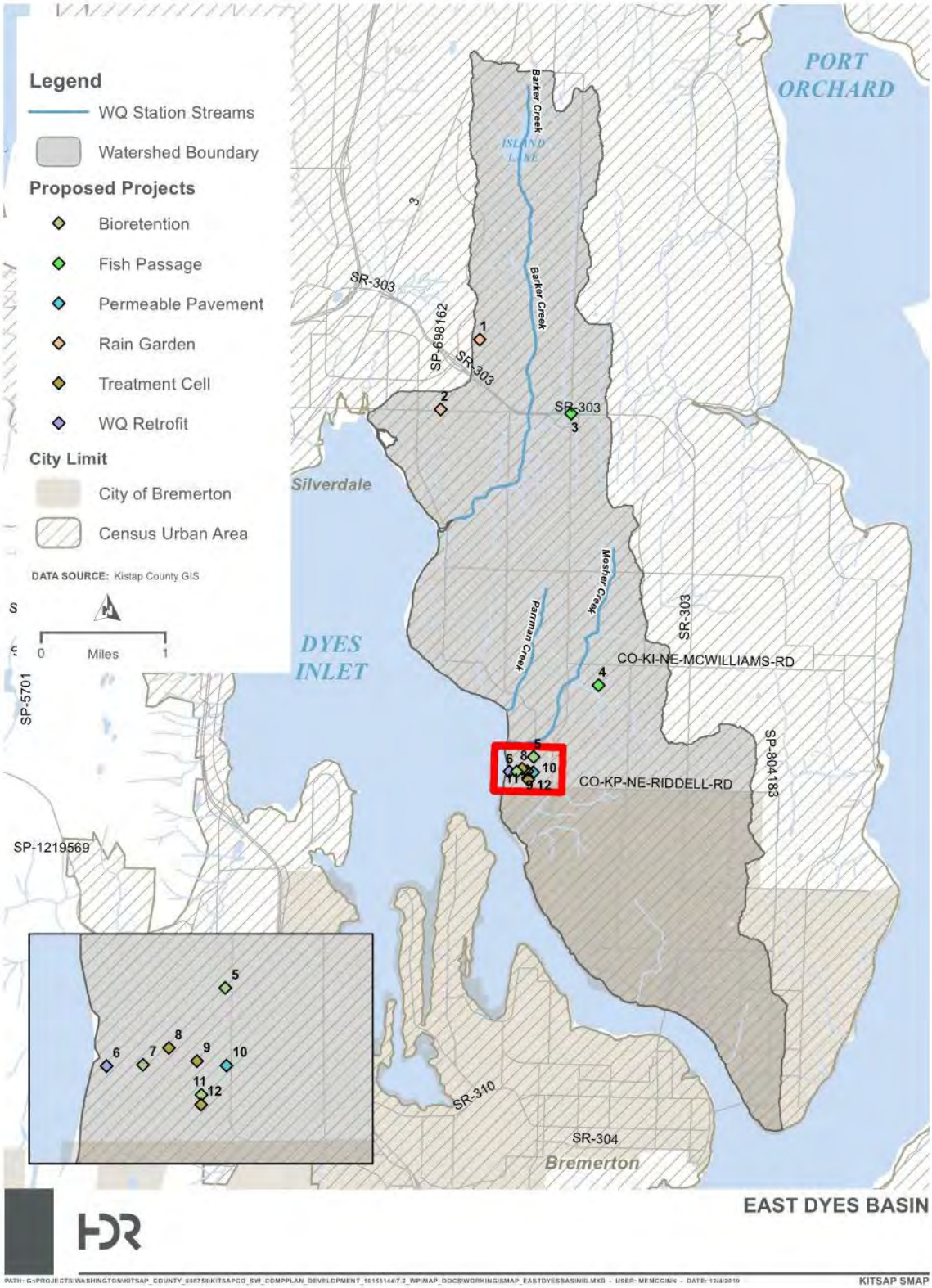

Figure 5-2. Proposed LID/BMPs

Table 5-1. Project type and source

Site ID	LID/BMP	Project source
1	Rain garden	Silverdale retrofit [a]
2	Rain garden	KCPW projects
3	Fish passage	WSDOT
4	Fish passage	KCPW projects
5	Bioretention	East Bremerton retrofit [b]
6	WQ retrofit	CFP
7	Bioretention	East Bremerton retrofit
8	Treatment cell	East Bremerton retrofit
9	Treatment cell	East Bremerton retrofit
10	Permeable pavement	East Bremerton retrofit
11	Bioretention	East Bremerton retrofit
12	Treatment cell	East Bremerton retrofit

[a] KCPW (2013b)
[b] KCPW (2019a)

5.1 Short-Term Actions

Short-term actions are actions that the County can take over the next 6 years.

Water quality concerns within the East Dyes basin appear to be common nonpoint source pollution issues. These issues are better addressed through programs, such as source control investigations or focused outreach, rather than capital projects.

The County currently provides public education related to stormwater through a variety of forums and presentation media within the KCPW Stormwater Division.

The Mutt Mitt program was implemented in 2014, providing more than 505 pet-waste disposal bag stations throughout the county. Through this effort it is estimated that 201.5 tons of dog waste have been diverted from natural surface waters (Clean Water Kitsap 2019). As an expansion of the program, the County is considering the development of a "Pet Waste—Get it in the Bin" program to inform the public of the importance of proper disposal.

Lawn care is another source of urban nonpoint source pollution. The County is partnering with Clean Water Kitsap and surrounding jurisdictions to put together programs on natural yard care and green stormwater solutions for homeowners.

In addition to long-term outreach programs, the County continues to host yearly events in which students partake in hands-on activities to learn about the hydrologic cycle and where the water goes when they flush. The County plans to continue and expand its efforts through the Water Festival and National Public Works Week.

5.2 Long-Term Actions

Long-term actions are actions that the County can take over the next 7 to 20 years. As shown in Table 5-1 above, several long-term projects have been identified in retrofit studies and through Washington State Department of Transportation (WSDOT) project planning.

As previously discussed, during basin prioritization analysis the East Dyes basin shows that it would benefit from habitat restoration projects along streams. With the addition of wood to the streams, deep, in-channel pools would form increasing habitat for fish to forage and seek refuge.

Barriers to fish migration also exist. The County is required by state law to maintain fish passage at all road crossings. Culverts that are perched high above the stream channel or culverts where the water is too shallow or too fast are examples of fish passage barriers. Removing fish barriers supports the community's vision for fishable waters, and regional efforts to protect and enhance salmon populations. Table 5-2 summarizes habitat and barrier projects from the County's existing Capital Facilities Program (CFP) that provide long-term action opportunities.

Table 5-2. Summary of recommended/proposed habitat enhancement, restoration, and protection projects

Project name	Description	Sponsor agency
Lower Mosher Creek Fish Passage Barrier Replacement	Tracyton Boulevard culvert replacement	KCPW
Upper Mosher Creek Fish Passage Barrier Replacement	McWilliams Court culvert replacement	KCPW
Pahrmann Creek Culvert Replacement	Barrier culvert replacement at Tracyton Boulevard	KCPW
Hoot Creek Culvert Replacements	Five barrier culvert replacements at SR 303	WSDOT
Hoot Creek Culvert Replacements	Barrier culvert replacements at Bucklin Hill Road	WSDOT
Barker Creek LWD Enhancement Above Nels Nelson Road	Improve in stream structure and habitat diversity	Not currently programmed

5.3 Recommended Capital Facilities Plan

Projects included in the County's 2020–2025 CFP located in East Dyes include the Ridgetop Boulevard Green Street Retrofit project and Tracyton Green Streets Stormwater Retrofit project.

The Ridgetop Boulevard Green Street Retrofit project is a joint Roads Department and stormwater project to retrofit Ridgetop Boulevard as a green street. The objective of the project is improve water quality in the Clear Creek estuary and Dyes Inlet through installation of water quality facilities including bioretention cells along Quail Run Drive in the town of Silverdale. This project will provide treatment for total suspended solids (TSS), oil (total petroleum hydrocarbons), dissolved copper, dissolved zinc, and total phosphorus to reduce stormwater runoff volume and improve water quality to

downstream receiving waters by intercepting stormwater runoff prior to it entering the built drainage system with infiltrating BMPs.

Soil properties for the project have undergone subsurface exploration and infiltration testing so that infiltrative capacity is well understood. The project is specified and a high-priority project in the following plans:

- Kitsap County Transportation Improvement Program (TIP)
- Stormwater CFP
- County's "Water as a Resource" policy Implementation Plan
- Puget Sound Partnership West Central Local Implementation Near Term Action WC-21

The project will also add pedestrian safety features, bike lanes, and traffic safety improvements. See TIP Project CRP 1593

The Tracyton Green Streets Stormwater Retrofit project (noted as Project EB-1, the East Bremerton Retrofit Plan) proposes the following stormwater BMP installations:

- Permeable pavement parking with subsurface weirs on NW Tracy Avenue between Naomi Street NW and May Street NW
- New curb bulb-out bioretention cells in the roadway right-of-way at two intersections:
  - NW Tracy Avenue and May Street NW
  - May Street NW and NW Nichols Avenue
- Retrofit existing ditches on Stingle Street NW between NW Tracy Avenue and NW Riddell Road
- Install proprietary treatment facilities on Stingle Street NW and NW Tracy Avenue
- Install sidewalks on May Street NW between NW Tracy Avenue and NW Nichols Avenue

The swales and proprietary treatment facility will provide enhanced water quality treatment for stormwater runoff from approximately 21 acres (ac) of existing impervious surface. Runoff from this area currently discharges untreated to Puget Sound.

6 Financial Plan Review and Recommendations

The County relies on state and federal grant funds to pay for CFP projects. Small projects that have a construction cost less than $1 million are usually designed by staff engineers. The County's Surface Water Division CFP budget has funding to supplement projects led by the Roads Department.

Two projects located in the East Dyes inlet basin are recommended for implementation to meet SMAP objectives to identify priority projects in the highest-ranked priority basin to improve conditions in receiving waters.

Because the County has relied on grants to fund CFP projects, the County's financial ability to fund these projects is uncertain. A financial assessment that includes strategies for funding capital projects is included in the County's Comprehensive Stormwater Management Plan.

7 Implementation Plan

The Phase II Permit includes timelines for SMAP implementation. The timelines are illustrated in Table 7-1.

Table 7-1. SMAP implementation plan

Permit Sub-Section C.1	Compliance action	Permit due date	County status
a	Convene a team to inform and assist in the development, progress, and influence of the stormwater planning program.	8/1/2020	Ongoing
b.i.a	Describe for the previous permit term (2013–2019) how stormwater management needs and protection/improvement of receiving water health did (or did not) inform the planning update process and influenced policy and strategies (e.g., updates to the SWCP or other long-range land use plans used to accommodate growth or transportation).	3/31/2021	Planning phase
b.i.b	Describe (via a report) how stormwater management needs and protection/improvement of receiving water health are (or are not) informing the planning update process and influencing policy and strategies since 8/1/2019 (e.g., updates to the SWCP or other long-range land use plans used to accommodate growth or transportation).	1/1/2023	2020 SWCP
c.i	Continue to require LID principles and BMPs when updating, revising, and developing new local development codes, rules, standards, and other enforceable documents. Make LID the preferred and commonly used approach to site development.	Ongoing	Ongoing
c.i.a	Assess and document any newly identified administrative or regulatory barriers to LID implementation. Describe (if any) mechanisms adopted to encourage or require implementation of LID principles or BMPs.	Annually	Ongoing

Permit Sub-Section C.1	Compliance action	Permit due date	County status
d.i	**Receiving Water Assessment:** Document and assess existing information related to local receiving waters and contributing area conditions to identify receiving waters most likely to benefit from stormwater management planning. **Submit a watershed inventory to Ecology in table format, with contents described in this Permit section and the guidance document. Include assessment documentation.**	3/31/2022	June 2020 SMAP report
d.ii	**Receiving Water Prioritization:** Develop and implement a prioritization method and process to determine which receiving waters will receive the most benefit from the retrofits, SWMP actions, and other land/development management actions. **Rank the list and document the method and ranking process used in a report format.**	6/30/2022	June 2020 SMAP report

Bold text = Future action item for Kitsap County

8 Adaptive Management Plan

Adaptive management is the systematic use of information to improve operations, especially in the face of uncertainty. This concept is common in business practices, such as General Electric's "Six Sigma" as well as conservation planning, such as The Nature Conservancy's "Open Source." These two examples have been used by multiple governments, businesses, and nonprofit organizations. While most business sectors use some type of system to determine actions, adaptive management is a focused, systematic approach to improving future work by learning from the outcomes of implemented actions. Establishing an intentional learning environment allows an organization to move forward in an uncertain environment, establish reasonable expectations and time frames, and reduce the risk of misdirected actions and funding. The key elements are condensed into an ongoing, cyclical process, as shown in Figure 8-1.

The adaptive management process can be applied at any scale, from budget processes to individual projects to overall stormwater management programs. This systematic process identifies uncertainties, monitors results, and informs actions. A formalized program that clearly articulates the uncertainties and monitors results reduces the risk of errors and allows programs to move forward in the face of uncertainty.

The CFP Plan comprises individual projects that are identified through system evaluations related to the public stormwater system operations regarding flooding, water quality, and habitat. It is recommended that these programs operate on a 7-year basis with a CFP review occurring every 2 years in off-budget years to inform the budget process. The CFP should review the goals and objectives of each program, consider the effects of sea-level rise on CFP design and operations, evaluate current conditions and

needs, develop project lists and preliminary budget, and then review the action plan with environmental staff for recommendations for approval to the County Commissioners as part of the budget process.

Individual project design can use a team approach for triple-bottom-line evaluation of best solutions. CFP projects for streams typically have permit conditions requiring a 5-year monitoring plan for plant survivability. Effectiveness of individual projects can be evaluated within the larger context of system assessment for flooding, water quality, and stream habitat. A formal adaptive management process that focuses on specific capital project design elements, such as plant survival rates or designs that improve fish passage with the least cost for maintenance, helps to identify successful implementation strategies.

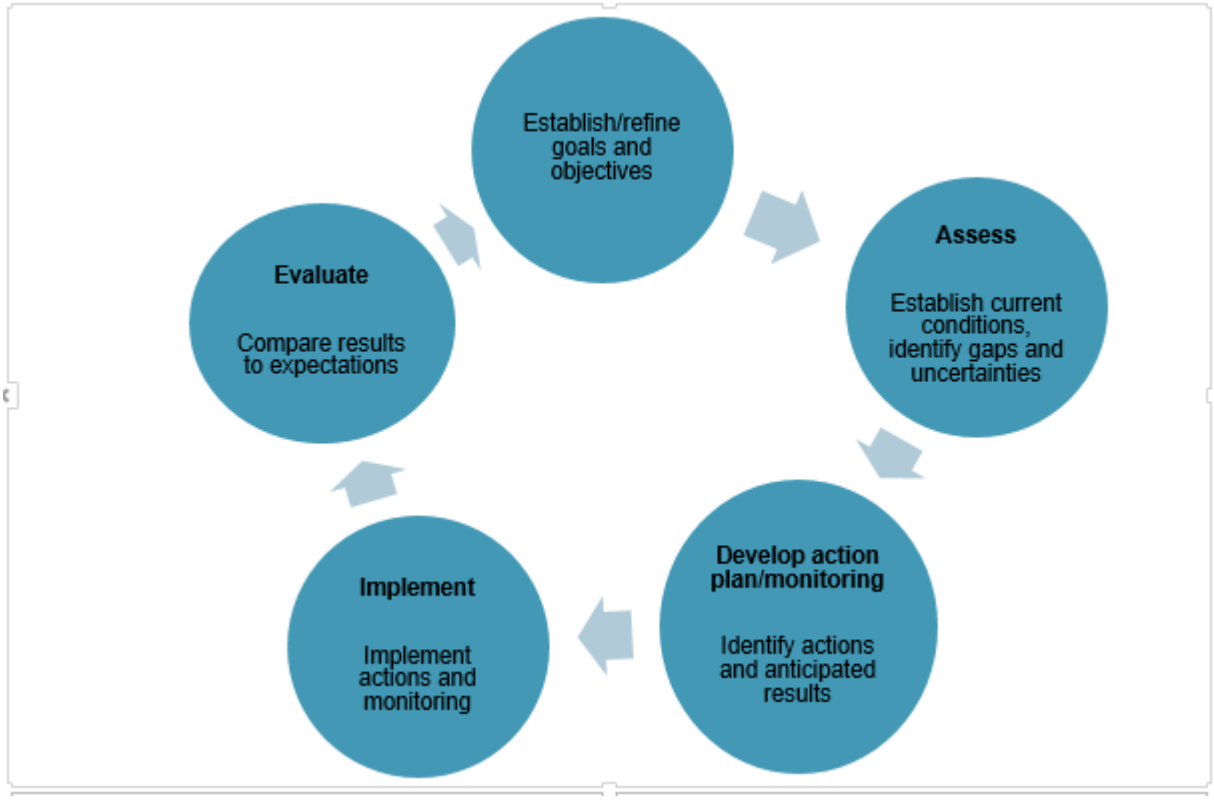

Figure 8-1. Adaptive management concept.

8.1 Environmental Indicator Monitoring

Monitoring programs provide information to guide the larger adaptive management program. Monitoring streams, small lakes, and aquatic life provides data to determine progress toward the overall stormwater vision and helps to guide or evaluate capital investment projects that affect stream habitat and fish passage.

The number and types of animals living in streams are good indicators of the relative condition of the streams. Biological information about streams collected by the County includes salmon spawning surveys of fall and summer salmon use of streams. Annual collection of benthic macroinvertebrates data from streams provides critical information for making resource decisions. Staff, professional consultants, and volunteers collect

biological information used to assess the environmental health of Kitsap County's open streams.

Aquatic benthic macroinvertebrates, resident fish, and spawning salmon populations are considered an indicator of aquatic health, as the diversity and types of organisms reflect the water quality and physical habitat conditions of the stream over the course of their life spans. Water quality samples can reflect the condition of the water only at the time of sampling and for the pollutants that were analyzed. While aquatic benthic macroinvertebrates cannot provide specific information on the types of pollutants that may be present, they can indicate general influences, such as toxic substances, sediment, or water temperature, that have biological significance over the course of their aquatic life.

Summer fish populations provide indications of water temperature and physical habitat conditions typically relating to spring and summer conditions. Decreased or absent trout, sculpin, or juvenile coho populations in summer sampling can indicate increased temperature, loss of instream pool habitat, increased heavy metals, or significant water quality concerns. Both aquatic macroinvertebrate and summer fish populations respond to local habitat conditions and are not likely directly linked to outside influences such as harvest or ocean conditions.

Salmon spawning surveys, while affected by outside influences, provide direct information about fish passage through culverts, as well as indications of physical habitat conditions. Salmon spawning surveys provide information about habitat conditions during the fall and winter, including late summer water temperature, flows, fine sediment, and stream stability. Using the aquatic indicator information as a whole helps to determine the types of projects and sequencing of stream projects that would best support aquatic life. For instance, increasing the complexity of habitat with LWD could help areas that spawning salmon or aquatic macroinvertebrates indicate have been affected by fine sediment. Salmon spawning surveys provide direct evidence whether salmon are using habitat created through capital projects or other basin improvements to normalize flow and/or sediment regimes. While monitoring the number of successful juveniles from those spawning adults would provide a direct measure of habitat health and the success of salmon habitat improvements, aquatic benthic macroinvertebrates have been used as a less expensive surrogate.

Because environmental indicators are instrumental in evaluating aquatic habitat conditions and informing where stream CFP projects should be constructed, it is recommended that the County continue to conduct salmon spawning surveys, continue to collect macroinvertebrate data, start to collect instream habitat data for LWD structures and instream pools, stay current on research evaluating the effectiveness of stream habitat standards that guide CFP Plan design, and develop a program for ongoing review of previously constructed CFP open-stream projects to inform future design strategies.

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10 Appendix

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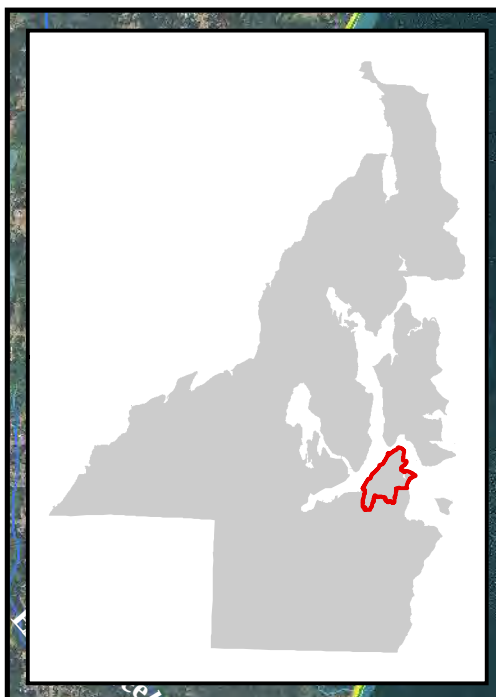


Rich Passage

Port Orchard Bay

Clam Bay

Beaver Creek

Little Clam Bay

Salmonberry Creek

Curley Creek

Basin Statistics	
Basin Area (acres)	3924.3
Urban Growth Area (acres)	146.8
Census Urbanized Area (acres)	3924.3
Road Density Average (miles/sq mile)	6.5

Basin Boundary
Census Urbanized Area
Wetland
Fresh Water
Stormwater Facility
Park

Stream Type

Shoreline of the State
Fish Habitat
Non-Fish Habitat
Perennial Non-Fish Habitat
Seasonal Non-Fish Habitat
Unsurveyed
No Channel Found

Shoreline Use

Commercial
Industrial
MFR
Marina
Public
SFR
Undisturbed

Drift Cells

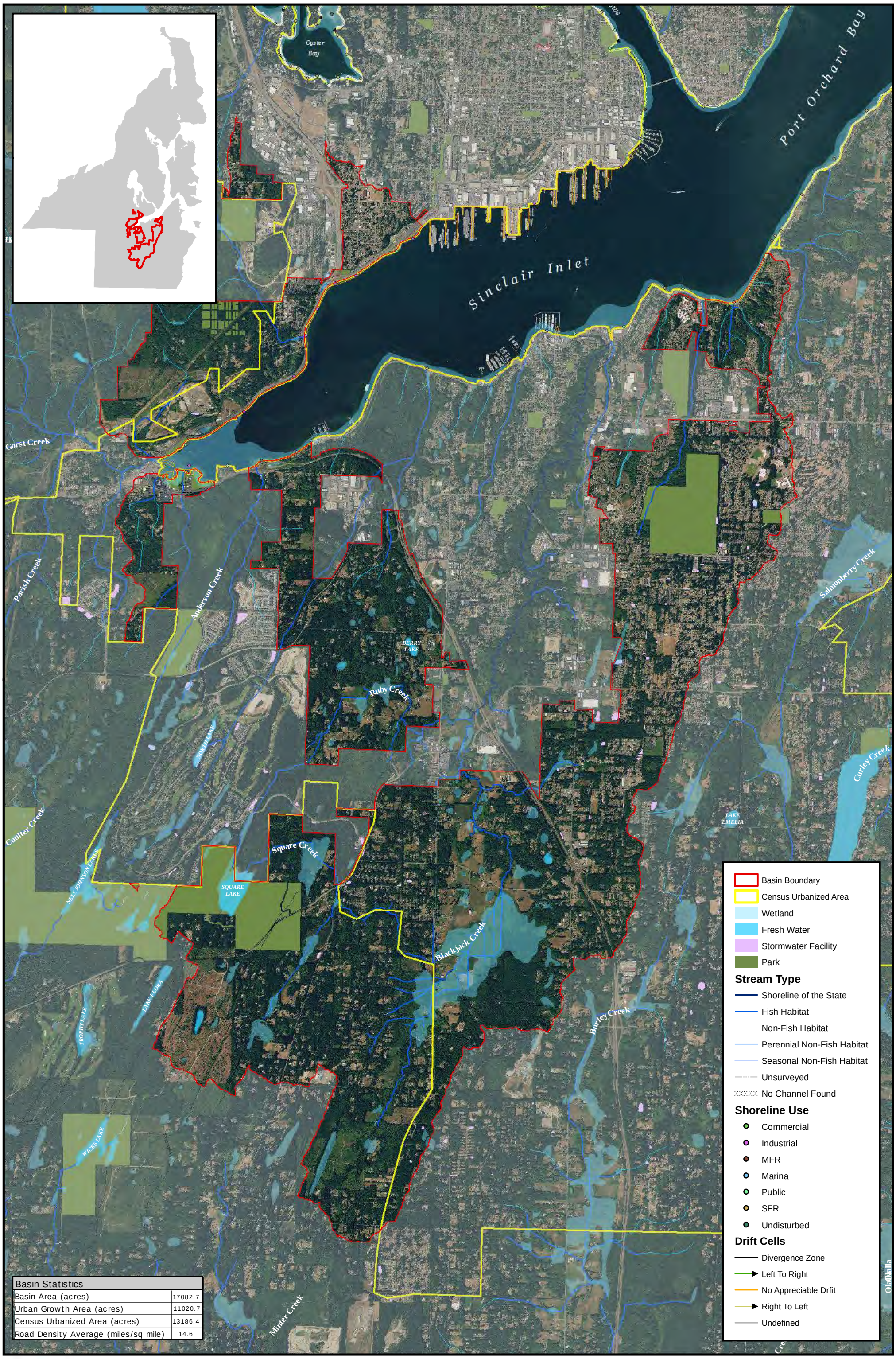
Divergence Zone
Left To Right
No Appreciable Drfit
Right To Left
Undefined

KITSAP COUNTY

Basin Fact Sheet - Beach Drive Basin

0 0.5 1 Miles

N W E S

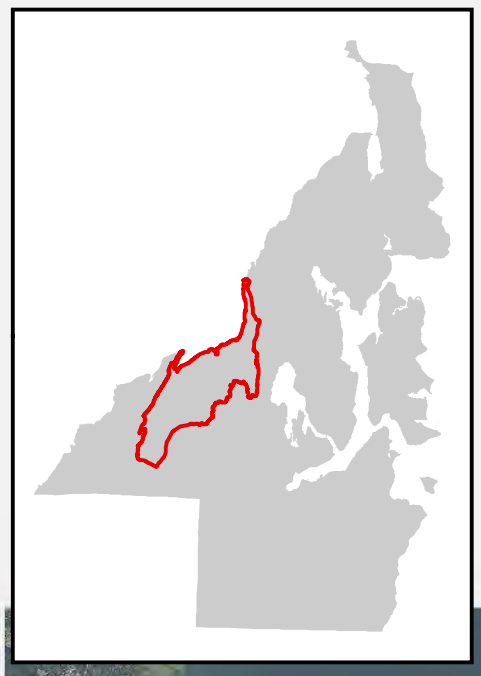


KITSAP COUNTY

Basin Fact Sheet - Blackjack Basin

0 0.5 1 Miles

N W E S



Hood Canal
Seabeck Bay
Stavis Bay
Boyce Creek
Stavis Creek
Seabeck Creek
Anderson Creek
Little Beef Creek
Big Beef Creek
LAKE SYMINGTON
WILDCAT LAKE
Wildcat
Tin Mine Creek
Lost Creek
LAKE TAHUYEH
Gold Creek
Tahuya River
Mission Creek
MISSION LAKE
Hazel Creek
Basin Boundary
Census Urbanized Area
Wetland
Fresh Water
Stormwater Facility
Park
Stream Type
Shoreline of the State
Fish Habitat
Non-Fish Habitat
Perennial Non-Fish Habitat
Seasonal Non-Fish Habitat
Unsurveyed
No Channel Found
Shoreline Use
Commercial
Industrial
MFR
Marina
Public
SFR
Undisturbed
Drift Cells
Divergence Zone
Left To Right
No Appreciable Drfit
Right To Left
Undefined

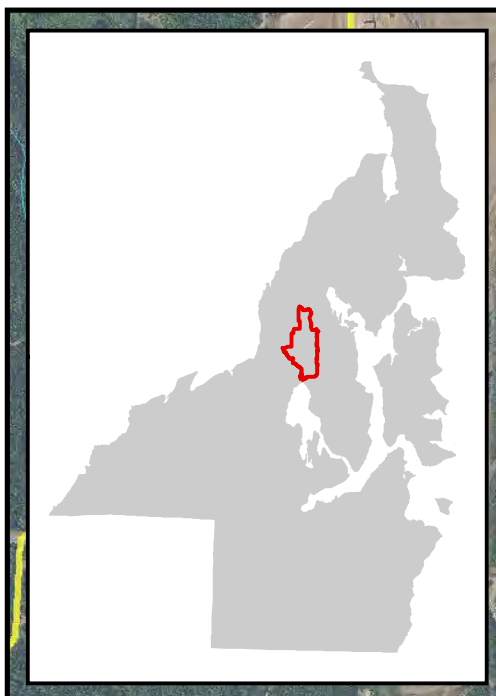
Basin Statistics	
Basin Area (acres)	19793.0
Urban Growth Area (acres)	526.4
Census Urbanized Area (acres)	2515.9
Road Density Average (miles/sq mile)	5.27

KITSAP COUNTY

Basin Fact Sheet - Central Hood Canal Basin

0 0.5 1 Miles

N W E S



ISLAND LAKE

Barker Cree

Clear Creek

Dyes Inlet

Basin Statistics	
Basin Area (acres)	5109.4
Urban Growth Area (acres)	1590.4
Census Urbanized Area (acres)	4676.3
Road Density Average (miles/sq mile)	10.5

Basin Boundary
Census Urbanized Area
Wetland
Fresh Water
Stormwater Facility
Park

Stream Type

Shoreline of the State
Fish Habitat
Non-Fish Habitat
Perennial Non-Fish Habitat
Seasonal Non-Fish Habitat
Unsurveyed
No Channel Found

Shoreline Use

Commercial
Industrial
MFR
Marina
Public
SFR
Undisturbed

Drift Cells

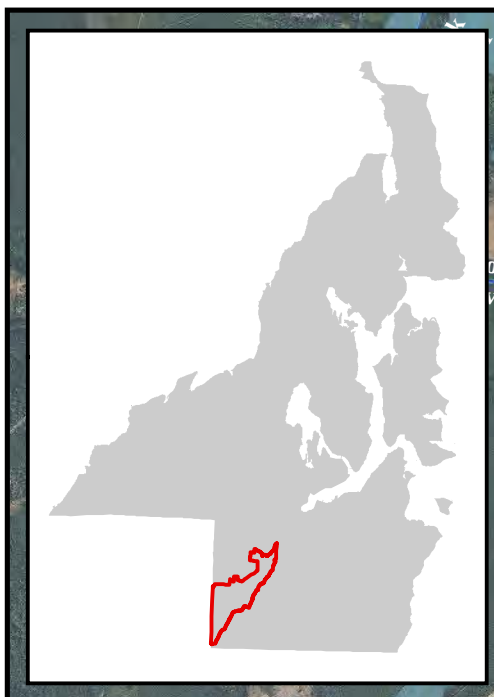
Divergence Zone
Left To Right
No Appreciable Drfit
Right To Left
Undefined

KITSAP COUNTY

Basin Fact Sheet - Clear Creek Basin

0 0.5 1 Miles

N W E S



East Fork Union River

Corst Creek

Parish Creek

NELS JOHNSON LAKES

TROPHY LAKE

KRIEGLER LAKE

Coulter Creek

WYE LAKE

Rocky Creek

FERN LAKE

CARNEY LAKE

Basin Boundary
Census Urbanized Area
Wetland
Fresh Water
Stormwater Facility
Park

Stream Type
Shoreline of the State
Fish Habitat
Non-Fish Habitat
Perennial Non-Fish Habitat
Seasonal Non-Fish Habitat
Unsurveyed
No Channel Found

Shoreline Use
Commercial
Industrial
MFR
Marina
Public
SFR
Undisturbed

Drift Cells
Divergence Zone
Left To Right
No Appreciable Drfit
Right To Left
Undefined

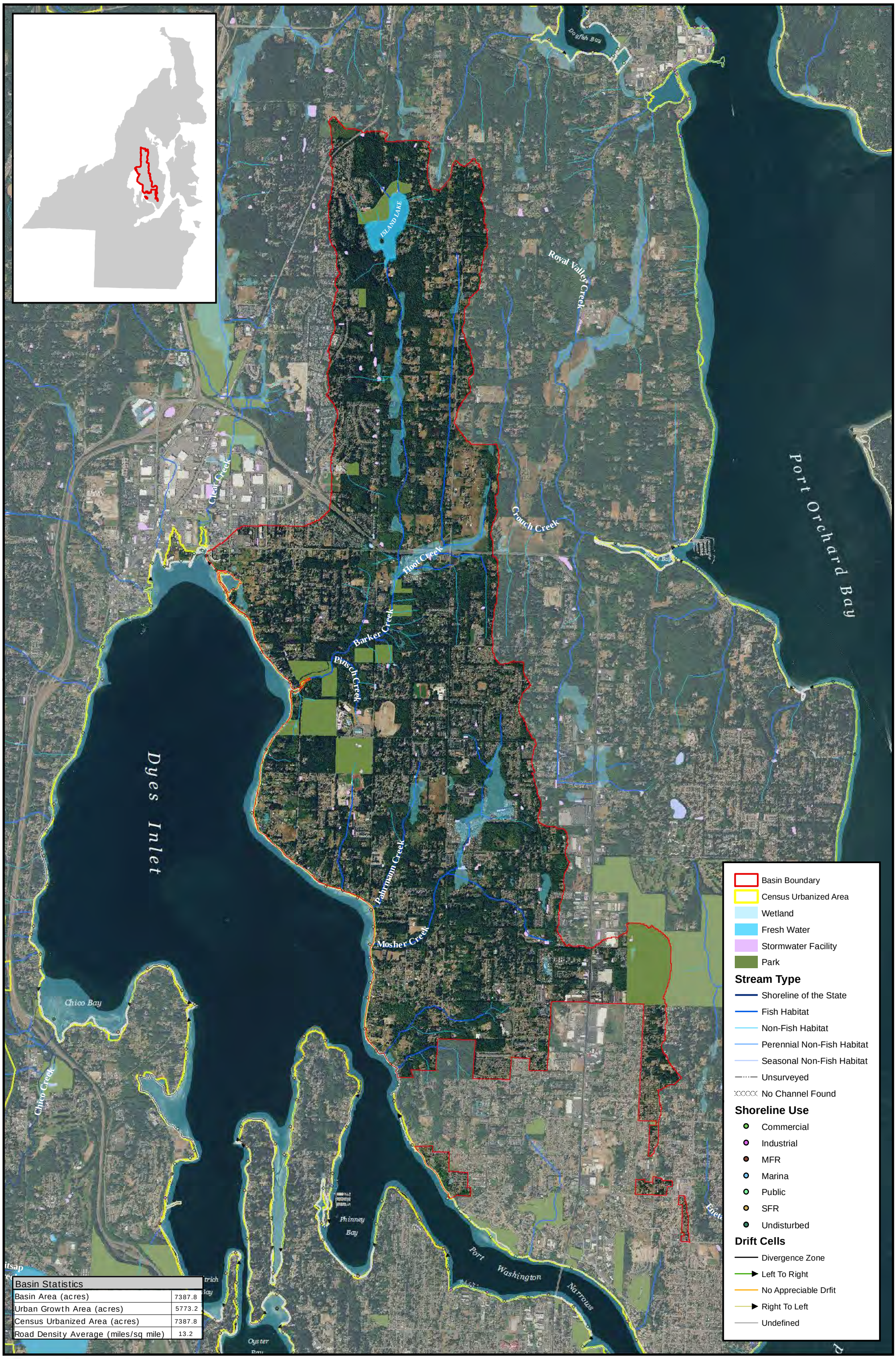
Basin Statistics	
Basin Area (acres)	7135.3
Urban Growth Area (acres)	1642.6
Census Urbanized Area (acres)	0
Road Density Average (miles/sq mile)	0.6

KITSAP COUNTY

Basin Fact Sheet - Coulter Creek Basin

0 0.5 1 Miles

N W E S



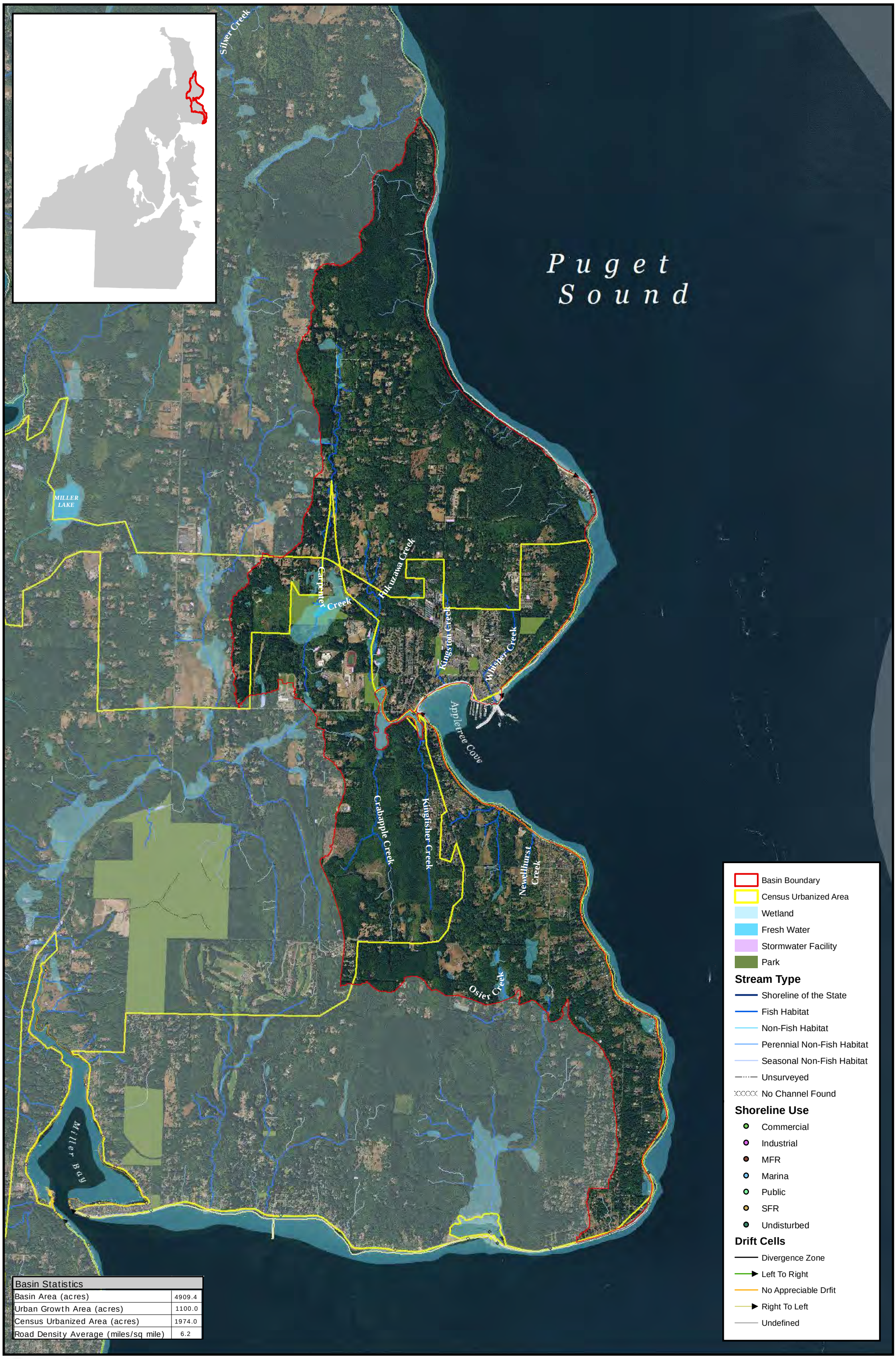
Basin Statistics	
Basin Area (acres)	7387.8
Urban Growth Area (acres)	5773.2
Census Urbanized Area (acres)	7387.8
Road Density Average (miles/sq mile)	13.2

KITSAP COUNTY

Basin Fact Sheet - East Dyes Basin

0 0.5 1 Miles

N W E S



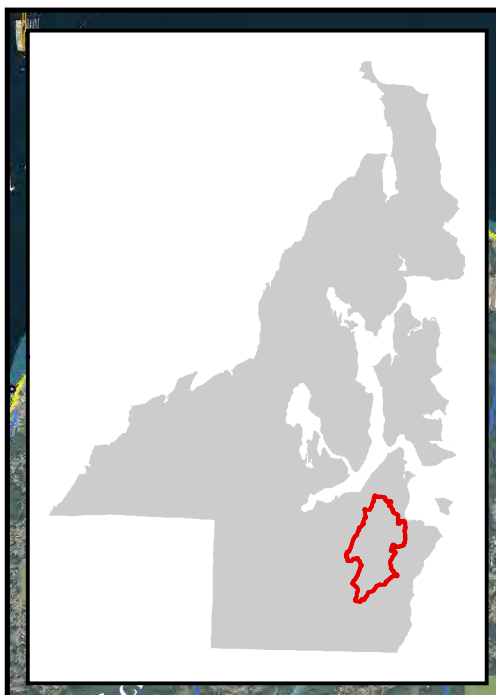
Basin Statistics	
Basin Area (acres)	4909.4
Urban Growth Area (acres)	1100.0
Census Urbanized Area (acres)	1974.0
Road Density Average (miles/sq mile)	6.2

KITSAP COUNTY

Basin Fact Sheet - Kingston Basin

0 0.5 1 Miles

N W E S



Beaver Creek

Yukon Harbor

Blackjack Creek

Salmonberry Creek

Curley Creek

LAKE EMELIA

Wilson Creek

LONG LAKE

Burley Creek

Olalla Creek

Basin Statistics	
Basin Area (acres)	8632.2
Urban Growth Area (acres)	740.7
Census Urbanized Area (acres)	5757.0
Road Density Average (miles/sq mile)	5.5

Basin Boundary
Census Urbanized Area
Wetland
Fresh Water
Stormwater Facility
Park

Stream Type

Shoreline of the State
Fish Habitat
Non-Fish Habitat
Perennial Non-Fish Habitat
Seasonal Non-Fish Habitat
Unsurveyed
No Channel Found

Shoreline Use

Commercial
Industrial
MFR
Marina
Public
SFR
Undisturbed

Drift Cells

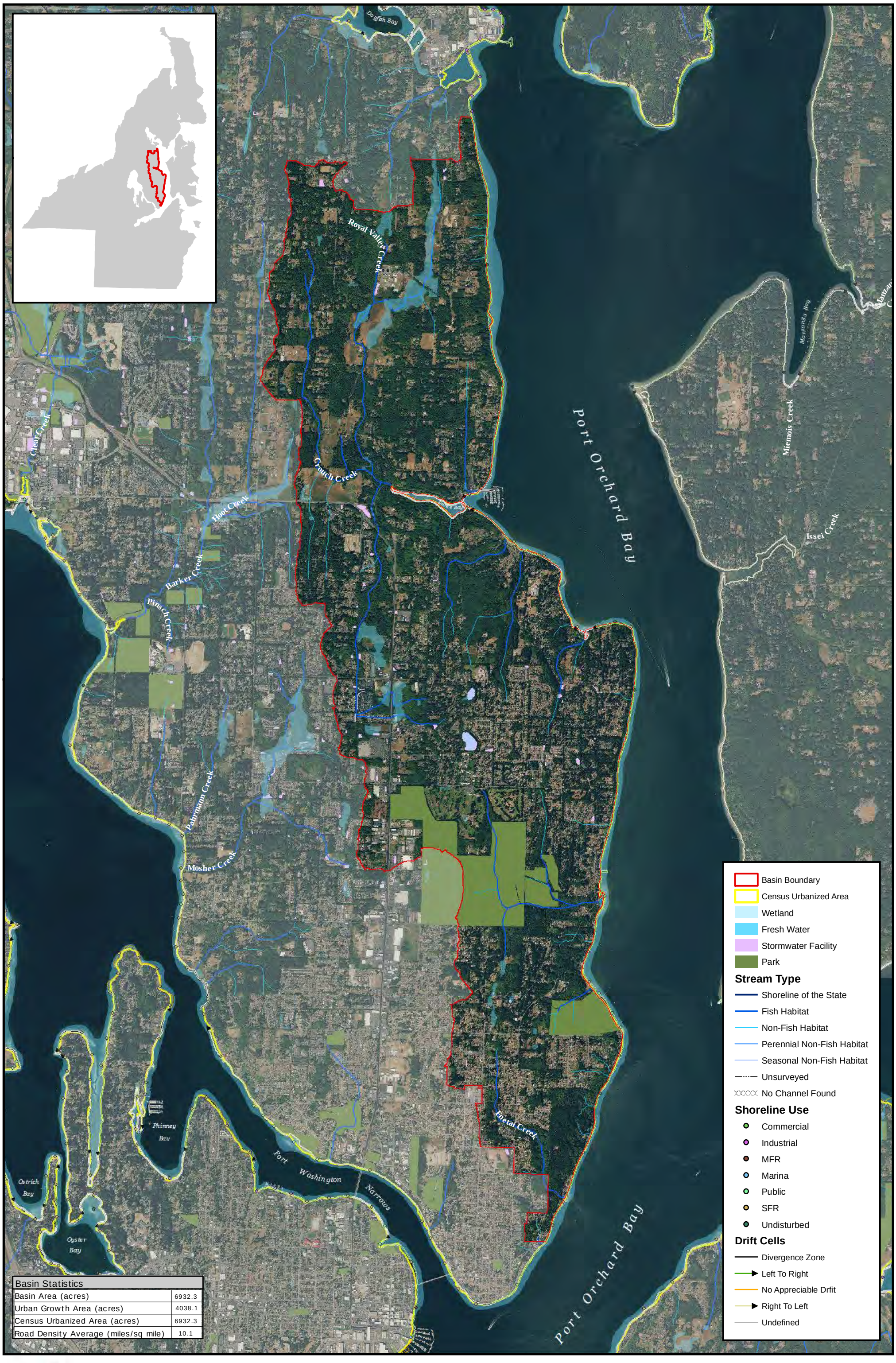
Divergence Zone
Left To Right
No Appreciable Drfit
Right To Left
Undefined

KITSAP COUNTY

Basin Fact Sheet - Long Lake Basin

0 0.5 1 Miles

N W E S



Basin Statistics	
Basin Area (acres)	6932.3
Urban Growth Area (acres)	4038.1
Census Urbanized Area (acres)	6932.3
Road Density Average (miles/sq mile)	10.1

KITSAP COUNTY

Basin Fact Sheet - Port Orchard Passage Basin

0 0.5 1 Miles

N W E S

East Fork Union River
Gorst Creek
Parish Creek
Anderson Creek
NORTH LAKE
Square Creek
SQUARE LAKE
TROPHY LAKE
LAKE FLORA
Blackjack Creek
KRIEGLER LAKE
WICKS LAKE
Coulter Creek
WYE LAKE
Rocky Creek
Huge Creek
FERN LAKE
CARNEY LAKE

Basin Boundary
Census Urbanized Area
Wetland
Fresh Water
Stormwater Facility
Park

Stream Type
Shoreline of the State
Fish Habitat
Non-Fish Habitat
Perennial Non-Fish Habitat
Seasonal Non-Fish Habitat
Unsurveyed
No Channel Found

Shoreline Use
Commercial
Industrial
MFR
Marina
Public
SFR
Undisturbed

Drift Cells
Divergence Zone
Left To Right
No Appreciable Drfit
Right To Left
Undefined

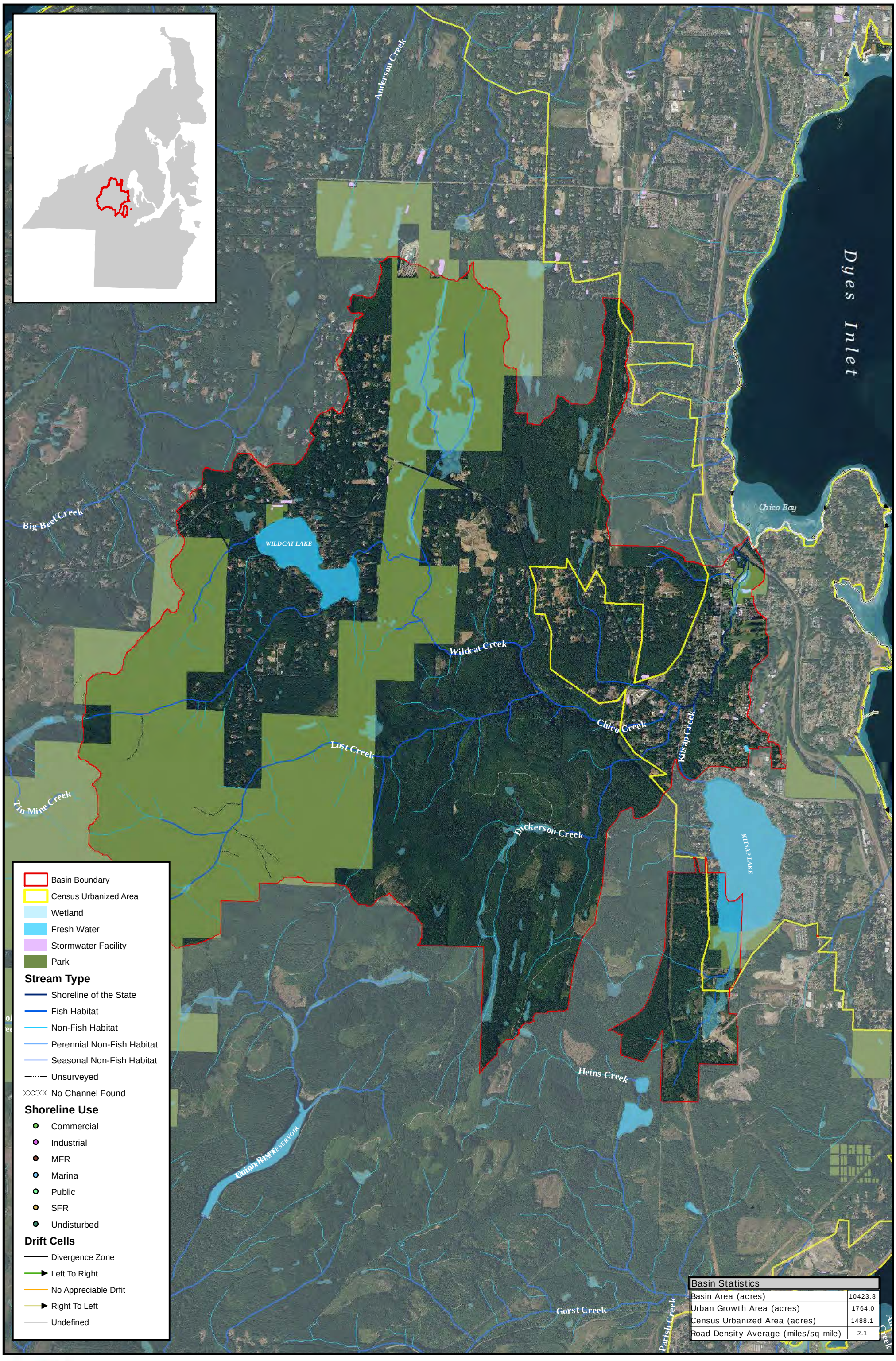
Basin Statistics	
Basin Area (acres)	7856.0
Urban Growth Area (acres)	170.0
Census Urbanized Area (acres)	60.1
Road Density Average (miles/sq mile)	2.3

KITSAP COUNTY

Basin Fact Sheet - Rocky Creek Basin

0 0.5 1 Miles

N W E S

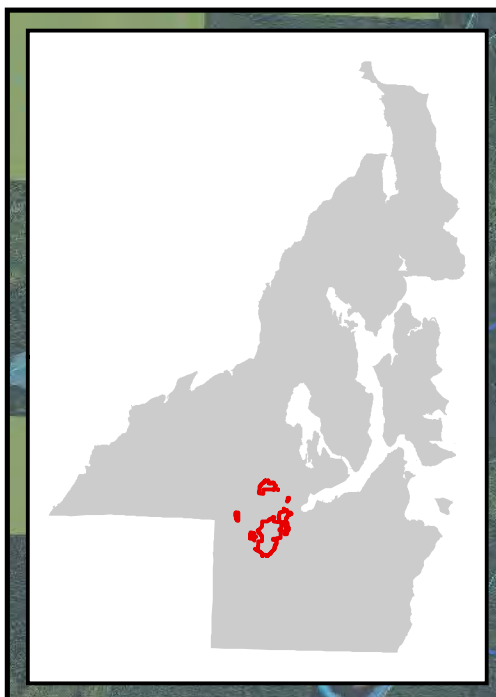


KITSAP COUNTY

Basin Fact Sheet - Chico Creek Basin

0 0.5 1 Miles

N W E S



KITSAP LAKE

Dickerson Creek

Heins Creek

Union River Reservoir

Gorst Creek

Sinclair Inlet

TWIN LAKE

East Fork Union River

Parish Creek

Anderson Creek

Coulter Creek

NELS JOHNSON LAKES

Basin Boundary
Census Urbanized Area
Wetland
Fresh Water
Stormwater Facility
Park

Stream Type
Shoreline of the State
Fish Habitat
Non-Fish Habitat
Perennial Non-Fish Habitat
Seasonal Non-Fish Habitat
Unsurveyed
No Channel Found

Shoreline Use
Commercial
Industrial
MFR
Marina
Public
SFR
Undisturbed

Drift Cells
Divergence Zone
Left To Right
No Appreciable Drfit
Right To Left
Undefined

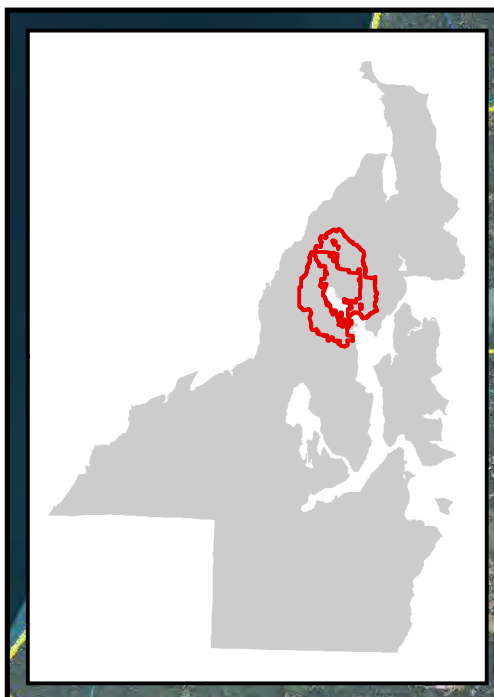
Basin Statistics	
Basin Area (acres)	6159.0
Urban Growth Area (acres)	4184.7
Census Urbanized Area (acres)	1011.8
Road Density Average (miles/sq mile)	2.5

KITSAP COUNTY

Basin Fact Sheet - Gorst Basin

0 0.5 1 Miles

N W E S



Creek

Jump Off Creek

Liberty Bay

Borgen Creek

Ne Si Ka Bay

Dogfish Bay

ISLAND LAKE

Barker Creek

Hoot Creek

Crouch Creek

Royal Valley Creek

Basin Boundary
Census Urbanized Area
Wetland
Fresh Water
Stormwater Facility
Park

Stream Type

Shoreline of the State
Fish Habitat
Non-Fish Habitat
Perennial Non-Fish Habitat
Seasonal Non-Fish Habitat
Unsurveyed
No Channel Found

Shoreline Use

Commercial
Industrial
MFR
Marina
Public
SFR
Undisturbed

Drift Cells

Divergence Zone
Left To Right
No Appreciable Drfit
Right To Left
Undefined

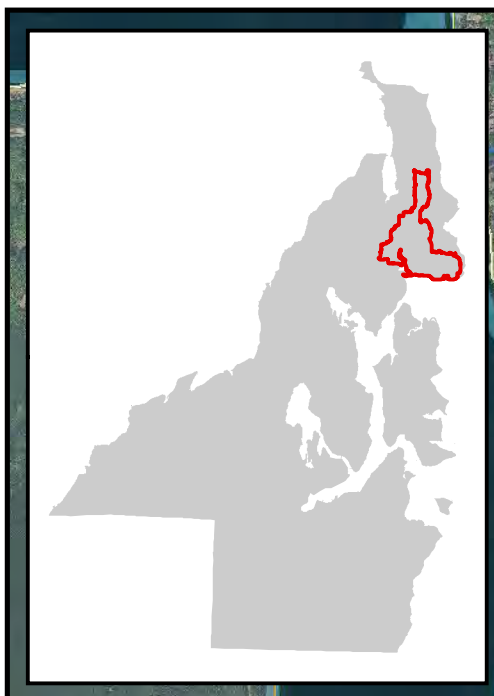
Basin Statistics	
Basin Area (acres)	14002.0
Urban Growth Area (acres)	3842.1
Census Urbanized Area (acres)	9877.4
Road Density Average (miles/sq mile)	10.8

KITSAP COUNTY

Basin Fact Sheet - Liberty Bay Basin

0 0.5 1 Miles

N W E S



Basin Boundary
Census Urbanized Area
Wetland
Fresh Water
Stormwater Facility
Park

Stream Type

Shoreline of the State
Fish Habitat
Non-Fish Habitat
Perennial Non-Fish Habitat
Seasonal Non-Fish Habitat
Unsurveyed
No Channel Found

Shoreline Use

Commercial
Industrial
MFR
Marina
Public
SFR
Undisturbed

Drift Cells

Divergence Zone
Left To Right
No Appreciable Drfit
Right To Left
Undefined

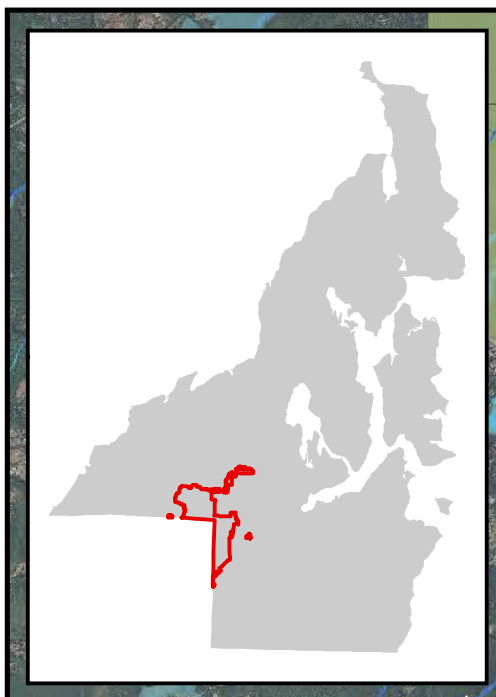
Basin Statistics	
Basin Area (acres)	8829.3
Urban Growth Area (acres)	44.2
Census Urbanized Area (acres)	3671.0
Road Density Average (miles/sq mile)	7.4

KITSAP COUNTY

Basin Fact Sheet - Miller Bay Basin

0 0.5 1 Miles

N W E S



Basin Boundary
Census Urbanized Area
Wetland
Fresh Water
Stormwater Facility
Park

Stream Type

Shoreline of the State
Fish Habitat
Non-Fish Habitat
Perennial Non-Fish Habitat
Seasonal Non-Fish Habitat
Unsurveyed
No Channel Found

Shoreline Use

Commercial
Industrial
MFR
Marina
Public
SFR
Undisturbed

Drift Cells

Divergence Zone
Left To Right
No Appreciable Drfit
Right To Left
Undefined

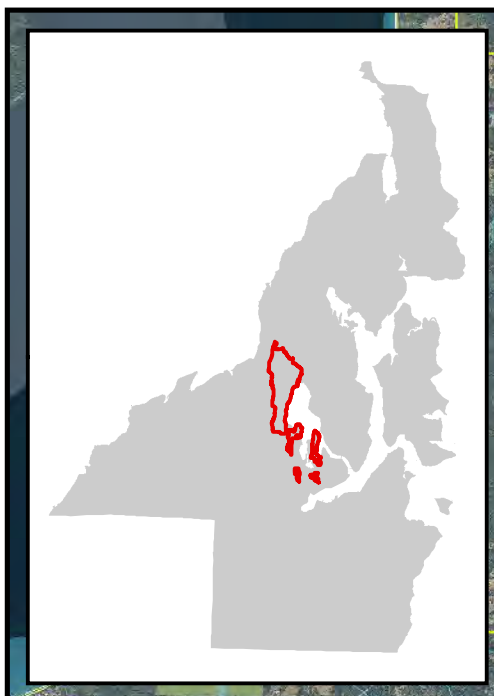
Basin Statistics	
Basin Area (acres)	10743.4
Urban Growth Area (acres)	5613.8
Census Urbanized Area (acres)	0
Road Density Average (miles/sq mile)	2.2

KITSAP COUNTY

Basin Fact Sheet - Union River Basin

0 0.5 1 Miles

N W E S



Basin Boundary
Census Urbanized Area
Wetland
Fresh Water
Stormwater Facility
Park

Stream Type

Shoreline of the State
Fish Habitat
Non-Fish Habitat
Perennial Non-Fish Habitat
Seasonal Non-Fish Habitat
Unsurveyed
No Channel Found

Shoreline Use

Commercial
Industrial
MFR
Marina
Public
SFR
Undisturbed

Drift Cells

Divergence Zone
Left To Right
No Appreciable Drfit
Right To Left
Undefined

Basin Statistics	
Basin Area (acres)	7431.9
Urban Growth Area (acres)	4975.2
Census Urbanized Area (acres)	6628.2
Road Density Average (miles/sq mile)	12.6

KITSAP COUNTY

Basin Fact Sheet - West Dyes Basin

0 0.5 1 Miles

N W E S

Task 700
Climate Change Assessment

Kitsap County Stormwater Comprehensive Plan
Appendix 5-1

Kitsap County
December 22, 2020

Report also submitted as a stand-alone document, September 2019

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Task 700 Climate Change Assessment

Kitsap County

December 22, 2020

Originally Submitted September 2019

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Contents

Tables

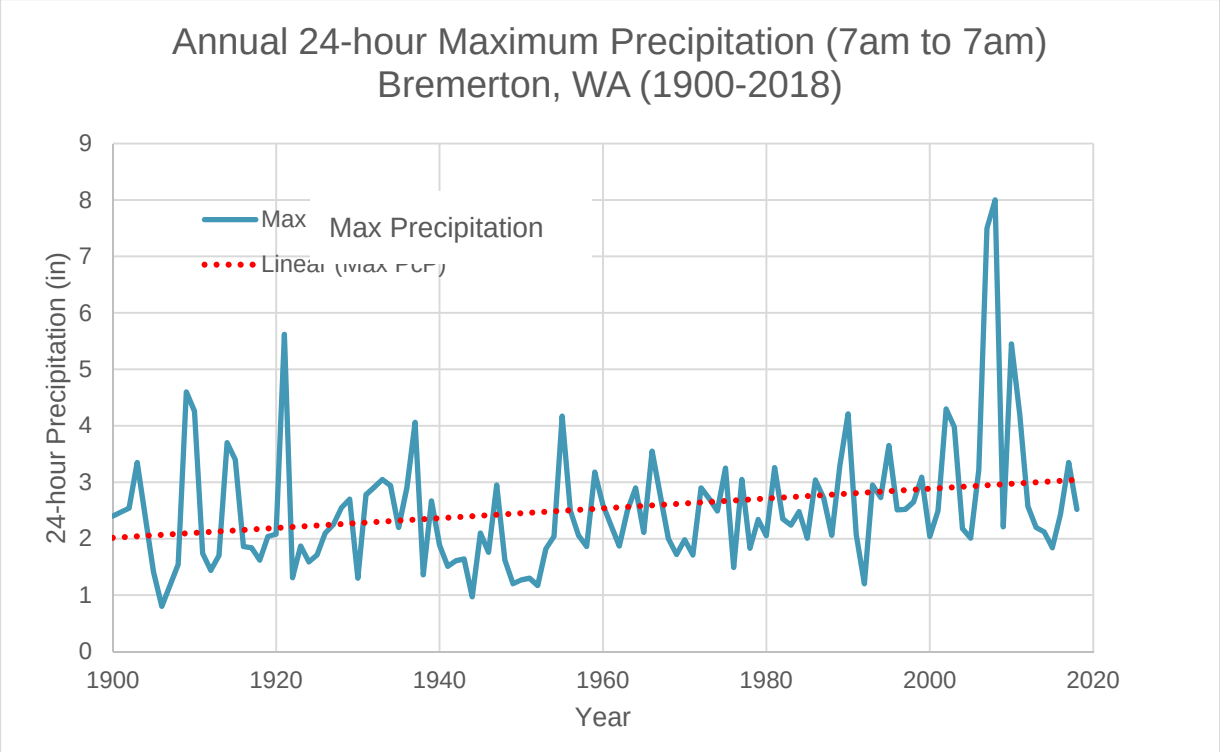
Figures

Appendices

Executive Summary

This portion of the broader study of the Kitsap County stormwater system was related to investigating the current and potential future impacts of climate on the system. This required both an up-to-date analysis of observed trends for changes in sea level around the county's coastal environment, as well as a look at the potential impacts future projections of sea level rise (SLR) will bring. Observed sea level trends showed a steady increase in sea level over the last 120 years to be on the order of approximately 1 inch every 12.3 years. Projected changes in SLR, according to the most recent study by the University of Washington (UW) Climate Impacts Group (CIG 2018), indicate an elevated increase in this rate of rise that ranges from 0.22 ft. for a low emissions scenario by the year 2030 to 1.37 ft. for a high emissions scenario by the year 2100. This analysis included a detailed accounting of the impact of these future SLR scenarios on individual system outfall conveyances (Appendix A).

This study also investigated both current and projected trends in precipitation intensities for Kitsap County. The analysis of historic trends in precipitation intensities discovered a 50 percent increase has occurred since 1900 in the annual 24-hour maximum precipitation in southern Kitsap County as seen in the figure below. This identified trend was further corroborated by a recent study of changes in observed precipitation intensities that was completed on behalf of Seattle Public Utilities (SPU 2017) for the region. This study showed a significant increase from previous estimates (i.e., NOAA Atlas 2) in the amount of precipitation associated with the higher return frequencies (i.e., 25, 50, and 100 year) for the 24-hour storm event. The 24-hour, 100-year event was shown to have increased 43 percent through the use of the post-1973 precipitation dataset that occurred after NOAA Atlas 2 was developed.



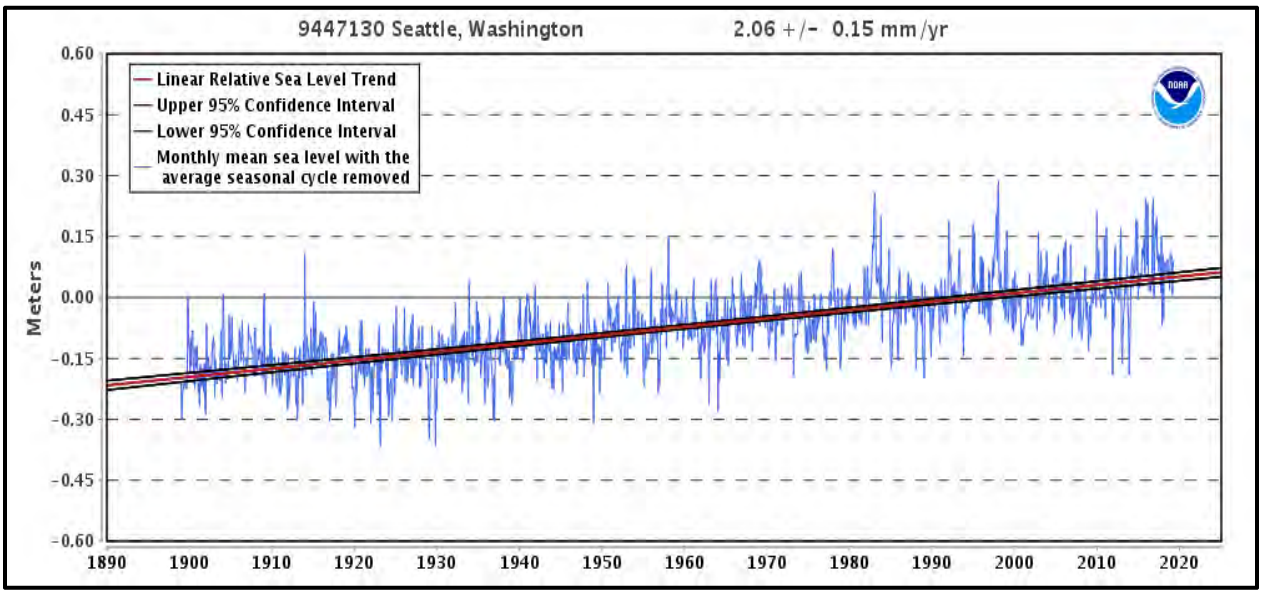
Future climate projections, as developed in a recent study by UW CIG (CIG 2019), showed this observed trend of precipitation intensities increasing in almost every future climate scenario. This analysis, which was attributable to Kitsap County, also showed a wide range for future outcomes with percentage increases ranging from -10 percent for the high emissions scenario in 2030 to as much as 65 percent for the high emissions scenario by 2080.

In order for Kitsap County to better visualize the impacts of these observed and potential increases in future precipitation intensities, HDR provided a spatial accounting of what a current, realistic 24-hour, 100-year design storm would look like and what future 24-hour, 100-year design storms could look like (Appendix B). Once a suitable temporal distribution is applied to these values, they will render a model-ready input to make quantifiable estimates of system capacity for adaptation decision support.

1 Historic Sea Level Trends and Future Sea Level Rise (SLR) for Kitsap County

Before the discussion of Sea Level Rise (SLR) begins, it is necessary to have an understanding of the historic sea level trend in the region. The nearest and most appropriate tide gauge in the region is located in Seattle at the Seattle to Bremerton ferry terminal on Elliott Bay (9447130) (NOAA Tides and Currents 2019). This site has a period of record from 1899 to 2018, which can be seen in Figure 1. This graph shows an average yearly sea level rise of 2.06 millimeters per year (mm/yr) or 0.081 inches per year (in/yr), or 1 inch every 12.3 years. Thus, at the very minimum, this rate of rise should be the baseline for which planning should consider.

Figure 1. Sea level trend at Seattle, WA during the period of record 1899-2018.



The most recent study of SLR (CIG 2018) within the Puget Sound region was completed by the Washington Sea Grant and the University of Washington's (UW) Climate Impacts Group (CIG). The report includes SLR projections for 171 sites along Washington's coast, including an excellent coverage of the coastal areas within Puget Sound. This UW CIG study included 13 locations (modeling nodes) for determining future SLR along the coast of Kitsap County. In order to make determinations as to the impact of SLR on Kitsap County's stormwater infrastructure, HDR utilized the 90 percent SLR probability of exceedance estimates from this study to identify and quantify potential future inundation levels at specific outfall locations provided by the county.

The analysis of the impact of SLR on stormwater infrastructure required the use of specific tidal datum so that the understanding of sea level rise can be developed as a function of the highest ***regular*** water surface elevation that occurs. The National Oceanic and Atmospheric Administration (NOAA) uses what is called Mean Higher High Water (MHHW) as their base tidal datum. For inundation studies for which increased water level scenarios are required to determine the amount of land affected by sea level inundation, the elevation of a tidal datum (such as mean higher high water, or MHHW, in areas with diurnal tides) is often used as the base elevation. This is because the high water datum represents the elevation of the normal daily excursion of the tide where the land

area is normally inundated. Taking this normal extent of inundation into account is important when trying to delineate land areas inundated by abnormal events such sea level change.

As with all climate change studies, the UW CIG study could have utilized an endless array of modeling scenarios and climate models, but chose to simplify the results by providing projections for only two climate (emissions) scenarios: Representative Concentration Pathway (RCP) 4.5 and RCP 8.5. RCP 4.5 projects a reduction scenario in which a significant Greenhouse Gas (GHG) mitigation policy is implemented, and RCP 8.5 calls for very high GHG emissions without additional efforts to constrain emissions. This study provided projected SLR data for Kitsap County for the years 2030, 2050, and 2100. Table 1 and Table 2 show the location points for this analysis around Kitsap County and the projected SLR relative to current MHHW tidal datum from NOAA at these locations for the years 2030, 2050, and 2100 at RCP 4.5 and 8.5, respectively.

Table 1. Projected SLR estimates for various locations along the Coast of Kitsap County for RCP 4.5.

Location		Year (ft.)		
Lat	Lon	2030	2050	2100
47.5	-123.0	0.2	0.3	0.8
47.6	-122.9	0.2	0.4	0.9
47.7	-122.7	0.2	0.4	1.0
47.8	-122.7	0.3	0.5	1.2
47.9	-122.6	0.1	0.3	0.8
47.9	-122.5	0.3	0.5	1.2
47.8	-122.5	0.4	0.7	1.5
47.7	-122.6	0.2	0.4	1.0
47.7	-122.5	0.2	0.5	1.1
47.6	-122.7	0.2	0.4	0.9
47.6	-122.6	0.1	0.3	0.7
47.6	-122.5	0.2	0.3	0.9
47.5	-122.5	0.2	0.4	0.9
Average		0.22	0.42	0.99

Table 2. Projected SLR estimates for various locations along the Coast of Kitsap County for RCP 8.5

Location		Year (ft.)		
Lat	Lon	2030	2050	2100
47.5	-123.0	0.2	0.4	1.2
47.6	-122.9	0.2	0.4	1.1
47.7	-122.7	0.3	0.6	1.6
47.8	-122.7	0.3	0.5	1.5
47.9	-122.6	0.1	0.4	1.2
47.9	-122.5	0.3	0.5	1.5
47.8	-122.5	0.4	0.7	1.8
47.7	-122.6	0.2	0.5	1.4
47.7	-122.5	0.2	0.5	1.5
47.6	-122.7	0.2	0.4	1.3
47.6	-122.6	0.1	0.3	1.1
47.6	-122.5	0.2	0.4	1.3
47.5	-122.5	0.2	0.4	1.3
Average		0.22	0.46	1.37

The county provided HDR with geospatial data associated with the stormwater outfalls in their service region. The original “Storm Outfall” data layer we received from Kitsap had 1,582 outfalls listed (some marked as “active” and some as “inactive”). When the county went in and measured the outfall elevations for HDR, our team ended up with a dataset that had 556 outfalls (and their elevations) listed. Out of those 556, we determined which outfall elevations were less than the current MHHW tidal surface (basis of NOAA SLR Calculations) in feet, and then which outfalls had elevations less than the six SLR RCP scenarios (RCP 4.5 and RCP 8.5 for 2030, 2050, 2100).

The average SLR estimates for each of the three future time periods, as seen in Table 1 and Table 2, were used to develop an understanding of the impacts to stormwater outfalls as described in the previous paragraph. The majority of these outfalls had elevations below the NOAA MHHW Tidal Surface, but with the advent of SLR, outfalls would become even more submerged during this tidal state. Figure 2 through Figure 7 identify stormwater outfall locations that are expected to be impacted by the given SLR scenarios at the future time steps. An electronic appendix (Appendix A) is attached to this report. It provides an accounting of the inundation levels and/or water surface elevations at the various future scenarios at each of the stormwater outfall locations identified in these maps.

Figure 2. Locations of outfalls impacted by the RCP 4.5 SLR Scenario by 2030 in Kitsap County.

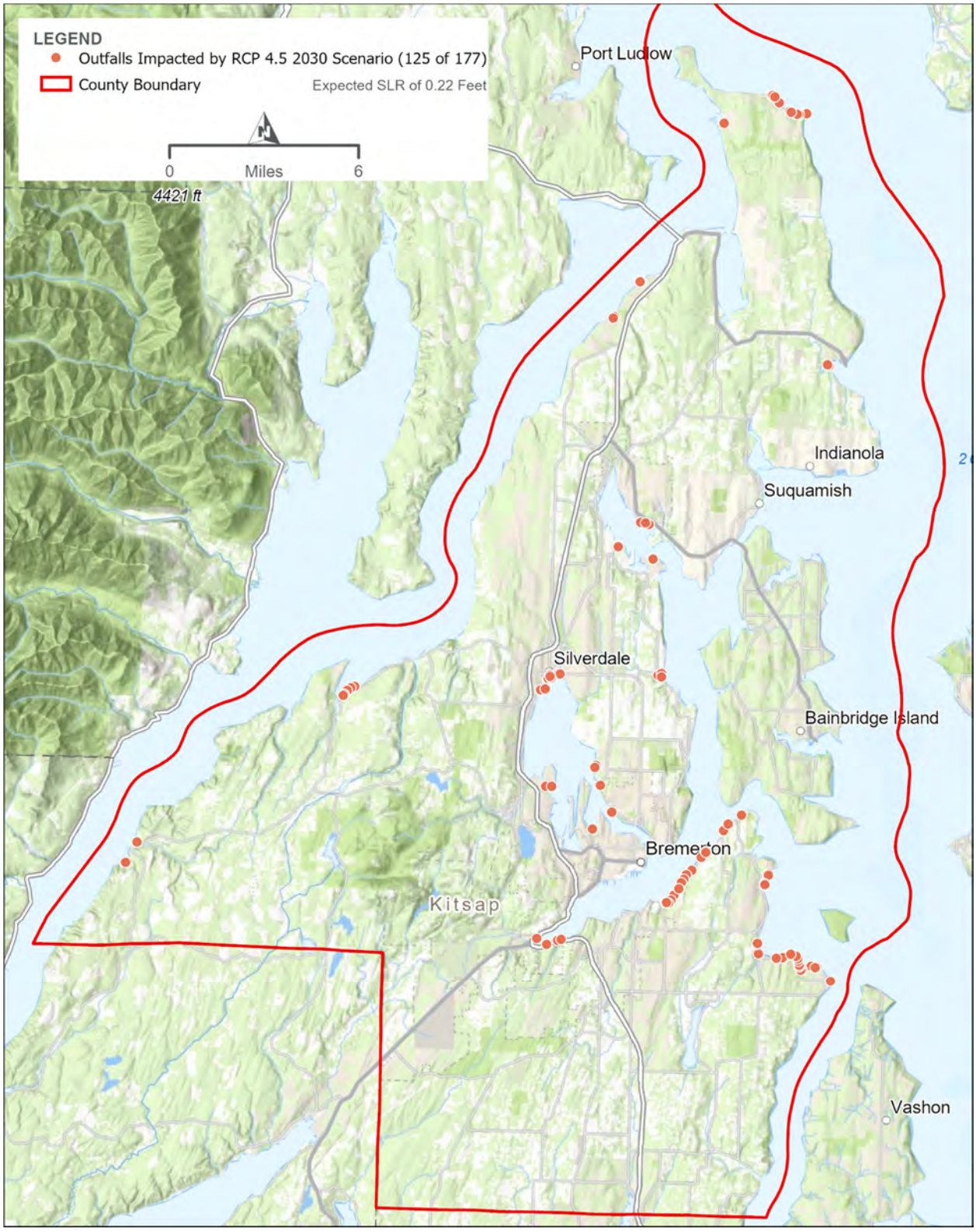


Figure 3. Locations of outfalls impacted by the RCP 4.5 SLR Scenario by 2050 in Kitsap County.

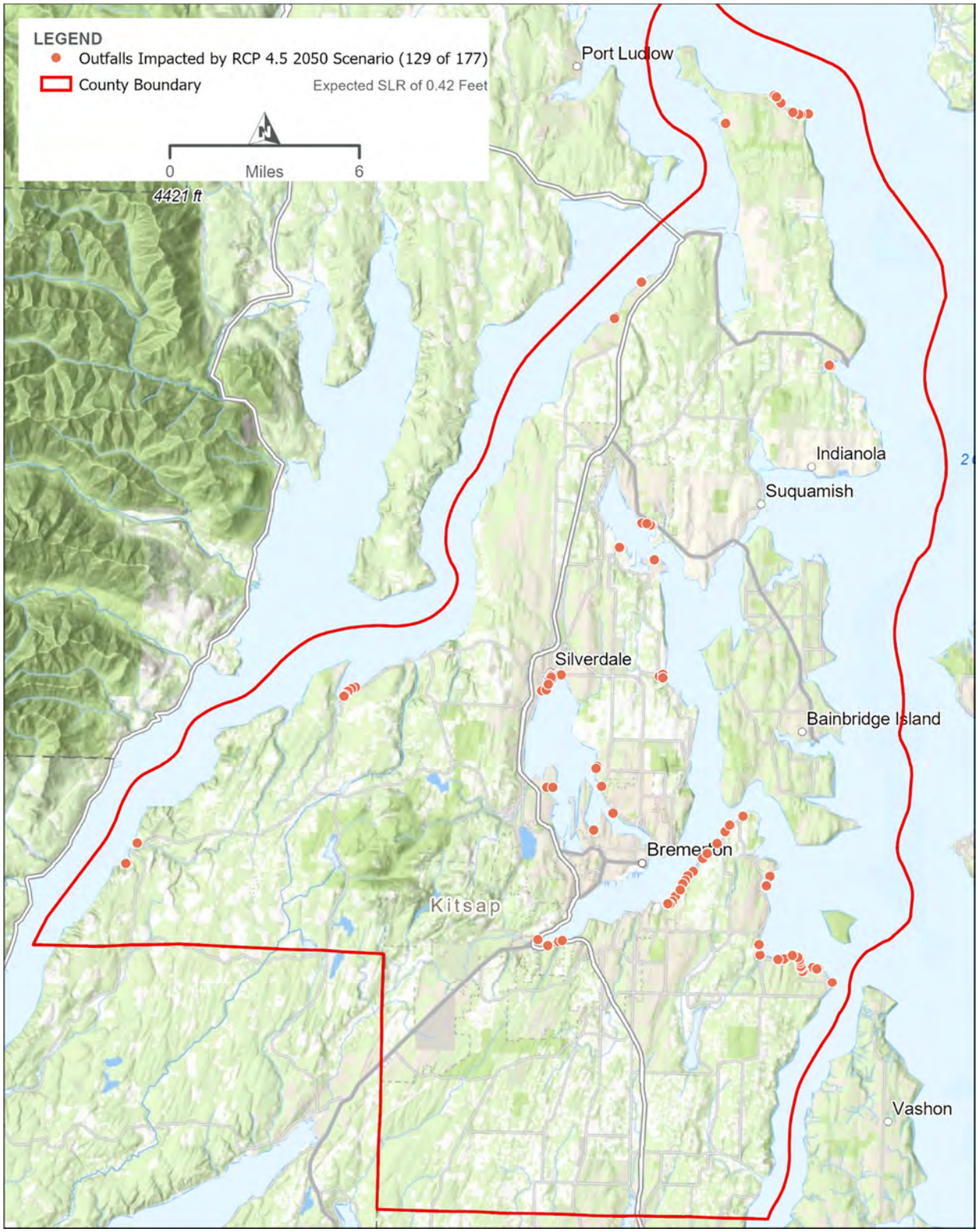


Figure 4. Locations of outfalls impacted by the RCP 4.5 SLR Scenario by 2100 in Kitsap County.

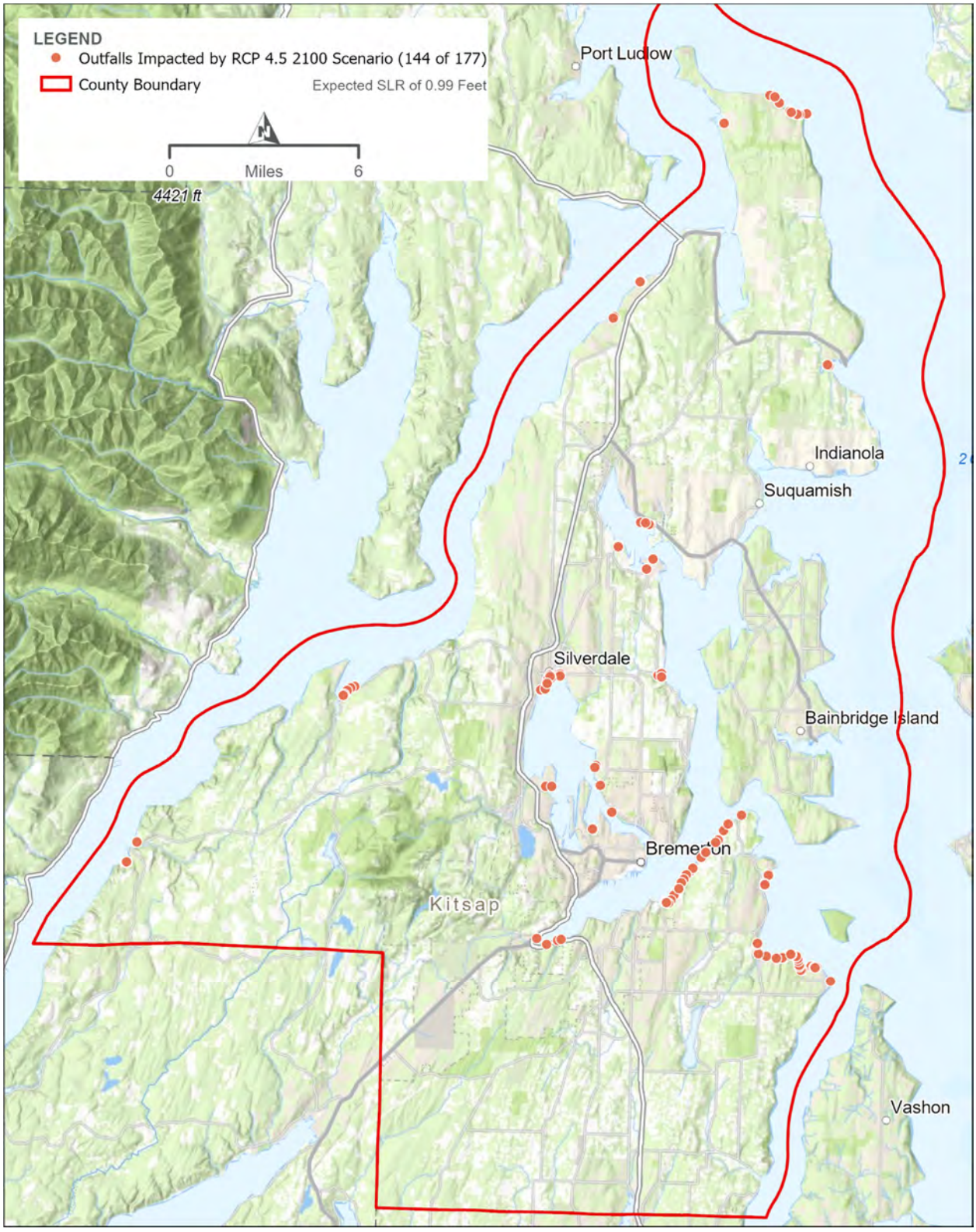


Figure 5. Locations of outfalls impacted by the RCP 8.5 SLR Scenario by 2030 in Kitsap County.

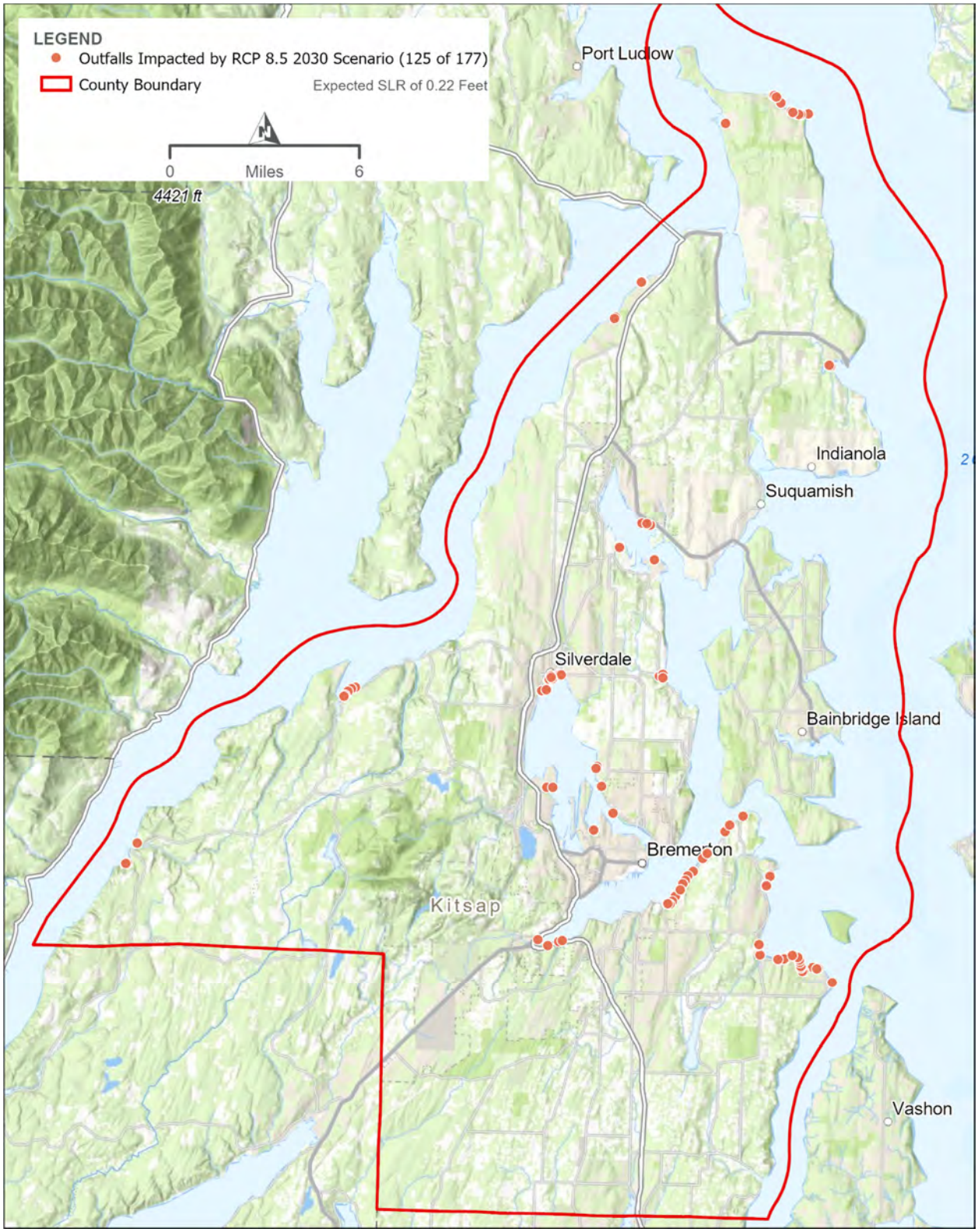


Figure 6. Locations of outfalls impacted by the RCP 8.5 SLR Scenario by 2050 in Kitsap County.

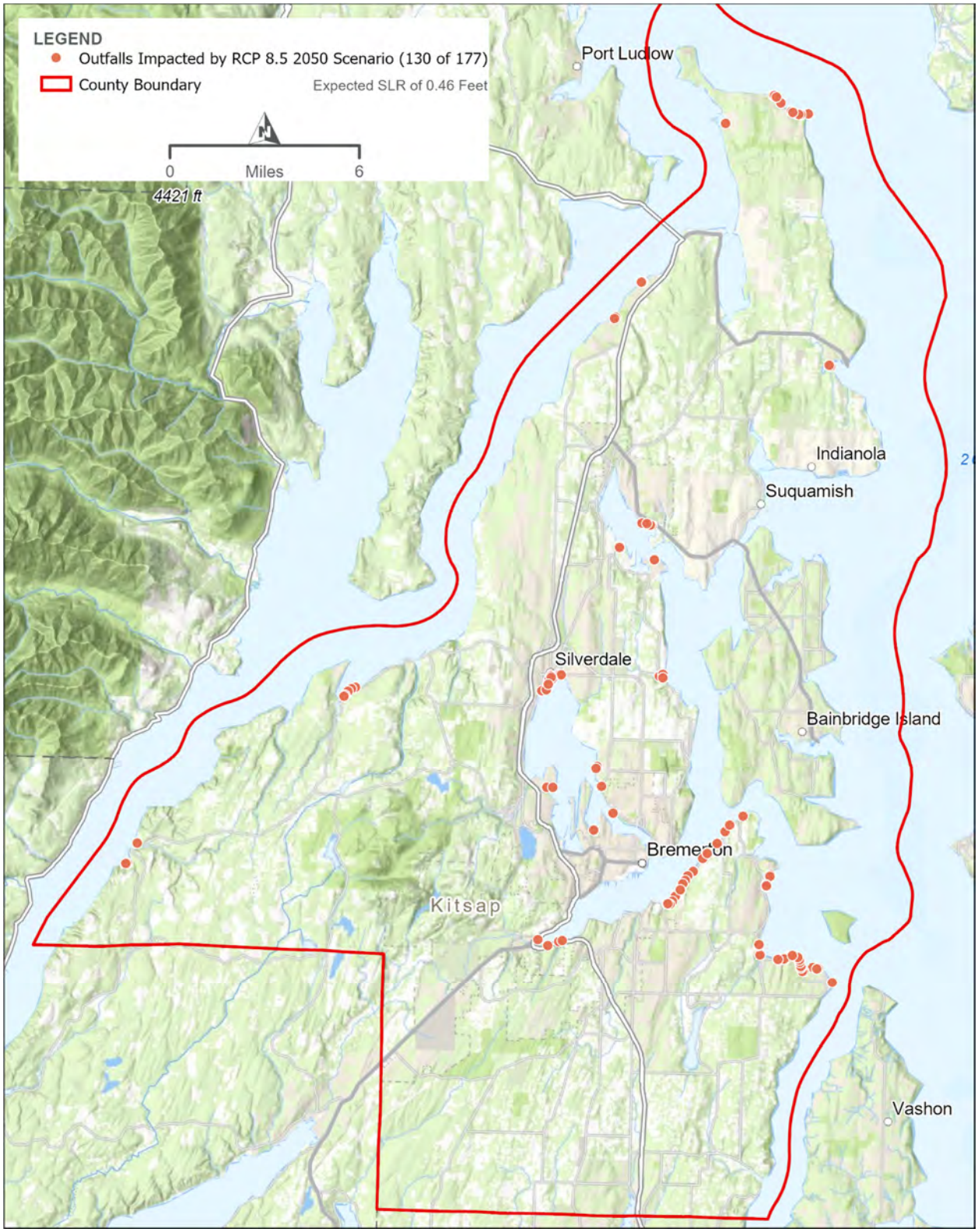
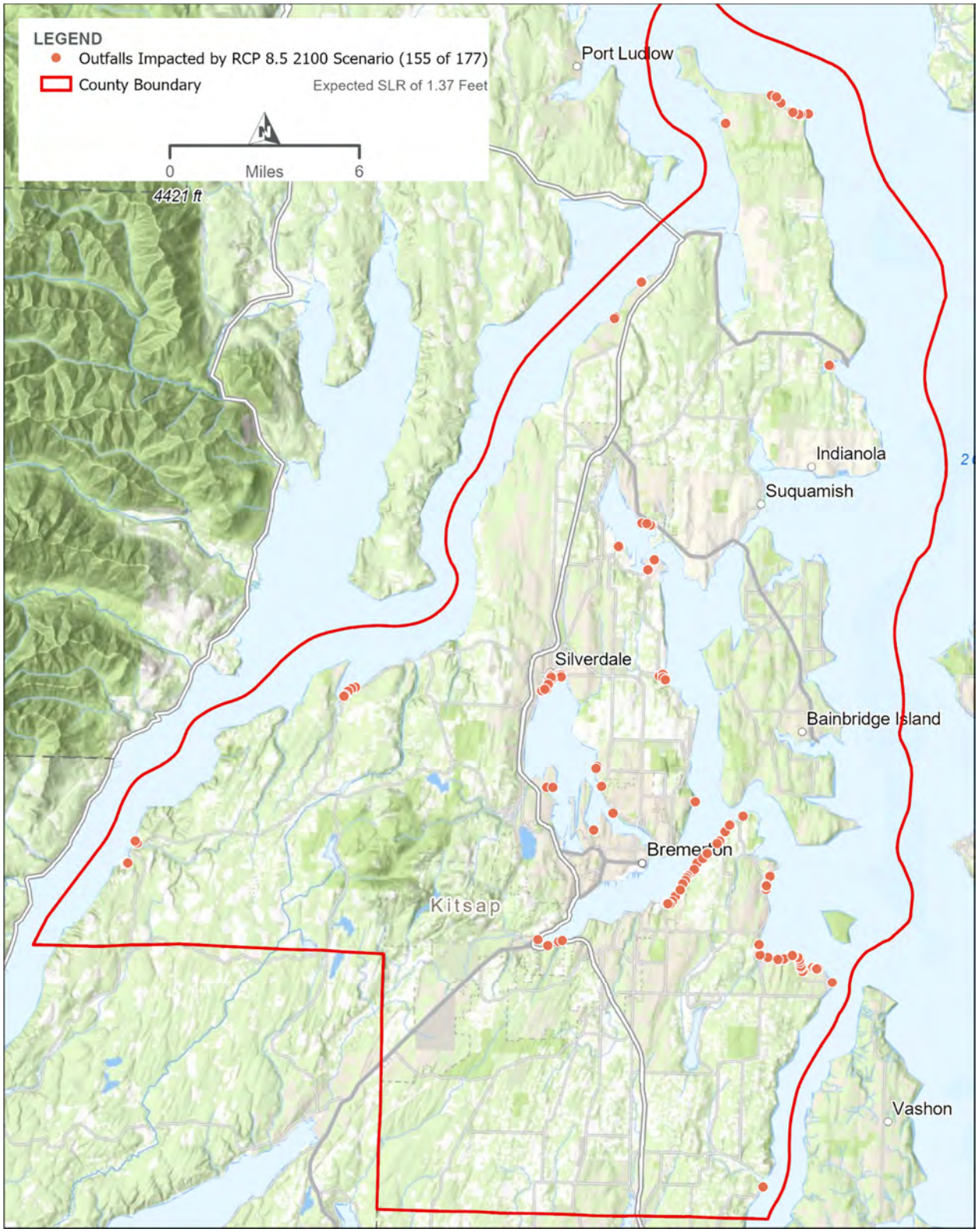


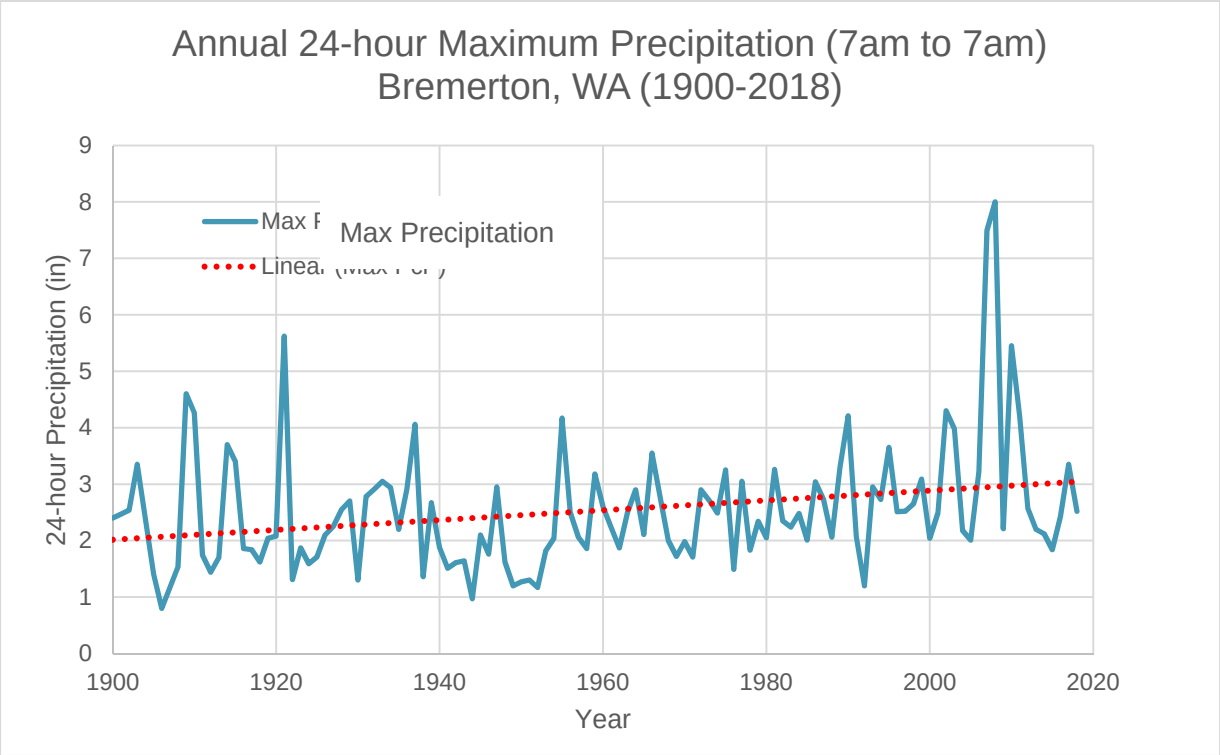
Figure 7. Locations of outfalls impacted by the RCP 8.5 SLR Scenario by 2100 in Kitsap County.



2 Historical Trends and Changes in Precipitation Intensities

Similar to the discussion of SLR, changes in precipitation intensities should begin with an understanding of the long-term historic trend in this parameter over Kitsap County. HDR looked at the historic trend in 24-hour maximum annual precipitation at Bremerton, WA during the period of record 1900-2018. Figure 8 shows this trend increasing by 50 percent over this time period from a value of 2 inches in a 24-hour period to a value of 3 inches in a 24-hour period. This trend, like the trend in SLR, should be considered the baseline for continued change in the coming years.

Figure 8. Annual 24-hour maximum precipitation at Bremerton, WA.



The current version of the Kitsap County Stormwater Design Manual (Kitsap County 2016) identifies the precipitation Intensity-Duration-Frequency (IDF) curves from U.S. Weather Bureau Technical Paper 25 (TP25) as the current IDF standard for design for short-duration precipitation events. Since that time, NOAA Atlas 2 (NOAA 1973) and the Washington State Department of Transportation (WSDOT 2002), which used NOAA Atlas 2 data to determine rainfall intensities (WSDOT 2002. Chapter 2, page 11-12) have provided similar guidance for regional precipitation frequency estimates specific to Kitsap County. An initial comparison between TP25 and the WSDOT study for events of 2-hour durations (Table 3) indicate very little change in these values for short-duration events.

Table 3. Comparison between TP25 precipitation return frequencies and WSDOT Regional precipitation frequencies for storms of 2-hour durations.

Comparison between TP25 and WSDOT Regional Precipitation Frequencies (2-hour)		
Return Freq. (yrs)	**TP25 for Bremerton**	**WSDOT for S. Kitsap Co.**
5	0.94	0.94
10	1.14	1.08
25	1.26	1.26
50	1.42	1.39
100	1.62	1.52

Consequently, a recent study (SPU 2017) performed on behalf of Seattle Public Utilities (SPU) investigated the nature of these trends in precipitation intensities in the region. This study, entitled "Intensity Duration Frequency (IDF) Curves and Trends for the City of Seattle," investigated the nature of the current IDF values using averaged historic precipitation data from 17 rain gauges in the region, which included the Bremerton daily gauge in Kitsap County and other gauges in close proximity to Kitsap County. Table 4 converts these newly developed IDF values into 2-hour return frequency estimates and compares them to the previously derived return frequency values (Table 3) for WSDOT for Kitsap County (Bremerton).

Table 4. Comparison between TP25, WSDOT, and the SPU study precipitation return frequencies for storms of 2-hour durations.

Comparison between TP25, WSDOT, and SPU Precipitation Frequencies (2-hour)			
Return Freq. (yrs)	**TP25 for Bremerton**	**WSDOT for S. Kitsap Co.**	**SPU values from IDF Curves**
5	0.94	0.94	0.84
10	1.14	1.08	0.96
25	1.26	1.26	1.16
50	1.42	1.39	1.30
100	1.62	1.52	1.46

In order to provide a comparative analysis between recently observed precipitation return frequencies and projected values as reported in the next section, Table 5 provides a similar comparison of return frequency data for storms of 24-hour durations for WSDOT (NOAA Atlas 2) and the SPU data. Return frequency values that were available from TP25 only provided information up to storms of 2-hours in duration. Although the values for storms of a 24-hour duration are similar at

the lower return frequencies (i.e., 5-year and 10-year), a marked increase was noted in the SPU study at the higher return frequencies.

Table 5. Comparison between WSDOT and the SPU study precipitation return frequencies for storms of 24-hour durations.

Comparison between WSDOT and the SPU Study for Regional Precipitation Frequencies (24-hour)		
Return Freq. (yrs)	**WSDOT for S. Kitsap Co.**	**SPU values from IDF Curves**
5	3.36	3.24
10	3.83	4.03
25	4.41	4.70
50	4.86	5.47
100	5.30	7.58

3 Projected Trends and Changes in Precipitation Intensities

The UW CIG recently developed a study entitled “Regional Model Projections of Heavy Precipitation for Use in Stormwater Planning” (CIG 2019). These future climate projections indicate that the historical trend in increasing precipitation intensities in western Washington is likely to continue and, consequently, produce more intense hydrologic extremes. Although this study did not specifically identify a location in Kitsap County for investigation of future trends in heavy precipitation, it is reasonable to use the data from the Seattle Tacoma International Airport, 8-10 miles to the east southeast of southern Kitsap County, as proxy for this study as they both reside in the same climate region as identified as the Interior Lowlands (Schaefer et al. 2009).

This study utilized a methodology wherein Global Climate Model (GCM) output was used as input to an atmospheric modeling platform called the Weather Research and Forecast (WRF) model. Figure 9 through Figure 11 show the projected change (RCP 4.5 and 8.5 scenarios) in 24-hour precipitation at this location as a percentage of the climatological mean from 1980-2009 at the future time scales of 2030, 2050, and 2080 It is very apparent that the projections of changes in future 24-hour precipitation amounts will be anything but stationary. With the exception of the 2030 RCP 8.5 scenario, each of the projections of future climate scenarios show an increase in precipitation intensities, particularly at the higher return frequencies (i.e., 100-year).

Figure 9. Projected change (in percent) of 24-hour precipitation at Seattle Tacoma International Airport by 2030 relative to the 1980-2009 climatological mean.

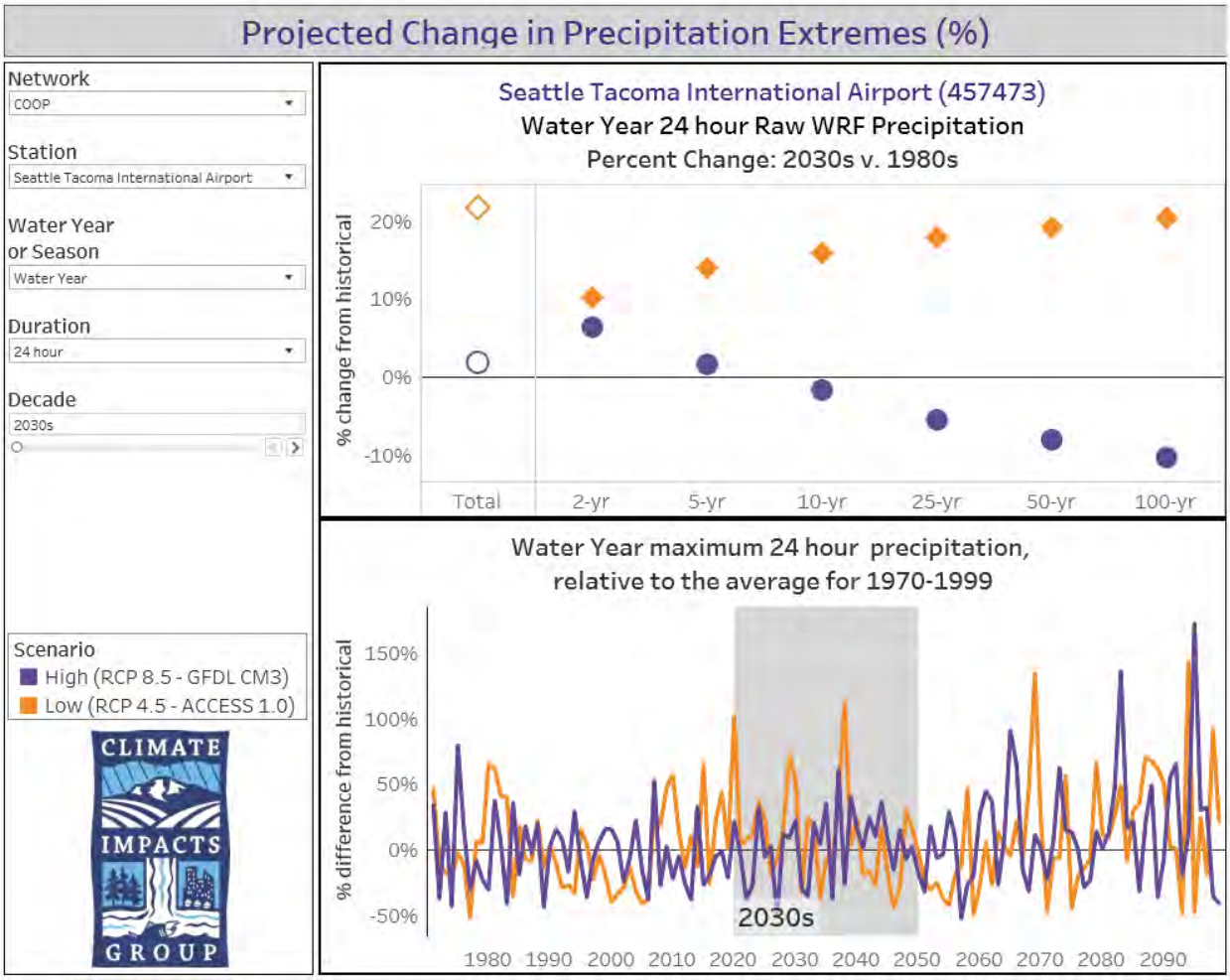


Figure 10. Projected change (in percent) of 24-hour precipitation at Seattle Tacoma International Airport by 2050 relative to the 1980-2009 climatological mean.

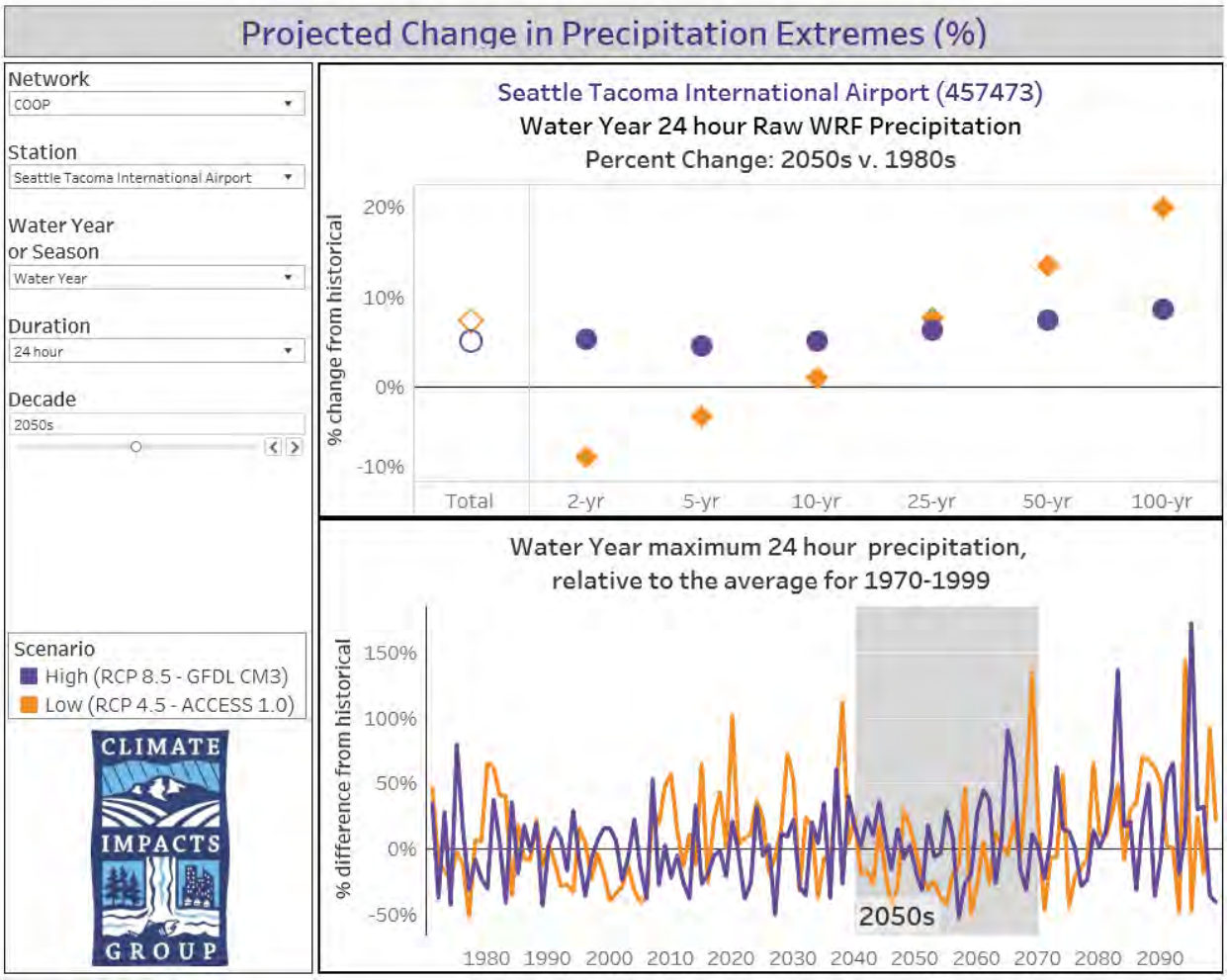
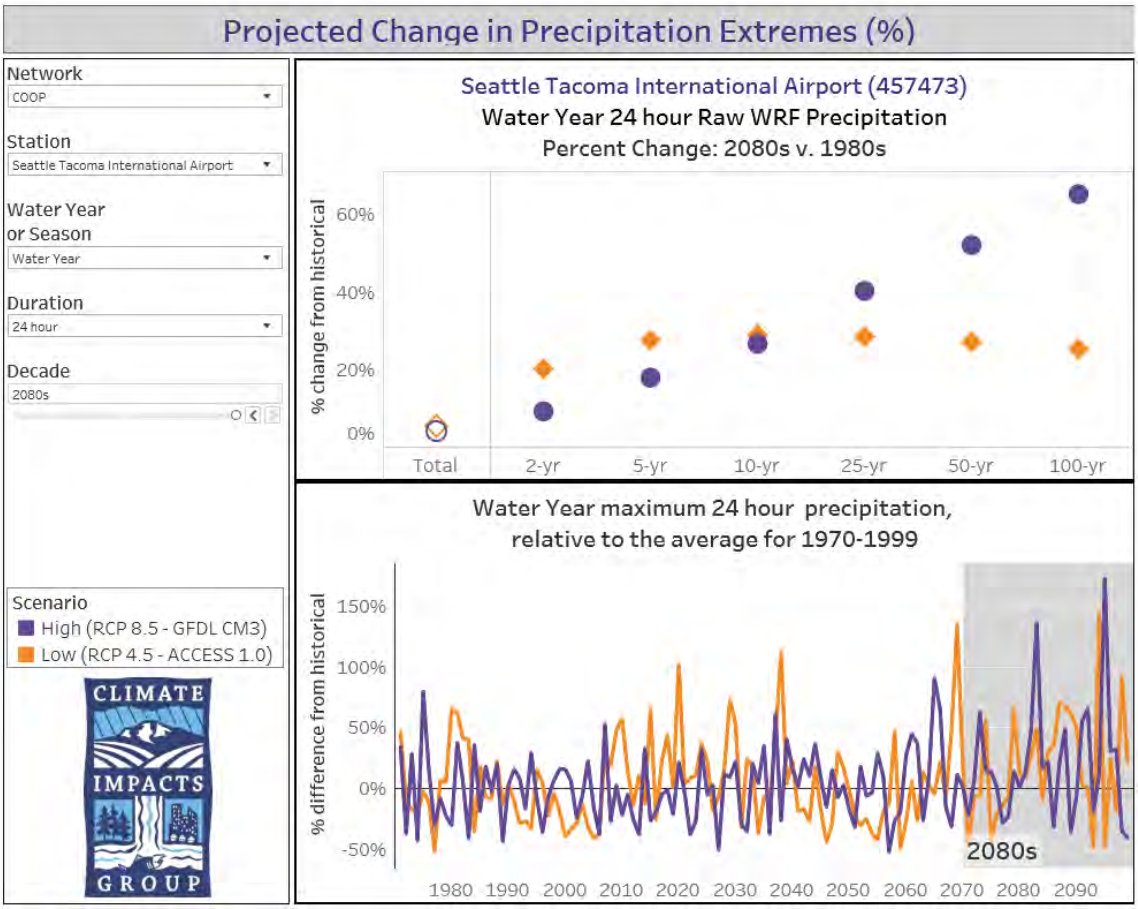


Figure 11. Projected change (in percent) of 24-hour precipitation at Seattle Tacoma International Airport by 2080 relative to the 1980-2009 climatological mean.



4 Observed Changes in the Kitsap County 24-hour, 100-year Design Storm Event

The majority of design storm events in use across the United States are one-size-fits-all design events based on historical data from the previous century and presented with no spatial variation in precipitation climatologically associated with a given region. HDR has developed the means to utilize the latest (up to 2017) historical data that includes observed changes in precipitation intensities in combination with a realistic and climatologically accurate spatial distribution to create a 24-hour, 100-year design event that is site-specific to an application over a given service region or watershed.

Through the use of the observed precipitation analysis from SPU (SPU 2017) and an application of the spatial distribution of rainfall over Kitsap County using climatological data from the Parameter elevation Regression on Independent Slopes Model (PRISM) from Oregon State University (OSU) (OSU 2019), HDR developed a new 24-hour, 100-year design event that is spatially distributed across the county on a 4 kilometer (km) grid. Figure 12 shows a map of this grid as it pertains to the distribution of annual precipitation from PRISM across the county. Table 6 identifies the new design storm grid values as a function of the application of the 24-hour, 100-year return frequency values as derived from the SPU study as they pertain to the spatial distribution provided in the grid in Figure 12.

Figure 12. Gridded (4 km) map showing the distribution of annual precipitation across Kitsap County.

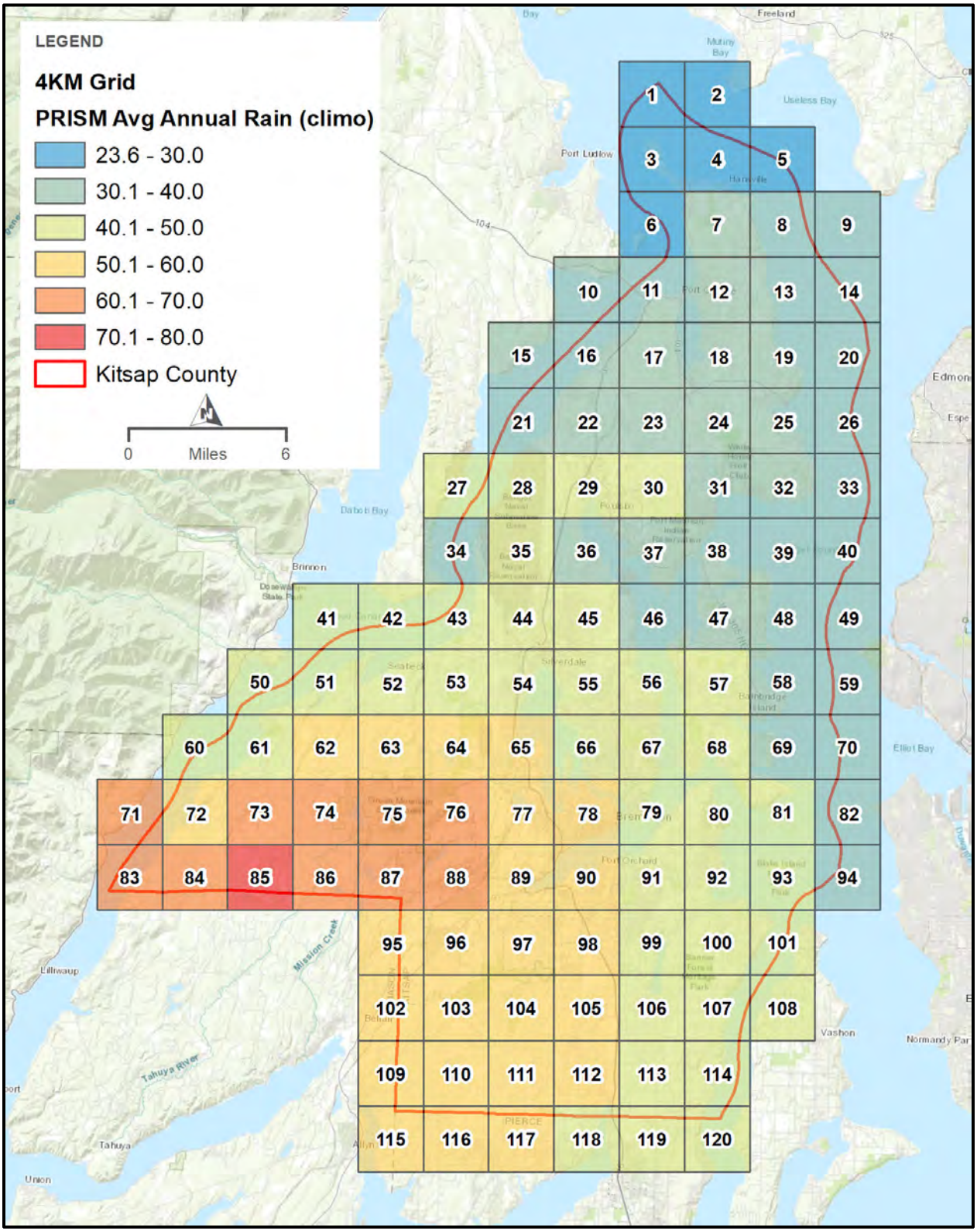


Table 6. Grid profile 24-hour, 100-year design storm event as derived through the use of the observed data from the SPU study and the spatial distribution of precipitation from the PRISM climate analysis in Figure 12.

Profile	100-year Return Frequency (in)	Profile	100-year Return Frequency (in)	Profile	100-year Return Frequency (in)
1	3.49	41	5.95	81	5.94
2	3.68	42	6.06	82	5.68
3	3.76	43	6.12	83	9.35
4	3.98	44	6.54	84	10.20
5	4.16	45	6.07	85	10.44
6	4.18	46	5.78	86	9.09
7	4.53	47	5.79	87	9.10
8	4.54	48	5.68	88	9.06
9	4.90	49	5.48	89	7.95
10	4.73	50	6.43	90	7.66
11	4.72	51	6.44	91	7.39
12	5.01	52	6.80	92	6.60
13	5.02	53	7.14	93	6.05
14	5.22	54	7.03	94	5.69
15	5.40	55	6.51	95	7.73
16	5.30	56	6.11	96	7.91
17	5.42	57	5.97	97	7.92
18	5.46	58	5.76	98	7.64
19	5.43	59	5.56	99	7.35
20	5.38	60	7.37	100	6.72
21	5.61	61	7.37	101	6.20
22	5.88	62	7.85	102	7.95
23	5.84	63	8.45	103	8.09
24	5.70	64	8.23	104	7.99
25	5.56	65	7.59	105	7.47
26	5.44	66	7.31	106	7.19
27	6.01	67	6.74	107	6.72
28	6.01	68	6.19	108	6.27
29	5.96	69	5.87	109	7.91

Profile	100-year Return Frequency (in)	Profile	100-year Return Frequency (in)	Profile	100-year Return Frequency (in)
30	5.98	70	5.63	110	8.14
31	5.78	71	10.01	111	7.92
32	5.62	72	8.56	112	7.44
33	5.46	73	9.19	113	6.93
34	5.82	74	8.97	114	6.47
35	6.33	75	10.10	115	7.60
36	5.91	76	9.54	116	7.92
37	5.87	77	8.17	117	7.78
38	5.75	78	7.58	118	7.32
39	5.62	79	7.03	119	6.86
40	5.46	80	6.39	120	6.35

5 Projected Changes in the Kitsap County 24-hour, 100-year Design Storm Event

There have been numerous studies and papers written regarding the potential for significant changes in precipitation intensities under future climate scenarios around the U.S. in the last several years (i.e., Jalowska 2018 and Kunkel 2019). These studies are primarily based on the relationship between a warmer climate and the ability of the atmosphere to retain and release moisture (precipitable water). This physical relationship is explained by the Clausius-Clapeyron equation (https://chemed.chem.purdue.edu/genchem/topicreview/bp/ch14/clausius.php), which, basically, states that as atmospheric temperature increases, so does the atmosphere's ability to hold and release moisture. A similar physical relationship was used to develop the methodology applied in the projected models in the UW CIG (CIG 2019) and the SPU study referenced earlier in this document (SPU 2017).

Through the use of the percent increase in precipitation intensities for the two climate scenarios, RCP 4.5 and RCP 8.5, from the UW CIG study (Figures 9-11), HDR developed projected 24-hour, 100-year design storm events for the years 2030, 2050, and 2080. The basis for applying these projected values are the recently observed values (SPU 2017) provided in Table 6. The profiles for these future design events, which are synonymous with the profiles as identified in Figure 12, are quantified in electronic Appendix B. It is important to note for the sake of comparison that the projected percentage increases or decreases are being applied to recently statistically calculated return frequencies based on the recent SPU study rather than on a percentage increase or decrease to old NOAA Atlas 2 or TP25 return frequency values.

6 Resources

The Washington State Climate Impacts Group (CIG) maintains an ongoing, publically-available resource library for the effects of climate change on Washington State (https://cig.uw.edu/). It contains analysis tools for obtaining future peak stream flows to aid in culvert design, trends in temperature, precipitation, and snow water equivalent, and a precipitation projection tool. Numerous research publications and special reports.

7 Conclusion and Recommendations

This investigation of the both current and projected climate influences on Kitsap County stormwater infrastructure determined that observed change is already occurring, while projected changes indicate the need for adaptation planning. Sea level rise, although not nearly on the order of what is expected to occur on the east coast of the U.S., was found to be a factor concerning stormwater outfalls. Change in precipitation intensities have shown a steady increase, particularly for 24-hour storm events, in the historic record and projected changes are expected to extend this trend.

HDR recommends a detailed accounting of risk, consequences, and system component criticality associated with the findings of this investigation to enable a cost-to-benefit analysis of remediation and/or adaptation measures for the Kitsap County stormwater system that would provide for increased system resilience and longevity. This cost-to-benefit analysis could take into account the following recommendations for specific action that should promote stormwater resilience over time within Kitsap County. These are presented in the list below in general order of efficacy and importance:

1. **Inspection and maintenance** should be a primary consideration before any attempt to increase system resilience is undertaken. In many cases, recurring system issues or problematic infrastructure is the result of a malfunction of the system due to a maintenance issue or a fault in system integrity. These should be inspected and remedied before making a system resiliency plan.

2. System resilience is not something that occurs overnight. It is a holistic undertaking that is generally incremental and requires a **long-term stormwater resiliency plan** that is implemented with the greatest cost-to-benefit in mind. This long-term plan will provide for a vetting process of the stormwater resilience solutions that are listed in #3 below.

3. **Stormwater infrastructure resilience solutions** can come in all shapes and sizes, and often can serve dual-purpose roles within the community. These can range from:

    - Modifying conveyance design standards to increase capacity of new infrastructure over time by updating design storm volumes to factor in climate change for pipe sizing, increasing the use and number of grated inlets for improved efficiency of getting runoff into the conveyance network, and/or modifying hydraulic freeboard standards for built pipe networks to accommodate anticipated changes in precipitation volumes.

    - Use of green infrastructure/low impact development solutions such as bioretention, green spaces, stormwater capture and recharge designs, stormwater

retention/detention ponds/wetlands to minimize runoff volumes that protect downstream resources.

- Identify areas where traditional hardening of stormwater infrastructure is the best solution. For example, planning for and installing pump stations in areas to protect critical outfalls from flood risk and other types of gray infrastructure.

- Enhancing codified protections for critical areas such as wetlands, riparian corridors, and other natural features that attenuate the effects of flooding.

4. Once a plan is developed options for the greatest cost-to-benefit have been vetted, the plan needs to be **funded**. While traditional funding through the Kitsap County Stormwater Division is feasible, there are currently numerous grant programs available for stormwater resilience that should be explored. These include CoastSmart Communities grants from NOAA, Green Infrastructure Resilience grants from the EPA, National Science Foundation environmental sustainability grants, the Kresge and Rockfeller Foundations, Washington State Stormwater Capacity grants, as well as numerous grant programs that are tied to collaboration with academic institutions.

The design of stormwater infrastructure is based on an underlying assumption that the probability distribution of precipitation events is statistically stationary. This assumption may no longer be valid, resulting in uncertainty about the future performance of systems constructed under this paradigm. Such uncertainty emphasizes the importance of developing a focused and dedicated vulnerability assessment of the County's stormwater system.

Additional incorporation of changes in precipitation patterns into modeling can also help the County understand how these changes impacts areas of the system differently, Specifically, the use of storm transpositioning within the stormwater model for the County can provide a means to better understand the impact of increased precipitation intensities in the region. This methodology utilizes high resolution gauge-adjusted radar rainfall (GARR) storm reconstructions (precipitation grids) that occurred within the same climatological region and transposes them over the county so that an understanding of their impacts can be gained. These "What if?" scenarios will allow the county to model precipitation events of various recurrence intervals and intensities so that system vulnerabilities can be identified and remediated.

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Washington State Department of Transportation (WSDOT). 2002. Regional Precipitation-Frequency Analysis and Spatial Mapping of Precipitation for 24-Hour and 2-Hour Durations in Western Washington.

Appendix A. Electronic Appendix of the Inundation Levels and/or Water Surface Elevations at the Various Future Scenarios at Each of the Stormwater Outfall Locations Identified.

Submitted electronically at time of original document submittal.

Appendix B. Electronic Appendix of the Profiled Average Annual PRISM Precipitation Distribution in Kitsap County and Future Projections of the 24-hour, 100-year Design Storm Events for 2030, 2050, and 2080

Submitted electronically at time of original document submittal.

NPDES Permit Gap Analysis

Kitsap County Stormwater Comprehensive Plan
Appendix 6-1

Kitsap County
December 22, 2020

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Key	
Existing Requirement	This permit condition was present in the 2015 NPDES Permit.
New Requirement	This permit condition was not present in the 2015 NPDES Permit, and is new for the 2019 NPDES Permit.
☐	This permit condition was not found during Gap Analysis. See descriptions of Gap and Recommendation for further actions.
✓	This permit condition was met during Gap Analysis. No further action required.

Acronyms & Abbreviations

BMP = best management practice
County = Kitsap County
DCD = Department of Community Development
Ecology = Washington State Department of Ecology
IDDE = illicit discharge detection and elimination
KCC = Kitsap County Code
LID = low impact development
MOU = memorandum of understanding
MS4 = municipal separate sewer storm system
NOI = Notice of Intent
NPDES = National Pollutant Discharge Elimination System
PIC = Pollution Identification and Correction Program
SMAP = Stormwater Action Management Plan
SWMMWW = Stormwater Management manual for Western Washington
SWMP = Stormwater Management Program
SWPPP = stormwater pollution prevention plan
TDML = total maximum daily load

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S1 PERMIT COVERAGE AREA AND PERMITTEES			
S1.D.2	February 1, 2018	Application	✓ (a). Operators of regulated small municipal separate sewer storm systems (MS4s) have submitted or shall submit to Washington Department of Ecology (Ecology) either a Notice of Intent (NOI) for Coverage under National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater General Permit or a Duty to Reapply – NOI.
S2 AUTHORIZED DISCHARGES			
			This section describes the variety of discharges that are covered under the Permit, and the discharges that may travel to surface waters and to ground waters of the state. No documentation required.
S3 RESPONSIBILITIES OF PERMITTEES			
			This section describes how Permittees are responsible for compliance with the Permit. No documentation required.
S4 COMPLIANCE WITH STANDARDS			
S4.F	Immediate	Documentation	✓ Section F describes the actions to take if a discharge occurs in non-compliance with the Permit. **Citation:** The Kitsap County (County) Illicit Discharge Detection and Elimination (IDDE) program (2011) outlines the procedure, which meets the requirements, but does not explain the timeline**.** **Compliance Improvement:** Program/procedure could be improved if timelines were stated in the document. **Recommendation**: Recommend the County to identify timelines for the procedures.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5 STORMWATER MANAGEMENT PROGRAM FOR CITIES, TOWNS, AND COUNTIES			
S5.A STORMWATER MANAGEMENT PROGRAM PLAN			
S5.A.1	Immediate	Documentation	Stormwater Management Program (SWMP). **(Existing Requirement)** ✓ The County's SWMP applies to the geographical urbanized areas and urban growth areas associated with permitted cities under the jurisdictional control of the city. **Citation**: 2019 SWMP for NPDES Permit Implementation in Kitsap County, Washington (page 3) **Gap**: None. **Recommendation**: None.
S5.A.2	Annually	Documentation	SWMP **(Existing Requirement)** ✓ (a) Include description of planned activities for each program component in S5.C. **Citation:** 2019 Kitsap County SWMP (pages 26, 28, 32) **Gap:** None. **Recommendation:** None**.** ✓ (b) Include description of any additional planned actions to meet the requirements of applicable total maximum daily loads (TMDLs) pursuant to S7 *Compliance with Total Maximum Daily Load Requirements.* **Citation:** 2019 Kitsap County SWMP (pages 33-34) **Gap:** None. **Recommendation:** None**.** ✓ (c) Include description of any additional planned actions to meet the requirements of S8 *Monitoring and Assessment*. **Citation:** 2019 Kitsap County SWMP (page 39) **Gap:** None. **Recommendation**: None.
S5.A.3	a. Immediate b. August 1, 2019	Record Keeping	SWMP – Information Management. **(Existing Requirement)** ☐ (a) Each permittee shall track the cost or estimated cost of development and implementation of each component of the SWMP. This information shall be provided to Ecology upon request. **Citation:** Unable to locate in the 2015 NPDES Annual Report**.** **Gap:** None of the online documents (Annual Report, SWMP) show the tracking of this information. **Recommendation**: Recommend the County develop a tracking mechanism for cost and implementation of each component of the SWMP. ☐ (b) Each Permittee shall track the number of inspection, follow-up actions as a result of inspections, official enforcement actions and types of public education activities as required by the respective program component. This information shall be included in the annual report. **Citation:** Unable to locate in the 2015 NPDES Annual Report**.** **Gap:** The annual report does not contain information about the number of inspections, follow-up actions as a result of inspections, official enforcement actions, and types of public education activities. **Recommendation**: Recommend the County develop a tracking mechanism for inspections and follow-up actions as required by each program in the SWMP and add to Annual Report.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.A.4	Immediate	Record Keeping	SWMP – Implementation. **(Existing Requirement)** ✓ The County continues to implement the SWMP until the updated version is implemented. **Citation**: 2019 Kitsap County SWMP **Gap**: None. **Recommendation**: None.
S5.A.5	a. Immediate b. March 31, 2021	Documentation	SWMP – Coordination among agencies. **(Existing Requirement)** a. Coordination among entities covered under municipal stormwater NPDES permit, including: ☐ i. Coordination mechanisms clarifying roles and responsibilities for the control of pollutants between physically interconnected MS4s covered by a municipal stormwater permit. **Citation:** None **Gap:** Formal mechanisms, such as MOUs or other documentation, were not found. **Recommendation:** Recommend the County to include text regarding memorandums of understanding (MOUs) with other jurisdictions in the SWMP. SWMP – Coordination among agencies. **(Existing Requirement)** ✓ ii. Coordinating stormwater management activities for shared water bodies, or watersheds among Permittees to avoid conflicting plans, policies, and regulations. **Citation:** https://apps.ecology.wa.gov/paris/DownloadDocument.aspx?id=227951 **Gap:** None. **Recommendation**: None. SWMP – Interdepartmental coordination. **(Existing Requirement)** ✓ b. Coordination mechanisms among departments within each jurisdiction to eliminate barriers to compliance with the terms of this permit. Permittees shall include a written description of internal coordination mechanisms in the Annual Report. **Citation:** 2019 Kitsap County SWMP (pages 6, 9-11) **Gap:** None **Recommendation**: None
S5.B DISCHARGE REDUCTION			
			This section describes how the SWMP shall be designed to reduce pollutant discharge. No documentation required.
S5.C.1 COMPREHENSIVE STORMWATER PLANNING			
S5.C.1.a	August 1, 2020	Policy Development and Implementation	Stormwater Planning Interdisciplinary team **(New Requirement)** ☐ Convene an interdisciplinary team to inform and assist in the development, progress, and influence of this program. **Citation:** None. Should be included in the SWMP. **Gap:** No team has yet formed. **Recommendation:** Convene a team, establish a meeting frequency, roles and responsibilities, etc. (create a team charter)

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.1.b.i.	(a) March 31, 2021 (b) January 1, 2023	Documentation	Coordination with long-range plan updates (**New Requirement)**. ☐ (a) The Permittee shall respond to the series of Stormwater Planning Annual Report questions to describe how anticipated stormwater impacts on water quality were addressed, if at all, during the 2013-2019 permit term. **Citation:** None. Should be included in the SWMP. **Gap:** This is a new requirement for the 2019 permit. **Recommendation:** Submit to Ecology a list of completed CFP projects with a brief description of the water quality treatment components of the project. ✓ (b) The Permittee shall submit a report responding to the same questions included in (a), above, to describe how water quality is being addressed, if at all, during this permit term in updates to the Comprehensive Plan (or equivalent) and in other locally initiated or state-mandated, long-range land use plans that are used to accommodate growth or transportation. **Citation:** 2020 Stormwater Management Action Plan (SMAP)**.** **Gap:** None **Recommendation:** Submit the SMAP to Ecology.
S5.C.1.c	i. Immediate ii. December 31, 2023	i. Documentation ii. Policy Development and Implementation	Low impact development (LID) code-related requirements (**New Requirement**) i. By updating, revising and developing new local development related codes, rules, standards or other documents, LID principles and LID best management practices (BMPs) will become the preferred and commonly-used approach for site development focusing on minimizing impervious surfaces, native vegetation loss, and stormwater runoff. ✓ (a) Annually, assess and document any newly identified administrative or regulatory barriers to implementation of LID principles or LID BMPs, and the measures developed to address the barriers. If applicable, the report shall describe mechanisms adopted to encourage or require implementation of LID principles or LID BMPs. **Citation:** 2019 Kitsap County SWMP (page 28), 2015 NPDES Annual Report. This is currently being completed by Herrera. **Gap:** None. **Recommendation:** Recommend the County to include this assessment in the SWMP. ✓ ii. Review, revise, and make effective codes, rules, standards, or other enforceable documents to incorporate and require LID principles and LID BMPs. A summary of results must be submitted with the annual report no later than March 31, 2024, and list participants, codes, rules, standards, and other enforceable documents revisions and existing requirements that incorporate and require LID principles and BMPs, organized as follows: (a) Measures to minimize impervious surfaces. (b) Measures to minimize loss of native vegetation. (c) Other measures to minimize stormwater runoff. **Citation:** Kitsap County's 2020 Stormwater Design Manual. **Compliance strengthening:** Include in the annual report a description of how the County's codes are linked to the 2020 Stormwater Design Manual where LID requirements are provided. **Recommendation:** None.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.1.d	i. March 31, 2022 ii. June 30, 2022 iii. March 31, 2023	Record Keeping	Stormwater Management Action Planning **(New Requirement)** ✓ (i) *Receiving water basin assessment.* Permittees shall document and assess existing information related to local receiving waters and contributing area conditions to identify receiving waters that will benefit from stormwater management planning. Submit a watershed inventory and include a brief description of the relative conditions of the receiving waters and the contributing areas. **Citation**: Section 4 (page 25) of the 2019 SWMP highlights improving water quality trends in County water bodies and attributes the improvements to the County's Pollution Identification and Correction (PIC) Program. **Compliance Improvement**: There is no watershed inventory included in the documents. **Recommendation**: Recommend the County to develop and submit a watershed inventory including descriptions of the relative conditions of the receiving waters and the contributing areas. ✓ (ii) *Receiving water basin prioritization.* Prioritize and rank identified water basins that would benefit from implementation of stormwater facility retrofits and management actions to reduce pollutant loading and address hydrologic impacts from existing development. **Citation**: Section 4 (page 24) of the 2019 SWMP describes how, through the IDDE program, the Kitsap County Public Works and Health District uses basin assessment indicators and trends to prioritize screenings and field investigations. **Gap**: None. **Recommendation**: None. ✓ (iii) *Stormwater Management Action Plan* (SMAP). Develop a SMAP for at least one high priority area that identifies the following: (a) A description of the stormwater facility retrofits needed for the area, including the BMP types and preferred locations. (b) Land management/development strategies and/or actions identified for water quality management. (c) Targeted, enhanced, or customized implementation of stormwater management actions related to permit sections within S5, including: • IDDE field screening, • Prioritization of Source Control inspections, • Operations & Maintenance (O&M) inspections or enhanced maintenance, or • Public Education and Outreach behavior change programs. Identified actions shall support other specifically identified stormwater management strategies and actions for the basin overall, or for the catchment area in particular. (d) If applicable, identification of changes needed to local long-range plans, to address SMAP priorities. (e) A proposed implementation schedule and budget sources for: • Short-term actions (*i.e.*, actions to be accomplished within 6 years), and • Long-term actions (*i.e.*, actions to be accomplished within 7 to 20 years). (f) A process and schedule to provide future assessment and feedback to improve the planning process and implementation of procedures or projects. **Citation**: In January 2019 the County went into contract with a consulting firm to prepare a SMAP that includes opportunities for public input. **Gap**: None. **Recommendation**: None.
S5.C.2 PUBLIC EDUCATION AND OUTREACH			
S5.C.2.a.i	Immediate	Documentation	Education and outreach program – *general awareness* (**Existing Requirement**, a few revisions to it including the ongoing/strategic schedule requirement) ✓ General awareness. To build general awareness, Permittees shall annually select at a minimum one target audience and one subject area. Permittees shall provide subject area information to the target audience on an ongoing or strategic schedule. **Citation**: County's web pages present stormwater education materials for both businesses and homeowners. https://www.kitsapgov.com/pw/Pages/business_stormwater.aspx https://www.kitsapgov.com/pw/Pages/home_stormwater.aspx **Gap:** None. **Recommendation:** None.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.2.a.ii	(a) Immediate	Documentation	Education and outreach program – *behavior change* (**Existing Requirement**) ✓ (a) Behavior change – To affect behavior change, Permittees shall select, at a minimum, one target audience and one BMP: **Citation**: The County's pet waste education/outreach program has focused on installing pet waste bag stations and educating through the Mutt Mitt Program. The 2019 SWMP (pages 13-14) shows figures demonstrating growth of the program and estimates pet waste removed due to the program. **Gap**: None. **Recommendation**: None.
	(b) July 1, 2020	Evaluation	Education and outreach program – *behavior change* (**New Requirement**) ✓ (b) Each permittee shall conduct a new evaluation of the effectiveness of the ongoing behavior change program. This evaluation may not be required if the County selects option S5.C.2.a.ii.(c)3 and it will not add value to the overall behavior change program. **Citation:** None. **Compliance Improvement**: This is a new requirement for the 2019 permit. Evaluation of the effectiveness of the backyard pet waste campaign was completed in 2019. **Recommendation**: Recommend the County to make the evaluation report of the Backyard Pet Waste Plan available online.
	(c) February 1, 2021	Documentation (program and program evaluation plan)	Education and outreach program – *behavior change* (**New Requirement**) ☐ (c).1. Each permittee shall: • Develop a strategy and schedule to more effectively implement the existing behavior change program; or • Develop a strategy and schedule to expand the existing program to a new target audience or BMPs; or • Develop a strategy and schedule for a new target audience and BMP behavior change campaign. **Citation:** None. **Gap**: This is a new requirement for the 2019 permit. **Recommendation**: Develop and implement an annual survey that measures the effectiveness of the County's education and outreach campaigns.
	(d) April 1, 2021		☐ (d). Begin to implement the strategy developed in c. **Citation:** None **Gap**: This is a new requirement for the 2019 permit. **Recommendation:** Expand the Annual Report to include the information obtained from strategy implemented in S5.C.2.a.ii.c.
	(e) March 31, 2024		☐ (e). Evaluate and report on the changes in understanding and adoption of targeted behaviors resulting from the implementation of the strategy and any planned or recommended changes to the program in order to be more effective; describe the strategies and process to achieve the results. Use results to continue to direct effective methods and implementation of the ongoing behavior change program. **Citation:** None. **Gap**: This is a new requirement for the 2019 permit. **Recommendation**: Design survey questions so that they are repeated annually and responses are tracked.
S5.C.2.a.iii	Immediate	Documentation	Education and outreach program (**Existing Requirement**) ✓ Stewardship: Each Permittee shall create and advertise stewardship opportunities and/or partner with existing organizations to encourage residents to participate in activities or events planned and organized within the community, such as: stream teams, storm drain marking, volunteer monitoring, riparian plantings, and education activities. **Citation**: Numerous stewardship opportunities listed in 2019 SWMP (page 17), including attendance at each. **Gap**: None. **Recommendation**: None.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.3 PUBLIC INVOLVEMENT AND PARTICIPATION			
S5.C.3.a	Immediate	Policy Development and Implementation	**(Existing Requirement)** ✓ Opportunities for the public, including over-burdened communities, to participate in the decision-making processes involving the development, implementation and update of the SWMP. **Citation**: Listed as a planned activity for 2019 in section 3.3 (page 22) of the 2019 SWMP, "Solicit input from the public regarding the Stormwater Comprehensive Plan…" **Gap**: None. **Recommendation**: None.
S5.C.3.b	Immediate	Documentation	**(Existing Requirement)** ☐ The SWMP and annual report are to be posted on the website by May 31 each year. **Citation**: www.kitsapgov.com/pw/Documents/2019_Kitsap_County_SWMP.pdf **Gap**: 2019 Annual Report not found on the public website. **Recommendation**: Recommend the County to put the Annual Reports online each year.
S5.C.4 MS4 MAPPING AND DOCUMENTATION			
S5.C.4.a	Immediate	Record Keeping	**(Existing Requirement)** ✓ Ongoing mapping: Each Permittee shall maintain mapping data for the features listed below: i. Known MS4 outfalls and known MS4 discharge points. ii. Receiving waters, other than groundwater. iii. Stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee. iv. Geographic areas served by the Permittee's MS4 that do not discharge stormwater to surface waters. v. Tributary conveyances to all known outfalls and discharge points with a 24-inch nominal diameter or larger, or an equivalent cross-sectional area for non-pipe systems. vi. Connections between the MS4 owned or operated by the Permittee and other municipalities or public entities. vii. All connections to the MS4 authorized or allowed by the Permittee after February 16, 2007. **Citation:** KC's stormwater infrastructure is managed through the Cartegraph Software system, stores information for each asset (size, type, as-built date, condition, inspection, and maintenance history etc.). Referenced in the 2019 SWMP (page 23). **Gap**: None. **Recommendation**: None.
S5.C.4.b	i. January 1, 2020 ii. August 1, 2023	Record Keeping	**(New Requirement)** New mapping: Each Permittee shall: ✓ i. Beginning on January 1, 2020, where known, map size and material for all known MS4 outfalls. **Citation:** IDDE report (page 2), Kitsap County Public Works (June 2011) **Gap:** None**.** **Recommendation**: None. ✓ ii. No later than August, 1, 2021, complete mapping of all known connections from the MS4 to a privately owned stormwater system. **Citation:** IDDE Program (page 2), Kitsap County Public Works**.** **Gap:** None**.** **Recommendation**: None.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.4.c	August 1, 2021	Record Keeping	**(New Requirement)** ✓ Beginning August 1, 2021, the required format for mapping is electronic, with fully described mapping standards. **Citation:** https://psearch.kitsapgov.com/psearch/ **Gap**: None. **Recommendation**: None.
S5.C.4.d	Immediate	Record Keeping	**(Existing Requirement)** ✓ To the extent consistent with national security laws and directives, each Permittee shall make available to Ecology, upon request, available maps depicting the information required in S5.C.4.a through c, above. **Citation:** https://psearch.kitsapgov.com/psearch/ **Gap**: None. **Recommendation:** None.
S5.C.4.e	Immediate	Record Keeping	**(Existing Requirement)** ✓ Upon request, and to the extent appropriate, Permittees shall provide mapping information to federally recognized Indian tribes, municipalities, and other Permittees. This permit does not preclude Permittees from recovering reasonable costs associated with fulfilling mapping information requests by federally recognized Indian tribes, municipalities, and other Permittees. **Compliance Improvement:** https://www.kitsapgov.com/dcd/Pages/Community_Development_Maps.aspx. **Recommendation:** Recommend the County include MS4 mapping information on its mapping website.
S5.C.5 ILLICIT DISCHARGE DETECTION AND ELIMINATION			
S5.C.5.a	Immediate	Documentation	**(New Requirement)** ✓ Procedures for reporting and correcting or removing illicit connections, spills and other illicit discharges when they are suspected or identified. **Citation:** The County's IDDE program manual is available at County website (page 10) https://www.kitsapgov.com/pw/Documents/IDDE_Program_Plan.pdf **Compliance Improvement**: None. **Recommendation**: Recommend the County to add the web site address to the Annual Report. Consider updating the 2011 manual to current practices and information.
S5.C.5.b	Immediate	Documentation	**(Existing Requirement)** ✓ Permittees shall inform public employees, businesses, and the general public of hazards associated with illicit discharges and improper disposal of waste **Citation:** Information regarding the hazards associated with illicit discharges readily found on website for businesses here: https://www.kitsapgov.com/pw/Pages/business_stormwater.aspx and for residents here: https://www.kitsapgov.com/pw/Pages/home_stormwater.aspx **Gap**: None. **Recommendation**: None.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.5.c	Immediate	Policy Development and Implementation	**(Existing Requirement)** ✓ Each Permittee shall implement an ordinance or other regulatory mechanism to effectively prohibit non-stormwater, illicit discharges in the Permittee's MS4 to the maximum extent allowable under state and federal law. ✓ (i) Allowable discharges. **Citation:** The SWMP states Kitsap County Code (KCC) Title 12 has prohibited illicit discharges to the MS4 since 1996 (page 23). The code was updated in 2016. **Gap:** None. **Recommendation:** None.
			✓ (ii) Conditionally allowable discharges **Citation:** The SWMP states KCC Title 12 has prohibited illicit discharges to the MS4 since 1996 (page 23). The code was updated in 2016. **Gap:** None **Recommendation:** None
			✓ (iii) Discharges identified as significant sources of pollutants **Citation:** The SWMP states KCC Title 12 has prohibited illicit discharges to the MS4 since 1996 (page 23). The code was updated in 2016. **Gap:** None. **Recommendation:** None.
			✓ (iv) Escalating enforcement procedures and actions **Citation:** The SWMP states KCC Title 12 has prohibited illicit discharges to the MS4 since 1996 (page 23). The code was updated in 2016 (KCC 12.30.020). **Gap:** None. **Recommendation:** None.
S5.C.5.d	Immediate	Policy Development and Implementation	**(Existing Requirement)** ☐ Each Permittee shall implement an ongoing program designed to detect and identify non-stormwater discharges and illicit connections in the Permittee's MS4. Program will include: (i). Procedures for conducting investigations of the Permittee's MS4, including field screening and methods for identifying potential sources. Procedures may also include source control inspections. (a) Complete field screening for an average of 12% of the MS4 per year. Track total percentage annually beginning August 1, 2019. (New requirement) (ii). A publicly listed and publicized hotline or other telephone number for public reporting of spills and other illicit discharges. (iii). An ongoing training program for all municipal field staff, who, as part of their normal job responsibilities, might come into contact with or otherwise observe an illicit discharge and/or illicit connection to the MS4, on the identification of an illicit discharge and/or connection, and on the proper procedures for reporting and responding to the illicit discharge and/or connection. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements, or staffing. Permittees shall document and maintain records of the trainings provided and the staff trained. **Citation:** The SWMP (page 24) states "KCPW and KPHD cooperate to conduct a comprehensive county-wide IDDE program." The program targets areas with existing water quality concerns and follows up with field investigations. The County also has a regional hotline and smartphone app to report spills and other water quality issues. **Gap:** A new requirement for the 2019 Permit is that on average, 12% of the MS4 should be field screened each year and these percentages must be tracked annually. **Recommendation:** Develop data record keeping program to demonstrate that 12% of the system is screened.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.5.e	Immediate	Record Keeping	**(Existing Requirement)** Each Permittee shall implement an ongoing program designed to address illicit discharges, including spills and illicit connections, into the Permittee's MS4. Program will include: ✓ (i). Procedures for characterizing the nature of, and potential public or environmental threat posed by, any illicit discharges found by or reported to the Permittee. Procedures shall address the evaluation of whether the discharge must be immediately contained and steps to be taken for containment of the discharge. ✓ (ii). Procedures for tracing the source of an illicit discharge, including visual inspections, and, when necessary, opening manholes, using mobile cameras, collecting and analyzing water samples, and/or other detailed inspection procedures. ✓ (iii). Procedures for eliminating the discharge, including notification of appropriate authorities (as well as owners or operators of interconnected MS4s); notification of the property owner; technical assistance; follow-up inspections; and use of the compliance strategy developed pursuant to S5.C.3.b.v5.c.iv, including escalating enforcement and legal actions if the discharge is not eliminated. ✓ (iv). In the case of illicit discharge, compliance with the provisions in (i), (ii), and (iii), above, shall be achieved by meeting established timelines **Citation:** The 2011 IDDE manual (pages 8-12) describes the County's program appearing to meet the requirements. **Compliance Improvement:** The IDDE does not describe timelines for actions in the event of an illicit discharge. **Recommendation:** Add timelines for each follow-up action as a reference within the written procedures.
S5.C.5.f	Immediate	Record Keeping	**(Existing Requirement)** ✓ Permittees shall train staff who are responsible for identification, investigation, termination, cleanup, and reporting of illicit discharges, including spills, and illicit connections, to conduct these activities. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements or staffing. Permittees shall document and maintain records of the training provided and the staff trained. **Citation:** The 2011 IDDE Program Manual (pages 11-12) outlines the training program for staff. **Gap:** None. **Recommendation:** None.
S5.C.5.g	Immediate	Record Keeping	**(New Requirement)** ✓ Recordkeeping. In the annual report permittees will submit data for all illicit discharges investigated during the previous calendar year. The data will include information specified in Appendix 12 and the WQWebIDDE. **Citation:** https://ecology.wa.gov/Regulations-Permits/Reporting-requirements/Stormwater-monitoring/Stormwater-Action-Monitoring/SAM-source-identification **Compliance Improvement:** The County has set up the Cartegraph system to do a direct export to the new WQWebIDDE, but the illicit discharge investigation data is not found in the annual report. This is a new requirement for the 2019 permit. **Recommendation:** Recommend the County to include illicit discharge investigation data in the annual report.
S5.C.6 CONTROLLING RUNOFF FROM NEW DEVELOPMENT, REDEVELOPMENT, AND CONSTRUCTION SITES			
S5.C.6.a	June 30, 2022	Policy Development and Implementation	**(Existing Requirement)** ✓ Implement an ordinance or other enforceable mechanism that addresses runoff from new development, redevelopment, and construction site projects. **Citation**: KCC 12.20.010. **Gap**: None. **Recommendation**: None.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.6.b	June 30, 2022	Record Keeping	**(Existing Requirement)** The ordinance or other enforceable mechanism shall include, at a minimum: ✓ (i). The Minimum Requirements in Appendix 1, or the 2013 Appendix 1 amended to include the changes identified in Appendix 10, or a program approved by Ecology under the *2013 NPDES Phase I Municipal Stormwater Permit* and amended to include Appendix 10. **Citation:** KCC 12.24. **Gap:** None **Recommendation:** None ✓ (ii). The local requirements shall include the following: (a) Site planning requirements (b) BMP selection criteria (c) BMP design criteria (d) BMP infeasibility criteria (e) LID competing needs criteria (f) BMP limitations **Citation:** https://www.kitsapgov.com/dcd/Documents/Kitsap_Stormwater_Design_Manual_2016.pdf#search=stormwater%20manual **Gap:** None. **Recommendation:** None. ✓ (iii). The legal authority to inspect and enforce maintenance standards for private facilities that discharge to the MS4. **Citation:** KCC 12.24; https://www.kitsapgov.com/dcd/Documents/Kitsap_Stormwater_Design_Manual_2016.pdf#search=stormwater%20manual. **Gap:** None. **Recommendation:** None.
S5.C.6.c	Immediate	Record Keeping	**(Existing Requirement)** ✓ The program shall include a permitting process with site plan review, inspection and enforcement capability to the following standards: (i). Site plan review. (ii). Pre-clearing/construction inspection. (iii). Inspection of sites during construction. (iv). Inspection of treatment and flow control facilities during construction. (v). Inspection upon completion. (vi). Compliance determined by achieving 80% of required inspections during permit term. (vii). Procedures for record keeping. (viii). Enforcement strategy for issues of non-compliance. **Citation:** KCC 12.10. **Gap:** None. **Recommendation:** None.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.6.d	Immediate	Record Keeping	**(New Requirement)** ☐ The program shall make available, as applicable, the link to the electronic Construction Stormwater General Permit NOI form for construction activity and, as applicable, a link to the electronic Industrial Stormwater General Permit NOI form for industrial activity to representatives of proposed new development and redevelopment. Permittees shall continue to enforce local ordinances controlling runoff from sites that are also covered by stormwater permits issued by Ecology. **Citation: F**orms are available on state websites. **Compliance Improvement:** Direction to forms is not provided on the County's website. **Recommendation:** Recommend the County to add active link to NOI form to its website.
S5.C.6.e	Immediate	Record Keeping	**(Existing Requirement)** ✓ Each Permittee shall ensure that all staff whose primary job duties are implementing the program to control stormwater runoff from new development, redevelopment, and construction sites, including permitting, plan review, construction site inspections, and enforcement are trained to conduct these activities. Follow-up training must be provided as needed to address changes in procedures, techniques or staffing. Permittees shall document and maintain records of the training provided and the staff trained. **Citation**: Located in Kitsap County's training database. **Compliance Improvement**: Records of training may be difficult to produce in the case of audit. **Recommendation**: Recommend the County to provide location of files that contain training records and develop a process of reporting on training status.
S5.C.7 OPERATIONS AND MAINTENANCE			
S5.C.7.a	June 30, 2022	O&M	**(Existing Requirement)** Each Permittee shall implement maintenance standards that are as protective, or more protective, of facility function than those specified in the *Stormwater Management Manual for Western Washington* or a Phase I program approved by Ecology. **(New Requirement)** ✓ (i) The purpose of the maintenance standard is to determine if maintenance is required. The maintenance standard is not a measure of the facility's required condition at all times between inspections. Exceeding the maintenance standard between inspections and/or maintenance is not a permit violation. **(Existing Requirement)** **Citation:** Per the 2019 SWMP (pages 29-30), KCPW facilities have SWPPPs that meet Permit requirements. Further, the County Stormwater Manual (page 7-1) states that the County follows required maintenance activities per the 2014 *Stormwater Management Manual for Western Washington* (SWMMWW) (Ecology). **Gap:** None. **Recommendation:** None. ✓ (ii) Maintenance shall be performed for the following standards unless there are circumstances beyond the Permittee's control, when an inspection identifies an exceedance of the maintenance standard, maintenance shall be performed for the following standards **(New Requirement):** • Within 1 year for typical maintenance of facilities, except catch basins • Within 6 months for catch basins • Within 2 years for maintenance that requires capital construction of less than $25,000 If the agency is unable to perform the inspections due to circumstances beyond their control, the agency shall document the circumstances. **Citation:** Per the 2019 SWMP (pages 29-30), KCPW facilities have SWPPPs that meet Permit requirements. Further, the County Stormwater Manual (page 7-1) states that the County follows required maintenance activities per the 2014 SWMMWW. **Gap:** None. **Recommendation:** None.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.7.b	Immediate	O&M	Maintenance of stormwater facilities regulated by the Permittee: (i). The program shall include provisions to verify adequate long-term O&M **(New Requirement):** ✓ (a) Implementation of an ordinance or other enforceable mechanism. • Clearly identifies the party responsible for maintenance in accordance with maintenance standards established under S5.C.7.a. • Requires inspection of facilities in accordance with the requirements in (b) below. • Establishes enforcement procedures. **Citation**: KCC 12.24.010. **Gap:** None**.** **Recommendation:** None**.** ✓ (b) Annual inspections of all stormwater treatment and flow control BMPs/facilities. Permittees may reduce the inspection based on maintenance records double the length of time of the proposed inspection frequency. **(Existing Requirement)** **Citation:** Kitsap County's Cartegraph asset management system. **Gap:** None**.** **Recommendation:** None**.**
			✓ (ii). Compliance with the inspection requirements in (b) above shall be determined by the presence of records of an established inspection program designed to inspect all sites. Compliance during this permit term shall be determined by achieving at least 80% of all sites. **(Existing Requirement)** **Citation**: Kitsap County's Department of Community Development (DCD) has records of construction inspections in SmartGov and other facility inspections and enforcement records are tracked in the Public Works Department's asset management system, Cartegraph. **Compliance Improvement**: There is currently no way to verify the existence of such records in the SWMP. **Recommendation**: Recommend including screen shots of Cartegraph records or a citation of Cartegraph records in the annual SWMP report to Ecology along with a program description and requirements in the SWMP.
			✓ (iii). The program shall include a procedure for keeping records of inspections and enforcement actions. **(Existing Requirement)** **Citation**: DCD has records of construction inspections in SmartGov and other facility inspections and enforcement records are tracked in Public Works' asset management system, Cartegraph. **Compliance Improvement**: There is currently no way to verify the existence of such records in the SWMP. **Recommendation**: Recommend including screen shots of Cartegraph records or a citation of Cartegraph records in the annual SWMP report to Ecology along with a program description and requirements in the SWMP.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.7.c	Immediate	O&M	Maintenance of stormwater facilities owned or operated by the Permittee: ✓ (i). Each Permittee shall implement a program to annually inspect all municipally owned or operated permanent stormwater treatment flow control BMPs/facilities. Permittees may reduce the number of inspections based on maintenance records to double the length of time between the proposed inspection frequency. **(Existing Requirement)** **Citation:** Kitsap County's Cartegraph asset management system. **Compliance Improvement**: There is currently no way to verify the existence of such records in the SWMP. **Recommendation**: Recommend including screen shots of Cartegraph records or a citation of Cartegraph records in the annual SWMP report to Ecology along with a program description and requirements in the SWMP.
			✓ (ii). Spot checks of potentially damaged permanent stormwater treatment and flow control BMPs/facilities after major storm events and repairs as appropriate. (Existing Requirement) **Citation:** Kitsap County's Cartegraph asset management system. **Compliance Improvement**: There is currently no way to verify the existence of such records in the SWMP. **Recommendation**: Recommend including screen shots of Cartegraph records or a citation of Cartegraph records in the annual SWMP report to Ecology along with a program description and requirements in the SWMP.
			✓ (iii). Inspection of all catch basins and inlets owned or operated by the Permittee every two years. **(Existing Requirement)** (a) Permitees may reduce the numbers of inspections based on maintenance records to double the length of time between proposed inspection frequency. (b) Inspection every two years may be conducted on a "circuit basis." (c) Permittee may clean all pipes, distches, and catch basins and inlets within a circuit once during the permit term. Circuits selected for this alternative must drain to a single point. **Citation:** Kitsap County's Cartegraph asset management system, and 2015 NPDES Annual Report (page 8). **Compliance Improvement:** The County plans and tracks all catch basin and stormwater facility inspection and maintenance activities in the Cartegraph asset management system. However, details about the tracking methods are not discussed in the SWMP (pages 23 and 30)**.** **Recommendation:** Recommend the County to provide the program description and requirements in the SWMP**.**
			✓ (iv). Compliance is determined by achieving at least 95% of required inspections. **Citation:** Kitsap County's Cartegraph asset management system. **Compliance Improvement**: The County plans and tracks all catch basin and stormwater facility inspection and maintenance activities in the Cartegraph asset management system. However, details about the tracking methods are not discussed in the SWMP (pages 23 and 30). **Recommendation:** Include tracking methods and protocols in the Annual Report.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.7.d	Immediate	O&M	**(Existing Requirement)** ✓ Each permittee shall implement and document all practices, policies, and procedures to reduce stormwater impacts associated with runoff from all lands owned or maintained by the Permittee, and road maintenance activities under the functional control of the Permittee, and must include the following activities: i. Pipe cleaning ii. Cleaning of culverts that convey stormwater in ditch systems iii. Ditch maintenance iv. Street cleaning v. Road repair and resurfacing, including pavement grinding vi. Snow and ice control vii. Utility installation viii. Pavement striping maintenance ix. Maintain roadside areas, including vegetation management x. Dust control xi. Fertilizers, pesticides, and herbicides xii. Sediment and erosion control xiii. Landscape maintenance and vegetation disposal xiv. Trash and pet waste management xv. Building exterior cleaning and maintenance **Citation**: Section 6 (pages 29-32) of the 2019 SWMP describes numerous efforts by the County to meet these requirements. **Gap**: None. **Recommendation**: None.
S5.C.7.e	Immediate	O&M	**(Existing Requirement)** ✓ Implement an ongoing training program for employees of the Permittee whose primary construction, operations, or maintenance job functions may impact stormwater quality. **Citation**: Unable to find location of records in the SWMP. **Gap**: Section 5 (page 28) of the 2019 SWMP mentions continued training for County staff and external partners in the development community, but no specific program located in the document. **Recommendation**: Recommend the County to provide location of records in the SWMP.
S5.C.7.f	Immediate	O&M	**(Existing Requirement)** ✓ Implement a SWPPP for all heavy equipment maintenance or storage yards, and material storage facilities owned or operated by the Permittee in areas subject to this Permit that are not required to have coverage under the Industrial Stormwater General Permit or another NPDES permit that authorizes stormwater discharges associated with the activity. i. Description of operational/structural BMPs in use and implementation schedule for future facilities ii. Annual inspections and documentation iii. Inventory of materials and equipment on site iv. Site map of drainage, discharge, pollutant exposure v. Prevention and spill response plans **Citation:** Per the 2019 SWMP (pages 29-30), County Public Works facilities have SWPPPs that meet Permit requirements, all of which were updated in 2017. **Gap:** None. **Recommendation:** None.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S5.C.7.g	Immediate	O&M	**(Existing Requirement)** ✓ Maintain records of inspections and maintenance or repair activities conducted by the Permittee. **Citation:** Unable to find location of records in the SWMP (pages 23 and 30). **Gap**: The County plans and tracks all catch basin and stormwater facility inspection and maintenance activities in the Cartegraph asset management system, but no records are located in the SWMP. **Recommendation**: Recommend the County to provide the program description and requirements in the SWMP.
S5.C.8 Source Control Program for Existing Development			
S5.C.8.a	[See S5.C.8.b]	Policy Development and Implementation	**(New Requirement)** ☐ Each Permittee shall implement a program to prevent and reduce pollutants in runoff from areas that discharge to MS4s. i. Application of operational and structural source control BMPs, and, if necessary, treatment BMPs/facilities to pollution generating sources associated with existing land uses and activities. ii. Inspections of pollutant generating sources at publically and privately owned commercial and industrial properties to enforce implementation of required BMPs to control pollution discharging into the Permittee's MS4. iii. Application and enforcement of local ordinances at sites, identified pursuant to S5.C.8.b.ii, including sites with discharges authorized by a separate NPDES permit. iv. Practices to reduce polluted runoff from the application of pesticides, herbicides, and fertilizer discharging into MS4s owned or operated by the Permittee. **Citation:** None**.** **Gap:** This is a new requirement for the 2019 permit. The 2019 SWMP mentions upcoming planned activity for 2019 to develop a source control program to meet upcoming permit requirements. **Recommendation:** Develop business-inventory organized by watershed and categorized by pollution-generating activities (e.g. fueling, grounds, vehicle maintenance, loading/unloading, hazardous materials, see Appendix 8 of the Phase II Municipal permit). Develop inspection schedule working in a "upstream to downstream" progression.
S5.C.8.b.	i. August 1, 2022	Regulatory	**(New Requirement)** ☐ Permittees shall adopt an ordinance, or other enforceable documents, requiring the application of source control BMPs for pollutant generating sources associated with existing land uses and activities. **Citation:** None**.** **Gap:** This is a new requirement for the 2019 permit. The 2019 SWMP mentions upcoming planned activity for 2019 is to develop a source control program to meet upcoming permit requirements. **Recommendation:** Continue working to develop ordinance to be put in place prior to implementation date.
	ii. August 1, 2022	Record Keeping	**(New Requirement)** ☐ Permittees shall establish an inventory that identifies publically and privately owned institutional, commercial, and industrial properties which have the potential to generate pollutants to the Permittee's MS4. The inventory shall include: ☐ (a) Businesses and/or properties identified based on the presence of activities that are pollutant generating (refer to Appendix 8). ☐ (b) Complaint-based response to identify other pollutant generating sources, such as: mobile or home-based businesses and multi-family properties. **Citation:** None**.** **Gap:** This is a new requirement for the 2019 permit. The 2019 SWMP mentions upcoming planned activity for 2019 is to develop a source control program to meet upcoming permit requirements. **Recommendation:** See S5.C.8.a

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
	iii. January 1, 2023	Inspection	**(New Requirement)** ☐ Permittees shall implement an inspection program for sites identified pursuant to S5.C.8.b.ii. (a) Inventory of businesses. (b) Annual completion of inspections of 20% of businesses/sites. (c) Inspect 100% of sites identified through credible complaints. (d) Complaint inspections may go toward the 20%. **Citation:** None**.** **Gap:** This is a new requirement for the 2019 permit. The 2019 SWMP mentions upcoming planned activity for 2019 is to develop a source control program to meet upcoming permit requirements. **Recommendation:** Agenda item with County to discuss this new requirement.
	iv. January 1, 2023	Enforcement	**(New Requirement)** ☐ Permittee shall implement a progressive enforcement policy that requires sites to comply with stormwater requirements within a reasonable time period. **Citation:** None**.** **Gap:** This is a new requirement for the 2019 permit. The 2019 SWMP mentions upcoming planned activity for 2019 is to develop a source control program to meet upcoming permit requirements. **Recommendation:** Model enforcement policy after IDDE program and ordinance.
	v. Ongoing following source control program schedule	Training	**(New Requirement)** ☐ Permittees shall train staff who are responsible for implementing the source control program to conduct these activities. The ongoing training program shall cover the legal authority for source control, source control BMPs and their proper application, inspection protocols, lessons learned, typical cases, and enforcement procedures. Follow-up training must be provided as needed to address changes in procedures, techniques, requirements, or staff. Permittees shall document and maintain records of the training provided and the staff trained. **Citation:** None**.** **Gap:** This is a new requirement for the 2019 permit. The 2019 SWMP mentions upcoming planned activity for 2019 is to develop a source control program to meet upcoming permit requirements. **Recommendation:** Create training program based on technical content of Appendix 8 in the Phase II permit. Develop database or other similar tool to track hours of training for staf.s
S6 STORMWATER MANAGEMENT PROGRAM FOR SECONDARY PERMITTEES			
			Not applicable to Kitsap County; these are for secondary permittees. This would occur if other public entities (such as ports, prisons, parks, etc.) own or operate a stormwater sewer system in the County. This separate system is called an MS4, and one of these other public entities with an MS4 may be required to get a secondary municipal stormwater permit.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S7 COMPLIANCE WITH TOTAL MAXIMUM DAILY LOAD REQUIREMENTS			
S7.A		Documentation	**(Existing Requirement)** For applicable TMDLs listed in Appendix 2, affected Permittees shall comply with the specific requirements identified in Appendix 2. Each Permittee shall keep records of all actions required by this Permit that are relevant to applicable TMDLs within their jurisdiction. The status of the TMDL implementation shall be included as part of the annual report submitted to Ecology. Each annual report shall include a summary of relevant SWMP and Appendix 2 activities conducted in the TMDL area to address the applicable TMDL parameter(s). ✓ Sinclair and Dyes Inlets Fecal Coliform Bacteria TDML (Appendix 2 Requirements): • Designate areas discharging via MS4 to Barker, Clear, Strawberry, Ostrich Bay, and Phinney creeks and shorelines at the head of Dyes Inlet as the highest priority areas for IDDE routine field screening (including agricultural land use inventories in rural areas) and, beginning no later than August 1, 2014, implement the associated schedules and activities identified in S5.C.3 of the Western Washington Phase II permit for response to any illicit discharges found. Conduct IDDE efforts in MS4 areas that discharge to Beaver, Pahrmann, Sacco, and upper Blackjack creeks and to the western shoreline of Chico Bay near Washington Department of Health (DOH) site 471 as resources allow. • By December 31, 2016, review and, if necessary, increase the frequency of inspection and cleanout of catch basins (in accordance with S5.C.4 and 5 of the Western Washington Phase II permit) to maintain catch basin sediment levels below 60% full. Focus on areas within the Sinclair and Dyes Inlets watershed with closed conveyance systems and catch basins. • Install and maintain pet waste education and collection stations at municipal parks and other Permittee owned and operated lands adjacent to stream and marine shorelines. Focus on locations where people commonly walk their dogs. **Citation**: 2015 NPDES Annual Report (page 33) **Compliance Improvement**: The 2015 NPDES Annual Report includes these items, but as more recent annual reports have not been found, this requirement remains unconfirmed. **Recommendation**: Recommend the County to upload the 2018 and 2019 NPDES Annual Reports so it can be confirmed that this requirement has been met.
S8 MONITORING AND ASSESSMENT			
S8.A.1	December 1, 2019	Payment	Regional status and trends monitoring **(Existing Requirement)** ✓ Permittees that chose S8.B Status and Trends Monitoring Option #1 in the Phase II Western Washington Municipal Stormwater Permit August 1, 2013–July 31, 2018 (extended to July 31, 2019) shall pay into the collective fund to implement regional small streams and marine near-shore areas status and trends monitoring in Puget Sound. The payments into the collective fund are due on or before December 1, 2019, and the S8.A amounts are listed in Appendix 11. **Citation**: The 2019 SWMP (page 35) identifies that on December 1, 2013, the county would pay into the collective fund and that payments have been made annually. **Gap**: None. **Recommendation**: None.
S8.A.2	December 1, 2019	Documentation	Regional status and trends monitoring **(Existing Requirement)** ✓ No later than December 1, 2019, all City and County Permittees covered under the Phase II Western Washington Municipal Stormwater Permit August 1, 2013–July 31, 2018 (extended to July 31, 2019) shall notify Ecology in writing which of the following two options for regional status and trends monitoring the Permittee chooses to carry out during the duration of this permit. Either option will fully satisfy the Permittee's obligations under this section (S8.A.2). Each Permittee shall select a single option for the duration of this permit. a. Collective fund to implement regional receiving water status and trends monitoring ***OR*** b. Conduct stormwater discharge monitoring per requirements in S8.C. **Citation**: Unable to locate in 2019 SWMP. **Compliance Improvement**: Recommend the County add documentation of their selection to SWMP annual report and document the participation with a budget number reference of letter of intent. Selection has not been verified in the SWMP.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S8.B.1	December 1, 2019	Payment	Stormwater management program effectiveness and source identification studies **(Existing Requirement)** ✓ Permittees that chose S8.C Effectiveness Studies Option #1 in in the Phase II Western Washington Municipal Stormwater Permit August 1, 2013–July 31, 2018 (extended to July 31, 2019) shall pay into the collective fund to implement effectiveness studies and source identification studies. The payments are due on or before December 1, 2019. The S8.B payment amounts are listed in Appendix 11. **Citation**: The 2019 SWMP (page 35) identifies that on December 1, 2013, the county would pay into the collective fund and that payments have been made annually. **Gap**: None. **Recommendation**: None.
S8.B.2	December 1, 2019	Documentation	Stormwater management program effectiveness and source identification studies **(Existing Requirement)** ☐ No later than December 1, 2019, all City and County Permittees covered under the Phase II Western Washington Municipal Stormwater Permit August 1, 2013–July 31, 2018 (extended to July 31, 2019) shall notify Ecology in writing which of the following two options for effectiveness and source identification studies the Permittee chooses to carry out during this permit cycle. Either option will fully satisfy the Permittee's obligations under this section (S8.B.2). Each Permittee shall select a single option for the duration of this permit term. a. Collective fund to implement Stormwater Action Monitoring (SAM) effectiveness and source identification studies ***OR*** b. Conduct stormwater discharge monitoring per requirements in S8.C. **Citation**: Unable to locate in 2019 SWMP. **Gap**: The 2019 SWMP identifies that the County has been paying into the collective fund, referring to the previous Permit; the County needs to notify Ecology in writing which option above will be chosen. **Recommendation**: Recommend adding the written notification to Ecology as an appendix to the SWMP annual report of the intended choice for stormwater management program effectiveness and source identification studies.
S8.C&D			Applies only to Permittees who choose to conduct stormwater discharge monitoring per S8.A.2.b and/or S8.B.2.b in lieu of participation in the regional status and trends monitoring and/or effectiveness and source identification studies.
S9 REPORTING REQUIREMENTS			
S9.A	March 31 of each year beginning 2020	Documentation	**(Existing Requirement)** ✓ No later than March 31 of each year beginning in 2020, each Permittee shall submit an annual report. The reporting period for the annual report will be the previous calendar year unless otherwise specified. Each shall include: • A copy of the Permittee's current SWMP Plan as required by S5.A.2. • Submittal of the annual report form as provided by Ecology pursuant to S9.A, describing the status of implementation of the requirements of this permit during the reporting period. • Attachments to the annual report form including summaries, descriptions, reports, and other information as required, or, as applicable, to meet the requirements of this permit during the reporting period. Refer to Appendix 3 for annual report questions. • If applicable, notice that the MS4 is relying on another governmental entity to satisfy any of the obligations under this permit. • Certification and signature pursuant to G19.D, and notification of any changes to authorization pursuant to G19.C. • A notification of any annexations, incorporations or jurisdictional boundary changes resulting in an increase or decrease in the Permittee's geographic area of permit coverage during the reporting period **Citation**: https://www.kitsapgov.com/pw/Documents/2019_Kitsap_County_SWMP.pdf **Gap**: None. **Recommendation**: None.

Permit Section	Compliance Date	Requirement Type	Description of Permit Condition
S9.B		Documentation	**(Existing Requirement)** ✓ Each Permittee is required to keep all records related to this permit and the SWMP for at least five years. **Citation**: Public Records Request information: https://www.kitsapgov.com/das/Pages/Public-Records.aspx **Compliance Improvement**: Historical records are not maintained online. **Recommendation**: Recommend the County to provide the SWMP and Annual Reports online for at least five years.
S9.C		Documentation	**(Existing Requirement)** ✓ Each Permittee shall make all records related to this permit and the Permittee's SWMP available to the public at reasonable times during business hours. **Citation**: Public Records Request information https://www.kitsapgov.com/das/Pages/Public-Records.aspx **Compliance Improvement**: Historical records are not maintained as publically available. **Recommendation**: Recommend the County to provide the SWMP and Annual Reports online for at least five years.
S9.D		Documentation	☐ Annual report for cities, towns, and counties. Each annual report shall include the following: 1. Copy of current SWMP Plan 2. Annual report form 3. Attachments to annual report 4. Notice of reliance on another governmental entity to satisfy obligations if applicable 5. Certification and signature 6. Notification of annexations, incorporations, or jurisdictional boundary changes **Citation**: https://www.kitsapgov.com/pw/Documents/NPDES_Annual_Report_2015.pdf **Gap**: Only the 2015 Annual Report can be found. Only the 2018 and 2019 SWMPs can be found. **Recommendation:** Recommend the County to provide the SWMP and Annual Reports online for at least five years**.**
S9.E.	NA	NA	Annual report for Secondary Permittees (not applicable).

Proposed CFP Criteria

Kitsap County Stormwater Comprehensive Plan
Appendix 8-1

Kitsap County
December 22, 2020

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This appendix describes recommend changes and rationale to the County's existing project prioritization framework for capital stormwater projects. Changes have been provided in redline (tracked changes), and comments are included to provide further description of the proposed changes. An example application of the new proposed criteria applied to two projects in the current CFP is also included. The proposed criteria (without redline), along with recommendations for future changes, is included in *Chapter 8 CFP*.

Proposed changes to the CFP are shown in Table 1. Changes focused on four areas:

- Evolution of existing criteria to reflect changing drivers, priorities, and industry experience in project prioritization.
- Additional criteria to reflect the County's *Water as a Resource policy*.
- Considerations for rehabilitation or replacement of existing assets.
- Clarifications to avoid double-counting of certain criteria, clarify intent, or make criteria more measurable or quantifiable.

Table 1: Proposed Changes to Project Prioritization Criteria (redlined)

~~**Project Purpose and Goals**~~	
Criteria	**Points**
~~Completion of the project is required under court order (lawsuit), as part of regulatory compliance, or as directed by US EPA, WA Department of Ecology, WDFW, KCHD, or other regulatory authority.~~	~~100~~
~~Project identified in long-range planning documents or by. by Kitsap County staff, community advisory group, or individual citizen as a significant problem~~	~~75~~
~~Project identified in long-range planning documents or by Kitsap County staff, community advisory group, or individual citizen. as a minor-moderate problem~~	~~50 (25)~~
~~Project identified in long-range planning documents or by Kitsap County staff, community advisory group, or individual citizen as a potential problem~~	~~25~~
Protect Life (100 points maximum)	
Reduce threat to human safety, health, or welfare	
Project does not reduce risk to human safety, health, or welfare	0
There is a small risk to ~~P~~public safety, health, or welfare is at risk (e.g. water over roadway which may result in a minor accident or event)	25
~~Problem results in a S~~significant risk to public safety, health, or welfare (e.g., failure may result in sinkhole or other public hazard, flooding may result in serious driver, pedestrian, other road user accidents causing serious injury)	50
Imminent ~~-~~risk to public safety, health, or welfare (e.g., a sinkhole or other public hazard has occurred, or could cause critical injury or death)	75
Problem frequency	
No threat to human safety, health, or welfare	0

Commented [LE1]: Per discussions with County, this section no longer relevant. Compliance with regulations is included in other categories of the scoring framework.

Commented [LE2]: Recommend an option for 0 points (i.e., not applicable to the project) is included for Categories and Criteria unless one criteria must be selected.

Re-ordered all criteria to be from least to most points.

Commented [LE3]: Added to WQ section.

Commented [LE4]: Updates intended to provide further definition to terms such as 'small', 'significant', and 'imminent'.

Other proxies that may be used to define public health and safety include roadway classification, surrounding land use, and critical infrastructure (e.g., access to hospitals, etc.).

Project Purpose and Goals	
Criteria	**Points**
Problem occurs infrequently (i.e. once a year) (i.e. once every 5-10 years or during a (>100 year event)	10
Problem occurs with moderate frequencyperiodically (i.e. a few 10 - 3 times per year)	20
Problem frequently occurs regularly (2 - 4 or>3 more times per year) during every major storm event]}	25
Protect Property (100 points maximum)	
Severity: Pprivate property damage during general flooding resulting from existing drainage problems.	
No private property flooding	0
Minor or Intermittent/persistent Yyard or field flooding	5
Periodic, intermittent Bbasement, driveway or garage flooding	10
Drainage Flooding affects ability to occupy private dwelling or significantly damages structure	25
Severity: Existing drainage problem causinges detrimental impact to public facilities	
No public facility or roadway flooding	0
Minor or intermittent impact to Flooding or erosion does not impact integrity of public roadway or facility integrity	5
Periodic, intermittent Fflooding or erosion of public roads or facilities which leads to minor damage/repair needs	10
Flooding or erosionSignificant impacts to public roadway integrity/function requiring major rehabilitation or replacement or results in periodic road closures	25
Problem fFrequency (private property and/or public facilities)	
No private property or public facility flooding	0
Problem occurs infrequently (i.e. once a year)every 5-10 years (>100 year event)	5
Problem occurs with moderate frequencyperiodically (i.e. 10 - 3 times per yearfrequently (i.e. a few time a year))	10
Problem occurs regularly (2 - 4 or more>3 times per year)during every major storm event	25
Proposed improvements would provide maximum benefit Population reach of proposed improvementsto taxpayers	
No private property or public facility flooding	0
Improvements would benefit <25 residents or motorists or impact up to 5 acres (whichever is greater)	5
Improvements would benefit 25 to 100 residents or motorists or impact between 5 and 20 acres (whichever is greater)	10
improvements Improvements would benefit >100 residents or motorists or impact greater than 20 acres (whichever is greater)	25

Commented [LE1]: Per discussions with County, this section no longer relevant. Compliance with regulations is included in other categories of the scoring framework.

Commented [LE2]: Recommend an option for 0 points (i.e., not applicable to the project) is included for Categories and Criteria unless one criteria must be selected.

Re-ordered all criteria to be from least to most points.

Commented [LE5]: Definitions and word choice for consistency for "Problem frequency" criteria throughout.

Commented [LE6]: Temporal component removed from first two Criteria as third Criteria "Project frequency" addresses.

Note, there could be instances where both public and private property are impacted, but at different frequencies.

Commented [LE7]: Impacts of agricultural flooding described in narrative and potential future updates.

Commented [LE8]: Agenda item to discuss with the County - does the County wish to consider e.g. low number of residents benefit, but they are in historically underserved areas.

Commented [LE9R8]: Over-burdened communities may be considered in future iterations. Included in narrative.

Commented [LE10]: Per County comments numbers were originally meant to target flooding, starting to shift toward area now.

Commented [LE11]: Additional analysis needed based on historic projects to estimate acres thresholds. Placeholder values use urban zoning as guidance.

~~Project Purpose and Goals~~	
Criteria	**Points**
Protect Water Quality ~~(~~100 points maximum~~)~~	
~~**Proposed improvements would provide maximum benefit to receiving water quality**~~	
Project does not provide water quality benefits	0
Proposed project is not required by NPDES Phase II Permit to provide water quality improvements, but minor incidental water quality improvements are likely (i.e., in currently unimpaired water bodies) ~~Minor improvement to water quality expected~~	5
Proposed project treats runoff from pollutant-generating surfaces resulting in m~~M~~oderate improvements to water quality ~~expected~~(i.e., improvements to 1-2 current impairments)	10
Proposed project treats runoff from pollutant-generating surfaces resulting in~~.~~ S~~s~~ignificant ~~, quantifiable~~ improvements to water quality ~~expected~~(i.e., improvements to multiple impairments)	25
Proposed project resolves a significant known water quality problem in a priority basin and~~/or may~~ results in a correction of a violation of state or federal water-quality standards	50
Completion of the project is required under court order (lawsuit), as part of regulatory compliance, or as directed by US-EPA, WA Department of Ecology, WDFW, KCHD, or other regulatory authority.	100
Protect Sensitive Ecological Resources ~~(~~50 points maximum~~)~~	
Proposed project provides no benefit to ecological resources	0
Proposed project results in incidental ~~Minor~~ improvement to natural resources ~~expected~~ (e.g. design includes minimum Permit-required measures for resource protection).	5
Proposed project provides moderate improvements to natural resources ~~expected~~ by protecting threatened structures, or preventing undermining of stream banks, or severe channel down-cutting.	10
Proposed project is explicitly designed for improvements to natural resource assets. ~~Significant improvement to natural resources expected~~	25
Proposed project resolves a significant known environmental problem and/or may result in a correction of a violation of state or federal regulations (e.g. ESA)	50
Life-Cycle ~~Operations and Maintenance Value~~Performance ~~(~~50 points maximum~~)~~	
Proposed project addresses an asset or group of assets that are low criticality (consequence of failure) are nearing end of life or have failed.~~Provides minor O&M savings~~	5
Proposed project addresses an asset or group of assets that are medium criticality (consequence of failure) are nearing end of life or have failed.	10
Proposed project addresses an asset or group of assets that are high criticality (consequence of failure) nearing end of life. ~~Provides moderate O&M savings~~	25~~10~~
Proposed projected addresses an asset or group of assets that are high criticality (consequence of failure) and have already failed~~Provides significant O&M savings~~	~~25~~50

Commented [LE1]: Per discussions with County, this section no longer relevant. Compliance with regulations is included in other categories of the scoring framework.

Commented [LE2]: Recommend an option for 0 points (i.e., not applicable to the project) is included for Categories and Criteria unless one criteria must be selected.

Re-ordered all criteria to be from least to most points.

Commented [LE12]: Note: original criteria had a total of 50 points possible for this category. I added the court order criteria from the original Project Purpose and Goals section. Acknowledge there may be other legal drivers than water quality but this seemed the best place.

Commented [LE13]: Edits are designed to further define "minor", "moderate", and "significant".

Future updates may include mechanism for accounting for near-term development. Mentioned in narrative.

Commented [LE14]: Original criteria had 25 points maximum, but we are re-purposing this category to be about renewal. Suggest at least 50, maybe even 100, but may be able to decide once we run a few test projects and/or based on recommendations around keeping weighting separate.

Commented [LE15]: Further analysis may be required to define low/medium/high criticality.

~~Project Purpose and Goals~~	
Criteria	**Points**
Public Outreach/Education and Citizen Involvement (25 points maximum)	
Proposed project provides opportunities for public engagement and comments or education and outreach using the County's standard methods of public engagement~~Provides some opportunities for public education/outreach or citizen involvement~~	5
Proposed project has explicit plans for advertising and receiving public comments or direct education and outreach opportunities based on BMPs.~~Provides major opportunities for public education/outreach or citizen involvement~~	10
Proposed project has explicit plans for advertising and receiving public comments. Finished projects results in ongoing public education/outreach component.~~Public education/outreach or citizen involvement is a significant and/or required component of the project~~	25
Supplemental Criteria (points awarded per criteria ranging from 0 to 10)	
A special opportunity (e.g., a project that may "piggy-back" on another project in the right-of-way, or a project in partnership with another jurisdiction) to implement a high priority project exists which will be lost if immediate action is not taken to implement the project	10
The project supports "Water as a Resource" Policy Goals and or has been identified as having significant sustainability value. This includes: Preservation of natural hydrology by preventing the creation of stormwater runoff Conservation of groundwater resources through infiltration Reduction in pollutant loading of ground and surface water by reducing surface flow volumes and incorporation of non-polluting products or processes Use of land for multiple purposes by maintaining forest, and open space, integrating stormwater management features into the landscape and encouraging practices that can be used for purposes beyond just stormwater management Education opportunities on how the public's actions can impact water quality	10
The project supports economic development by solving regional stormwater problem affecting area identified for growth in comprehensive plan	10
The project has dedicated grant funding, ~~or~~ has the potential for grant funding support or has other external funding sources ~~it~~	10
The project provides an opportunity to work jointly with City or Tribal governments or other federal, state or local government entities	10

An example rating of select criteria for two projects in the current CFP is shown in Table 2.

Commented [LE1]: Per discussions with County, this section no longer relevant. Compliance with regulations is included in other categories of the scoring framework.

Commented [LE2]: Recommend an option for 0 points (i.e., not applicable to the project) is included for Categories and Criteria unless one criteria must be selected.

Re-ordered all criteria to be from least to most points.

Commented [LE16]: County may clarify if these supplemental criteria are meant to be yes/no (10/0 points), or a scale. Our interpretation was a scale based on user judgment: for example Water as a Resource Policy Goals could have more than one goal met on a project. But this could be a yes/no with an explanatory note.

Commented [LE17]: Suggest County defines what "high priority" means, if not previously defined, or remove.

Commented [PS18]: Suggested addition since funding can come from other sources than grants

Commented [PS19]: Suggested edit to reflect project partners could include other government entities including feds, state, Ports, regional entities like Hood Canal Coord Council, etc.

Table 2 - Example Project Prioritization Rating

		Kingston Regional	Suquamish Regional
Criteria	**Points**	Score	Score
Protect Life (100 points maximum)			
Reduce threat to human safety, health, or welfare			
Project does not reduce risk to human safety, health, or welfare	0		
There is a small risk to public safety, health, or welfare is at risk (e.g. water over roadway which may result in a minor accident or event)	25	25	25
Significant risk to public safety, health, or welfare (e.g., failure may result in sinkhole or other public hazard, flooding may result in serious driver, pedestrian, other road user accidents causing serious injury)	50		
Imminent risk to public safety, health, or welfare (e.g., a sinkhole or other public hazard has occurred, or could cause critical injury or death)	75		
Problem frequency			
No threat to human safety, health, or welfare	0		
Problem occurs infrequently (i.e. once every 5-10 years or during a >100 year event)	10	10	10
Problem occurs with periodically (i.e. 1-3 times per year)	20		
Problem frequently occurs regularly (>3 times per year)	25		
Protect Property (100 points maximum)			
Severity: private property damage during general flooding resulting from drainage problems			
No private property flooding	0		
Yard or field flooding	5	5	5
Basement, driveway or garage flooding	10		
Flooding affects ability to occupy private dwelling or significantly damages structure	25		
Severity: Existing drainage problem causing detrimental impact to public facilities			
No public facility or roadway flooding	0		
Flooding or erosion does not impact integrity of public roadway or facility	5	5	
Flooding or erosion of public roads or facilities which leads to minor damage/repair needs	10		10

		Kingston Regional	Suquamish Regional
Criteria	**Points**	Score	Score
Flooding or erosion impacts public roadway integrity/function requiring major rehabilitation or replacement or results in periodic road closures	25		
Problem frequency (private property and/or public facilities)			
No private property or public facility flooding	0		
Problem occurs infrequently (i.e. once every 5-10 years (>100 year event)	5	5	5
Problem occurs periodically (i.e. 1-3 times per year	10		
Problem occurs regularly (>3 times per year)	25		
Population reach of proposed improvements			
No private property or public facility flooding	0		
Improvements would benefit <25 residents or motorists or impact up to 5 acres (whichever is greater)	5	5	5
Improvements would benefit 25 to 100 residents or motorists or impact between 5 and 20 acres (whichever is greater)	10		
Improvements would benefit >100 residents or motorists or impact greater than 20 acres (whichever is greater)	25		
Protect Water Quality (100 points maximum)			
Project does not provide water quality benefits	0		
Proposed project is not required by NPDES Phase II Permit to provide water quality improvements, but minor incidental water quality improvements are likely (i.e., in currently unimpaired water bodies)	5		
Proposed project treats runoff from pollutant-generating surfaces resulting in moderate improvements to water quality (i.e., improvements to 1-2 current impairments)	10		
Proposed project treats runoff from pollutant-generating surfaces resulting in significant improvements to water quality (i.e., improvements to multiple impairments)	25	25	25
Proposed project resolves a significant known water quality problem in a priority basin and results in a correction of a violation of state or federal water-quality standards	50		
Completion of the project is required under court order (lawsuit), as part of regulatory compliance, or as directed by US-EPA, WA Department of Ecology, WDFW, KCHD, or other regulatory authority.	100		

Criteria	Points	Kingston Regional Score	Suquamish Regional Score
Protect Sensitive Ecological Resources (50 points maximum)			
Proposed project provides no benefit to ecological resources	0		
Proposed project results in incidental improvement to natural resources (e.g. design includes minimum Permit-required measures for resource protection).	5		
Proposed project provides moderate improvements to natural resources by protecting threatened structures, or preventing undermining of stream banks, or severe channel down-cutting.	10	10	
Proposed project is explicitly designed for improvements to natural resource assets.	25		25
Proposed project resolves a significant known environmental problem and/or may result in a correction of a violation of state or federal regulations (e.g. ESA)	50		
Life-Cycle Performance (50 points maximum)			
Proposed project addresses an asset or group of assets that are low criticality (consequence of failure) are nearing end of life or have failed.	5		
Proposed project addresses an asset or group of assets that are medium criticality (consequence of failure) are nearing end of life or have failed.	10	10	
Proposed project addresses an asset or group of assets that are high criticality (consequence of failure) nearing end of life.	25		25
Proposed projected addresses an asset or group of assets that are high criticality (consequence of failure) and have already failed	50		
Public Outreach/Education and Citizen Involvement (25 points maximum)			
Proposed project provides opportunities for public engagement and comments or education and outreach using the County's standard methods of public engagement	5		
Proposed project has explicit plans for advertising and receiving public comments or direct education and outreach opportunities based on BMPs.	10		
Proposed project has explicit plans for advertising and receiving public comments. Finished projects results in ongoing public education/outreach component.	25	25	25
Supplemental Criteria (points awarded per criteria ranging from 0 to 10)			

Commented [LE20]: County may clarify if these supplemental criteria are meant to be yes/no (10/0 points), or a scale. Our interpretation was a scale based on user judgment: for example Water as a Resource Policy Goals could have more than one goal met on a project. But this could be a yes/no with an explanatory note.

		Kingston Regional	Suquamish Regional
Criteria	**Points**	Score	Score
A special opportunity (e.g., a project that may "piggy-back" on another project in the right-of-way, or a project in partnership with another jurisdiction) to implement a high priority project exists which will be lost if immediate action is not taken to implement the project	10	10	10
The project supports "Water as a Resource" Policy Goals and or has been identified as having significant sustainability value. This includes:	10	10	10
Preservation of natural hydrology by preventing the creation of stormwater runoff			
Conservation of groundwater resources through infiltration			
Reduction in pollutant loading of ground and surface water by reducing surface flow volumes and incorporation of non-polluting products or processes			
Use of land for multiple purposes by maintaining forest, and open space, integrating stormwater management features into the landscape and encouraging practices that can be used for purposes beyond just stormwater management			
Education opportunities on how the public's actions can impact water quality			
The project supports economic development by solving regional stormwater problem affecting area identified for growth in comprehensive plan	10	10	5
The project has dedicated grant funding or has the potential for grant funding support or other external funding	10	5	10
The project provides an opportunity to work jointly with City, Tribal governments, federal, state or other local government entities	10	10	10
TOTAL SCORE		**170**	**205**
CIP Budget		$1,900,000	$3,960,000
Less Grant funding		$0.00	$900,000
Total SW Division funding		$1,900,000	$3,060,000
Total $/point		$11,176	$19,317
SW Division $/point		$11,176	$14,927
Rank by Score		2	1
Rank By Cost/Point		2	3