Brown AND Caldwell

FINAL/REPORT | Prepared for
City of Mukilteo, Washington

CITY OF MUKILTEO

Stormwater Management Action Plan

March 6, 2023

Stormwater Management Action Plan

Prepared for
City of Mukilteo, WA
Mach 6, 2023

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List of Abbreviations

amsl	above mean sea level
AMWA	Association of Metropolitan Water Agencies
AUs	analysis units
BC	Brown and Caldwell
B-IBI	Benthic Index of Biotic Integrity
bgs	below ground surface
BLR	Buildable Lands Report
BMPs	best management practices
CAMP	Critical Areas Mitigation Program
City	City of Mukilteo
CIP	Capital Improvement Project
CWA	Federal Pollution Control Act aka Clean Water Act
Ecology	Washington State Department of Ecology
GIS	geographic information system
gpd	gallons per day
gph	gallons per hour
IDDE	Illicit Discharge Detection and Elimination
LEED	Leadership in Energy and Environmental Design
lf	linear feet
LID	low impact development
MS4	municipal separate stormwater sewer system
MMC	Mukilteo Municipal Code
MUGA	Mukilteo Urban Growth Area
NPDES	National Pollutant Discharge Elimination System
Permit	Western Washington Phase II Municipal Stormwater Permit
PAUs	project analysis units
PSRC	Puget Sound Regional Council
SMAP	Stormwater Management Action Planning/Plan
TM	technical memorandum
WQA	Water Quality Assessment

Executive Summary

The City of Mukilteo (City) is permitted to discharge surface water runoff to the streams, rivers and other "waters of the state." All discharges from the City drainage system to waters of the state must comply with the Western Washington Phase II Municipal Stormwater Permit (the Permit). The Washington State Department of Ecology (Ecology) issued the Permit in July 2019 in compliance with the provisions of the Clean Water Act (CWA) and State of Washington Water Pollution Control Law. The current Permit expires July 31, 2024.

The Permit requires that cities develop a plan to accommodate future growth and development while preventing water quality degradation and/or improving water quality and aquatic habitat conditions in receiving waters harmed by past development. That plan must be prepared according to guidance from Ecology.

The City completed this Stormwater Management Action Plan to meet the requirements of Special Condition S5.C.1.d.iii in the Permit. The City completed the three-part process as prescribed in the Permit by completing a:

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** (SMAP) to identify potential retrofit opportunities, land management/development strategies and/or actions, targeted enhancement strategies, an implementation schedule, budget and funding sources as well as a strategy for future Plan updates.

The City followed Ecology's SMAP guidance (Ecology 2019) to meet the Permit requirements. The City selected the Chennault Beach Creek catchment as the focus of the SMAP. Through the SMAP process the City identified appropriate retrofits, land management strategies and actions, and specific stormwater management actions for the Chennault Beach Creek catchment.

The Chennault Beach Creek SMAP includes:

- A summary of the receiving water condition assessment and receiving water prioritization, and a description of the Chennault Beach Creek catchment.
- Specific SMAP actions intended to reduce water quality degradation and/or improve water quality and aquatic habitat conditions, including retrofits to the existing stormwater drainage system, a summary of existing land management and development strategies, and targeted stormwater management actions.

The SMAP identifies actions for each category identified in the Permit–retrofits, land management and development strategies, and targeted or customized stormwater management actions. Table ES-1 summarizes each action, its water quality benefits, planning-level costs, implementation schedule, and overall action priority.

Table ES-1. SMAP Action Summary

Action Type	SMAP ID	Action Status	Action	Water Quality Benefit	Schedule (years)		Priority (1=highest)
					0-6	7-20	
Retrofit	CIP 1	In design	Chennault Beach Drive Improvements Project	Erosion and sediment reduction	X	-	1
	Study 1	Proposed	Canyon Drive Pond Expansion Feasibility Study	Reduce pollutants associated with sediment	X	-	2
	Study 2	Proposed	Chennault Beach Creek Access Road Culvert Improvements Feasibility Study	Sediment and erosion reduction	-	X	3
Land Management and Development Strategies	Code 1	Existing	Native vegetation inclusion and protection code (MMC, various sections)	Sediment and erosion reduction; lower water temp	NA		
	Code 2	Existing	Impervious surface limitations (MMC, various sections)	Sediment and erosion reduction; lower water temp	NA		
	Program 1	Existing	Critical area protection code and Critical Area Mitigation Plan	Maintain critical area habitat and address wetland watershed restoration	NA		
	Program 2	Existing	Land and riparian corridor purchases	Protect/enhance B-IBI	NA		
Targeted Stormwater Management	Program 3	Existing, enhanced	Increased inspections to detect for IDDE	Reduce pollutant loading from various land uses	X	X	1
	Program 4	Existing, enhanced	Source control investigation	Reduce pollutant loading from various land uses	X	X	2
	Program 5	New	Increased sweeping and catch basin cleaning	Reduce downstream sedimentation, pollutants associated with particulate, and nutrient loading	X	X	1
	Program 6	Existing	CCTV Program for inspection and condition assessment	Reduce erosion, sedimentation and other pollution resulting from improperly functioning stormwater drainage systems	X	X	1
Public Education and Outreach	Program_7	New	Site Evaluation for Private Property Program	Maintain critical area habitat	X	X	3
	Program_8	New	Residential Leaf Collection Outreach Program	Reduce nutrient load (P, N) from leaf matter entering the Chennault drainage system	X	-	4

Table abbreviations:

B-IBI = Benthic Index of Biotic Integrity

CAMP = Critical Areas Mitigation Program

CB = catch basin

CCTV = closed-circuit television

IDDE =Illicit Discharge Detection and Elimination

MMC= Mukilteo Municipal Code

N =nitrogen

P = phosphorus

X = yes, - = no, NA = Not applicable

Section 1

Purpose and Background

Stormwater discharges within the city are regulated under the City of Mukilteo's (City) Western Washington Phase II Municipal Stormwater Permit (Permit). The current Permit, was issued in July 2019 by the Washington State Department of Ecology (Ecology), in compliance with the provisions of the State of Washington Water Pollution Control Law and the Federal Water Pollution Control Act. The Permit allows the City to discharge stormwater runoff to waters of the state.

1.1 Purpose

The City prepared this Stormwater Management Action Plan (SMAP) to comply with Special Condition S5.C.1.d of the Permit, which requires three elements:

- Receiving water assessment
- Receiving water prioritization to determine which receiving water will receive the most benefit from a suite of actions
- SMAP development for a high-priority catchment area by March 31, 2023

The City developed the SMAP in accordance with Ecology's *Stormwater Management Action Planning Guidance* (Ecology 2019). The guidance calls for a strategic approach to reduce impacts from existing development and a plan to avoid impacts from future growth or redevelopment within the area served by the City drainage system, or Municipal Separate Storm Sewer System (MS4).

1.2 SMAP Organization

The remainder of the SMAP is organized as follows:

- Section 2 outlines the planning components used to develop the SMAP, including the Receiving Water Assessment and Receiving Water Prioritization.
- Section 3 summarizes the projects and activities evaluated and proposed for the SMAP.
- Section 4 describes the City's process for gathering public input on the SMAP prioritization principles.
- Section 5 outlines the budget, funding sources, and schedule for the proposed SMAP projects and activities.

Section 2

SMAP Catchment Area Selection Process

Ecology suggests there are many ways to successfully approach comprehensive stormwater planning in general. There also are many ways to approach the specific steps necessary in developing the SMAP required by the Permit as outlined in Ecology's *Stormwater Management Action Planning Guidance.*

The Permit requires a planning approach that emphasizes protecting the designated beneficial uses of receiving water bodies in the planning area. To that end, the SMAP identifies approaches to accommodate future growth and development while minimizing water quality degradation and/or improving conditions in receiving waters harmed by past development.

The City has a long history of stormwater planning and management. This SMAP planning effort builds on those past efforts to address the City's unique conditions with regard to land use, critical areas protections, significant wildlife habitat preservation, fish species diversity and distribution, geomorphological conditions and stormwater management programs and operations.

The SMAP planning process steps are outlined below.

2.1 Gap Analysis

Historically, the City has invested considerable time, effort and budget in stormwater planning. Since completion of the *Comprehensive Stormwater Management Plan* in 2015, the City has completed a variety of stormwater projects, studies, and stormwater management tools that have helped the City make more effective progress toward meeting the goals of the SMAP.

The City performed a data gap analysis to compare its past stormwater action planning efforts with the SMAP requirements in the Permit. The gap analysis identified areas where work was still needed to meet Permit requirements and information to be submitted to Ecology. The gap analysis is included in this SMAP document as Appendix A.

The following bullets list the stormwater management and planning data sources relevant to the Mukilteo SMAP process. More details for each data source are included in Appendix A.

- 2001 Comprehensive Stormwater Management Plan (2001 Comprehensive Plan).
- 2010 Smuggler's Gulch Retrofit Study Pre-Design Report.
- Critical Area Mitigation Program (2011 Critical Area Mitigation Plan or 2011 CAMP).
- Mukilteo Watershed Based Stormwater Strategies Plan (Strategies Plan or 2013 Strategies Plan).
- 2014 Mukilteo Stormwater Retrofit Project Identification and Prioritization Report (2014 Retrofit and Prioritization Report).
- 2015 Pre-Design Report Mukilteo Watershed Based Stormwater Retrofit Plan (2015 Pre-Design Report).
- 2015 Technical Memorandum: Geomorphology and Critical Slope Evaluation in Support of the City of Mukilteo Stormwater Comprehensive Plan Update.

- 2015 Mukilteo Comprehensive Surface Water Management Plan Update: 2015-2021 (2015 Comprehensive Surface Water Plan).
- City of Mukilteo Comprehensive Plan 2035 (prepared 2015).
- 2017 LID Code Update (LID Code).
- City of Mukilteo Development Standards (2019).
- City GIS datasets.
- Pollution Source Control Program (2022)
- Surface Water Code Updates (2022)
- Retrofit and New Project List (2020).

Of the sources listed above, the 2013 Strategies Plan provided the most relevant information for the SMAP development. The Strategies Plan characterized the city's watersheds and receiving waters using methodologies consistent with those outlined in the SMAP Guidance. The Strategies Plan prioritized the subbasins, or Project Analysis Units[1] (PAUs), based on the anticipated relative benefits from a suite of potential stormwater management actions.

Funded by a Puget Sound Watershed Protection and Restoration Ecology grant, this plan was developed in response to the "Action Agenda" created by the Puget Sound Partnership in 2008 and updated in 2012. The Strategies Plan follows Ecology's Puget Sound Watershed Characterization process to analyze the health of watersheds. It utilized the assessment units (AUs) developed by Ecology. These AUs were further subdivided into PAUs to analyze which of these areas would benefit the most from stormwater management activities.

Delineation of PAUs facilitated the completion of several SMAP requirements including determining the percent area of each PAU within Mukilteo's city limits and identifying outfalls to Puget Sound. In addition, the Strategies Plan included the development of landscape-scale geographic information system (GIS) data essential to developing and implementing the SMAP.

To determine priorities for stormwater management, the Strategies Plan derived a primary and secondary score for each PAU.

- The primary score is based on the relative importance of each watershed process to overall watershed health under pre-developed conditions and the level of intactness[2] of the PAUs under existing conditions.
- The secondary score is based on processes unique and important to Mukilteo and include:
  - Sedimentation potential (evaluates surface erosion, mass wasting, and stream channel erosion)
  - Freshwater habitat (quantity and quality of salmonid habitats)
  - Hydrologic relatedness (influence of headwater flow processes on downstream basins)

[1] PAUs were developed as a subdivision of larger drainage areas defined by Ecology in the Puget Sound Watershed Characterization study (Stanley et al 2011). For the purposes of this SMAP, the terms PAU, subbasin and catchment are used interchangeably. "Catchment area" is a term used in the NPDES SMAP Guidance document (Ecology 2019) to define the extent of the SMAP planning area. "Catchment area" is synonymous with "subbasin".

[2] Level of intactness is defined as the degree or level that the watershed is similar to predeveloped conditions.

The primary and secondary scores were compiled into an overall priority ranking consistent with Ecology's preferred watershed planning process at the time the Strategies Plan was developed. The resulting scores then formed the basis for the prioritization ranking of PAUs within the city. The results of the prioritization process fed directly into the follow-on work of the 2014 Retrofit and Prioritization Report and the 2015 Pre-Design Report which identified and prioritized stormwater retrofit project planning and pre-design work.

Elements of the 2013 Strategies Plan are directly relevant to the SMAP assessment and prioritization requirements. The City used information developed for the Strategies Plan to help meet the requirements of Special Condition S5.C.1. See Appendix A for additional information on the Strategies Plan.

2.2 Receiving Water Conditions Assessment

The Receiving Water Conditions Assessment (Assessment) includes the following:

- Watershed inventory table which lists PAUs and associated receiving watersheds
- Map of the delineated basins showing PAUs and receiving watersheds
- Description of the relative condition of receiving waters and watersheds
- Discussion of the stormwater management influences on surface water resources
- Analysis of these stormwater management influences

The City documented the Assessment in a technical memorandum (TM) "Mukilteo SMAP Watershed Inventory Table and Map" dated February 7, 2022. The Assessment is included in this SMAP document as Appendix B.

The watershed inventory map of the delineated basins is shown on Figure 2-1.

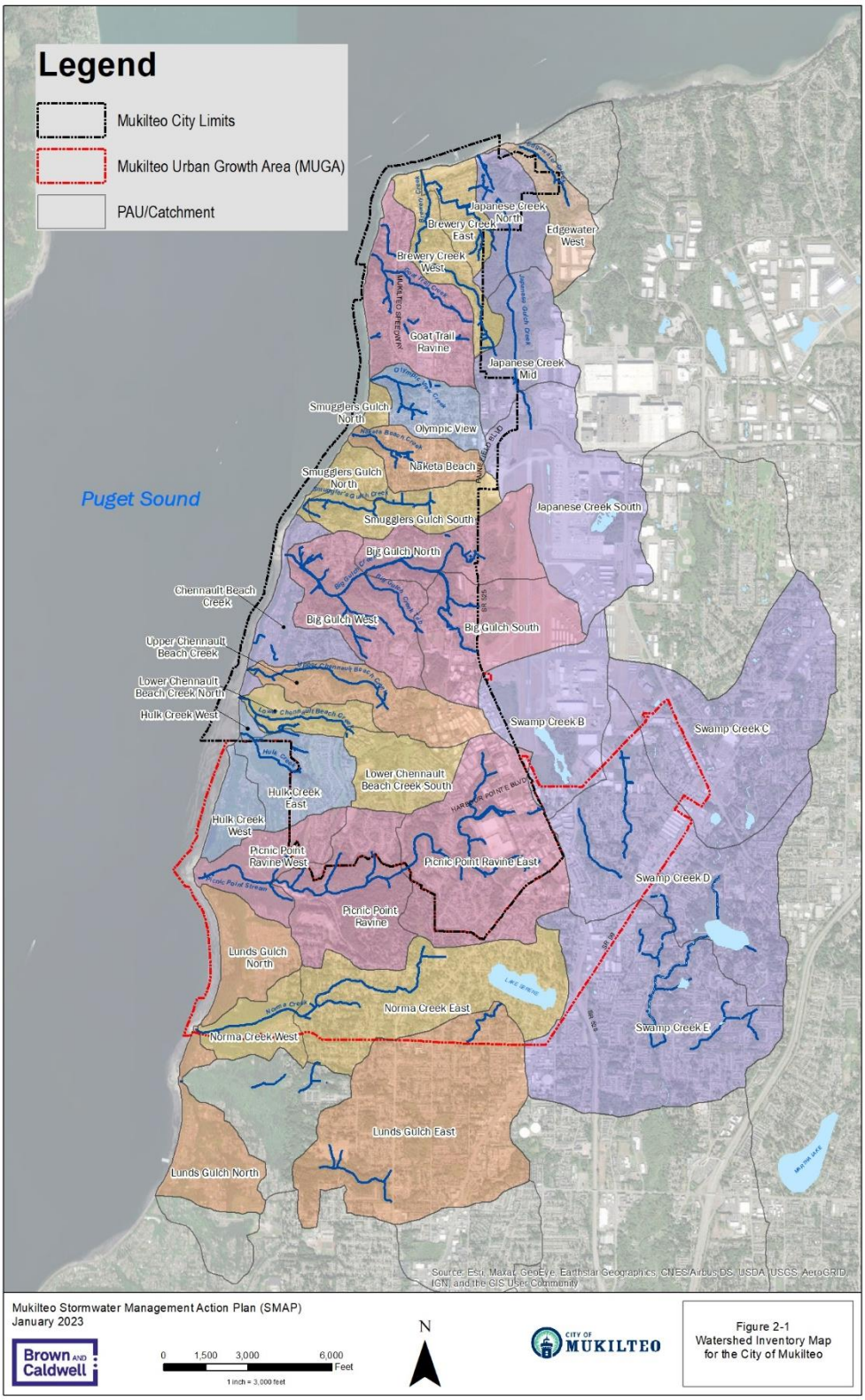

Figure 2-1. Watershed inventory map

Key components of the Receiving Water Condition Assessment include:

- Data documentation
- Stormwater management influence
- Relative conditions and contributions
- Watershed inventory and map

Data Documentation. A significant amount of existing data was used to assess relative receiving water conditions and stormwater management influence, including several past watershed-scale planning studies that considered many of the issues suggested in the SMAP Guidance. The City reviewed additional stormwater-related planning information suggested in the SMAP Guidance including the 2013 Strategies Plan (ESA 2013), which included information used to perform the receiving water assessment.

Information to develop the SMAP included:

- Prior City watershed studies and condition assessments
- Current sources for Ecology water quality assessments and designated use information
- Future stormwater conditions and development/redevelopment potential
- Information on overburdened communities within the City

Section 1.2 of this SMAP lists applicable stormwater management and planning data sources. For a complete list of resources, refer to Section 7.

Stormwater Management Influence. The City evaluated stormwater management influence to help sort receiving waters based on their relative influence of [their] MS4 and potential SMAP actions to protect or improve receiving water condition. The influence evaluation considered potential short-term (next 6 years) and long-term (7-20 years) benefits.

The City's SMAP team initially considered several watersheds and MS4 characteristics that might help screen out PAUs with relatively low stormwater management influence. However, the City chose to include all PAUs in the prioritization and SMAP planning process because the PAUs have similar land uses with similar stormwater impact potential. Further, removing low stormwater management influence PAUs from the prioritization list is functionally equivalent to assigning them a low priority. Retaining all PAUs in the prioritization process preserves relevant information that could help the City identify potential future opportunities, such as leveraging other related projects or potential partnerships with other entities.

Relative Conditions and Contributions. The City assessed relative conditions and contributions to narrow the list of receiving waters and PAUs for the SMAP prioritization process. In keeping with Ecology's SMAP Guidance, the City assessed relative conditions and contributions based on three (3) considerations:

1. **Evaluate future conditions and consider how changes could impact water quality, habitat, and biota**. The City evaluated Land Status data from the Snohomish County 2021 Buildable Lands Report to identify potential areas of new development and redevelopment within the 2035 planning horizon. Areas with redevelopment have the potential to improve water quality by triggering improved onsite stormwater management, water quality BMPs and flow control facilities. New development has the potential to impact water quality and flow control if the development is not adequately mitigated.
2. **Evaluate which PAUs should be "protected" and "restored"**. The City used information from the 2013 Strategies Plan to analyze and categorize PAUs into one of three strategies:
    - Preserve–acquire and/or protect existing undisturbed wetlands and forests

- Repair–retrofit highly impaired processes
- Targeted–develop appropriate management strategies based on the PAU's level of impairment

The PAUs in the Preserve and Repair management strategies were given a priority of 'highest'. Most PAUs were in the as *Targeted Strategies* category and varied in priority ranking between high, moderate, and low, providing decision-making criteria for targeted investments. PAUs categorized for Repair strategies and high priority PAUs categorized for *Targeted Strategies* have the greatest gap between known conditions and pollution control goals. It is important to note that the Strategies Plan was a regional watershed scale study and some PAUs, while part of watersheds within Mukilteo, are outside Mukilteo's jurisdiction. Further, the PAUs categorized for *Repair Strategies* are located outside Mukilteo's jurisdiction.

3. **Understand existing plans and planning efforts.** The City developed a list of current projects (planned and completed) that address water quality, flow control and/or flooding (refer to Appendix A). The list includes project locations, anticipated capital improvements, planning and construction status, study or planning effort source, and relative ranking resulting from the associated study/planning effort.

Watershed Inventory Table and Map. The City developed a watershed inventory table and associated map using the PAU subbasin delineations and data from the City's 2013 Strategies Plan, GIS files, State water quality tools, and new information gathered about future growth and overburdened communities. The table and map are included in Appendix B.

Per Ecology requirements, the inventory table includes the following information:

- Water body name
- Total watershed area
- Percent of the total watershed area within Mukilteo
- Summary of the relative conditions of the receiving waters and contributing area conditions

2.3 Receiving Water Prioritization

The Receiving Water Prioritization element of the SMAP development includes refining initial ranking efforts of the Receiving Water Condition Assessment and implementing a prioritization process to select basins where SMAP planning can reduce pollutant loading and hydrologic impacts from existing and future development.

The City completed the prioritization process in June 2022 and documented the effort in a TM (refer to Appendix C). In accordance with Ecology guidelines, the prioritization process:

- Described the priority ranking process used to identify high-priority receiving waters with the ranking process rationale.
- Provided a prioritized and ranked list of receiving waters resulting from the ranking process.
- Identified high-priority catchment areas for the SMAP.

2.3.1 Priority Ranking Process and Rationale

As required of all medium-sized cities, the City has developed and implemented a prioritization method and process to determine which receiving waters would receive the most benefit from stormwater management actions.

The City's methodology to prioritize basins for inclusion in the SMAP is based on three elements:

- Basin information (from the watershed inventory table (BC 2022)

- Prioritization principles
- Scoring and weighting criteria

The three (3) elements are combined in a spreadsheet tool developed for the SMAP process to help automate the prioritization process (e.g., color coding, formulas, etc.) and assist in assessing alternative ranking and prioritization values. The three (3) elements of the spreadsheet tool are easy to update making the tool useful for future SMAP planning effort. The City solicited public input on the draft prioritization principles and used this input to refine the prioritization methodology and rank drainage basins for SMAP consideration. The prioritization table and ranking results for the SMAP are presented in Appendix C.

Prioritization Principles. The City developed a set of prioritization principles designed to facilitate ranking the PAUs. The City reviewed the recommendations in Ecology's SMAP guidance document and developed the five (5) principles summarized below. Each principle is associated with one or more data sets from the relative condition assessment for water bodies and watersheds.

- **Relative Condition.** The Integrated Secondary Score developed to prioritize PAUs for stormwater strategies for the City's 2013 Strategies Plan. PAUs with a higher Integrated Secondary Score have a greater need for restoration or preservation.
- **Jurisdictional Influence.** Defined as how much of a given watershed area lies within the City's jurisdiction for implementing stormwater management projects and programs.
- **Wetland and Landscape Position.** Wetlands located in the upper watershed plateau landscape position and/or included in the City's Wetland Mitigation Program provide potential water quality benefits for future projects.
- **Overburdened Communities.** Communities with higher health and social disparity relative to other communities. The Disparity Ranking scale ranges from 1 to 10, with 10 having the highest health and social disparity. Mukilteo PAUs ranked between 2 and 5.
- **Project Partner Opportunity.** Identifies planned stormwater projects potentially reducing flooding problems or improving water quality within certain planning areas.

Other priority principles recommended in the SMAP Guidance document were considered but not included in the City's prioritization process because they did not provide a meaningful differentiation among the PAUS. For example, the SMAP Guidance document recommends permittees consider future land use and growth when prioritizing PAUs. However, most of the city is already built out and the rate of redevelopment is projected to be small through 2035, according to the *Snohomish County Buildable Lands Report* (Snohomish County 2021). Since all the PAUs have similar potential for new and redevelopment, future land use/growth is not useful for PAU ranking.

2.3.2 Prioritized and Ranked List of Receiving Waters

The final element of the prioritization process included scoring values for the basin information and applying weighting factors for priority principles. Combining basin information, scoring values and weighting factors results in a numeric value for calculating a final overall weighted score for comparison and ranking purposes.

The PAU information, scoring, and weighting criteria were used to calculate priorities and develop a Total Weighted Score for each PAU.

Following completion of the prioritization calculations, the City's SMAP team evaluated the high-ranked PAUs to select a PAU to be the focus of the SMAP. The top-ranked PAUs were defined as those with a Total Weighted Score of 13.5 or greater.

The City's SMAP team outlined several basin conditions and opportunities to help determine which of the top-ranked PAUs would receive the most benefit from the SMAP selection by considering the following questions:

- The *Strategies Plan* identified strategies for the PAUs. Is there a watershed-based plan or set of actions that address the strategy already being applied in the PAU?
- Is the PAU's hydrology fully mapped and understood?
- Does the PAU have sufficient MS4 infrastructure to apply SMAP actions and projects?

Table 2-1 lists the ten highest-ranking PAUs and summarizes their basin conditions and opportunities relative to the SMAP catchment selection. Based on the responses to the SMAP benefit questions, the Chennault Beach Creek and Smuggler's Gulch South PAUs would most benefit from the SMAP planning efforts.

Table 2-1. High Ranking PAU SMAP Benefit Evaluation

PAU	Receiving Water Name	Total Weighed Score	Strategy from *Strategies Plan (ESA 2013)* [a]	Has basin planning effort or actions to address strategy? [b]	Has well-mapped hydrology (streams and wetlands)?	Level of stormwater management influence
Japanese Creek North	Japanese Creek	18.0	Preserve	Yes	Yes	Minimal. PAU has a substantial parklands area, with conservation easement covering some of that area.
Big Gulch North	Big Gulch Creek	17.0	Targeted	Yes	Yes	Moderate. Much of PAU is in ravine/parkland.
Lower Chennault Beach Creek South	Lower Chennault Beach Creek	16.0	Preserve	No. Some passive protection exists on the golf course and through wetlands preserved in private NGPAs.	Yes	Moderate. PAU is substantially private property (golf course). Property owner controls the regional detention.
Japanese Creek Mid	Japanese Creek	14.7	Targeted	Yes	Yes	Minimal. PAU within the city is largely open space with conservation easement.
Big Gulch South	Big Gulch Creek	14.5	Targeted	Yes	Yes	Moderate, for the portion within city limits.
Smugglers Gulch South	Smuggler's Gulch Creek	13.7	Targeted	Yes	Yes	Moderate
Brewery Creek East	Brewery Creek	13.5	Targeted	No	Yes, with exception of PAU boundary, which should include outfall.	High
Chennault Beach Creek	Chennault Beach Creek (unnamed)	13.5	Targeted	No	No	High
Picnic Point Ravine East	Picnic Point Creek	13.5	Targeted	No	Yes	High
Smugglers Gulch North	Puget Sound	13.5	Targeted	Yes	Yes	High

a. Preservation strategy means to acquire and/or protect existing undisturbed wetlands and forest; Targeted means to develop appropriate management strategies based on level of Impairment.

b. See Appendix C for a summary or watershed-based work in the City's high-ranked PAUs.

To help select a single PAU for the SMAP planning effort, the City reviewed each of the high-ranking PAUs for potential opportunities using the City's mapped project list (City 2021). Reviewing planned projects provided an opportunity to incorporate flow control and water quality improvements with a basin-wide perspective, thereby achieving greater water quality and habitat benefits.

In addition, coupling water quality improvements with currently planned projects allows water quality-related elements to be implemented sooner, providing benefits more quickly with those benefits being enjoyed over a longer time period. The project list review revealed a significant number of capital projects planned in Chennault Beach Creek catchment in the near future. Based on evaluation of basin conditions shown in Table 1 and the potential for combining SMAP efforts with planned projects, the City selected the Chennault Beach Creek as the preferred catchment for the SMAP.

2.4 Chennault Beach Creek Catchment Description

The 184-acre Chennault Beach Creek catchment is located on the western edge of the city limits between the Big Gulch West and Upper Chennault Beach Creek PAUs. Adjacent to the Puget Sound, basin runoff discharges directly to the Puget Sound through a series of pipes and open channels. Two (2) sections of the open channel are mapped as wetland areas by the Snohomish County's Remote Sensing-based wetland model. Figure 2-2 shows the location of the basin within the city and the basin's surface water features and infrastructure. The figure also shows the areas of steep slopes in the basin.

Similar to other city basins draining to Puget Sound, the risk of landslides within the Chennault Beach Creek catchment ranges from very high to moderate due to the geology and steep terrain. Consequently, slope stability must be considered when siting and designing stormwater retrofits in the basin.

Approximately 96 percent of the basin is zoned as Single Family land use. The remaining 4 percent is split between multifamily and park land use. The Chennault Beach Creek catchment is characterized as 33 percent impervious. Less than 1 percent of the developable land is anticipated to experience new or redevelopment by 2035.

Other basin characteristics evaluated in the SMAP receiving water condition assessment include water quality listings, designated use and overburdened status. This catchment has no state impaired water quality listings. Using the City-derived weighed average for environmental health disparity (EPA 2020), this PAU has a ranking of 4 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.

Water quality concerns in the Chennault Creek Beach basin originate from the land use, impervious areas and the combination of steep slopes and erosive soils. Common pollutants in runoff from residential areas include fecal bacteria, lawn care chemicals and petrochemicals from driveways and roadways. Impervious surfaces transport the pollutants to both piped and open channel conveyance with less opportunity for infiltration into the soil as with the pervious surfaces. Stormwater from developed areas often contains suspended solids from soil erosion.

Erosion and the resulting sedimentation from storm events from raindrop impact and failing or undersized stormwater conveyance systems can have adverse water quality and habitat impacts. During larger storms, overland flow through yards and other pervious surfaces can cause significant erosion and sediment transport.

Sediment is a natural part of aquatic habitats. However, its quantity and characteristics can affect the physical, chemical and biological integrity of aquatic ecosystems (EPA 2022). Impacts to downstream water resources can occur due to:

- Devegetated banks, shores and other ground surfaces
- Road maintenance
- Landslides
- Erosional rills and gullies
- Incised channels

Erosion can result in muddy or turbid water, visible plumes of discolored water and deposited sediment. Sediment pollution can cause a wide range of undesirable biological effects including:

- Changes in fish assemblages, such as fewer fishes that depend on sight for feeding (e.g., salmonids, cyprinids, centrarchids)
- Changes in invertebrate assemblages, such as fewer invertebrates with gills (e.g., mayflies) and more filter feeders
- Changes in submerged aquatic vegetation, such as loss of eel grass necessary to a healthy Puget Sound
- Reduced primary productivity nutrient enrichment
- Altered physical habitat
- Low dissolved oxygen
- Morphological effects (e.g., proliferation of gill lamellae, reduction of lymphoid tissue in the spleen, lesions in blood vessels, mucus secretion)
- Organismal and population effects (e.g., decreased growth and abundance, mass mortality)

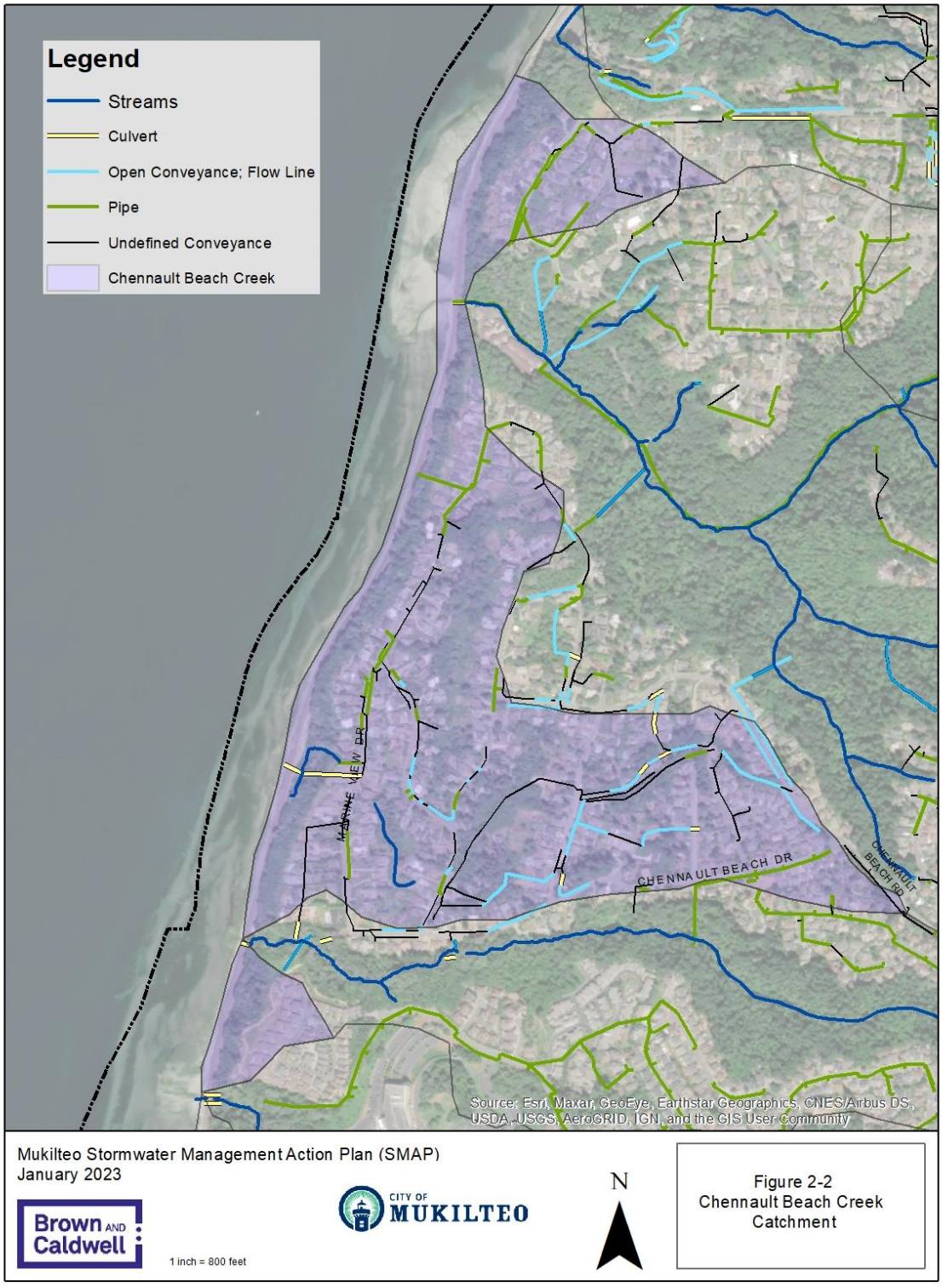

Figure 2-2. Chennault Beach Creek catchment

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Section 3

SMAP Actions Elements

This section described the projects and activities the City proposes to improve water quality in the Chennault Beach Creek catchment.

Actions include retrofits, land management and development strategies, and targeted or customized stormwater management actions. For each action, water quality benefits, planning level costs, and an implementation schedule were identified, and an overall action priority was assigned. Table 3-1 summarizes selected stormwater management strategies to help address the potential water quality concerns in the basin. See Figure 2-1 for a map of retrofits and other actions in the Chennault Beach Creek catchment. See Appendix D for additional detail on cost estimates for SMAP actions and CIP factsheet.

Table 3-1. SMAP Action Summary

Action Type	SMAP ID	Action Status	Action	Water Quality Benefit	Schedule (years)		Priority (1=highest)
					0-6	7-20	
Retrofit	CIP 1	In design	Chennault Beach Drive Improvements Project	Erosion and sediment reduction	X	-	1
	Study 1	Proposed	Canyon Dr Pond Expansion Feasibility Study	Reduce pollutants associated with sediment	x	-	2
	Study 2	Proposed	Chennault Beach Creek Access Road Culvert Improvements Feasibility Study	Sediment and erosion reduction	-	x	3
Land Management and Development Strategies	Code 1	Existing	Native vegetation inclusion and protection code (MMC, various sections)	Sediment and erosion reduction; lower water temp	NA		
	Code 2	Existing	Impervious surface limitations (MMC, various sections)	Sediment and erosion reduction; lower water temp	NA		
	Program 1	Existing	Critical area protection code and Critical Area Mitigation Plan	Maintain critical area habitat and address wetland watershed restoration	NA		
	Program 2	Existing	Land and riparian corridor purchases	Protect/enhance B-IBI	NA		
Targeted Stormwater Management	Program 3	Existing, enhanced	Increased inspections to detect for IDDE	Reduce pollutant loading from various land uses	X	X	1
	Program 4	Existing, enhanced	Source control investigation	Reduce pollutant loading from various land uses	X	X	2
	Program 5	Existing, enhanced	Increased sweeping and catch basin cleaning	Reduce downstream sedimentation, pollutants associated with particulate and reduce nutrient loading	X	X	1
	Program 6	Existing	CCTV Program for inspection and condition assessment	Reduce erosion, sedimentation and other pollution resulting from improperly functioning stormwater drainage systems	X	X	1
Public Education and Outreach	Program 7	New	Site Evaluation for Private Property Program	Maintain critical area habitat	X	X	3
	Program 8	New	Residential Leaf Collection Outreach Program	Reduce nutrient load (P, N) from leaf matter entering the Chennault drainage system	X	-	4

Table abbreviations:

B-IBI = Benthic Index of Biotic Integrity

CAMP = Critical Area Mitigation Program

CB = catch basin

CCTV = closed-circuit television

IDDE =Illicit Discharge Detection and Elimination

MMC= Mukilteo Municipal Code

N =nitrogen

P = phosphorus

X = yes, - = no, NA = Not applicable

3.1 Stormwater Retrofits

Ecology requires that the SMAP include retrofits and improvements to the existing stormwater drainage system. The retrofits are intended to provide flow control and/or treatment benefits to protect the beneficial uses of those water resources.

3.1.1 Chennault Beach Drive Drainage Improvements

This project will construct improvements to the existing drainage system along Chennault Drive between 60th Avenue W and Marine View Drive. The improvements are expected to include the installation of new drainage pipe within erodible roadside ditches, relocation of poorly sited inlets, minor shoulder paving and asphalt curbing, re-establishment of capacity in existing ditches, and assessment/potential replacement of driveway culverts. Water quality benefits include routing water away from potentially landslide-prone slopes and the removal of erosive flows that result in muddy or turbid water, visible plumes of discolored water and deposited sediment.

3.1.2 Canyon Drive Pond Expansion Feasibility Study

This study will evaluate the feasibility of expanding a City-owned detention pond located on 59th St near Canyon Dr. to enhance removal of pollutants associated with particulates. The study will include a cost benefit analysis and compare the potential project to other water quality and flow reduction projects.

3.1.3 Chennault Beach Creek Access Road Culvert Improvements Feasibility Study

This study will evaluate the feasibility of realigning the Upper Chennault Beach culvert crossing at the access road connecting Upper Chennault Beach Creek and Chennault Beach Creek catchments. The realignment would potentially provide more flow attenuation in the creek ravine and provide an opportunity for public education related to watershed processes and water quality.

3.2 Land Management Strategies

Ecology suggests that the SMAP may include identification of lands to protect or conserve from impervious surface conversions or native vegetation removal, and the strategic means for providing the needed protection.

Land management strategies focused on new and redevelopment are not anticipated to have a large impact on improving water quality over the SMAP planning horizon. Future redevelopment should reduce pollutant loading due to the improved stormwater management practices of the Permit requirements, but redevelopment is anticipated to occur at a relatively slow rate. Less than one percent of the buildable land in the Chennault Beach Creek catchment is forecasted for new or redevelopment by 2035 (Snohomish County 2021).

Mukilteo is already implementing land management strategies to reduce stormwater impacts on receiving waters, including:

- Native vegetation inclusion and protection were included in municipal code updates in 2016 as part of the City's extensive LID code update.
- Impervious surface limitations for new and redevelopment with LID-based code revisions occurred in 2016.
- Critical areas protections, including critical areas delineation and the Critical Areas Management Plan (ESA 2011) have been established to mitigate development project impacts on wetlands, streams, and wetland buffer areas.

- Riparian corridor preservation occurs through City acquisition and protection of receiving water riparian corridors.

The City will continue monitoring and reviewing proposed code and policy changes to ensure those changes protect water quality and do not inadvertently result in increased flow or reduce water quality.

3.3 Targeted Programmatic Actions

This section describes proposed targeted, enhanced, or customized implementation of stormwater management actions in Chennault Beach Creek catchment required as part of Special Condition S5.C of the Permit. Targeted actions are directed at specific pollutants or pollutant types and specific areas or land uses.

Targeted, enhanced, or customized implementation of stormwater management actions related to Permit section S5 and Ecology SMAP guidance encourages the SMAP to build on other efforts of Permit compliance including efforts such as:

- Focused or more frequent IDDE field screening
- Prioritization of Source Control inspections
- O&M inspections or enhanced maintenance of facilities
- Maintenance that requires capital construction of more than $25,000; and/or
- Public Education and Outreach behavior change programs to support SMAP actions for the receiving water overall, or for the catchment area in particular.

3.3.1 IDDE

Special Condition S5.C.5 of the Permit requires the City to continue its ongoing IDDE program, which is designed to prevent, detect, characterize, trace, and eliminate illicit connections and illicit discharges to the MS4.

During both regular maintenance and source control inspections, the City work crews also screen for the presence of illicit discharges or illicit connections, and report any found to the City's Surface Water Program Manager. Thus, as source control inspections increase in the Chennault Beach Creek catchment, the City anticipates additional work on IDDE field screening and compliance follow up activities.

3.3.2 Source Control

The Source Control Program for Existing Development (Special Condition S5.C.8 of the Permit) requires the County to implement an ongoing program to reduce pollutants from areas of existing commercial development that discharge to the MS4.

With approximately 96 percent of the buildable land in the catchment consisting of single-family land use, the opportunities for water quality improvements from commercial source control inspections is limited. The City will prioritize the multi-family sites within the Chennault Beach Creek catchment as potential source control locations.

3.3.3 O&M Inspections and Maintenance

The O&M (Special Condition S5.C.7 of the Permit) requires the City to regulate and conduct maintenance activities that aim to prevent or reduce stormwater impacts. The City identified the following O&M activities for inclusion in this SMAP:

Increased and prioritized Street Sweeping. The City is equipped with one street sweeper that covers almost 67 miles of roadway within the city limits. Street sweeping helps remove debris and other contaminants that would otherwise enter the MS4. Winter storms can impede sweeping due to road conditions. During these events, maintenance efforts are concentrated on applying de-icer (when the timing and temperature are right), sanding streets, and plowing.

This new program focus prioritizes sweeping in the winter between snow and icy conditions where winter sand collects in the Chennault Beach Creek catchment. The program will also prioritize sediment removal from catch basins known to fill more often with sediment such as those located in vertical sags in the roadway. Other operations for this program include a combined cleaning and inspection program with both cleaning and inspection taking place simultaneously rather than sequentially and using one crew trip rather than two. Other potential actions include catch basin spot inspections during snow events, assessing the costs and benefits of contracting some sweeping, vacuum truck deployment, and inspection services with a private service provider.

CCTV Inspection Program. Pipes and structures in the Chennault Beach Creek catchment are part of the City's ongoing CCTV inspection and condition inspection program. The inspection and condition assessment for Chennault Beach Creek is scheduled for 2024/2025. As part of the program, each pipe and structure is cleaned of debris and sediment which can help to improve water quality. The inspection information can also identify conditions that may result in increased erosion and sediment accumulation and therefore reduced water quality. The program also looks at potential IDDE locations and maps cross connections for stormwater entering the MS4.

Surface Water Feature Verification Field Investigation. This effort is a field investigation effort performed by City public works staff to confirm the location of MS4 infrastructure and surface water features in the Chennault Beach Creek catchment. Where possible, staff will request private property access to make observations. The information will be used to verify and correct City GIS data and to identify localized erosion and sedimentation issues that can potentially reduce water quality.

3.3.4 Public Education and Outreach

Special Condition S5.C.2 of the Permit requires the City to implement a program designed to reduce or eliminate behaviors and practices employed by the general public and business entities that cause or contribute to adverse stormwater impacts. The program also encourages the public to participate in stewardship activities to protect, preserve and enhance surface water quality. This SMAP includes two public education and outreach programs for the Chennault Beach Creek catchment:

Site Evaluation for Parcels in Flow Path. This program offers a review and advice service for private property owners whose property includes a wetland or surface water flow path. The service is provided by the City's stormwater technician. The goal of the program is to provide education to property owners for land management strategies to enhance habitat and water quality. The service is intended for private property in the Chennault Beach Creek catchment.

Residential Leaf Collection Outreach Campaign. This city-wide program encourages residents to sweep leaves from impervious surfaces on their property and dispose of leaves in controlled on or offsite composting. The program will provide written communication on natural yard care and tips for

effective onsite leaf composting. Removal of leaves from impervious surfaces will reduce nutrient loading in surface runoff and help maintain the efficiency and effectiveness of the City's street sweeping program.

Section 4

Public Involvement

The City gathered public input on the SMAP prioritization principles. The City's public input strategy was to first solicit public comment on the draft priority principles (referred to in the survey as SMAP Categories) to help refine those principles and inform the priority weightings. The City sent the survey to known interested parties having past experience with stormwater issues, including city residents and outside agencies. The City also provided all residents access to the survey with a link posted on the City's Facebook page, as a News Item on the City website, and on the City's Watershed Planning webpage.

The survey asked respondents to rank the importance[3] of each of the draft SMAP Categories. The Categories are listed below with the descriptions provided in the survey:

- **Jurisdictional Influence** means how much of a watershed is in Mukilteo's city limits. The city has had limited ability to perform actions in watersheds outside of the City boundary. The City contributes stormwater flows to thirteen watersheds. Some watersheds are completely contained within the city limits (e.g., Lower Chennault Beach Creek). Other watersheds only have a small area in the City (e.g., Hulk Creek and Swamp Creek).
- **Landscape Position** is the relative location of the area within a watershed. Mukilteo has three (3) landscape positions: 1) plateau area, 2) bluffs and 3) ravines. Plateau areas are important because they provide more opportunity for rainwater storage in the landscape. Storage can reduce flow rates that scour stream channels. Storage can also provide groundwater recharge for very important summer stream flows. The plateau landscapes in Mukilteo are the flat land areas at the tops of the streams.
- **Overburdened Community** means a community with higher health risks, more exposure to environmental harms, and fewer economic opportunities. Identifying overburdened communities can help reduce negative impacts when selecting project areas. On a scale of 1 to 10, with 10 being the most overburdened, populations in Mukilteo ranked between 2 and 5.
- **Percent Impervious** means the area covered by developed surfaces that don't let rainwater soak into the ground naturally. Examples are pavements and roofs. Watersheds with more impervious areas have scoured streams and lower water quality. The 13 different watersheds in the city have varying percentages of impervious cover. The Chennault Beach Creek catchment is approximately 33 percent impervious.
- **Project Partner Opportunities** means there are other municipal capital or retrofit projects in the area. Projects done together with others might produce economies of scale. The city might meet more goals, reduce project costs, and get water quality improvements faster when partnering. Most of the city's watersheds include at least some project partner opportunity.

[3] Six importance rating options included "Extremely Important", "Very important", "Somewhat important", "Not so important", "Not at all important", and "No opinion".

- **Wetland Mitigation Opportunities** Wetland mitigation can reduce negative impacts from development projects in a watershed. Identified mitigation areas could help guide land use management strategies helpful for water quality improvements and flood reduction. Forty percent of the 13 watersheds in Mukilteo have a wetland mitigation site located within its drainage area.

The City received 47 responses, including three (3) from outside agencies and one (1) from a former resident. All other responses were from current Mukilteo residents. The survey was available for two (2) weeks. Appendix C "Receiving Water Prioritization" contains the survey and responses.

The survey results showed the Landscape Position, Percent Impervious, and Jurisdictional Influence categories received relatively high importance responses. The Overburdened Community category received lower importance responses compared to the other categories, but nearly half of the respondents considered overburdened communities at least somewhat important.

The survey also asked respondents to rank draft priority principles relative to one another from most important to least important. The survey suggested a greater importance of Landscape Position and the lesser importance of Overburdened Communities categories.

While none of the survey information is statistically significant, the survey responses do provide an indication of what issues those in the Mukilteo community having an interest in stormwater management believe are relatively more or less important.

After reviewing the public survey responses, the City's SMAP team updated the priority principles and developed the final weightings. The primary changes to draft priority principles (or SMAP Categories) as a result of community input and further Team evaluation included using existing PAU condition assessment ranking information (Integrated Secondary Score) from the 2013 Strategies Plan to develop a Relative Condition priority principle and combining the Wetland Mitigation and Landscape Position information to develop a single priority principle.

Section 5

Plan Implementation

This section describes the proposed SMAP implementation schedule and identifies the budget and resources needed to implement SMAP projects and activities. Resources necessary to SMAP implementation may include those for facility design, land acquisition, permit fees, installation, O&M staff, any desired monitoring and analysis, and administrative support.

5.1 Incorporation into Long Range Planning

The SMAP identifies changes to local long-range plans to address stormwater management priorities. For the City of Mukilteo, this will include incorporating the SMAP projects and activities into the 2024 Comprehensive Surface Water Plan Update.

5.2 Proposed Short- and Long-Term Implementation

The short-term actions of the SMAP are on a 6-year timeframe identified in the Growth Management Act (GMA) Capital Facility Planning process. Short-term SMAP actions should help meet water quality goals and are a mix of opportunistic efforts (building on other efforts occurring or planned in the area) and strategic new projects/activities. Short-term actions may include reprioritization of stormwater management programs or currently funded but unconstructed capital projects that help address water quality. Short-term actions may also include targeted public outreach efforts.

The 20-year long-term timeframe is identified in the GMA Capital Facility Planning process as well. Long-term SMAP actions should include an anticipated schedule for long-term implementation including interim steps. This long-term schedule is not intended to be a Permit compliance goal, but rather an indication of the anticipated level of effort that reflects an understanding of the time and resources required for detailed planning and successful implementation. Long term actions may include design and construction of potential capital retrofit projects that address water quality goals and the continued implementation of on-going programs.

Table 5-1 includes a proposed budget and potential funding sources to implement the short- and long-term projects and activities.

Table 5-1. SMAP Action Cost, Schedule and Implementation

Action Type	SMAP ID	Action	Cost ($k) [1]	Action Status and Funding Source	
				Phase 1 (0-6 years)	Phase 2 (7-20 years)
Retrofit	CIP 1	Chennault Beach Drive Improvements	$5,030,00 $900 [2]	Design and construct	Project complete.
	Study 1	Canyon Dr Pond Expansion Feasibility Study	$30,000	Include SW Comp Plan funding and apply for grants	Design and construct
	Study 2	Chennault Beach Creek Access Road Culvert Improvements Feasibility Study	$80,000	Include SW Comp Plan funding and apply for grants	Design and construct
Land Management and Development Strategies	Code 1	Native vegetation inclusion and protection MMC various sections	NA	Continue implementation	
	Code 2	Impervious surface limitations	NA	Continue implementation	
	Program 1	Critical area protection and Critical Areas Mitigation Plan	NA	Continue implementation	
	Program 2	Land and riparian corridor purchases	NA	Continue implementation	
Targeted SW Management	Program 3	Increased inspections to detect for IDDE	NA	Continue implementation of existing program but prioritize Chennault Beach Creek catchment	
	Program 4	Source control investigation	NA	Continue implementation of existing program but prioritize Chennault Beach Creek catchment	
	Program 5	Increased sweeping and CB cleaning	NA	Continue implementation of existing program but prioritize Chennault Beach Creek catchment	
	Program 6	CCTV Program for inspection and condition assessment	NA	Existing Inspection and Condition Assessment Program funding	
Public Education and Outreach	Program 7	Site Evaluation for Private Property Program	NA	Continue implementation of existing program but prioritize Chennault Beach Creek catchment	
	Program 89	Residential Leaf Collection Outreach Program	$40,000[3]	Include SW Comp Plan funding and apply for grants	Program complete.

SW Comp Plan = City of Mukilteo 2024 Stormwater Comprehensive Plan

1. Planning level costs for CIP construction and program implementation. CIP design costs are currently accounted for in City budgets, therefore costs are for construction only.

2. Annual maintenance cost.

3. Program cost for 5 years.

5.3 Plan Adaptive Management

As the actions identified in the SMAP are implemented, the City will follow adaptive management principles to improve the effectiveness and efficiency of the stormwater management strategies. Adaptive management is a process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood.

The adaptive management process should also include implementation tracking and an ongoing assessment of what portion of the planned projects and activities have taken place and how much of the catchment area has been addressed. The adaptive management process can also address new problems and take advantage of new information and opportunities to improve water quality, aquatic wildlife habitat and enhance beneficial uses. Figure 5-1 illustrates the typical adaptive management approach.

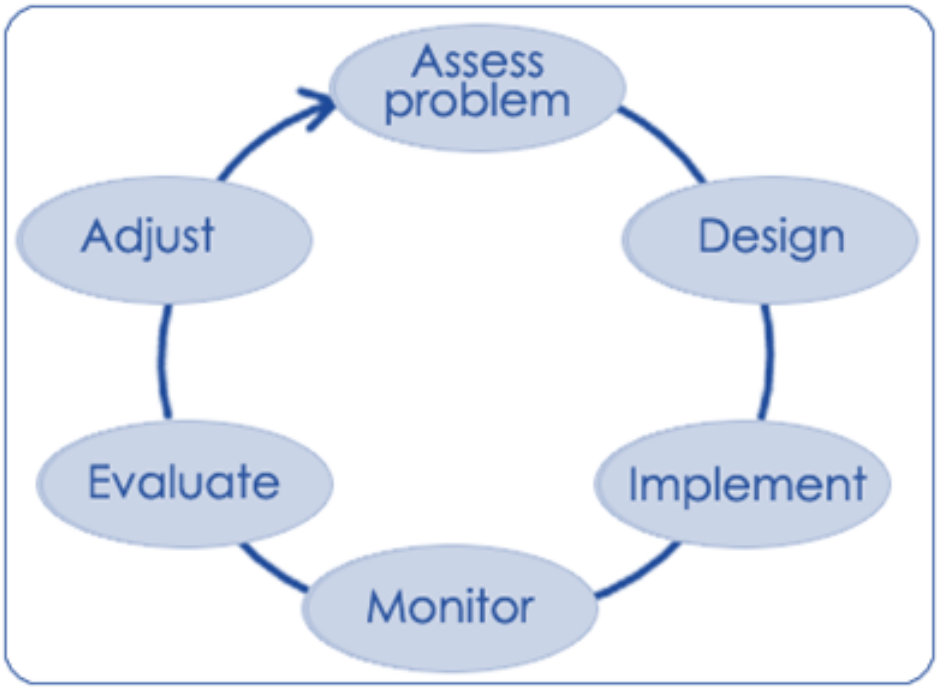

Figure 5-1. Diagram of adaptive management approach

Section 6

Limitations

This document was prepared solely for City of Mukilteo in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Mukilteo and Brown and Caldwell dated April 7, 2020. This document is governed by the specific scope of work authorized by City of Mukilteo; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Mukilteo and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

Section 7

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Appendix A: Gap Analysis

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Technical Memorandum

Prepared for: City of Mukilteo

Project Title: Mukilteo Stormwater Management Action Plan Gap Analysis

Project No.: 155075

Draft Technical Memorandum

Subject: SMAP Gap Analysis

Date: November 10, 2020

To: Jennifer Adams, Surface Water Programs Manager

From: Dan Shapiro, Damon Diessner and Margaret Ales

Prepared by: Margaret Ales, P.E.

Reviewed by: Mike Milne

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List of Abbreviations

AUs	analysis units
BC	Brown and Caldwell
CAMP	Critical Areas Mitigation Plan
City	City of Mukilteo
Ecology	Washington State Department of Ecology
GIS	geographic information system
LID	low impact development
MS4	municipal separate stormwater sewer system
NPDES	National Pollutant Discharge Elimination System
PAUs	project analysis units
PSRC	Puget Sound Regional Council
SMAP	Stormwater Management Action Planning /Plan
TM	technical memorandum

Section 1: Introduction

The City of Mukilteo (City) asked Brown and Caldwell (BC) to perform a gap analysis to help address the Stormwater Management Action Plan (SMAP[1]) requirements of the Western Washington Phase II Municipal Stormwater Permit (Permit). The gap analysis is intended to serve as an internal reference document that enables the City to compare its past stormwater action planning efforts with those required in the Permit, and identify areas where work is still needed to meet Permit requirements and deliverables

Section 2: Background

The Phase II Permit authorizes the discharge from the City's Municipal Separate Stormwater Sewer System (MS4) to waters of the State. The Washington State Department of Ecology (Ecology) issued the current Permit on July 1, 2019. The Permit expires on July 31, 2024 (Ecology 2019a).

Special Condition S5.C.1.d of the Permit requires the City to conduct a receiving water assessment, develop a receiving water prioritization to determine which receiving water will receive the most benefit from a suite of actions, and develop an SMAP for at least one high-priority catchment area[2] by March 2023. In developing the SMAP, the City must conduct a similar process and consider the range of issues outlined in Ecology's *Stormwater Management Action Planning Guidance* (SMAP Guidance), (Ecology 2019b) which states:

> SMAP is focused on addressing impacts from the cumulative development in a watershed rather than on single site or subdivision impacts. SMAP helps to answer these two important questions:
>
> 1. How can we most strategically address existing stormwater problems?
> 2. How can we meet our future population and density targets while also protecting and improving conditions in receiving waters?
>
> A successful SMAP strategically identifies approaches – in addition to current requirements of the Permit – to accommodate future growth and development while preventing water quality degradation and/or improving conditions in receiving waters harmed by past development.
>
> *Stormwater Management Action Planning Guidance (Ecology 2019b)*

The City has already completed several watershed-scale[3] planning studies that considered many of the issues suggested in the SMAP guidance and directly inform the SMAP questions listed above. For example, the *Mukilteo Watershed-based Stormwater Strategies Plan (*Strategies Plan*)* (ESA 2013) is a receiving water assessment that characterized the Mukilteo watersheds using "assessment units" from the Puget Sound Watershed Characterization Project and used a prioritization method to determine which assessment units would most benefit from a suite of actions, using methodologies consistent with those outlined in the SMAP

[1] SMAP is used interchangeably to mean Stormwater Management Action Planning and Stormwater Management Action Plan.

[2] Catchment area is a term used in the NPDES SMAP Guidance document to define the extent of the planning area to apply the SMAP process and is synonymous with "sub-basin".

[3] Watershed is a drainage area contributing to a water body. The scale of a watershed varies depending upon the waterbody being referenced.

Guidance. Several subsequent City studies identified retrofit projects to help improve stormwater quality and reduce erosive flows within the high-priority basins. Additional details about Mukilteo's stormwater planning, studies, and projects applicable to the SMAP requirements are described in Section 3.1 below.

Table 1 is a summary of NPDES Permit requirements and the applicable SMAP processes related to those requirements. The table includes a summary of the guidance tasks (SMAP Guidance Task Summary) that may be completed by the City to help develop the NPDES deliverables (NPDES Deliverables to Ecology).

Table 1. Summary of NPDES Permit SMAP Guidance and NPDES Deliverables

NPDES SMAP Stage (Permit Section & Date)	SMAP Guidance Task (page #)	SMAP Guidance Task Summary	NPDES Deliverables to Ecology
Receiving Water Condition Assessment (S5.C.1.d.i., by March 31, 2022)	Delineate basins/ID receiving water (p. 3)	• Delineate basins within jurisdiction and identify receiving waters. • Perform seven planning-level actions proposed to help delineate basin, identify receiving waters, and understand net deposition of sediment/solids for direct discharges to Puget Sound.	Submit a watershed inventory table that includes: • Receiving water name • Total watershed area • Percent of the total watershed area in Permittee's jurisdiction Include a map of the delineated basins with reference to the watershed inventory table.
	Assess receiving water conditions (p.5)	• Perform a rapid assessment of existing information to compile and review to understand the likely condition of each of the receiving waters to which the MS4 discharges. • Perform seven planning-level actions to guide permittee to existing data sources and relevant assessment methods for receiving water conditions. Information to be used to assess stormwater management influence and assessment of relative conditions and contributions.	Submit a watershed inventory table that includes findings of the SW management influence assessment for the basin.
	Assess stormwater management influence (p. 7)	• Provide the rationale for sorting receiving waters according to their relative expected benefit from the SMAP. • Perform four planning-level actions to help understand which basins would most benefit from SMAP and to outline documentation expectations for the Permit Annual Report.	Submit a watershed inventory table that includes findings of the SW management influence assessment for the basin.
	Assess relative conditions and contributions (p. 8)	• Develop and document a prioritization approach based on each basin's relative conditions and contributions to narrow the list of basins to prioritize. • Perform four planning-level actions to identify specific areas of documentation including relevant findings, overall rationale for final list, rationale for stormwater investments, and relevant information about existing plans and programs that meet SMPA needs.	Submit a watershed inventory table that indicates which receiving waters will be included in the prioritization process.

Table 1. Summary of NPDES Permit SMAP Guidance and NPDES Deliverables			
NPDES SMAP Stage (Permit Section & Date)	SMAP Guidance Task (page #)	SMAP Guidance Task Summary	NPDES Deliverables to Ecology
Receiving Water Prioritization (S5.C.1.d.ii , June 30, 2022)	Receiving Water Prioritization (p. 9)	• Establish and conduct a prioritization process to select an area to focus on where SMAP is applied based on three strategic SMAP elements: strategic retrofits, land management strategies, and strategic stormwater management. Follow prioritization principles, seek public input, and be prepared to adjust prioritization process based on input. • Perform three planning-level actions to focus prioritization process and documentation of process.	• Document the prioritized and ranked list of receiving waters. • Document the priority ranking process used to identify high priority receiving waters. (Can reference existing local watershed management plans as source of information or rationale for prioritization). • "Ranking process shall include the identification of high priority catchment areas for focus of Stormwater Management Action Plan …"
Stormwater Management Action Plan (S5.C.1.d.iii, March 31, 2023)	Assess need for stormwater facilities (p. 12)	• Review rankings of Receiving Water Prioritization to help assess need for protection or restoration planning and investments. Also consider water quality treatment and flow control benefits.	Develop and submit a SMAP for at least one high priority catchment area that includes a description of the stormwater facility retrofits and/or actions for water quality management.
	Identify land management/ development strategies (p. 13)	• Evaluate basins for lands to protect/conserve or zoning and land use policy changes. Development strategies may be considered for largely undeveloped watersheds. Increasing tree canopy may be a benefit to built out areas.	Develop and submit a SMAP for at least one high priority catchment area that identifies land management/development strategies and/or actions identified for water quality management.
	Create a targeted/ customized implementation plan (p. 14)	• Evaluate and increase/adjust current stormwater management programs such as targeted implementation of IDDE screening, source control inspections, O&M inspections and maintenance, and Public Education and Outreach behavior change programs.	Develop and submit a SMAP for at least one high priority catchment area that identifies: "Targeted, enhanced, or customized implementation of stormwater management actions related to permit sections within S5…"
	Proposed schedule/budget (p. 14)	• Identify budget sources and schedule. Identify proposed short-term actions (within 6 years), and long-term actions.	Develop and submit a SMAP for at least one high priority catchment area that identifies: "…needed changes to local short-term and long-range plans (schedule and budget) to address SMAP priorities, if applicable."
	Implement process to adaptively manage plan (p. 15)	• Include a long-term assessment approach in detail; should be able to report whether goals are being achieved. Include implementation tracking and an ongoing assessment of what portion of projects have taken place and how much of the catchment area has been addressed.	Develop and submit a SMAP for at least one high priority catchment area that identifies: "A process and schedule to provide future assessment and feedback to improve the planning process and implementation of procedures or projects."

Section 3: Scope of Work

The SMAP gap analysis represents the first of two phases to be completed as part of the City's ongoing stormwater planning efforts. The Phase 1 SMAP work includes the following components:

1. Complete a data review
2. Develop a gap analysis table and perform the gap analysis
3. Develop recommendations to close the gaps

This technical memorandum (TM) compares the Phase II Permit SMAP requirements with the considerable amount of applicable planning already completed by the City.

In Phase 2, City staff, in collaboration with BC, will implement recommendations from the gap analysis and prepare the SMAP to meet Phase II Permit requirements.

3.1 Data Review

The City has invested considerable time, effort and budget in stormwater planning. Since completion of the *Comprehensive Stormwater Management Plan* in 2001, the City has completed a variety of stormwater projects, studies, and stormwater management tools that will help the City make progress toward meeting SMAP planning goals.

BC reviewed the available City stormwater management and planning data sources applicable to the SMAP process. The following bullets summarize these documents and identifies how each supports the NPDES Permit requirements.

- **2001 Comprehensive Stormwater Management Plan (2001 Comprehensive Plan).** The 2001 Comprehensive Plan provided an overview of Mukilteo's natural resources including surface water features, geologic and soils information, as well as land uses and vegetation. It also documents general and specific drainage issues in Mukilteo, identifies possible solutions, and documents the development of hydraulic and hydrologic models for evaluation of drainage issues and solutions. Mukilteo was divided into 23 hydrologic basins which were each modeled individually. The 2001 Comprehensive Plan supports the first step in the Receiving Water Condition Assessment, required by Condition S5.C.1.d.i of the NPDES Permit.
- **2010 Smuggler's Gulch Retrofit Study Pre-Design Report.** This study evaluated the feasibility of retrofits to alleviate peak flows and improve water quality in the Smuggler's Gulch basin. This basin was selected for study because of issues identified with water quality and erosive flows in the ravine. This report found that "infill" development occurring between 1970 and 1990 contributed to increased runoff, which exacerbated erosion issues. Retrofit projects from this study are listed in Table B-2 along with an implementation status. These projects, along with others, will be considered in the list of capital projects in the development of the SMAP (plan), required by Condition S5.C.d.iii of the NPDES Permit.
- **Critical Area Mitigation Program (2011 Critical Area Mitigation Plan or 2011 CAMP).** The 2011 CAMP was intended to provide mitigation alternatives for development projects that impact wetlands, streams, or wetland buffer areas. This program utilizes a 2010 study of Japanese Gulch, Big Gulch, and Picnic Point, which identified locations within Mukilteo and the UGA that could provide mitigation opportunities. These sites provide an opportunity for wetland creation, wetland restoration, and/or stream restoration. This program also established the Mukilteo Habitat Reserve (MHR), which allows developers to pay a fee in lieu of wetland buffer mitigations, thus offsetting costs of protecting high-quality wetlands through the purchase of conservation easements or parcels. Depending on the location of the basin selected for SMAP prioritization, these pre-identified locations for mitigation and the program strategies could be

useful in identifying land management/development strategies for water quality management. as required by Condition S5.C.d.iii of the NPDES Permit.

- **Mukilteo Watershed Based Stormwater Strategies Plan (Strategies Plan or 2013 Strategies Plan).** Funded by a Puget Sound Watershed Protection and Restoration Ecology grant, this plan was a response to the "Action Agenda" created by the Puget Sound Partnership in 2008 and updated in 2012. The Strategies Plan followed Ecology's Puget Sound Watershed Characterization process to analyze the health of watersheds and utilized the assessment units (AU's) developed by Ecology. These AUs were further subdivided into Project Analysis Units (PAU's) to analyze which of these areas would benefit the most from stormwater management activities. The study identified Big Gulch North, Big Gulch South, and Picnic Point Ravine as the highest priority catchments in the City.

  The delineation of PAUs will facilitate completion of several SMAP requirements including the determination of the percent area of each PAU that is within Mukilteo's city limits and identifying outfalls to Puget Sound. In addition, the Strategies Plan included the development of landscape-scale geographic information system (GIS) data that will be useful for developing and implementing the SMAP.

  To determine priorities for stormwater management, the Strategies Plan derived a primary and secondary score for each PAU. The primary score is based on the relative importance of each watershed process to overall watershed health under pre-developed conditions and the level of intactness of the PAUs under existing conditions. The primary score for each PAU was evaluated for four watershed processes following methodology outlined in Ecology's Puget Sound Characterization (Stanley 2011):

  – Delivery (amount of flow generated in the watershed by precipitation)
  – Storage (amount of runoff stored as surface water)
  – Recharge (ease of infiltration in the watershed)
  – Discharge (ratio of manmade conveyance systems to natural streams)

  The primary score separated the PAUs into one of three Management Categories: Preserve, Repair, or Targeted. Targeted PAUs were then further scored and ranked with a secondary score based on processes unique and important to Mukilteo and include:

  – Sedimentation potential (evaluates surface erosion, mass wasting, and stream channel erosion)
  – Freshwater habitat (quantity and quality of salmonid habitats)
  – Hydrologic relatedness (influence of headwater flow processes on downstream basins)

  The primary and secondary scores were compiled into an overall priority ranking consistent with Ecology's preferred watershed planning process at that time. The resulting scores then formed the basis for the prioritization ranking of PAUs within the City. The results of the prioritization process fed directly into the follow-on work of the 2014 Retrofit and Prioritization Report and the 2015 Pre-Design Report.

  Elements of this report are directly relevant to the SMAP assessment and prioritization requirements. The City is allowed to reference existing local watershed management plans as a source of information rationale for the prioritization and plans to utilize the Strategies Plan work where relevant to meet the requirements of Condition S5.C.1.

- **2014 Mukilteo Stormwater Retrofit Project Identification and Prioritization Report (2014 Retrofit and Prioritization Report).** This report builds on the Strategies Plan, striving to identify, prioritize, and select stormwater retrofit projects for further analysis. The report identified eight possible projects in Mukilteo's high priority catchments and recommended three of these to be further analyzed. Three proposed projects that are currently being designed or have had pre-design or geotechnical work completed are:
  - Retrofit Project 7, 55th Pl. W/127th St. SW
  - Retrofit Project 4, Harbor Pointe Middle School
  - Retrofit Project 1, Staybridge Suites Pond
- **2015 Pre-Design Report Mukilteo Watershed Based Stormwater Retrofit Plan (2015 Pre-Design Report).** This plan builds off the 2014 Retrofit Report and analyzes in further detail the three previously identified potential projects. The analysis for these three potential projects included a delineation of catchments to the project-scale, geotechnical investigations in the field, pre-design work, and cost estimation. Depending on the final selection of the priority basin, the projects in this plan may be considered in the list of retrofit projects in the development of the SMAP (plan) for at least one high priority catchment per Condition S5.C.1.d.iii of the NPDES Permit.
- **2015 Technical Memorandum: Geomorphology and Critical Slope Evaluation in Support of the City of Mukilteo Stormwater Comprehensive Plan Update.** This study was conducted to support the 2015 Comprehensive Plan. It involved walking and evaluating the physical conditions of four ravines/channels: Brewery Creek, Upper Chennault Creek, Lower Chennault Creek, and Smuggler's Gulch Creek. These evaluations contribute to the understanding of the Receiving Water Assessment, and some information may be included in the watershed inventory table deliverable as described in Condition S5.C.d.i of the NPDES Permit.
- **2015 Mukilteo Comprehensive Surface Water Management Plan Update: 2015-2021 (2015 Comprehensive Surface Water Plan).** In 2015, the City updated its 2001 Comprehensive Surface Water Management Plan. The update evaluated current levels of service, staffing levels, and utility expenses. A rate study to evaluate future fees necessary to support expenses such as planned projects and stormwater management activities was also included in the 2015 Plan. The plan provided an outlook on the regulatory environment and the City's developing stormwater needs, and sought to define new goals and performance measures for the surface water utility. This Plan lists recorded surface water issues, capital projects, and a ranking criteria for projects based on flood hazard reduction, environmental protection/improvement (including water quality and habitat), community considerations, maintenance, and risks. The projects may be considered in the list of retrofit projects in the development of the SMAP (plan) which are required to be identified and described for one high priority catchment area per Condition S5.C.1.d.iii of the NPDES Permit.
- **City of Mukilteo Comprehensive Plan 2035 (prepared 2015).** This plan was prepared by the City to fulfill the requirements of the Growth Management Act. It establishes goals and policies for sustainability, promoting quality of life, ensuring a robust economy, creating a healthy community, and highlighting neighborhood identity. The Comprehensive Plan 2035 does not have a direct connection to the requirements of the SMAP. The plan was reviewed for information about planned future growth and development. The Permit requires Permittees to identify changes needed to local long-range plans to address SMAP priorities, if applicable per Condition S5.C.1.d.iii of the NPDES Permit.
- **2017 LID Code Update (LID Code).** The City updated its planned residential development code (Chapter 17.51) to limit building and structure coverage to fifty percent of the lot. Impervious coverage of the lot is limited to 60 percent. The code also encourages the use of low impact development (LID) techniques and new technologies to reduce impervious area wherever possible. The LID Code was

reviewed to prepare a baseline to evaluate potential future land/development management actions associated with Receiving Water Prioritization per Condition S5.C.1.d.ii of the NPDES Permit.

- **City of Mukilteo Development Standards (2019).** The City's Development Standards (Standards) provide governance and guidance for all new construction and upgrade of facilities related to transportation and stormwater for both public and private facilities. The Standards identify several requirements that uniquely address the interaction of stormwater with the steep sloped and erosive terrain within the city. Examples of these stormwater requirements include LID measures (Standards Section 3.3) and stormwater system design information for geologically sensitive areas (Standards Section 3.4.4). The Standards were reviewed to prepare a baseline to evaluate potential future land/development management actions associated with Receiving Water Prioritization, Condition S5.C.1.d.ii of the NPDES Permit.
- **City GIS datasets.** The City developed GIS shapefiles including PAU data and prioritization results from the 2013 Strategies Plan, natural surface water features, stormwater infrastructure assets, streets and street sweeping routes, and land use and zoning shapefiles. See Table B-1 in Attachment B for a complete list of data received and reviewed for the SMAP planning process. This data is the basis for the City's watershed inventory table submittal for the NPDES SMAP Receiving Water Assessment requirement as described in Condition S5.C.1.d.i of the NPDES Permit.
- **Retrofit and New Project List.** Projects that originated from studies and planning efforts are found in Table B-2 in Attachment B. This table provides project title, location, issue being targeted, and project completion status to easily identify which projects may have already been completed when evaluating past plans and future options. Where applicable, the project list will help identify and describe stormwater facility retrofits within the SMAP for at least one high priority catchment per Condition S5.C.1.d.iii of the NPDES Permit.

3.2 Gap Analysis Results

BC developed an SMAP gap analysis using the Permit requirements as the criteria to evaluate Mukilteo's relevant stormwater planning efforts and data sources. The Permit requires the City to consider the range of issues in a process similar to the one found in the *SMAP Guidance Document.* Planning actions in the Guidance Document were reviewed and determinations were made as to whether previous City efforts had considered those actions. If the actions were not considered in previous efforts, the action was evaluated against the Permit requirement, and a recommended follow-up action was proposed for any potential gaps.

The SMAP gap analysis results are summarized in Attachment A. An explanation of Attachment A's column headings and their relationship to each other is described in some detail below.

NPDES SMAP Stage. The Phase II NPDES permit outlines three work stages in the SMAP planning process:

1. **Receiving Water Assessment** - Assess and document existing information to determine which receiving waters would receive the greatest benefit from stormwater management planning.
2. **Receiving Water Prioritization** - Define and implement a prioritization process to select basins where SMAP planning can reduce pollutant loading and hydrologic impacts of existing and future development.
3. **Stormwater Management Action Plan** - Develop an SMAP for one high priority catchment area that identifies retrofits, land management strategies, and stormwater management strategies.

NPDES SMAP Guidance Task. SMAP Tasks are groupings of specific planning actions as listed in the SMAP Guidance.

NPDES SMAP Guidance Planning Action (SMAP Guidance Action). These are the specific recommended planning-level actions in the SMAP Guidance for the permittee to consider while developing the SMAP.

City Documentation. This column lists the documents or data relevant to each SMAP Guidance Action.

City Gap Status. (No Gap/Partial Potential Gap/ Potential Gap). Identifies the degree to which the suggested planning action has been implemented. A partial potential gap or a potential gap at the SMAP Guidance Action level indicates that a suggested planning action was not considered in past efforts, but it may not be at gap at the SMAP Guidance Task or Permit compliance level.

Status and Recommendation. This indicates whether a gap at the SMAP Guidance Action level might exist. Gaps are evaluated as low, moderate or high relative to the effort to fill the planning gap.

- **Activity – Resolved.** Resolved means work is complete and meets the intent of the SMAP Guidance Action or the NDPES permit requirement.
- **Activity – Current SMAP Activities** help meet the requirements of the current Phase II NPDES Permit and are expressed as tasks to summarize, research, or analyze information for inclusion in the SMAP planning process.
- **Activity – Potential Future SMAP Activities** identifies work to consider as part of the adaptive management process or future iterations of the SMAP planning process beyond the current Permit period. Future SMAP Activity recommendations are not needed for compliance with the current Permit.
- **Effort.** Lists the level of effort (Low, Moderate or High) to perform the recommended activity and provides a brief explanation of the effort.
  - Low effort work takes place over a shorter time period and includes tasks such as researching or documenting existing and readily available information.
  - Moderate effort work typically includes GIS-based research or documenting or summarizing new findings and analysis for inclusion in an NPDES permit SMAP deliverable.
  - High effort work is iterative and includes collaboration with stakeholders. High effort work may include new analyses such as developing scoring or updating existing prioritization methodologies, stakeholder and public outreach and involvement, and policy development.

3.3 Recommendations

The Recommendations from the gap analysis are summarized below by the three NPDES SMAP planning stages.

For the **Receiving Water Condition Assessment** NPDES planning stage, the City has completed a majority of the SMAP Guidance actions from its 2013 Strategies Plan, including basin delineation, identifying receiving waters, use of landscape scale data to describe watersheds (water flow process, impervious coverage, sediment loading, habitat and hydrologic connectivity), identification of data sources, and review of all watersheds' contributions to receiving waters within the City. Three areas of planning and analysis work are recommended to prepare for this portion of the NPDES SMAP planning:

1. Gather the readily available information related to water quality in receiving waters, impaired water body considerations, and overburdened communities.
2. Summarize impervious area and land use information. Incorporate existing information about potential impervious area reduction and wetland mitigation site per basin.
3. Incorporate new and existing watershed-based information from the 2013 Strategies Plan into an NPDES watershed inventory table and map by March 31, 2022. Identify which basins are expected to have relatively low stormwater management influence for the SMAP. Also document the overall rationale for the final list, proposed restoration goals, potential areas for additional stormwater investments, and relevant information about existing plans and planning efforts.

For the **Receiving Water Prioritization** NPDES planning stage, there are two recommendations to advance the SMAP planning:

1. Update the existing prioritization discussion included in the 2013 Strategies Plan (Integrated Secondary Score, Section 2.5, pg. 18) with new work by June 30, 2023 to include:
   a. development and discussion of a new scoring category for overburdened communities,
   b. basin prioritization results from the addition of the new secondary scoring category for overburdened communities, and
   c. a public education and outreach effort for the overall SMAP planning process.
2. Document the strategic process for retrofits, land management, and stormwater management programs and incorporate discussion about the level of investment needed to meet water quality goals for each basin.

The final planning stage, **Stormwater Management Action Plan**, requires the permittees to develop an SMAP for at least one high priority catchment area by March 31, 2023. Although the City has prepared watershed-scale planning documents for three high priority PAUs, the City is required to include additional evaluation to meet NPDES SMAP requirements. The City can meet those additional requirements by identifying planning elements related to land management and developing strategies for stormwater management program actions. The four recommendations for meeting these requirements include:

1. Evaluating the previously identified projects and new project needs with the revised prioritization methodology.
2. Integrating land management and development strategies developed during the SMAP planning process.
3. Documenting existing and proposed stormwater management actions (programs)
4. Identifying changes to long-range plans to address SMAP priorities.
5. Researching and documenting funding sources, and preparing associated schedules for implementing high priority actions for both short- and long-term actions.
6. Developing and documenting processes to adaptively manage the SMAP into the future.

Table 2 provides a tabular summary of the recommendations for the current NPDES SMAP deliverables by the NPDES SMAP planning stage and SMAP Guidance Task (categories for the SMAP Guidance). Recommendations are provided in detail in Attachment A.

Table 2. Summary of SMAP Recommendations and Effort by NPDES SMAP Stage and Guidance Task

NPDES SMAP Stage	SMAP Guidance Task	Recommendation Summary from Attachment A – Gap Analysis Table	Effort
Receiving Water Assessment (by March 31, 2022)	Delineate basins/ID receiving water	No activities, work complete.	None
	Assess receiving water conditions	Gather the following information and include in NPDES required watershed inventory table on a watershed basis: • Desktop study of State-provided online water quality data for each receiving water • Existing development planning and policy • Various impaired water body considerations • Desktop study of EPA and State-provided online tools for assessing overburdened communities	Low
	Assess stormwater management influence	Summarize existing information such as impervious coverage and land use and incorporate impervious area reduction and wetland mitigation sites per basin.	Low
	Assess relative conditions and contributions	• Combine existing information, planning and prioritization with new findings into a watershed inventory table and map. • Document how the existing information will be leveraged to address SMAP needs.	Low
Receiving Water Prioritization (by June 30, 2022)	Receiving water prioritization	• Develop an overburdened community scoring system to include in and use with the Integrated Secondary Score developed in the 2013 Strategies Plan. • Incorporate the new overburdened community scoring category to the PAU prioritization. • Develop public involvement and participation plan to include opportunities for the public (including overburdened communities) to participate in the SMAP decision-making process (S5.C.3.a) .	Moderate
		Document prioritization process and identify high priority catchment areas that will benefit from strategic retrofits, land management strategies, and stormwater management programs.	Low
Stormwater Management Action Plan (by March 31, 2023)	Assess need for stormwater facility retrofits	• Evaluate projects in high priority catchment . • Document process and facility retrofit results for SMAP document.	Moderate
	Identify land management/ development strategies	Document land management and development strategies from existing sources and proposed changes developed during SMAP planning process.	Low
	Create a targeted/customized programmatic plan	Document implementation of existing and proposed stormwater management program work developed during SMAP planning process.	Moderate
	Proposed schedule/budget	Research and document funding sources and prepare schedule for high priority actions.	Moderate
	Implement process to adaptively manage plan	Develop and document a process to adaptively manage the plan.	Moderate

Section 4: Next Steps

BC performed a gap analysis to compare the City's stormwater efforts with the NPDES Phase II Permit requirements for Stormwater Management Action Planning (SMAP). The SMAP effort includes three planning stages: Receiving Water Assessment, Receiving Water Prioritization, and Stormwater Management Action Plan.

The City has completed much of the work or the intent of the work outlined in the SMAP Guidance with the analysis and associated GIS files included in the 2013 Strategies Plan. The data sources, water conditions assessment, and analysis have been developed in tabular format and will be transferable to the watershed inventory table required by the Permit. The City has collected data for the water condition assessment and developed a retrofit prioritization process based on Ecology's framework to evaluate watershed processes in the Puget Sound Characterization (Stanley 2011). This existing work will continue to be the foundation for the City's ongoing SMAP effort.

The gap analysis identified two primary areas of work to update the City's stormwater planning efforts for compliance with the SMAP requirements of the current NPDES permit:

1. Document existing stormwater planning information (land use management, prioritization process, retrofit strategies, and stormwater programs) and new findings from desktop research (water quality, overburdened communities, and pollutant sources by land use/zoning). Documented information can be included in the required NPDES watershed inventory table as updates to watershed (PAU) fact sheets developed in the 2013 Strategies Plan or in narrative discussion.
2. Research overburdened conditions as identified in online tools (USEPA's Environmental Screening and Mapping tool and the Washington State's Health Disparity Map) and create an additional spatially based scoring category to include in the existing watershed prioritization methodology. Assess watersheds with the revised scoring and integrate results into the watershed prioritization.

Areas of potential work for future versions of the SMAP are to integrate additional scoring categories. The current prioritization process includes scoring for water flow process, sediment potential, freshwater habitat, and hydrologic relatedness. In addition to the recommended scoring category for overburdened communities to be included for the current SMAP, future scoring categories may include water quality based on source control and land use/zoning. Another recommendation for future stormwater planning is to evaluate the feasibility of expanding the number of mitigation sites identified in the CAMP.

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Attachment A: Gap Analysis Table

NPDES SMAP Stage	NPDES SMAP Guidance Task	#	NPDES SMAP Guidance Planning Action	City Documentation [a]	City Gap Status	City Status or Recommendation	
						Activity (Resolved, Current SMAP, Potential Future SMAP)	Effort
Receiving Water Condition Assessment (S5.C.1.d.i., by March 31, 2022)	Delineate basins/ ID receiving water	1	Calculate total watershed areas between one square mile and about 20 square miles (variable depending on what makes sense for each municipality).	2013 Strategies Plan: • Section 2.2 • Figure/Map 1	No Gap	Resolved: • Continue to use existing watershed delineations from 2013 Strategies Plan and City GIS information in planning efforts. • Information currently documented in GIS.	No additional effort.
		2a	For each receiving water determine: 1) total contributing area including other jurisdictions to the point where the receiving water flows into a flow control exempt water body.				
		2b	For each receiving water determine: 2) the percentage of area that is in your jurisdiction.				
		3	Use "assessment units" from PS Watershed Characterization Project.				
		4	Map of jurisdiction delineated into basins.				
		5a	For direct MS4 discharges to Puget Sound determine: 1) whether discharge is to shoreline area.	City of Mukilteo GIS data			
		5b	For direct MS4 discharges to Puget Sound determine: 2) what drift cell type is there (determines where sediment deposition is likely to occur)?	Washington State Coastal Atlas online GIS map			
	Assess receiving water conditions	6a	For each receiving water: 1) Identify designated uses and desired WQ conditions to support uses.	2013 Strategies Plan: Table 8	Partial Potential Gap	**Current SMAP Activities:** • Continue use of Water Quality Strategies from 2013 Strategies Plan for impaired water bodies. • Confirm designated uses and desired WQ conditions with Washington Water Quality Atlas online map (includes State Water Quality Assessment data) and Washington Administrative Code (WAC) 173-201A-602 Table for WRIA 7 and 8. • Document in watershed inventory table.	**Low:** Desktop research to include in watershed inventory table.
		6b	For each receiving water: 2) Determine what information is available and assess if uses are currently being met.				
		6c	For each receiving water, 3)gather and evaluate landscape scale data (e.g., land use, land cover, road density etc.).	2013 Strategies Plan: Section 2.4 and associated GIS Data	No Gap	Resolved: • Continue to use existing landscape scale data from 2013 Strategies Plan and City GIS information in planning efforts. • Information currently documented in GIS.	No additional effort.
		6d	For each receiving water, 4) assess development pressure in basin (proposed growth, transportation planning, sensitive portions of basin protected with current zoning and plans).	2011 Critical Areas Mitigation Program	No Gap	Resolved: • Continue to use prioritization and mitigation site selection analyses prepared for Critical Areas Mitigation Program for each receiving water. • Information currently documented in GIS.	No additional effort.
						Potential Future SMAP (after March 2023): • Explore feasibility to expand analysis for Critical Area Mitigation Program to identify additional potential mitigation sites as identified in previous CAMP analysis.	High: Field study of remaining potential field sites for inclusion in CAMP.
		7	For basin that discharges to an impaired water, consider: • What sources/activities are the main contributors to the pollutant load targeted for reduction? • When does the impairment occur? (i.e., seasonal versus flow-dependent) • Can these sources be addressed (or are they already being addressed through BMPs found in SWMMWW and applied through your SWMP)? • Will enhanced municipal stormwater management actions result in meeting loading targets? • Are substantial non-stormwater management actions needed to address the impairment? • What combination of additional stormwater management actions will most effectively reduce current and future loadings?	2013 Strategies Plan: • PAU Factsheets (Appendix B) list specific WQ parameters • Targeted project-based strategies identified for impaired waters	Partial Potential Gap	**Current SMAP Activities:** • Continue use of Water Quality Strategies from 2013 Strategies Plan for impaired water bodies. • Prepare summary of Permit requested information for each impaired water. • Document in watershed inventory table.	**Low:** Desktop research and summary for inclusion in watershed inventory table.
		8	Evaluate available information related to overburdened communities (use USEPA's EJ Screen and Washington State's Health Disparity Map) to determine overlap of improving water quality and human health.		Partial Potential Gap	**Current SMAP Activities:** • Evaluate overburden communicates based on available tools and discussion with City. • Research an overburdened community category for scoring in prioritization. • Document in watershed inventory table.	**Low:** Desktop research to include in watershed inventory table.

NPDES SMAP Stage	NPDES SMAP Guidance Task	#	NPDES SMAP Guidance Planning Action	City Documentation [a]	City Gap Status	City Status or Recommendation	
						Activity (Resolved, Current SMAP, Potential Future SMAP)	Effort
		9	Document which data sources are being utilized, how they are being utilized in the Assessment of Receiving Water Conditions. Would any other additional data be useful?	2013 Strategies Plan 2020 Gap Analysis	No Gap	Resolved: • Continue to document data sources and tools during overall SMAP (planning) process. • Information currently documented in GIS table format.	No additional effort.
	Assess stormwater management influence	10	Create list of low expected hydrologic and low expected pollutant loading conditions to determine the MS4's current contribution to the receiving water and the potential for stormwater management influence on future development.	2013 Strategies Plan: • Section 2.5 Integrated Secondary Score • Section 3.2 Secondary Score Results	No Gap	Resolved: • Continue to use existing analyses and data from 2013 Strategies Plan and City GIS information in planning efforts. • Information currently documented in GIS table format.	No additional effort.
		11a	For each basin document answers to the following: 1) what are the major pollutants and/or flow impacts associated with point vs. non-point sources? Will either increase under future conditions?	2013 Strategies Plan	Potential Gap	**Current SMAP Activities:** • Use or combine with analysis developed in Action #7. • Prepare summary of needed information such as impervious coverage and land use for each basin. Incorporate existing information about impervious area reduction for development and wetland mitigation sites. • Document in watershed inventory table.	**Low:** Summary of existing work and anticipated future land use for inclusion in watershed inventory table.
		11b	For each basin document answers to the following: 2) sources addressed through other land management strategies? Policies/development standards?	2011 Critical Areas Mitigation Program			
		11c	For each basin document answers to the following: 3) can future growth be managed to minimize adverse stormwater impact?	2011 Critical Areas Mitigation Program	No Gap	Resolved: • Continue to use prioritization and mitigation site selection analyses prepared for Critical Areas Mitigation Program for each receiving water. • Information currently documented in GIS table format.	No additional effort.
						Potential Future SMAP (after March 2023): • If feasible, expand analysis for Critical Area Mitigation Program to identify additional potential mitigation sites as identified in previous CAMP analysis. (Same as #6d.)	High: Field study of remaining potential field sites for inclusion in CAMP.
	Assess relative conditions and contributions	12	Evaluate and document: land use impact on WQ, habitat, biota; anticipated buildout landscape, protection, and restoration goals; gaps between conditions and goals.	2013 Strategies Plan: • Section 2.5 Integrated Secondary Score • Section 3.2 Secondary Score Results	Partial Potential Gap	**Current SMAP Activity:** • Combine existing 2013 Strategies Plan information with new findings in watershed inventory table.	**Low:** Summary of existing work and new findings for inclusion in watershed inventory table.
		13	Document: The overall rationale for the final list of basins and proposed restoration and protection goals for each receiving water.	2013 Strategies Plan: • Section 2.5 Integrated Secondary Score • Section 3.2 Secondary Score Results	Partial Potential Gap	**Current SMAP Activity:** • Update discussion and methodology of 2013 Strategies Plan as needed to include overburdened communities in current and future scoring and prioritization. Update discussion as needed with information from #11a and #11b.	**Low:** Summary of existing work and new findings for inclusion in watershed inventory table.
		14	Document: Development of sub-basins targeted for additional stormwater investments.	2013 Strategies Plan: Section 2.2, Figure/Map 1	No Gap	Resolved: • Continue to use existing retrofit analysis in planning efforts.	No additional effort.
		15	Document: Include relevant information about existing plans and planning efforts that might meet these requirements.	2020 Gap Analysis	No Gap	Resolved: • Continue gap analysis and documentation efforts of 2013 Strategies Plan 2020 Gap Analysis	No additional effort.
Receiving Water Prioritization (By June 30, 2022)	Prioritize water bodies	16	Establish and conduct a process to prioritize and select an area of focus by using prioritization goals, actively seeking input, involve interested parties.	2013 Strategies Plan: Section 2.4 and 2.5)	Potential Gap	**Current SMAP Activities:** • Develop and implement overburden community category for the scoring and prioritization process. (Builds on research from #8). • Develop a public involvement and participation effort about SMAP.	**Moderate:** Integrating all new findings and existing information. Developing a new secondary scoring category. Public involvement and participation planning. Collaborative effort with SMAP team.
		17	Highlight three elements for prioritization: 1. stormwater facility retrofits 2. tailored implementation of SWMP actions 3. land/development actions (different than existing new and redevelopment standards)	2014 Retrofit and Prioritization Report: Section 4.2 and 4.3	Partial Potential Gap	**Current SMAP Activity:** • Document existing information and new findings in prioritization narrative for the three elements in SMAP.	**Low:** Summary of existing work and new findings for documentation of prioritization process.
		18	Goal: Prioritization system and ranked water bodies Guidance Doc suggests using 5 general principles to prioritize and give higher priority to basins: i. Showing low or moderate levels of impairment. ii. Where municipality has influence (alone or with partnership). iii. Where regional rehabilitation efforts are also focused (WRIA plans, salmon recovery plans, MTCA/superfund cleanups, ESA listings, critical habitat designations). iv. With MS4 discharges to shoreline segments. v. With overburdened communities where WQ and human health impacts overlap.	2013 Strategies Plan: Section 2.4 and 2.5 2014 Retrofit and Prioritization Report: Section 6.1 for work with other municipalities	Partial Potential Gap	**Current SMAP Activity:** • Prepare summary of existing and new efforts meeting SMAP guiding principles as outlined in guidance document.	**Low:** Summary of existing work and new findings for documentation of prioritization process.

NPDES SMAP Stage	NPDES SMAP Guidance Task	#	NPDES SMAP Guidance Planning Action	City Documentation [a]	City Gap Status	City Status or Recommendation	
						Activity (Resolved, Current SMAP, Potential Future SMAP)	Effort
Stormwater Management Action Plan for priority catchment (By March 31, 2023)	Assess need for SW facilities	19	Include appropriate, strategic stormwater retrofits for existing facilities/BMPs or create new ones.	2020 Gap Analysis Technical Memorandum: Attachment B Table B-2 (Retrofit and New Project List)	Potential Gap	**Current SMAP Activity:** • Continue to consider identified projects and programs. Identify new projects, and other opportunities.	**Moderate**: Iterative process and possible workshop setting with City and public.
	Identify land management/ development strategies	20	Identify land management or development strategies (e.g., purchase of land, or zoning/land use policy changes).	2011 Critical Area Management Plan 2017 LID Code Update for limiting impervious surface	Partial Potential Gap	**Current SMAP Activity:** • Integrate any new land management and development strategies into land use planning and CAMP.	**Low:** Summarize existing and new SMAP assessment and prioritization work relative to Critical Areas Mitigation Program.
	Create a targeted/customized implementation plan	21	Any increase/adjustments to the actions already undertaken under section S5 of Phase II Permit, including: IDDE field screening, source control inspections, O&M inspections, or public education and outreach.	SW Management Program Annual Reports	Potential Gap	**Current SMAP Activity:** • Identify on-going programs such as pipe inspections, street sweeping, catch basin cleaning, and outreach that could be leveraged and integrated into SMAP for targeted, enhanced or custom implementation of permit sections within S5; including: o IDDE field screening o Prioritization of Source Control inspections o O&M inspections or enhanced maintenance o Public Ed & Outreach behavior change programs	**Moderate:** Summarize existing and new SMAP assessment and prioritization work.
	Proposed schedule/budget	22	Identify budget sources and schedule. Identify proposed short-term actions (within 6 years), and long-term actions.	2015 Pre-Design Report: • Section 7.0 Cost Estimate • Section 8.0 Proposed Schedule 2015 Comprehensive Surface Water Plan: • Chapter 9 Financial Plan	Potential Gap	**Current SMAP Activities:** • Review possible sources of funding including grants, rate increases, bonds, budget reallocations, and intergovernmental opportunities to pursue state grant and loan funding. • Schedule highest priority actions (programs and projects).	**Moderate:** Desktop research incorporated into SMAP document.
	Implement process to adaptively manage plan	23	Include a long-term assessment approach, should be able to report whether goals are being achieved. Include implementation tracking, and an ongoing assessment of what portion of projects have taken place and how much of the catchment area has been addressed.		Potential Gap	**Current SMAP Activity:** • Develop and document procedures to ensure plan is a "living" document structured to respond to changing conditions or achievements.	**Moderate:** Develop and document new planning method collaboratively with SMAP team.

a. *Refer to Section 3.1 and the Reference section in the TM for full name of documentation or data source.*

Attachment B: City GIS Data and Project List

Table B-1. Potential City GIS Features Reviewed for SMAP			
GIS category	GIS Data Type	GIS feature class name	Relevance to SMAP
Political and Jurisdictional			
City Limits	Polygon	City_Limits	Helps calculate percentage of drainage basins within jurisdiction.
City Property	Polygon	City_Property	Identifies existing and potential locations for retrofit or new projects.
Street Sweeping Routes	Polylines	Streets	Demonstrates O&M efforts for sediment reduction in street runoff.
Land Use			
Zoning	Polygon	Current_Zoning	Helps identify potential development.
Land Cover	Polygon	LandCover	Helps calculate percentage of impervious area and identify potential pollution sources.
Land Use	Polygon	Land_Use	Indicates land uses within PAUs.
Surface Water and Stormwater Feature			
PAUs	Polygons	PAU_Final, PAU_Merged	Delineates PAUs and includes prioritization results from 2013 Strategies Plan.
Detention	Polygons	Detention	Indicates location of current and potential retrofit projects. Useful in assessing water bodies/PAUs.
Permeable Pavement	Polygons	Permeable_Pavement	Shows areas where permeable pavement is being used.
Swale	Polygons	Swale	Shows areas where water quality swales are being used.
Wetlands	Polygons	Wetlands	Shows areas that are potentially important for habitat and water quality.
Drainage Pipe	Polyline	Drainage_Pipe	Useful for locating potential retrofit locations.
Flow Connector	Polyline	Flow_Connector	Shows informal drainage pathways and helps confirm PAU delineation.
Open Channel	Polyline	Open_Channel	Shows locations where drainage system is daylighted.
Streams	Polyline	Streams	Shows natural stream locations.
Access Hatch	Point	Access_Hatch	Shows access hatches and locations of stormwater vaults.
Catchbasins	Point	Catch_Basins	Shows surface water collection points.
Dry well	Point	Dry_Well	Shows areas where dry well infiltration is being used.
Flow Restrictor	Point	Flow_Restrictor	Shows structures with flow control (storage) or high flow by-pass features.
Outfalls	Point	Outfalls	Used for determining if flow is “direct” to Puget Sound and determining limits of City-owned infrastructure.
Pollution Control	Point	Pollution_Control	Shows City-owned structures with pollution control assets (downturned elbows and oil-water separator). Identifies areas with possible high pollutant potential.
Pump	Point	Pump	Shows low-lying areas, potential for retrofit projects (all private ownership).
Stormfilter	Point	Stormfilter	Identifies water quality BMP locations (primarily private property).

Table B-2. City of Mukilteo Retrofit and New Project List by PAU Basin (2010 – Present)		
Project Title (Data Source)	Issue Addressed	Project Status [a]
Big Gulch		
Central Drive Storm Drainage Improvements (2015 Comp SW Plan)	Drainage/flooding	Evaluated
Staybridge Pond–Retrofit (BG08-2014 Retrofit Plan)	Flow and WQ	Pre-Design complete
Harbor Pt PL–New Pond (BG12-2014 Retrofit Plan)	Flow and WQ	Identified
YMCA and 47th Pl W–New Raingarden (BG21-2014 Retrofit Plan)	WQ	In design phase 2020
Golf Course–New Daylit Pipe and Wetland (PPR08-2014 Retrofit Plan)	Flow and WQ	Identified
Library Swale-Retrofit (BG14-2014 Retrofit Plan)	WQ	Identified
Harbor Pointe Middle School–New Bioretention (BG17-2014 Retrofit Plan)	WQ	Pre-Design Complete
Brewery Creek		
10th Street and Loveland Ave Storm Drainage (2015 Comp SW Plan)	Drainage/flooding	Evaluated
Chennault		
64th Pl W and 66th Pl W St Drainage Improvements (2015 Comp SW Plan)	Drainage/flooding	Evaluated
62nd Pl W/Canyon Dr Drainage Improvements (2015 Comp SW Plan)	Drainage/flooding	Evaluated
Japanese Gulch		
Mukilteo Lane Drainage Improvements (2015 Comp SW Plan)	Drainage/flooding	Evaluated
Naketa Beach		
84th Street SW Storm Drainage Improvements (2015 Comp SW Plan)	Drainage/flooding	Evaluated
Olympic View		
44th Ave W bioretention (Smuggler's Retrofit Study/2014 Retrofit Plan)	WQ	Complete (2018)
Picnic Point		
55th Pl W and 127th St SW–New Green Street (PPR18/19/20-2014 Retrofit Plan)	WQ	In design (2020)
Deep Infiltration–New Infiltration and retrofit vault (PPR11-2014 Retrofit Plan)	Flow and WQ	Identified
Smuggler's Gulch		
Mukilteo Estates (88th St) Pond Retrofit (Smuggler's Retrofit Study)	Flow and WQ	Complete (2016)
50th Pl Pond Retrofit (Smuggler's Retrofit Study)	Flow and WQ	Complete (2016)
49th Ave W Detention Vault Retrofit (Smuggler's Retrofit Study)	Flow and WQ	Identified
Guthrie 2 Pond Retrofit (Smuggler's Retrofit Study)	Flow and WQ	Identified
Whisper Wood Pond Retrofit (Smuggler's Retrofit Study)	Flow and WQ	Identified
Numerous potential projects (Smuggler's Retrofit Study)	Various	Identified
49th Ave W Bioretention (Smuggler's Retrofit Study)	WQ	Complete (2016)
56th Ave W Bioretention (Smuggler's Retrofit Study)	WQ	Design complete
Columbia Elementary School Rain Garden (Smuggler's Retrofit Study)	WQ	Complete (2016)
Upper Chennault Beach Creek		
Chennault Beach Drive Drainage Improvement (2015 Comp SW Plan)	Drainage/flooding	Evaluated
Various PAUs		
Numerous Potential Project (Items 10-47, Table 6-5; 2015 Comp SW Plan)	Various	Identified

Note: a. Identified means the project has been identified in a study or planning effort. Evaluated means some analytic work has been completed.

Appendix B: Receiving Water Condition Assessment

Brown AND Caldwell

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Technical Memorandum

Prepared for: City of Mukilteo

Project Title: Mukilteo Stormwater Management Action Plan (SMAP)

Project No.: 155075

Technical Memorandum

Subject: Mukilteo SMAP Watershed Inventory Table and Map

Date: February 7, 2022

To: Jennifer Adams, Surface Water Programs Manager

From: Margaret Ales, P.E., and Damon Diessner

Copy to: Mike Milne, Vice-President

Prepared by: Margaret Ales, P.E., Project Manager

Reviewed by: Mike Milne, Vice-President

Table of Contents

List of Abbreviations

AUs	analysis units
BC	Brown and Caldwell
BMPs	best management practices
BLR	Buildable Lands Report
CAMP	Critical Areas Mitigation Program
City	City of Mukilteo
CIP	Capital Improvement Project
Ecology	Washington State Department of Ecology
GIS	geographic information system
LID	low impact development
MS4	municipal separate stormwater sewer system
MUGA	Mukilteo Urban Growth Area
PAUs	project analysis units
PSRC	Puget Sound Regional Council
SMAP	Stormwater Management Action Planning /Plan
TM	technical memorandum
WQA	Water Quality Assessment

Section 1: Introduction and Purpose

The City of Mukilteo (City) is developing a Stormwater Management Action Planning (SMAP) to meet the requirements of the 2019 Phase II National Pollution Discharge Elimination System (NPDES) permit (Permit). The SMAP development process involves three elements:

- Receiving Water Conditions Assessment
- Receiving Water Prioritization
- Stormwater Management Action Plan

This Technical Memorandum (TM) describes the Receiving Water Conditions Assessment. In accordance with Permit Condition S5.C.1.d. and Ecology's SMAP Guidance (Guidance) (Ecology 2019). This TM includes a watershed inventory table, a map of the delineated basins, a description of the relative condition for receiving waters and watersheds, and a discussion of the stormwater management influence assessment. These items must be submitted to Ecology by March 31, 2022.

Section 2: Background and Data Sources to Assess Receiving Water Conditions

A significant amount of existing data was used to assess relative receiving water conditions and stormwater management influence, including several past watershed-scale planning studies that considered many of the issues suggested in the SMAP Guidance. (For a complete list of resources, see the References section). The City and Brown and Caldwell (BC) also reviewed additional stormwater-related planning information suggested in the SMAP Guidance including the Mukilteo Watershed-based Stormwater Strategies Plan (Strategies Plan) (ESA 2013) which included information used to perform the receiving water assessment. Information to develop the SMAP included:

- Prior City watershed studies and condition assessments
- Current sources for Ecology water quality assessments and designated use information
- Future stormwater conditions and development/redevelopment potential
- Information on overburdened communities in the City

Prior watershed studies and condition assessments. Several condition assessments, retrofit project plans, and long-range plans were reviewed and considered. These documents included the following:

- 2001 Comprehensive Stormwater Management Plan (Tetra Tech/KCM 2001)
- Smuggler's Gulch Retrofit Study Pre-Design Report (Perteet, Inc. 2010)
- Stormwater Strategies Plan (ESA 2013)
- Mukilteo Stormwater Retrofit Project Identification and Prioritization Report (ESA and BC 2014)
- Pre-Design Report Mukilteo Watershed Based Stormwater Retrofit Plan (BC 2015)
- 2015 Mukilteo Comprehensive Surface Water Management Plan (BC et al 2015)

Of these sources, the Strategies Plan provided the most relevant information for the Receiving Water Assessment. It characterized the City's watersheds and receiving waters using methodologies consistent with those outlined in the SMAP Guidance. The Strategies Plan prioritized the subbasins, or "project analysis units" (PAUs), based on the anticipated relative benefits from a suite of potential stormwater management actions. This information was augmented by additional considerations suggested in the SMAP Guidance, as described below.

Water quality condition and designated beneficial uses. The PAU factsheets in the 2013 Strategies Plan included impaired water listings from the state Water Quality Assessment (WQA). BC updated the listings for each watershed based on Ecology's draft 2018 WQA (Ecology 2020) and prepared a summary description as part of the receiving water condition in the watershed inventory table.

Future land use conditions. Information from the Snohomish County Buildable Lands Report (BLR) (Snohomish 2021) was used to evaluate future land use conditions within the city limits. The BLR's Land Status map projects the approximate locations and amounts of new development and redevelopment in the City. Redevelopment of areas with little to no existing stormwater management measures is expected to improve stormwater quality and flow control compared to existing conditions. New development of open or vacant land will be subject to State requirements and local codes designed to mitigate stormwater impacts on receiving waters.

As mentioned above, stormwater quality in PAUs with significant potential redevelopment may improve in the future because redeveloped sites must meet the applicable Minimum Requirements for Permit Condition S5.C6: Controlling Runoff from New Development, Redevelopment, and Construction Sites. PAUs without anticipated redevelopment may be good candidates for stormwater retrofits or tailored stormwater management programs based upon receiving water conditions and needs. PAUs with underdeveloped areas with a larger percentage for potential new development would benefit from land management and development strategies. For Mukilteo, the latter case appears to present few opportunities because the majority of the buildable area is built out. The majority of potential development is redevelopment, with approximately five percent of the buildable land anticipated to be developed or redeveloped by 2035, per the BLR planning horizon.

Overburdened communities. The SMAP Guidance recommends giving "*a higher priority to basins with overburdened communities where water quality issues and human health impacts overlap and can be addressed (at least partly) through stormwater management improvements.*" Information about overburdened communities was obtained from the Washington Department of Health, "Washington Environmental Health Disparities Map (Health Disparity)" (WDOH 2021).

The Health Disparity data are summarized by census tract and divided into four themes (Environmental Exposures, Environmental Effects, Sensitive Populations and Socioeconomic Factors). Census tracts across Washington are compared using a 1-10 Disparity Rank.

BC used mapping tools and a method of weighted averages for census tracts covering Mukilteo to apply the overall Heath Disparity rankings to each PAU in the City. The weighted average of disparity rankings were developed using the Health Disparity score for each census track covering Mukilteo and the MUGA. The census tract area was then divided into subareas in GIS using the PAU basin delineation and simple geoprocessing tools. The result was a set of PAU subareas assigned a Health Disparity score from the census tract. Using an area-weighted area average method, the final Health Disparity score was calculated for each PAU and rounded to a whole number as necessary. These scores will be used as a factor in the prioritization process.

Section 3: Stormwater Management Influence and Relative Conditions and Contributions

PAUs were sorted and ranked using receiving water condition information to develop the Stormwater Management Influence and Relative Conditions and Contributions for the PAUs. The sorting helps the City prepare for subsequent SMAP work such as prioritization and developing a SMAP for at least one high priority catchment area.

3.1 Stormwater Management Influence

The primary goal of the stormwater management influence assessment is help sort receiving waters according to their relative expected benefit from the SMAP. Ecology's SMAP Guidance suggests Permit holders use "their judgment as to the relative influence of [their] MS4 and potential SMAP actions to protect or improve receiving water condition" for current and future conditions.

The City SMAP team considered several watershed and MS4 characteristics to help identify PAUs with relatively low stormwater management influence, but ultimately chose to not eliminate any PAUs from the prioritization and subsequent SMAP planning process. In general, PAUs within Mukilteo have similar land uses with stormwater pollution potential. Eliminating certain PAUs from this planning effort would be based on relatively arbitrary considerations given the similarity of PAUs across the City. Further, removing low stormwater management influence PAUs from the prioritization list is functionally equivalent to leaving them as a low-ranking priority. While a SMAP would likely not be developed for these PAUs, leaving them in the prioritization process documents as relevant information could help the City identify potential future opportunities, such as leveraging other related projects, or partnerships with surrounding jurisdictions.

To help assess the stormwater management influence, the Guidance suggests permit holders answer the following questions for each basin:

1. What are the major pollutants and/or flow impacts associated with individual point sources versus non-point sources? Will the loadings and/or runoff volumes increase under expected future land use conditions?
2. Can these sources be addressed through other land management strategies, including policies, code, or development standards?
3. Can future growth be managed to minimize adverse stormwater impacts?

The following paragraphs contain Mukilteo's responses to these questions. Given the homogeneity of the Mukilteo watersheds, a single response is prepared for each question.

Response 1a. What are the major pollutants and/or flow impacts associated with individual point sources versus non-point sources? There are no known point source pollutant discharges in the City of Mukilteo. The non-point pollutant sources listed below are typical of residential urban, commercial, and industrial areas in the Puget Sound lowlands (EPA 2021):

- Sediment from soil erosion
- Oil, grease, petrochemicals, and other toxic materials from motor vehicles as well as from commercial and industrial land uses
- Pesticides and nutrients from lawns, gardens, and commercial landscaping
- Viruses, bacteria, pharmaceuticals, and nutrients from pet waste and failing septic systems
- Road salt from de-icing
- Metals from roof shingles, motor vehicles, commercial areas, and other sources
- Thermal pollution from impervious surfaces such as streets, parking lots, and rooftops

Stormwater from many industrial sites require coverage under the state industrial general stormwater permit which require monitoring and best management practices (BMPs) to control pollutants such as petroleum hydrocarbons, zinc, and copper.

Response 1b. Will the loadings and/or runoff volumes increase under expected future land use conditions? Future land use for areas of new development will include some increases in these pollutant loadings that will be mitigated by the latest BMPs required by the Ecology NPDES Permit and the Ecology Stormwater Management Manual for Western Washington. Conversely, future redevelopment should reduce pollutant loading due to the improved stormwater management practices of the NPDES Permit requirements. However, the percentage of the buildable land forecasted for new or redevelopment within the jurisdiction is five percent and, therefore, is not a strong distinguishing factor between the PAUs.

Response 2. Can these sources be addressed through other land management strategies, including policies, code, or development standards? Mukilteo is already implementing the land management strategies listed below to reduce stormwater impacts on receiving waters:

- Native vegetation inclusion and protection were included in municipal code updates in 2016 as part of the City's extensive LID code update.
- Critical areas protection, including critical areas delineation and the Critical Areas Management Plan (ESA 2011) to mitigate development project impacts on wetlands, streams, and wetland buffer areas.
- Riparian corridor preservation through City acquisition and protection of receiving water riparian corridors.
- Impervious surface limitations for new and redevelopment with LID-based code revisions in 2016.

With little anticipated future growth, the land development strategies for new development are expected to yield modest receiving water benefits. The City will maintain its existing land management strategies and incorporate new strategies where applicable.

Response 3. Can future growth be managed to minimize adverse stormwater impacts? Future growth can be managed to minimize future adverse stormwater management impacts through a combination of new stormwater controls and future land use strategies as noted in the Response 2 above. However, with future growth (redevelopment and new development) limited to roughly five percent of the total buildable lands, additional programmatic efforts such as public outreach, operations and maintenance strategies, and stormwater retrofit projects will be necessary to help reduce stormwater pollution.

3.2 Relative Conditions and Contributions

The purpose of assessing relative conditions and contributions is to narrow the list of receiving waters and PAUs for the SMAP prioritization process. In keeping with Ecology's SMAP Guidance, BC assessed relative conditions and contributions based on the following three considerations:

1. **Evaluate future conditions and consider how changes could impact water quality, habitat, and biota**. BC evaluated Land Status data from the 2021 Buildable Lands Report to identify areas of new development and redevelopment within the 2035 planning horizon. Areas with redevelopment have the potential to improve water quality by triggering improved onsite stormwater management, water quality BMPs and flow control facilities. New development has the potential to impact water quality and flow control if the development is not fully mitigated.
2. **Evaluate which PAUs should be "protected" and "restored**". BC used information from the City's Strategies Plan to analyze and categorize PAUs for Preserve, Repair and Targeted strategies. The PAUs categorized with Preserve and Repair management strategy were given a priority of "highest". The majority of PAUs were categorized for Targeted Strategies and varied in priority ranking of High, Moderate and Low, providing decision-making criteria for targeted investments. PAUs categorized for Repair strategies and High priority PAUs categorized for Targeted Strategies have the greatest gap between known conditions and pollution control goals. It is important to note that the Strategies Plan was a regional watershed scale study and PAUs categorized for Repair strategies are located outside Mukilteo's jurisdiction.
3. **Understand existing plans and planning efforts.** The City has developed a draft list of current projects (planned and completed) that address water quality, flow control and/or flooding (BC 2020). The list includes project locations, anticipated capital improvements, planning and construction status, study or planning effort source, and relative ranking resulting from the study/planning effort.

Section 4: Watershed Inventory Table and Map

BC developed a watershed inventory table and associated map using the PAU subbasin delineations and data from the City's 2013 Strategies Plan, GIS files, State water quality tools, and new information gathered about future growth and overburdened communities. The March 31, 2022, deliverable to Ecology, must include an inventory table with the following information:

- Water body name
- Total watershed area
- Percent of the total watershed area within Mukilteo
- Brief description of the relative conditions of the receiving waters and contributing area conditions

The City first delineated its drainage basins in the 2001 Comprehensive Surface Water Management Plan. For the 2013 Strategies Plan, the City refined the delineations to include the entire drainage basins and enable a more complete understanding of the contributing areas.

The 2015 Comprehensive Surface Water Management Plan summarizes the City's streams as follows:

"All of the streams and stream segments with the City are fairly small (classified as 1st order in the Strahler system) with many of the drainages beginning in the low gradient headwaters (the plateau area) and becoming steeper in the ravines before discharging to the Puget Sound. Edgewater, Japanese Gulch, and Big Gulch, and small portions of Smuggler's Gulch and Brewery Creek have headwaters that lie outside of Mukilteo. Goat Ravine Trail, Olympic View Ravine, Naketa Beach, Chennault, Upper Chennault, and Lower Chennault lie entirely with Mukilteo, with the exceptions of the outfalls. All streams discharging to Puget Sound cross over the Burlington Northern [Santa Fe (BNSF)] Railroad jurisdiction as some point. Brewery Creek, Edgewater Creek and Japanese Gulch cross under the railroad tracks but have some piped flow path between BNSF right-of-way and the Puget Sound. The outfall pipes of the remaining 10 Puget Sound streams lie under the BNSF right-of-way."

Permit Condition S5.C.1, requires submittal of "a map of the delineated basins with references to the watershed inventory table" and "a brief description of the relative conditions of the receiving waters and the contributing areas". Figure 1 contains a map of the delineated basins in Mukilteo. Figure 1 also includes. basin delineation for PAUs outside the City limits but within the Mukilteo Urban Growth Area (MUGA), even though annexation of the area is not anticipated within the next ten years. These areas are included in Figure 1 to maintain the understanding of the contributing areas and to help identify potential future opportunities such as projects and partnerships with surrounding jurisdictions. No inventory work was performed for basins located completely outside Mukilteo's jurisdiction, and these basins will not be included in the prioritization process.

Table 1 below contains the watershed inventory table required by the permit. The City will use the watershed inventory table to assist with prioritization, selecting at least one priority PAU to develop the SMAP, and identify projects and programs while considering issues involving overburdened communities in the Mukilteo City limits.

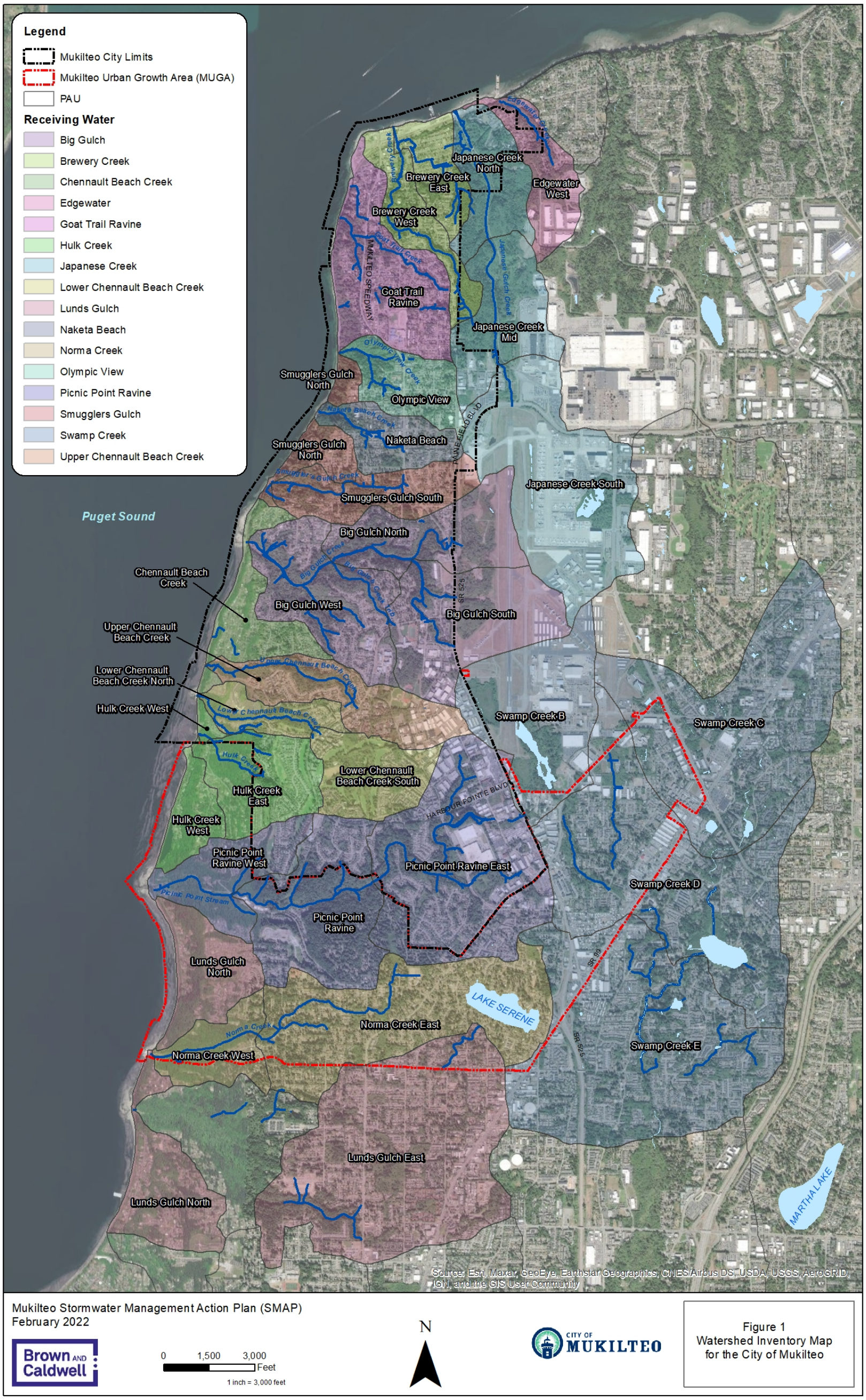

Figure 1. Watershed Inventory Map

Table 1. Watershed Inventory Summary

Receiving Water Name	Total Watershed Area (acres)	Percent Total Watershed Area within Mukilteo City Limits	Relative Conditions of Receiving Water and Watershed by PAUs [a, b, c]
Big Gulch Creek	1,807	68	Big Gulch Creek basin is comprised of three project analysis units (PAUs), Big Gulch North, Big Gulch South, and Big Gulch West. • The Big Gulch North PAU is 303 acres total with 55 percent of its basin area within city limits. This PAU is characterized as 23 percent impervious and situated on a plateau landscape position. The majority of the land use is characterized as Industrial, Single Family and Parks, (44, 25 and 21 percent, respectively). Approximately one percent of the area is designated as wetland. Delivery and recharge are key watershed processes within this PAU, and both have been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Approximately one percent of the developable land in the Mukilteo portion of this PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 5 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity. • The Big Gulch South PAU is 419 acres total with 48 percent of its basin area within city limits. This PAU is characterized as 41 percent impervious and situated on a plateau landscape position. The majority of the land use is characterized as Industrial, Single Family and Commercial, (59, 13 and 13 percent, respectively). Approximately one percent of the area is designated as wetland. Delivery and recharge are key watershed processes within this PAU, and both have been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Approximately six percent of the developable land in the Mukilteo portion of PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 5 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity. • The Big Gulch West PAU is 365 acres total with 100 percent of its basin area within city limits. This PAU is characterized as 26 percent impervious and situated on a ravine landscape position with a large portion of the PAU located in well vegetated steep ravine. The majority of the land use is characterized as Single Family and Parks, (58 and 32 percent, respectively). Approximately one percent of the area is designated as wetland. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Approximately six percent of the developable land in the Mukilteo portion of PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 4 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Brewery Creek	303	90	Brewery Creek basin is comprised of two PAUs, Brewery Creek East, and Brewery Creek West. • The Brewery Creek East PAU is 133 acres total with 94 percent of its basin area within city limits. This PAU is characterized as 42 percent impervious and situated on a ravine landscape position. The majority of the land use is characterized as Single Family and Commercial, (81 and 11 percent, respectively). There are no wetlands in this PAU. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Approximately one percent of the developable land in the Mukilteo portion of this PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings nor designated aquatic life use. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 2 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity. • The Brewery Creek West PAU is 171 acres total with 86 percent of its basin area within City limits. This PAU is characterized as 35 percent impervious and situated on a ravine landscape position. The majority of the land use is characterized as Single Family and Industrial, (76 and 13 percent, respectively). There are no wetlands in this PAU. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Approximately three percent of the developable land in the Mukilteo portion of PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 2 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Chennault Beach Creek	184	100	Chennault Beach Creek basin is comprised of PAU, Chennault Beach Creek. • The Chennault Beach Creek PAU is 184 acres total with 100 percent of its basin area within city limits. Chennault Beach Creek PAU is split into an upper and lower portion by the Upper Chennault Beach Creek PAU as a result of earlier mapping techniques. The Chennault Beach Creek PAU is characterized as 33 percent impervious and situated on a bluff landscape position. The majority of the land use is characterized as Single Family, 96 percent of the total land use area. There are no wetlands in this PAU. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Less than 1 percent of the developable land in the Mukilteo portion of PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings nor designated aquatic life use. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 4 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Edgewater Creek	341	8	Edgewater Creek basin is comprised of two PAUs of which one has a portion within Mukilteo city limits, Edgewater West. • The Edgewater West PAU is 175 acres total with 15 percent of its basin area within city limits. This PAU is characterized as 21 percent impervious and situated on a ravine landscape position. The majority of the land use is characterized as Industrial and Single Family, (58 and 40 percent, respectively). There are no wetlands in this PAU. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Less than 1 percent of the developable land in the Mukilteo portion of PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as salmonid spawning, rearing and migration. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 2 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Goat Trail Creek	382	100	Goat Trail Creek basin is comprised of one PAU, Goat Trail Ravine. • The Goat Trail Ravine PAU is 382 acres total with 100 percent of its basin area within city limits. This PAU is characterized as 35 percent impervious and situated on a ravine landscape position. The majority of the land use is characterized as Single Family, 87 percent of the total land use area. There are no wetlands in this PAU. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Less than 1 percent of the developable land in the Mukilteo portion of PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings nor designated aquatic life use. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 2 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Hulk Creek	375	44	Hulk Creek is comprised of two PAUs, Hulk Creek East, and Hulk Creek West • The Hulk Creek East PAU is 248 acres total with 60 percent of its basin area within city limits. This PAU is characterized as 23 percent impervious and situated on a ravine landscape position. The majority of the land use is Single Family, 95 percent. Less than one percent of the area is designated as wetland. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Less than 1 percent of the developable land in the Mukilteo portion of PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 3 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.

Table 1. Watershed Inventory Summary

Receiving Water Name	Total Watershed Area (acres)	Percent Total Watershed Area within Mukilteo City Limits	Relative Conditions of Receiving Water and Watershed by PAUs [a, b, c]
			• The Hulk Creek West PAU is 127 acres total with 13 percent of its basin area within city limits. Hulk Creek West PAU is split into an upper and lower portion by the Hulk Creek East PAU as a result of earlier mapping techniques. Portions of the upper Hulk Creek West PAU discharge directly to Puget Sound. The Hulk Creek West PAU is characterized as 11 percent impervious and situated on a bluff landscape position. The majority of the land use is characterized as Single Family, 91 percent. Approximately two percent of the area is designated wetland. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Less than 1 percent of the developable land in the Mukilteo portion of PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 3 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Japanese Creek	1,148	16	Japanese Creek basin is comprised of three PAUs, Japanese Creek Mid, Japanese Creek North and Japanese Creek South. • The Japanese Creek Mid PAU is 277 acres total with 19 percent of its basin area within city limits. This PAU is characterized as 25 percent impervious and situated on a ravine landscape position. The majority of the land use is Industrial, 93 percent of the total land use area. Less than one percent of the area is designated as wetland. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Sixty percent of the developable land within the Mukilteo portion of this PAU is forecasted to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as salmonid spawning, rearing and migration. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 2 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity. • The Japanese Creek North PAU is 213 acres total with 48 percent of its basin area within city limits. This PAU is characterized as 15 percent impervious and situated on a plateau landscape position, however the PAU contains portions of a well vegetated steep ravine. The majority of the land use is characterized as Industrial and Single Family, (50 and 39 percent, respectively). Delivery and discharge are key processes within this PAU. Less than one percent of the area is designated as wetland. The discharge process is relatively intact, but delivery process is impaired by impervious surfaces and surface storage has been impaired by loss of wetlands. The 2013 Strategies Plan analysis categorized this PAU for Preserve strategies in stormwater management decision making. . Less than one percent of the developable land within the Mukilteo portion of this PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as salmonid spawning, rearing and migration. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 2 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity. • The Japanese Creek South PAU is 659 acres total with 4 percent of its basin area within city limits. This PAU is characterized as 35 percent impervious and situated on a plateau landscape position. The majority of the land use is Industrial, 96 percent. Approximately three percent the PAU area is designated as wetland. Delivery and recharge are both key watershed processes within this PAU and have been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Thirteen percent of the developable land within the Mukilteo portion of this PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as salmonid spawning, rearing and migration. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 5 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Lower Chennault Beach Creek	337	100	Lower Chennault Beach Creek basin is comprised of two PAUs, Lower Chennault Beach Creek North, and Lower Chennault Beach Creek South. • The Lower Chennault Beach Creek North PAU is 122 acres total with 100 percent of its basin area within city limits. This PAU is characterized as 31 percent impervious and situated on a ravine landscape position with a large portion of the PAU located in well vegetated steep ravine. The majority land use is Single Family, Parks, Multi-Family, Industrial, and Parks (53, 17, 15, and 15 percent, respectively). Less than one percent of the area is designated as wetland. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Less than one percent of the developable land within the Mukilteo portion of this PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 3 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity. • The Lower Chennault Beach Creek South PAU is 215 acres total with 100 percent of its basin area within city limits. This PAU is characterized as 30 percent impervious and situated on a plateau landscape position. The majority of the land use is Multi-family and Commercial, (51 and 30 percent, respectively). Approximately 21 percent the PAU area is designated as wetland. Delivery, surface storage and recharge are key watershed process within this PAU. Surface storage processes are relatively intact, but delivery and recharge processes are impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Preserve strategies in stormwater management decision making. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 4 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Naketa Beach Creek	160	100	Naketa Beach Creek is comprised of one PAU, Naketa Beach. • The Naketa Beach PAU is 160 acres total with 100 percent of its basin area within city limits. This PAU is characterized as 41 percent impervious and situated on a ravine landscape position. The majority of the land use is Single Family, Multi-Family and Commercial, (61, 21, and 18 percent, respectively). There are no wetlands in this PAU. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Approximately 15 percent of the developable land in the PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 4 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Olympic View Creek	172	100	Olympic View Creek is comprised of one PAU, Olympic View. • The Olympic View PAU is 173 acres total with 100 percent of its basin area within city limits. This PAU is characterized as 31 percent impervious and situated on a ravine landscape position. The majority of the land use is Single Family and Multi-family, 78 and 10 percent, respectively. Less than one percent of the area is designated as wetland. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Approximately three percent of the developable land in the Mukilteo portion of PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 2 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Picnic Point Creek	1,416	53	Picnic Point Creek basin is comprised of three PAUs, Picnic Point Ravine, Picnic Point Ravine East, and Picnic Point Ravine West. • The Picnic Point Ravine PAU is 441 acres total with 24 percent of its basin area within city limits. This PAU is characterized as 16 percent impervious and situated on a ravine landscape position. The majority of the land use is Single Family, 98 percent of the total land use area. Approximately two percent the PAU area is designated as wetland. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater decision making. Less than one percent of the developable land within the Mukilteo portion of this PAU is forecasted to experience new or redevelopment by 2035. This PAU has a water quality condition category of 5 and is therefore on the polluted/impaired water 303(d) list. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 3 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity. • The Picnic Point Ravine East PAU is 747 acres total with 78 percent of its basin area within city limits. This PAU is characterized as 40 percent impervious and situated on a plateau landscape position. The majority of the land use is characterized as Single Family and Industrial, 49 and 38 percent, respectively). Approximately five percent the PAU area is designated as wetland. Delivery and recharge are key processes within this PAU and both processes have been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Approximately 16 percent of the developable land within the Mukilteo portion of this PAU is anticipated to experience new or redevelopment by 2035 This PAU has a water quality

Table 1. Watershed Inventory Summary

Receiving Water Name	Total Watershed Area (acres)	Percent Total Watershed Area within Mukilteo City Limits	Relative Conditions of Receiving Water and Watershed by PAUs [a, b, c]
			condition category of 5 and is therefore on the polluted/impaired water 303(d) list. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 4 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity. • The Picnic Point Ravine West PAU is 229 acres total with 28 percent of its basin area within city limits. This PAU is characterized as 15 percent impervious and situated on a ravine landscape position. The land use is 100 percent Single Family. Less than one percent the PAU area is designated as wetland. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Less than one percent of the developable land within the Mukilteo portion of this PAU is anticipated to experience new or redevelopment by 2035. This PAU has a water quality condition category of 5 and is therefore on the polluted/impaired water 303(d) list. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 3 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Smugglers Gulch Creek	331	96	Smuggler's Gulch Creek is comprised of two PAUs, Smugglers Gulch North, and Smugglers Gulch South • The Smugglers Gulch North PAU is 112 acres total with 100 percent of its basin area within city limits. Smugglers Gulch North is split into an upper and lower portion by the Naketa Beach PAU as a result of earlier mapping techniques. Large portions of Smugglers Gulch North discharge directly to Puget Sound. This PAU is characterized as 23 percent impervious and situated on a bluff landscape position. The majority of the land use is Single Family and Multi-Family, 90 and 10 percent, respectively. There are no wetlands in this PAU. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Approximately four percent of the developable land in the PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings nor designated aquatic life use. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 3 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity. • Smugglers Creek South PAU is 220 acres total with 94 percent of its basin area within city limits. This PAU is characterized as 26 percent impervious and situated on a ravine landscape position. The majority of the land use is characterized as Single Family, 89 percent. Approximately two percent of the area is designated wetland. Delivery is a key watershed process within this PAU and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in r stormwater management decision making. Less than 1 percent of the developable land in the Mukilteo portion of PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 4 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Swamp Creek	6,603	< 1	Swamp Creek is comprised of seven PAUs of which one has a portion within Mukilteo city limits, Swamp Creek B. • The Swamp Creek B PAU is 463 acres total with 7 percent of its basin area within city limits and drains to Swamp Creek which is outside of Mukilteo. This PAU is characterized as 50 percent impervious and situated on a plateau landscape position. The majority of the land use is Industrial, 94 percent. Approximately ten percent of the area is designated wetland. Delivery and recharge area key watershed processes and has been impaired. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Approximately 39 percent of the developable land in the PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighed average for environmental health disparity, this PAU has a ranking of 5 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.
Upper Chennault Beach Creek	277	100	Upper Chennault Beach Creek is comprised of one PAU, Upper Chennault Beach Creek. • The Upper Chennault Beach Creek PAU is 278 acres total with 100 percent of its basin area within city limits. This PAU is characterized as 43 percent impervious and situated on a ravine landscape position. The land use is somewhat evenly distributed between Single Family, Multi-family, Industrial and Commercial (34, 25, 21 and 11 percent, respectively). Approximately two percent of the area is designated wetland. Delivery is a key watershed process and has been impaired by impervious surfaces. The 2013 Strategies Plan analysis categorized this PAU for Targeted strategies in stormwater management decision making. Approximately four percent of the developable land in the PAU is anticipated to experience new or redevelopment by 2035. This PAU has no state impaired water quality listings. Designated aquatic life use identified as core summer salmonid habitat. Using the City-derived weighted average for environmental health disparity, this PAU has a ranking of 4 based on the Environmental Health Disparity Database scale of 1-10 with 10 having the greatest disparity.

a. PAUs within Mukilteo have relatively similar geologic considerations and land uses with very similar stormwater pollution potential.

b. Watershed key processes include Delivery which means amount of flow generated in the watershed by precipitation; Surface Storage which means amount of run off stored as surface water; Recharge which means ease of infiltration in the watershed.

c. The Environmental Health Disparity rankings help to compare health and social factors that may contribute to disparities in a community.

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Appendix C: Receiving Water Prioritization

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Technical Memorandum

Prepared for: City of Mukilteo

Project Title: Mukilteo NPDES Stormwater Management Action Planning (SMAP)

Project No.: 155075

Subject: Mukilteo SMAP Receiving Water Prioritization Summary

Date: June 17, 2022

To: Jennifer Adams, Project Manager

From: Margaret Ales, P.E., Project Manager
Damon Diessner

Copy to: Mike Milne

Prepared by: Margaret Ales, P.E.

Reviewed by: Mike Milne

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Section 1: Introduction

The City of Mukilteo (City) is developing a Stormwater Management Action Planning (SMAP) to meet the requirements of its 2019 Phase II National Pollution Discharge Elimination System (NPDES) permit (Permit). The SMAP development process involves the following three elements:

1. Completing a Receiving Water Conditions Assessment
2. Performing a Receiving Water Prioritization
3. Developing a Stormwater Management Action Plan

This Technical Memorandum (TM) describes the Receiving Water Prioritization element, which includes refining and implementing a prioritization process to select basins where SMAP planning can reduce pollutant loading and hydrologic impacts from existing and future development.

This TM presents the following information, which is required to be submitted to the Washington State Department of Ecology (Ecology) by June 30, 2022:

- Describe the priority ranking process used to identify high-priority receiving waters with a rationale of the process.
- Provide a prioritized and ranked list of receiving waters developed as a result of the ranking process.
- Identify high-priority catchment areas that will be the focus of the Stormwater Management Action Plan.

Section 2: Background

The City's Phase II Permit authorizes the discharge from the City's Municipal Separate Stormwater Sewer System (MS4) to waters of the State. Ecology issued the current Permit on July 1, 2019; it expires on July 31, 2024 (Ecology 2019a).

Special Condition S5.C.1.d of the Permit requires the City to conduct a receiving water assessment, develop a receiving water prioritization to determine which receiving water will receive the most benefit from a suite of actions, and develop a for at least one high-priority catchment area by March 2023.

The City completed the Receiving Water Conditions Assessment (BC 2022) and submitted the Ecology required documentation in the City's annual stormwater management program annual report, including a:

- Watershed Inventory Table (WIT) and map of delineated basins
- Description of the relative condition for receiving waters and watersheds
- Discussion of the stormwater management influence assessment

Section 3: Prioritization Methodology

As required of all medium-sized cities, Mukilteo has developed and implemented a prioritization method and process to determine which receiving waters would receive the most benefit from stormwater management actions. The City's methodology to prioritize basins for inclusion in the SMAP is based on three elements:

- Basin information
- Prioritization principles
- Scoring and weighting criteria

The three elements are combined in table format in Excel to help automate the prioritization process (e.g., color coding, formulas, etc.). The City solicited public input on the draft prioritization principles and used this input to refine the prioritization methodology and rank drainage basins for SMAP consideration. Each of the elements are described in the sections below. The prioritization table, ranking results, and identification of high-priority catchment areas for the SMAP are presented in Section 4.

3.1 Basin Information

Basin Information was the first element in the prioritization methodology; it was developed as part of the City's WIT and Map, which the City submitted to Ecology in March 2022. The WIT included a description of the relative condition of receiving waters and watersheds. Table 1 lists the information included in the City's Receiving Water Conditions Assessment used to complete the basin prioritization. The City defines its watershed subbasins or catchments as "Project Analysis Units" (PAUs).

Table 1. PAU Subbasin Information for Prioritization

Data/Information	Description	Data Source
PAU [a]	Receiving water sub-basins are defined as PAUs, which are subdivided from Assessment Units (AUs) delineated by the Washington Department of Fish and Wildlife Salmon and Steelhead Habitat Inventory and Assessment Program using high-resolution LiDAR digital elevation model (DEM) and hydrology and stormwater infrastructure maps.	2013 Strategies Plan
Integrated Secondary Score	Condition scoring value applied to PAUs based on relative condition evaluations for the following: • Sediment potential—evaluates the potential for surface erosion, mass wasting, and stream channel erosion. • Habitat—evaluates freshwater habitat, specifically quantity and quality of salmonid habitat. • Hydrologic relatedness—evaluates the influence of headwater flow processes on downstream basins.	2013 Strategies Plan
Percent Area Within Jurisdiction	The percentage of the PAU area within the Mukilteo city limits.	2013 Strategies Plan for PAU delineation; Snohomish County GIS for city limits boundary (cities.shp).
Wetland Mitigation Site	Critical Area Mitigation Program provides mitigation alternatives for development projects that impact wetlands, streams, or wetland buffers. Mitigation sites may provide land management/development strategies for SMAP priority catchment.	2013 Strategies Plan
Landscape Position	Areas with similar geologic and topographic characteristics and hydraulic processes. Mukilteo's landscape positions include plateau, ravine, and bluff.	2013 Strategies Plan
Disparity Ranking	Disparity ranking scale 1-10 is a relative ranking comparing Washington State census tracts (10 having greatest disparity). The average Disparity Ranking from the Environmental Health Disparity Database was recorded for the census tract covering Mukilteo city limits and the Mukilteo Urban Growth Area. The average Disparity Ranking was applied to each PAU using mapping tools and an area-weighted average calculation.	Washington Tracking Network (https://fortress.wa.gov/doh/wtn/WTNIBL/ Methodology for applying a ranking to PAU described in 2021 Receiving Water Condition Assessment TM (BC 2022).
Project Opportunities	Identified projects from a list of planned or recently constructed stormwater projects addressing flooding problems, water quality, or flow control.	City GIS shapefile (Stormwater Projects Shapefile_1.shp).

a. City PAUs are sub-basin areas that are equivalent to the "catchment areas," used in Ecology's Stormwater Management Action Planning Guidance (SMAP Guidance) document to define the extent of the planning area to which the SMAP process is applied.

3.2 Prioritization Principles

The City developed a set of prioritization principles designed to facilitate ranking the PAUs. The City reviewed the recommendations in Ecology's SMAP guidance document and developed the five principles summarized below. Each principle is associated with one or more data sets from the relative condition assessment for water bodies and watersheds.

- **Relative Condition.** The Integrated Secondary Score (see Table 2 below) developed to prioritize PAUs for stormwater strategies for the City's 2013 Strategies Plan. PAUs with a higher Integrated Secondary Score have a greater need for restoration or preservation. The score combines relative condition evaluations for the following areas of concern:
  - Sediment potential (evaluates potential for surface erosion, mass wasting, and stream channel erosion)
  - Habitat (evaluates freshwater habitat, specifically quantity and quality of salmonid habitat)
  - Hydrologic relatedness (evaluates the influence of headwater flow processes on downstream basins)
- **Jurisdictional Influence.** Defined as how much of a given watershed area lies within the City's jurisdiction for implementing stormwater management projects and programs.
  - The ability to perform the SMAP-recommended actions can be limited if the area is not entirely within the City-service area.
- **Wetland and Landscape Position.** Wetlands located in the plateau landscape position and/or included in the City's Wetland Mitigation Program provide potential water quality benefits for future projects.
  - Wetland mitigation reduces the potential for development projects to adversely affect the benefit to water quality and habitat wetlands, streams, or wetland buffer areas. Wetland mitigation sites can provide an opportunity for wetland creation, wetland restoration, and stream restoration.
  - The plateau landscape typically provides more opportunity for infiltration, reducing peak flows and providing groundwater recharge for wetlands and summer creek flows.
- **Overburdened Communities.** Communities found to have higher health and social disparity relative to other communities. The Disparity Ranking scale ranges from 1 to 10, with 10 having the highest health and social disparity. Mukilteo PAUs ranked between 2 and 5.
  - Identifying overburdened communities in the planning process can help guide the selection of stormwater projects and programs that benefit the community or avoid adding additional burdens.
- **Project Partner Opportunity.** Identifies planned stormwater projects potentially reducing flooding problems or improving water quality within certain planning areas.
  - Combining project partner opportunities with other 'state-required planning' such as SMAP, can help the City meet multiple stormwater management goals, reduce project costs, and expedite system improvements and water quality benefits.
  - Most of Mukilteo's planning areas include project partner opportunities. Some planning areas have several project partner opportunities.

The priority principles were developed using an iterative process. Other priority principles recommended in the SMAP Guidance document were considered but deemed not relevant or effective in the prioritization process. For these irrelevant or ineffective priority principles, the scoring was homogenous and did not provide a meaningful differentiation among the PAUS. For example, the SMAP Guidance document recommends permittees consider future land use and growth in evaluating PAU prioritization. However, most of the buildable area in Mukilteo is already built out and the rate of redevelopment is projected to be small through 2035, according to the Snohomish County Buildable Lands Report (Snohomish County 2021).

Therefore, assessing potential new development is not useful in deciding what areas might benefit more than others from potential stormwater management actions related to new development.

3.3 Scoring and Weighting Criteria

The final element of the prioritization process included scoring values for the basin information and applying weighting factors for priority principles. Combining basin information, scoring values and weighting factors assigns a numeric value in calculating a final overall weighted score for comparison and ranking purposes. Table 2 summarizes the scoring methodology and scoring values assigned to the PAU information. For this prioritization process, the larger the scoring value, the more important the information is for ranking PAUs for inclusion in the SMAP.

Table 2. Data/Information Scoring

Data/Information	Scoring Methodology	Scoring Values
Integrated Secondary Score	Scoring was established in the 2013 Strategies Plan based on sediment potential, habitat, and hydraulic connectivity. Two PAUs set aside for Preservation and not given an Integrated Secondary Score in the Strategies Plan were given a high score of 2.	Scores range between 2 to 0.4 per PAU, with a score of 2 indicating higher priority.
Percent Area within Jurisdiction	PAUs were scored based on the percent of total PAU area within the city limits and placed into one of the following categories: • > 90% • 90-28% • < 28% The percentages were selected to divide the PAUs into three roughly equal categories.	One of 3 scores applied per PAU: Percentage — Score > 90% — 1.0 90-28% — 0.5 < 28% — 0.0
Wetland and Landscape Position	PAUs were scored based on the number of wetland sites per landscape position. PAUs located in the plateau landscape position with one or more wetland mitigation sites scored the highest. These PAUs have the greatest opportunity for stormwater detention flow control as part of the mitigated wetland site and also provide wetland functions such as storage and water quality benefits as well as enhancing stream base flows by safely replenishing ground water supplies. Ravine PAUs with wetlands scored in the low or medium category. PAUs without wetland mitigation sites have a zero score.	One of 5 scores applied per PAU: Condition — Score Multiple sites/plateau — 1.0 One site/plateau — 0.5 Multiple sites/ravine — 0.3 One site/ravine — 0.2 No sites — 0.0
Disparity Ranking	PAUs were scored based on Environmental Health Disparity database and placed into one of three categories: • > 4 • 3-4 • < 3 The ranges were selected to divide the PAUs into three categories with roughly the same number of PAUs per scoring category.	One of 3 scores applied per PAU: Disparity Ranking — Score > 4 — 1.0 3-4 — 0.5 < 3 — 0.0
Project Opportunities	The City CIP project descriptions include a total project area. The combined project areas within a PAU are summed and represent the total area in acres of project opportunities per PAU. PAUs were scored based on the program opportunity area and placed into one of three categories: • > 5 acres • 1-5 acres • < 1 acre	One of 3 scores applied per PAU: Area (acres) — Score > 5 — 1.0 1-5 — 0.5 <1 — 0.0

Note: The categories listed above reflect the final principles after completion of the public survey and review by the SMAP team. See Section 3.4.

Weighting factors are associated with each priority principle on a scale of 5-1. A weighting factor of 5 indicates the priority is more important to ranking PAUs than the other priority principles. Table 3 below lists the prioritization principles and associated weighting factors. The weightings were developed with input from a public survey and the City SMAP team discussion.

Table 3. Priority Principle Weighting	
Priority Principle	**Weighting Factor**
Relative Condition	5
Jurisdiction Influence	5
Wetland and Landscape Position	4
Overburdened Communities	2
Project Partner Opportunity	3

Three of the five priority principles have a weighting factor between 4 and 5 and are considered more important than the other principles for the purposes of decision making and, when applied to the prioritization calculations, will have a greater influence on the PAU ranking. The two principles with a weighting of 5 (Relative Condition and Jurisdiction Influence) are directly related to the condition of the PAU and the likelihood that stormwater enhancement efforts can be implemented in a timely manner, respectively. The principle with the weighting of 4 (Wetland and Landscape Position) relates to how much impact Mukilteo programs can have on a given PAU.

Conversely, Overburdened Communities and Project Partner Opportunities priority principles have lower weighting factors and will have a reduced influence on the PAU ranking. Overburdened Communities is an important priority principle in general, but in Mukilteo, it carries less weight, given that the disparity ranking is relatively homogenous and low across the city. As discussed in the following section (Section 3.4), Overburdened Communities was ranked with the lowest importance based on public input survey results. A Project Partner Opportunity is of moderate importance, reflecting opportunity potential rather than certainty of timely improvement implementation by combining stormwater capital projects with SMAP projects and actions.

3.4 Public Input

As part of the SMAP process, the City gathered public input on the prioritization principles. The City's public input strategy was to first solicit public comment on the draft priority principles (referred to in the survey as SMAP Categories) to help refine those principles and also inform weightings. After a catchment is selected for the SMAP, the City will distribute a second survey to seek input from ratepayers in the catchment area to help inform SMAP projects and actions. The City sent the survey to known interested parties having past experience with stormwater issues, including city residents and outside agencies. The City also provided all residents access to the survey with a link posted on the city's Facebook page, as a News Item on the city website, and on the City's Watershed Planning webpage. The City received 47 responses, with three of the responses from outside agencies and one former resident. All other responses were from current Mukilteo residents. The survey was available for two weeks. The brief survey is included in Attachment A.

The survey asked respondents to rank the importance[1] of each of the following draft SMAP Categories:

- Jurisdictional Influence
- Landscape Position
- Overburdened Communities
- Percent Impervious
- Project Partner Opportunities
- Wetland Mitigation Opportunities

Figure 1 shows the results of the importance ranking per category. The Landscape Position, Percent Impervious, and Jurisdictional Influence categories received relatively high importance responses. The Overburdened Community category received lower importance responses.

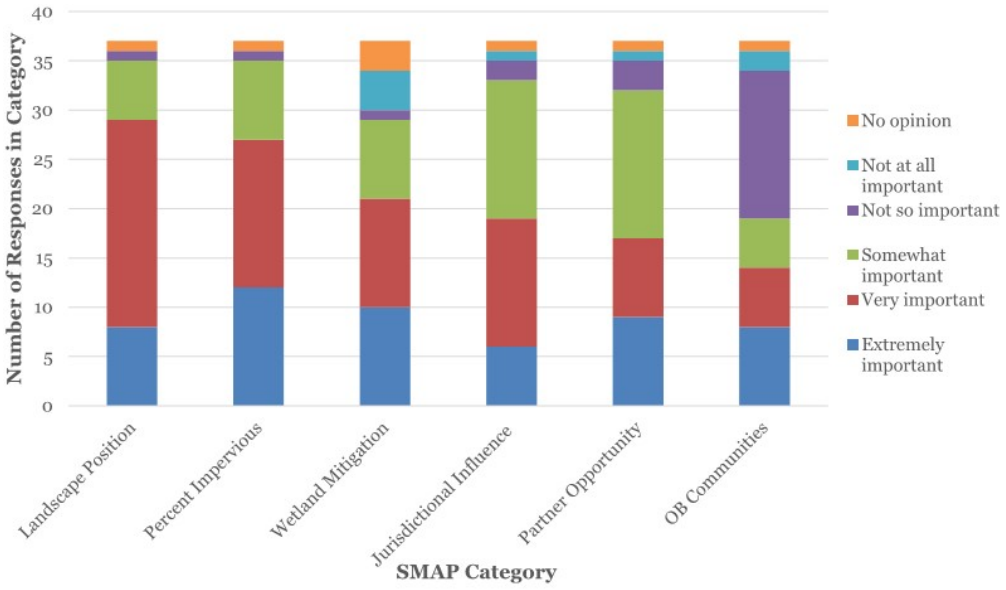

Figure 1. Importance responses for SMAP categories from the first SMAP public survey.

Figure 2 shows the same results as Figure 1 but with the just two importance categories: 'Not so Important' to 'Not Important at all' and 'Extremely important' to 'Somewhat important'. The 'No opinion' responses were omitted. Figure 2 shows the lesser importance of addressing the Overburdened Communities category with the SMAP process. However, it is important to note that approximately half of the Overburdened Communities responses indicated higher importance.

[1] Six importance rating options included “Extremely Important”, “Very important”, “Somewhat important”, “Not so important”, “Not at all important”, and “No opinion”.

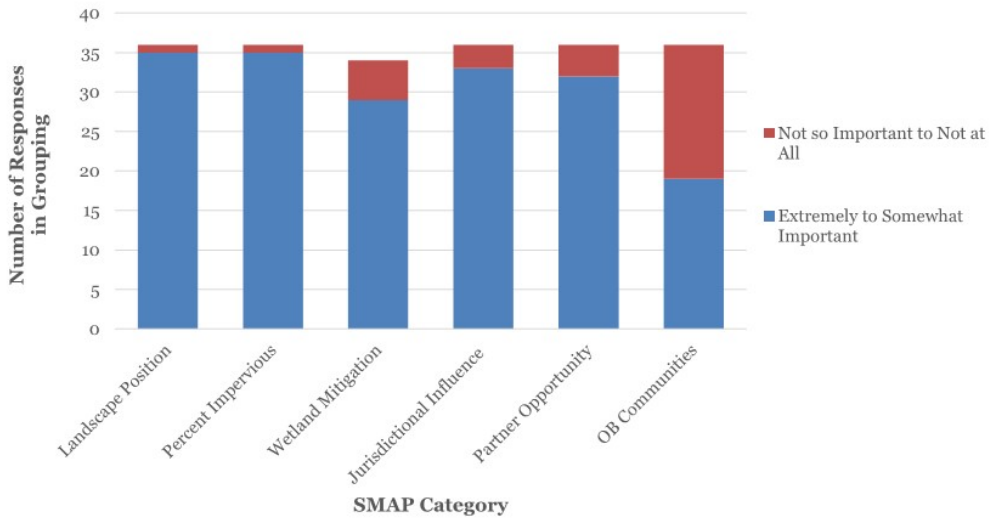

Figure 2. Grouped importance responses for SMAP categories from the first SMAP public survey

The survey also asked respondents to rank draft priority principles relative to one another from most important to least important. Figure 3 presents the comparison of the weighted scoring for each category. The response to this question illustrated the greater importance of Landscape Position and the lesser importance of Overburdened Communities categories.

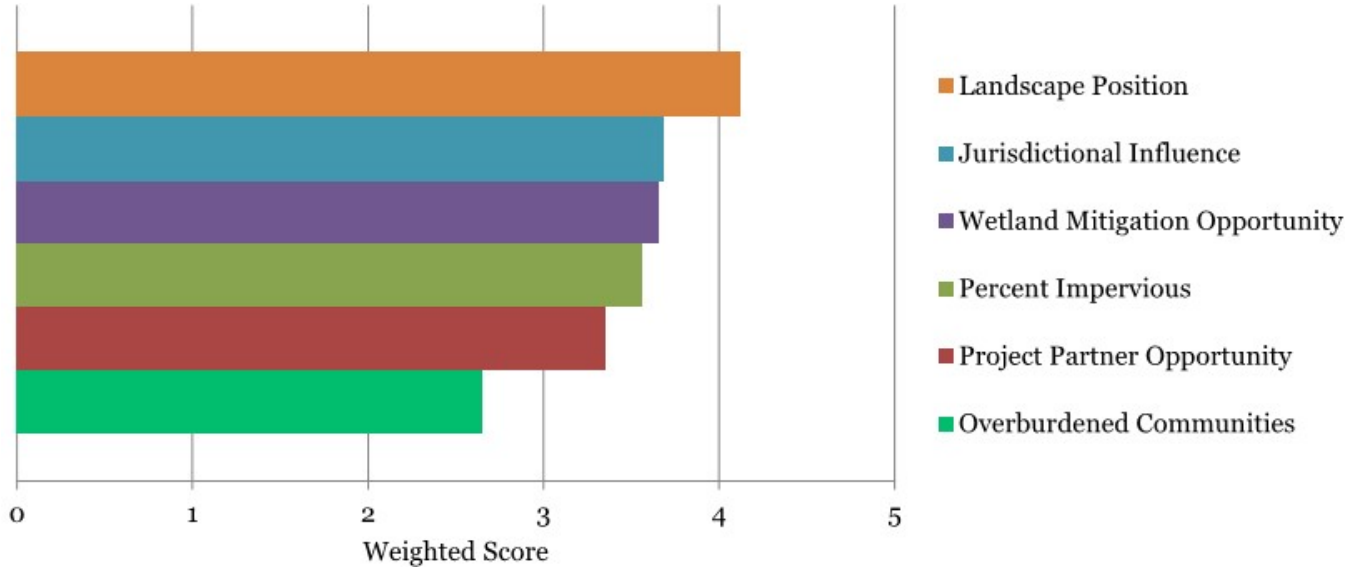

Figure 3. Relative importance weighted score for SMAP categories from the first SMAP public survey

While none of the survey information is statistically significant, the survey responses do provide an indication of what issues those in the Mukilteo community having an interest in stormwater management believe are relatively more or less important. After reviewing the public survey responses, the City SMAP team updated the priority principles and developed the final weightings described in Section 3.3 of this TM. The primary changes to draft priority principles (or SMAP Categories) included using existing PAU condition assessment ranking information (Integrated Secondary Score) from the 2013 Strategies Plan to develop a Relative

Condition priority principle and combining the Wetland Mitigation and Landscape Position information to develop a single priority principle.

Section 4: Prioritization Results

The PAU information, scoring, and weighting criteria were combined using an Excel spreadsheet to calculate priorities and develop a Total Weighted Score for each PAU. Figure 4 illustrates the prioritization results which have been color-coded with green indicating the highest scores and red indicating the lowest scores.

For each PAU, the Total Weighted Score is the sum of the product of the weighting factors and the scoring values. For example, the Total Weighted Score of 18 for Japanese Creek North is calculated as follows:

$$(5*2) + (5*0.5) + (4*0.5) + (2*2.0) + (3*0.5)$$

The full prioritization table is included as Attachment B to the TM.

	Weighting Scale (5 to 1, with 5 having the greatest importance)						
	5	5	4	2	3		
	Relative Condition	Jurisdiction Influence	Wetland & Landscape Position	Overburdened Communities	Project Partner Opportunity	Total Weighted Score	PAU Name
Scoring	2.0	0.5	0.5	1.0	0.5	18.0	Japanese Creek North
	1.5	0.5	1.0	0.0	1.0	17.0	Big Gulch North
	2.0	1.0	0.0	0.5	0.0	16.0	Lower Chennault Beach Creek South
	1.7	0.0	0.3	1.0	1.0	14.7	Japanese Creek Mid
	1.3	0.5	0.5	1.0	0.5	14.5	Big Gulch South
	0.8	1.0	0.3	1.0	0.5	13.7	Smugglers Gulch South
	0.9	1.0	0.0	0.5	1.0	13.5	Brewery Creek East
	0.9	1.0	0.0	0.5	1.0	13.5	Smugglers Gulch North
	0.9	1.0	0.0	0.5	1.0	13.5	Chennault Beach Creek
	1.2	0.5	0.5	0.0	1.0	13.5	Picnic Point Ravine East
	0.9	1.0	0.0	0.0	1.0	12.5	Big Gulch West
	0.9	1.0	0.0	0.5	0.5	12.0	Naketa Beach
	0.6	1.0	0.0	0.0	1.0	11.0	Goat Trail Ravine
	0.7	1.0	0.0	0.5	0.5	11.0	Olympic View
	0.5	0.5	0.3	0.5	1.0	10.2	Brewery Creek West
	1.4	0.0	0.2	1.0	0.0	9.8	Picnic Point Ravine
	1.4	0.0	0.0	0.5	0.5	9.5	Japanese Creek South
	1.5	0.0	0.5	0.0	0.0	9.5	Swamp Creek B
	0.6	1.0	0.0	0.5	0.0	9.0	Upper Chennault Beach Creek
	0.8	1.0	0.0	0.0	0.0	9.0	Lower Chennault Beach Creek North
	0.9	0.5	0.0	0.5	0.0	8.0	Picnic Point Ravine West
	0.6	0.5	0.0	0.0	0.0	5.5	Hulk Creek East
	0.6	0.0	0.0	0.0	0.5	4.5	Edgewater West
	0.4	0.0	0.0	1.0	0.0	4.0	Hulk Creek West

Figure 4. PAU Prioritization summary with scoring values and weighting factors

Following completion of the prioritization calculations, the City SMAP team evaluated the high-ranked PAUs to select a PAU to be the focus of the SMAP. The top-ranked PAUs were defined as those with a Total Weighted Score of 13.5 or greater. The City SMAP team outlined several basin conditions and opportunities to help determine which of the top-ranked PAUs would receive the most benefit from the SMAP selection.

To make this determination, the SMAP team considered the following questions:

- The *Strategies Plan* identified strategies for the PAUs. Is there a watershed-based plan or actions that address the strategy already in the PAU?
- Is the PAUs hydrology fully mapped and understood?
- Does the PAU have sufficient MS4 infrastructure to apply SMAP actions and projects?

Table 4 lists the ten highest-ranking PAUs and evaluates each PAU on the basin conditions and opportunities that would likely result in the most benefit from the SMAP selection. Based on the responses to the SMAP benefit questions, the Chennault Beach Creek and Smuggler's Gulch South PAUs would most benefit from the SMAP planning efforts.

To help select a single PAU on which to focus the SMAP planning effort, the City reviewed each of the high-ranking PAUs for potential opportunities using the City's mapped project list (City 2021). Reviewing planned projects provides an opportunity to incorporate flood reduction and water quality improvements with a basin-wide perspective, thereby achieving greater water quality and habitat benefits. In addition, coupling water quality improvements with currently planned project allows water quality-related elements to be implemented sooner, providing benefits in a more timely manner. The project list review revealed a significant number of capital projects planned in Chennault Beach Creek PAU in the near future. Based on evaluation of basin conditions shown in Table 4 and the potential for combining efforts with planned projects, the City SMAP team selected the Chennault Beach Creek PAU as the preferred catchment for the SMAP.

Table 4. High Ranking PAU SMAP Benefit Evaluation

PAU	Receiving Water Name	Total Weighed Score	Strategy from *Strategies Plan*	Has basin planning effort or actions to address strategy? [a]	Has well-mapped hydrology (streams and wetlands)?	Level of MS4 components to work with
Japanese Creek North	Japanese Creek	18.0	Conservation	Yes	Yes	Minimal. PAU has a substantial parklands area, with conservation easement covering some of that area.
Big Gulch North	Big Gulch Creek	17.0	Targeted	Yes	Yes	Moderate. Much of PAU is in ravine / parkland.
Lower Chennault Beach Creek South	Lower Chennault Beach Creek	16.0	Conservation	No. Some passive protection exists on the golf course and through wetlands preserved in private NGPAs.	Yes	Moderate. PAU is substantially private property (golf course). Property owner controls the regional detention.
Japanese Creek Mid	Japanese Creek	14.7	Targeted	Yes	Yes	Minimal. PAU within the city is largely open space with conservation easement.
Big Gulch South	Big Gulch Creek	14.5	Targeted	Yes	Yes	Moderate, for the portion within city limits.
Smugglers Gulch South	Smuggler's Gulch Creek	13.7	Targeted	Yes	Yes	Moderate
Brewery Creek East	Brewery Creek	13.5	Targeted	No	Yes, with exception of PAU boundary, which should include outfall.	High

Table 4. High Ranking PAU SMAP Benefit Evaluation						
PAU	Receiving Water Name	Total Weighed Score	Strategy from *Strategies Plan*	Has basin planning effort or actions to address strategy? [a]	Has well-mapped hydrology (streams and wetlands)?	Level of MS4 components to work with
Chennault Beach Creek	Chennault Beach Creek (unnamed)	13.5	Targeted	No	No	High
Picnic Point Ravine East	Picnic Point Creek	13.5	Targeted	No	Yes	High
Smugglers Gulch North	Puget Sound	13.5	Targeted	Yes	Yes	High

Note: (a) See Attachment C for a summary or watershed-based work in the City of Mukilteo high ranked PAUs.

Section 5: Summary

BC worked with the City SMAP team to develop a prioritization process that incorporated information from the Receiving Water Condition Assessment completed in March 2022 and public input received from a survey on priority principles. The City leveraged the relative condition information developed in the 2013 Strategies Plan and considered the recommendations presented in Ecology's SMAP Guidance document, including Jurisdictional Influence, Overburdened Communities, and Future Land Use and Growth.

Completion of a Receiving Water Prioritization is a requirement of the 2019 Phase II NPDES Permit. This TM describes the City's SMAP prioritization process, which included the following permit-required elements:

- Describe the priority ranking process used to identify high-priority receiving waters with a rationale of the process.
- Provide a prioritized and ranked list of receiving waters developed as a result of the ranking process.
- Identify high-priority catchment areas that will be the focus of the Stormwater Management Action Plan.

The City SMAP team selected the Chennault Beach Creek PAU as the preferred catchment for the SMAP.

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Attachment A: Public Input Survey

Stormwater Management Action Plan Survey

Help shape the future of stormwater planning in Mukilteo. The State of Washington requires that we pick a City watershed to improve water quality. We will then develop a Stormwater Management Action Plan (SMAP) for that watershed. The SMAP will guide actions the city should take to improve water quality.

We would like your input on how much importance we should give to six different categories. This input will help us select a watershed based on priority need.

More information on the SMAP can be found here: Mukilteo Watershed Based Planning

Please take 3-5 minutes to respond to the survey at the link below. Answers are anonymous. The survey will close April 15, 2022.

1. Are you a Mukilteo resident?

- ◯ Yes
- ◯ No

If yes, how long have you lived in the city?

2. Do you represent an outside agency? (For example, a non-profit or other governmental agency)

- ◯ Yes
- ◯ No

If yes, which agency do you represent?

Watersheds and Categories

A watershed is an area of land that drains rainfall and snowmelt to streams, rivers, and lakes.

Washington State Department of Ecology developed ranking categories for watersheds. The city used these categories and added some categories from past city watershed planning. The city can prioritize the categories, based on which is most important to consider. Each category is described later in the survey. These are the categories we are asking you to consider.

- **Jurisdictional Influence**
- **Landscape Position**
- **Overburdened Communities**
- **Percent Impervious**
- **Project Partner Opportunity**
- **Wetland Mitigation Opportunities**

Jurisdictional Influence

- **“Jurisdictional Influence” means how much of a watershed is in Mukilteo’s city limits.**
- **The city can have limited ability to perform actions in watersheds outside of the city boundary.**
- **The city contributes stormwater flows to thirteen watersheds. Some watersheds are completely contained within the city limits (Lower Chennault Beach Creek). Other watersheds only have a small area in the City (Hulk Creek).**

* 3. How important is Jurisdictional Influence for ranking the watersheds?

- ◯ Extremely important
- ◯ Very important
- ◯ Somewhat important
- ◯ Not so important
- ◯ Not at all important
- ◯ No opinion

Landscape Position

- **“Landscape position” is the relative location of the area within a watershed. Mukilteo has three landscape positions: plateau, bluff and ravine.**
- **Plateau areas are important because they provide more opportunity for rain water storage. Storage can reduce flows that scour streams. Storage can provide groundwater recharge for summer stream flows.**
- **The plateau landscape in Mukilteo are the flat land areas at the tops of the streams.**

* 4. How important is Landscape Position for ranking the watersheds?

- ◯ Extremely important
- ◯ Very important
- ◯ Somewhat important
- ◯ Not so important
- ◯ Not at all important
- ◯ No opinion

Overburdened Communities

- **“Overburdened community” means an area with higher health risks, more exposure to environmental harms, and fewer economic opportunities.**
- **Identifying overburdened communities can help reduce negative impacts when selecting project areas.**
- **On a scale of 1 to 10, with 10 being the most overburdened, populations in Mukilteo ranked between 2 and 5.**

* 5. How important are Overburdened Communities for ranking the watersheds?

- ◯ Extremely important
- ◯ Very important
- ◯ Somewhat important
- ◯ Not so important
- ◯ Not at all important
- ◯ No opinion

Percent Impervious

- **“Percent impervious” means the area covered by surfaces that don’t let rain water soak through. Examples are pavements and roofs.**
- **Watersheds with more impervious areas have scoured streams and lower water quality.**
- **Impervious surfaces cover between 11 and 63 percent of the watersheds in Mukilteo.**

* 6. How important is Percent Impervious for ranking watersheds?

- ◯ Extremely important
- ◯ Very important
- ◯ Somewhat important
- ◯ Not so important
- ◯ Not at all important
- ◯ No opinion

Project Partner Opportunity

- **“Project partner opportunity” means there are other projects in the area. Projects done together might produce economies of scale.**
- **The city might meet more goals, reduce project costs, and get water quality improvements faster when partnering.**
- **Most of Mukilteo’s watersheds include at least some project partner opportunities.**

* 7. How important is Project Partner Opportunity for ranking the watersheds?

- ◯ Extremely important
- ◯ Very important
- ◯ Somewhat important
- ◯ Not so important
- ◯ Not at all important
- ◯ No opinion

Wetland Mitigation Opportunities

- **Wetland mitigation can reduce negative impacts from development projects in a watershed.**
- **Identified mitigation areas could help guide land management strategies helpful for water quality.**
- **Forty percent of the watersheds have a wetland mitigation site.**

* 8. How important is Wetland Mitigation opportunity for ranking the watersheds?

- ◯ Extremely important
- ◯ Very important
- ◯ Somewhat important
- ◯ Not so important
- ◯ Not at all important
- ◯ No Opinion

Rank the Conditions

Definitions:

- **“Jurisdictional Influence” means how much of a watershed is in Mukilteo’s city limits.**
- **“Landscape position” is the relative location of the area within a watershed. Mukilteo has three landscape positions: plateau, bluff and ravine.**
- **“Overburdened community” means an area with higher health risks, more exposure to environmental harms, and fewer economic opportunities.**
- **“Percent impervious” means the area covered by surfaces that don’t let rain water soak through. Examples are pavements and roofs.**
- **“Project partner opportunity” means there are other projects in the area. Projects done together might produce economies of scale.**
- **Wetland mitigation can reduce negative impacts from development projects in a watershed**

* 9. Please rank the watershed conditions in order of most importance to least importance (using 1 for most important and 6 for least important).

- ☐ Jurisdictional Influence
- ☐ Landscape Position
- ☐ Overburdened Communities
- ☐ Percent Impervious
- ☐ Project Partner Opportunity
- ☐ Wetland Mitigation Opportunity

10. Please share any other comments you have below:

Thank you!

Thank you for your input. More information on this project can be found at the City's Watershed Based Planning webpage.

Attachment B: Prioritization Table

City of Mukilteo
NPDES SMAP Analysis
PUA Data and Information Table with Priorization Total Weighted Score
Brown and Caldwell (M Ales and D Diessner)
6/17/2022

	Weighting Scale (5 to 1, with 5 having the greatest importance)																																				
	5	5	4	2	3													Land Use Type as Percent [1]						Importance [1]				Intactness [1]				Secondary Score [1]					
	Relative Condition	Jurisdiction Influence	Wetland & Landscape Position	Overburdened Communities	Project Partner Opportunity	Total Weighted Score	PAU Name	Receiving Water Name	Total Watershed Area [1,3]	Percent within Jurisdiction [3]	Percent Impervious [1]	Percent Wetland [1]	Landscape Position [1]	Com	MF	SF	Ind	Parks	Other	Imp - Delivery	Imp - Surface Storage	Imp - Recharge	Imp - Discharge	Int - Delivery	Int - Surface Storage	Int - Recharge	Int - Discharge	SS - Sediment Potential	SS - Habitat	SS - Hydrologic Relatedness	SS - Overall	Percent Area w/ New or Redevelopment [4]	Water Quality Condition Category [2,4]
Scoring	2.0	0.5	0.5	1.0	0.5	18.0	Japanese Creek North	Japanese Creek	213	48%	13	0	Plateau	2	0	39	50	8	1	High	Moderate	-	High	Moderate	Low	-	High	NA	NA	NA	Preserve	0	-
	1.5	0.5	1.0	0.0	1.0	17.0	Big Gulch North	Big Gulch Creek	303	55%	23	1	Plateau	2	8	25	44	21	0	High	Low	High	Low	Moderate	Low	Moderate	High	0.6	0.4	0.5	1.5	1	-
	2.0	1.0	0.0	0.5	0.0	16.0	Lower Chennault Beach Creek South	Lower Chennault Beach Creek	215	100%	30	21	Plateau	30	51	8	10	1	0	High	High	High	Low	Moderate	High	Moderate	Moderate	NA	NA	NA	Preserve	0	-
	1.7	0.0	0.3	1.0	1.0	14.7	Japanese Creek Mid	Japanese Creek	277	19%	25	0	Ravine	0	0	5	93	0	2	High	Low	-	Low	Moderate	Low	-	High	0.6	0.1	1.0	1.7	60	-
	1.3	0.5	0.5	1.0	0.5	14.5	Big Gulch South	Big Gulch Creek	419	48%	41	4	Plateau	13	0	13	59	4	11	High	Low	High	Low	Moderate	Low	Moderate	High	0.4	0.4	0.5	1.3	6	-
	0.8	1.0	0.3	1.0	0.5	13.7	Smugglers Gulch South	Smuggler's Gulch Creek	220	94%	26	2	Ravine	0	0	89	8	3	0	High	Low	-	Low	Moderate	Low	-	Moderate	0.6	0.2	0.0	0.8	0	-
	0.9	1.0	0.0	0.5	1.0	13.5	Brewery Creek East	Brewery Creek	133	94%	42	0	Ravine	11	0	81	5	1	2	High	Low	-	Low	Low	Low	-	Low	0.9	0.0	0.0	0.9	1	-
	0.9	1.0	0.0	0.5	1.0	13.5	Smugglers Gulch North	Puget Sound	112	100%	23	0	Bluff	0	10	90	0	0	0	High	Low	-	Low	Moderate	Low	-	High	0.9	0.0	0.0	0.9	4	-
	0.9	1.0	0.0	0.5	1.0	13.5	Chennault Beach Creek	Chennault Beach Creek (unnamed)	184	100%	33	0	Bluff	0	2	96	0	2	0	High	Low	-	Low	Moderate	Low	-	High	0.9	0.0	0.0	0.9	0	5
	1.2	0.5	0.5	0.0	1.0	13.5	Picnic Point Ravine East	Picnic Point Creek	747	78%	40	5	Plateau	7	0	49	38	6	0	High	Low	High	Low	Low	Low	Moderate	Moderate	0.4	0.3	0.5	1.2	16	-
	0.9	1.0	0.0	0.0	1.0	12.5	Big Gulch West	Big Gulch Creek	365	100%	26	1	Ravine	0	0	58	0	32	10	High	Low	-	Low	Moderate	Low	-	High	0.5	0.4	0.0	0.9	6	-
	0.9	1.0	0.0	0.5	0.5	12.0	Naketa Beach	Naketa Beach Creek	160	100%	41	0	Ravine	18	21	61	0	0	0	High	Low	-	Low	Low	Low	-	Moderate	0.9	0.0	0.0	0.9	15	-
	0.6	1.0	0.0	0.0	1.0	11.0	Goat Trail Ravine	Goat Trail Creek	382	100%	35	0	Ravine	0	0	87	0	3	10	High	Low	-	Low	Moderate	Low	-	High	0.6	0.0	0.0	0.6	0	5
	0.7	1.0	0.0	0.5	0.5	11.0	Olympic View	Olympic View Creek	173	100%	32	0	Ravine	3	10	78	2	4	3	High	Low	-	Low	Moderate	Low	-	High	0.7	0.0	0.0	0.7	3	-
	0.5	0.5	0.3	0.5	1.0	10.2	Brewery Creek West	Brewery Creek	171	86%	35	0	Ravine	5	0	76	13	3	3	High	Low	-	Low	Moderate	Low	-	High	0.5	0.0	0.0	0.5	3	5
	1.4	0.0	0.2	1.0	0.0	9.8	Picnic Point Ravine	Picnic Point Creek	441	24%	16	2	Ravine	1	1	98	0	0	0	High	Low	-	Low	Moderate	Low	-	High	0.5	0.4	0.5	1.4	0	-
	1.4	0.0	0.0	0.5	0.5	9.5	Japanese Creek South	Japanese Creek	659	4%	63	3	Plateau	0	0	2	96	0	2	High	Low	High	Low	Low	Low	Low	Low	0.3	0.1	1.0	1.4	13	-
	1.5	0.0	0.5	0.0	0.0	9.5	Swamp Creek B [11]	Swamp Creek	463	7%	50	10	Plateau	3	0	3	94	0	0	High	Low	High	Low	Low	Low	Moderate	Moderate	0.4	0.4	1.0	1.5	39	-
	0.6	1.0	0.0	0.5	0.0	9.0	Upper Chennault Beach Creek	Upper Chennault Beach Creek	278	100%	43	2	Ravine	1	25	34	21	11	8	High	Low	-	Low	Low	Low	-	High	0.6	0.0	0.0	0.6	4	1
	0.8	1.0	0.0	0.0	0.0	9.0	Lower Chennault Beach Creek North	Lower Chennault Beach Creek	122	100%	31	0	Ravine	0	15	53	15	17	0	High	Low	-	Low	Moderate	Low	-	High	0.8	0.0	0.0	0.8	0	-
	0.9	0.5	0.0	0.5	0.0	8.0	Picnic Point Ravine West	Picnic Point Creek	229	28%	15	0	Ravine	0	0	100	0	0	0	High	Low	-	Low	Moderate	Low	-	High	0.5	0.4	0.0	0.9	0	-
	0.6	0.5	0.0	0.0	0.0	5.5	Hulk Creek East	Hulk Creek	248	60%	23	0	Ravine	2	2	95	0	0	1	High	Low	-	Low	Moderate	Low	-	Moderate	0.6	0.0	0.0	0.6	0	-
	0.6	0.0	0.0	0.0	0.5	4.5	Edgewater West	Edgewater Creek	175	15%	21	0	Ravine	1	0	40	58	0	1	High	Low	-	Low	Moderate	Low	-	High	0.6	0.0	0.0	0.6	0	-
	0.4	0.0	0.0	1.0	0.0	4.0	Hulk Creek West	Hulk Creek/Puget Sound	127	13%	11	2	Bluff	0	0	91	0	5	4	High	Low	-	Low	Moderate	Low	-	High	0.4	0.0	0.0	0.4	0	-

Notes

1 Mukilteo Watershed-Based Stormwater Strategies Plan and Appendices
Importance - relative importance of each watershed process to the overall health under predeveloped conditions
Intactness - level of intactness of the PAUs under existing conditions relative to predeveloped conditions
Delivery - amount of flow generated in the watershed by precipitation
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Recharge - ease of infiltration in the watershed
"-" means not evaluated. Recharge was not evaluated for PAUs in ravine and bluff landscape positions.
Discharge - ratio of manmade conveyance system to natural systems.
Secondary Score - scoring system applied to PAUs identified for Targeted Management (not Preserve or Repair).
These PAUs have a lower Importance score and a variety of Intactness scores.
Sediment Potential - evaluates potential for erosion, mass wasting and stream channel erosion
Habitat - evaluates freshwater habitat, specifically quantity and quality of salmonid habitat
Hydrologic Relatedness - evaluates influence of headwater flow processes on downstream basins
NA - means not evaluated.
Management Strategy:
Preserve - acquire and/or protect existing undisturbed wetlands and forest,
Repair - retrofit highly impaired processes
Targeted - develop appropriate management strategies based on level of intactness.

2 Visual inspection of GIS and other data

3 City GIS

4 Snohomish County Buildable Lands Report (BLR) (https://snohomishcountywa.gov/1352/Buildable-Lands)
The BLR Land Status map indicates where there will be new development and redevelopment providing opportunity for onsite stormwater management, water quality BMPs and new flow control facilities.

5 Water Quality Atlas Map (https://apps.ecology.wa.gov/waterqualityatlas/wqa/map);
Ecology Water Quality Assessment Category
Category 1: Meets tested standards, Category 2: Waters of Concern, Category 3: Insufficient Data,
Category 4: Has TMDL or alternative Pollution Control Program, Category 5: On the polluted/impaired water 303(d) list.
All streams with aquatic life use noted also have standard for Primary Contact Recreation Use, Water Supply Uses and Miscellaneous Uses.
Aquatic Life Use Key: Spawning= salmonid spawning, rearing, and migration; Core Summer=Core summer salmonid habitat.

6 Washington Tracking Network (https://fortress.wa.gov/doh/wtn/WTNIBL/);
Average Disparity Ranking from Environmental Health Disparity Databased were recorded per census track covering Mukilteo City Limits and the MUGA.
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Disparity ranking scale 1-10 is relative ranking comparing Washington state census tracts (10 having greatest disparity).

7 Identified projects from draft list of planned or recently constructed stormwater projects addressing flooding problems, water quality or flow control.

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	Weighting Scale (5 to 1, with 5 having the greatest importance)															
	5	5	4	2	3											
	Relative Condition	Jurisdiction Influence	Wetland & Landscape Position	Overburdened Communities	Project Partner Opportunity	Total Weighted Score	PAU Name	Designated Use [2, 5]	Disparity Ranking (Overburdened Communities) [2, 6]	Shore Sediment Accumulation [2]	Existing or Planned SW Projects (acres) 7	CAMP Regional Mitigation Site Count [8]	Site Location Score	SSR - Management Strategy [1, 9]	Key Management Strategies [1, 9]	Regional Rehabilitation Effort [10]	WRIA
Scoring	2.0	0.5	0.5	1.0	0.5	18.0	Japanese Creek North	Core Summer	5	1	3.2	1	0.5	Preserve	M_O_A	1	8
	1.5	0.5	1.0	0.0	1.0	17.0	Big Gulch North	Spawning	2	0	5.7	2	1.0	Targeted	O	0	8
	2.0	1.0	0.0	0.5	0.0	16.0	Lower Chennault Beach Creek South	Core Summer	4	0	0.0	0	0.0	Preserve	M_O_A	0	8
	1.7	0.0	0.3	1.0	1.0	14.7	Japanese Creek Mid	Core Summer	5	0	5.9	3	0.3	Targeted	O	0	8
	1.3	0.5	0.5	1.0	0.5	14.5	Big Gulch South	Core Summer	5	0	3.6	1	0.5	Targeted	O	0	8
	0.8	1.0	0.3	1.0	0.5	13.7	Smugglers Gulch South	Core Summer	5	0	2.2	2	0.3	Targeted	O	0	7
	0.9	1.0	0.0	0.5	1.0	13.5	Brewery Creek East	Core Summer	4	0	6.2	0	0.0	Targeted	O	0	8
	0.9	1.0	0.0	0.5	1.0	13.5	Smugglers Gulch North	Core Summer	4	0	8.8	0	0.0	Targeted	O	0	8
	0.9	1.0	0.0	0.5	1.0	13.5	Chennault Beach Creek	Core Summer	3	0	5.9	0	0.0	Targeted	O	0	8
	1.2	0.5	0.5	0.0	1.0	13.5	Picnic Point Ravine East	Core Summer	2	0	8.2	1	0.5	Targeted	O	0	8
	0.9	1.0	0.0	0.0	1.0	12.5	Big Gulch West	Spawning	2	0	6.7	0	0.0	Targeted	O	0	8
	0.9	1.0	0.0	0.5	0.5	12.0	Naketa Beach	Core Summer	3	0	4.9	0	0.0	Targeted	O	0	8
	0.6	1.0	0.0	0.0	1.0	11.0	Goat Trail Ravine	Core Summer	2	0	5.2	0	0.0	Targeted	O	0	8
	0.7	1.0	0.0	0.5	0.5	11.0	Olympic View	NA	4	0	1.5	0	0.0	Targeted	O	0	7
	0.5	0.5	0.3	0.5	1.0	10.2	Brewery Creek West	Core Summer	3	0	8.8	2	0.3	Targeted	M_O	0	7
	1.4	0.0	0.2	1.0	0.0	9.8	Picnic Point Ravine	Spawning	5	0	0.3	1	0.2	Targeted	O	0	8
	1.4	0.0	0.0	0.5	0.5	9.5	Japanese Creek South	Core Summer	4	0	1.1	0	0.0	Targeted	O	0	7
	1.5	0.0	0.5	0.0	0.0	9.5	Swamp Creek B [11]	NA	2	0	0.0	1	0.5	Targeted	O	0	8
	0.6	1.0	0.0	0.5	0.0	9.0	Upper Chennault Beach Creek	Core Summer	3	0	0.3	0	0.0	Targeted	O	0	8
	0.8	1.0	0.0	0.0	0.0	9.0	Lower Chennault Beach Creek North	NA	2	0	0.0	0	0.0	Targeted	O	0	8
	0.9	0.5	0.0	0.5	0.0	8.0	Picnic Point Ravine West	Core Summer	4	0	0.0	0	0.0	Targeted	O	0	8
	0.6	0.5	0.0	0.0	0.0	5.5	Hulk Creek East	NA	2	0	0.4	0	0.0	Targeted	O	0	8
	0.6	0.0	0.0	0.0	0.5	4.5	Edgewater West	Spawning	2	0	1.5	0	0.0	Targeted	O	0	8
	0.4	0.0	0.0	1.0	0.0	4.0	Hulk Creek West	Core Summer	6	0	0.0	0	0	Targeted	O	0	8

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9 Protection / restoration goals -guide final plans, management strategy - (targeted)

10 Review of regional rehabilitation plans and projects

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Attachment C: Watershed Basin Work Summary

Table C-1 Summary of Watershed-Based Work for High-Ranking PAUs			
Basin (PAU)	**Strategy**	**Basin Plan or Effort**	**Year**
Japanese Creek South	Conservation	• None. Only 4% within the city limits and therefore not a priority based on jurisdictional influence.	N/A
Japanese Creek North	Conservation	• 2014 Conservation Easement AFN #201404070370; covering 98 acres. • Wetland mitigation bank site in CAMP.	2014
Lower Chennault Beach	Conservation	• No action taken to date.	N/A
Japanese Creek Mid	Targeted – Highest	• Only 14% within the city limits and therefore not a priority based on jurisdictional influence.	N/A
Picnic Point Ravine	Targeted - Highest	• 2014 Mukilteo Retrofit Report (ESA 2014) identifies, prioritizes, and selects three low impact development retrofit projects in this PAU. • 2015 Mukilteo SW Retrofit Grant Pre-Design Report (BC 2015). Project #7 moved to pre-design & cost estimates	2014 2015
Big Gulch South	Targeted - Highest	• Installed high flow bypass. • 2014 Mukilteo Retrofit Report identifies, prioritizes, and selects five low impact retrofit projects in this PAU. • 2015 Mukilteo SW Retrofit Grant Pre-Design Report. Projects #1 & #4 moved to pre-design & cost estimates.	2010 2014 2015
Big Gulch North	Targeted - Highest	• 2014 Mukilteo Retrofit Report reviews stormwater retrofit projects within City limits in this PAU. • No suitable areas were identified for retrofits in this PAU.	2015
Smuggler's Gulch	Targeted - Moderate	• 2010 Smuggler's Gulch Stormwater Retrofit Study (Perteet 2010) completed prior to the Strategies Plan. • 2013 Smuggler's Gulch LID projects implemented under Ecology Grant G-1200540 identifies conceptual projects with estimated costs. Some projects moved to design & construction.	2010 2013

Appendix D: SMAP Action Cost Estimates and CIP Fact Sheet

Mukilteo SMAP - Cost Summary

Jan-23

		Total Cost		Annual O&M Cost	2023 Total Cost Range [1]	
ID	**Action**	**Construction [2]**	**Study/Program**		**Low**	**High**
CIP 1	Chennault Beach Drive Improvements	$ 5,030,000	-	$ 900	$ 3,521,000	$ 7,545,000
Study 1	Canyon Dr Pond Expansion Feasibility Study	-	$ 30,000	-	-	-
Study 2	Chennault Beach Creek Access Road Culvert Improvements Feasibility Study	-	$ 80,000	-	-	-
Program 8	Residential Leaf Collection Program	-	$ 40,000	-	-	-
	Total	**$ 5,030,000**	**$ 150,000**	**$ 900**	**$ 3,521,000**	**$ 7,545,000**

Note: *1. Range corresponds to -30% to +50% of the likely cost.*

2. 2023 Construction Cost based on ENR Construction Cost Index escalation from March 2015 to January 2023. Excludes design costs.

Mukilteo SMAP CIP 1

Chennault Beach Drive Improvements

Class 5 Estimate, 2023 Dollars

Capital Cost Estimate

Item	Unit	Unit Cost [1]	Quantity	Cost
12-inch Gravity Storm Drain in ROW	LF	980	1,400	1,373,000
18-inch Gravity Storm Drain in ROW	LF	1,100	730	803,000
18-inch Gravity Storm Outfall Pipe	LF	640	170.00	109,000
18-inch gravity Storm Drain in ROW, deep	LF	1,400	390.00	546,000
Improve shoulder ROW	LS	83,100	1	84,000

[1] *Unit costs based on 2015 Mukilteo Comprehensive Surface Water Management Plan Update, updated to 2023 dollars (Seattle ENR).*

Subtotal		2,915,000
Contractor Overhead, profit and mobilization	*18.0%*	524,700
Construction Contingency	*20.0%*	583,000
Washington State sales tax (applied to all above)	*10.0%*	402,270
Subtotal construction costs		**$ 4,022,700**
Construction Management and inspections	*15.0%*	603,405
Engineering Design [2]	*0.0%*	0
Maintenance Easement		45,000
2023 Total Capital Cost		**$ 5,030,000**

[2] *Engineering Cost included in City budget for 2022 and 2023.*

Mukilteo SMAP Study 1
PLANNING-LEVEL COST ESTIMATE

Study Name Canyon Dr Pond Expansion Feasibility Study
Study Description: Feasibility to expand the existing City-owned detention pond located on 59th St near Canyon Dr for increased water quality and flow control benefit.

Activity	Number of Units	Unit	Hours per Unit	Other Direct Cost	Non-Labor Cost per Unit	Per Year Implementation	Years Implemented	City Staff					Contractor/Consultant Staff				Total Cost
								Hours	FTE	Labor Cost	Other Direct Costs	Subtotal Cost	Hours	Labor Costs	Other Direct Costs	Subtotal Cost	
Management and Administration	1	Percent of Program						10	0.01	$950		$950		$0	$0	$0	$950
Project Management	1	Program	38					38	0.02	$3,800		$3,800		$0	$0	$0	$3,800
Topographic survey	100	Data Point			$75				0.00	$0				$0	$7,500	$7,500	$7,500
Geotechnical survey	1								0.00	$0			40	$6,000	$0	$6,000	$6,000
Hydrologic and hydraulic analysis	1								0.00	$0			75	$11,250	$0	$11,250	$11,250
Feasibility Analysis	1								0.00	$0			75	$0	$0	$0	$0
Annual Program Subtotal							**1**	**48**	**0.03**	**$4,750**	**$0**	**$4,750**	**190**	**$17,250**	**$7,500**	**$24,750**	**$30,000**

FTE and Rate Assumptions

Staff availability (hrs/year/FTE)	1768
Percent of total Program FTE for Management, Supervision and Admin	5%
City Project Management 1.5 hr/$1000 consultant contract	0.0015
Staff Loaded Rate, $/hour (per City SW Program Manager)	100
Contractor Rate, $/hour	150

Activity Assumptions

Management and admin: Percent of total program FTE for Public Works Management, Supervision and Admin.
PM and coordination: Managing the project, reviewing deliverables and interdepartmental coordination.
Topographic survey: City PM meets with contractor and reviews deliverables. Approximately 100 data points at $75 per topographic data point
Geotechnical investigation: Review existing studies, pit test, soil logs.
Hydrologic and hydraulic modeling; WWHM model development for hydrology, EPA SWMM hydraulics, brief TM (draft and final).
Feasibility Analysis: Summarize other studies in draft and final TM with recommendations for advancing project.

Mukilteo SMAP Study 2
PLANNING-LEVEL COST ESTIMATE

Study Name Chennault Beach Creek Access Road Culvert Improvements Feasibility
Study Description: Feasibility to realign the culvert crossing of the access road connecting road Chennault Beach Drive and Harbor Heights Pkwy.

Activity	Number of Units	Unit	Hours per Unit	Other Direct Cost	Non-Labor Cost per Unit	Per Year Implementation	Years Implemented	City Staff					Contractor/Consultant Staff				Total Cost
								Hours	FTE	Labor Cost	Other Direct Costs	Subtotal Cost	Hours	Labor Costs	Other Direct Costs	Subtotal Cost	
Management and Administration	1	Percent of Program					1	16	0.01	$1,625		$1,625					$1,625
Project Management	1	Program	102				1	102	0.06	$10,200		$10,200					$10,200
Topographic survey	250	Data points			$75		1								$18,750	$18,750	$18,750
Geotechnical investigation	1						1						150	$22,500		$22,500	$22,500
Hydrologic and hydraulic analysis	1						1						100	$15,000		$15,000	$15,000
Feasibility Analysis	1						1						75	$11,250		$11,250	$11,250
Annual Program Subtotal							**1**	**115**	**0.07**	**$11,825**	**$0**	**$11,825**	**325**	**$48,750**	**$18,750**	**$67,500**	**$80,000**

FTE and Rate Assumptions

Staff availability (hrs/year/FTE)	1768
Percent of total Program FTE for Management, Supervision and Admin	5%
City Project Management 1.5 hr/$1000 consultant contract	0.0015
Staff Loaded Rate, $/hour (per City SW Program Manager)	100
Contractor Rate, $/hour	150

Activity Assumptions

Management and admin: Percent of total program FTE for Public Works Management, Supervision and Admin.
PM and coordination: Managing the project, reviewing deliverables and interdepartmental coordination.
Topographic survey: City PM meets with contractor and reviews deliverables. Approximately 250 shots at 75 per shot
Geotechnical investigation: Review existing studies, slope stability, borings and soil logs.
Hydrologic and hydraulic modeling; WWHM model development for hydrology, EPA SWMM hydraulics, brief TM (draft and final).
Feasibility Analysis: Summarize other studies in draft and final TM with recommendations for advancing project.

Mukilteo SMAP Program 8
PLANNING-LEVEL COST ESTIMATE

PLANNING-LCOST ESTIMATE **Residential Leaf Collection Outreach Program**

Program Description: **Public outreach campaign to encourage proper leaf disposal.**

Activity	Years Implemented	City Staff					Contractor/Consultant Staff				Total Cost
		Hours	FTE	Labor Cost	Other Direct Costs	Subtotal Cost	Hours	Labor Costs	Other Direct Costs	Subtotal Cost	
Preprogram public survey (website, direct mailings)	1	25	-	$2,500	$2,000	$4,500	20	$3,000	$0	$3,000	$7,500
Develop public outreach materials	1	25	0.01	$2,500	$5,000	$7,500	20	$3,000	$0	$3,000	$10,500
Program implementation and evaluation	5	125	0.07	$12,500	$0	$12,500	0	$0	$0	$0	$12,500
Annual Program Subtotal		**175**	**0.08**	**$17,500**	**$7,000**	**$24,500**	**40**	**$6,000**	**$0**	**$6,000**	**$40,000**

FTE and Rate Assumptions

Staff availability (hrs/year/FTE)	1768
Percent of total Program FTE for Management, Supervision and Admin	5%
City Project Management 1.5 hr/$1000 consultant contract	0.0015
Staff Loaded Rate, $/hour (per City SW Program Manager)	100
Contractor Rate, $/hour	150

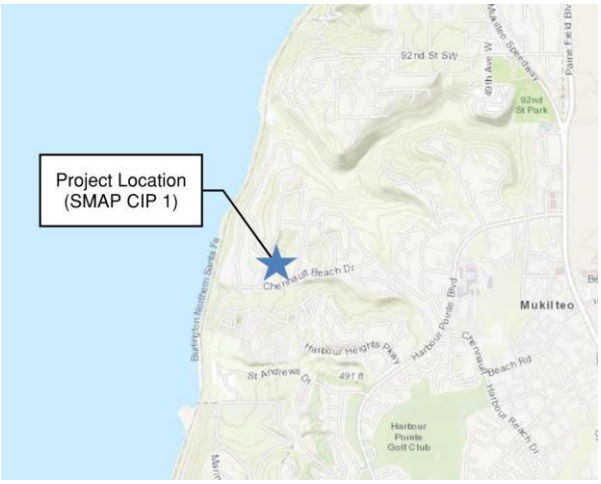
Activity Assumptions

Preprogram: Assumes City staff time to develop survey and indirect costs for direct mailer. Consultant assistance.
Outreach materials: Printed posters and flyers for various City outreach events. Consultant assistance.
Program implementation and evalution: Survey data analysis and attendance at City outreach events for five years.

Project Number SMAP CIP 1

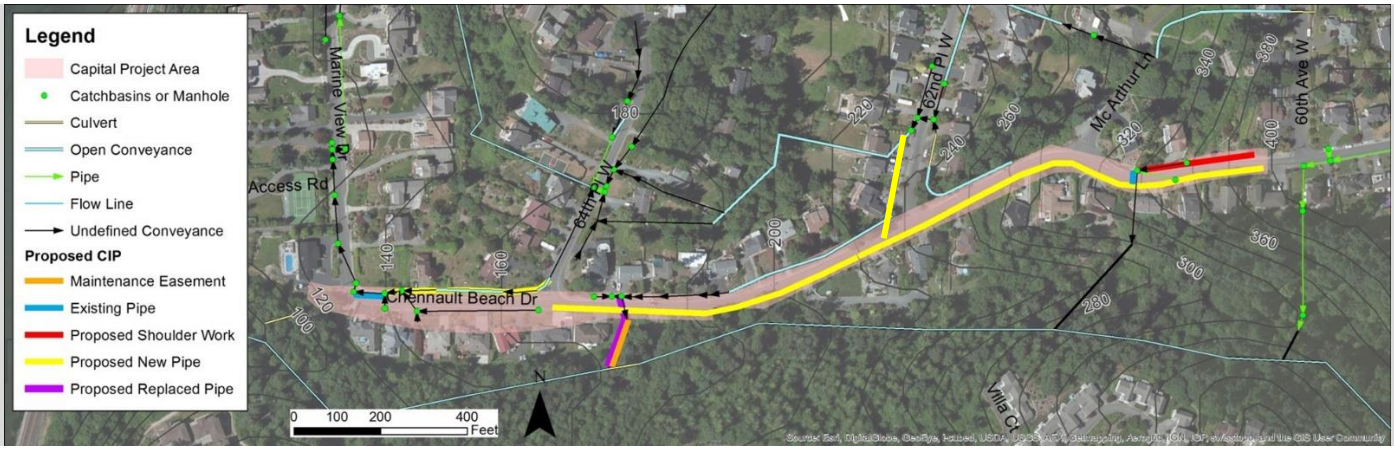
Chennault Beach Drive Drainage Improvements (Chennault)

SW Goal: Drainage Improvements & Reduce Erosion



DEPARTMENT
Public Works/Surface Water
OBJECTIVE
Reduce channel erosion and flashiness. Resolve flooding along Chennault Beach Drive from 60th Street to Marine View Drive and along 62nd Place W and Canyon Drive
WATERSHED
Chennault Beach Creek
COST OPINION
Planning Level Construction Cost $5,030,000 (Jan 2023 dollars)

CONSIDERATIONS
Condition of existing pipe
Special construction requirements or replacement of retaining walls due to soil conditions.
Street Classification/Access
Impact to residences
Coordination with other utilities (gas, water, sewer)



Project Description

This project provides a new drainage system along Canyon Drive and Chennault Beach Drive, where the existing drainage system is under-developed, under-capacity, or bypassed. Flows currently routed to the existing Upper Chennault Creek outfall east of McArthur Lane will be routed through the new drainage system to the existing Upper Chennault Creek outfall east of 64th Place W. Existing inlets that are not currently collecting surface water will either be repositioned and connected to the new system or removed. Existing functional inlets may be connected to the new system. New inlets and laterals will be installed as needed.

The project consists of five areas of drainage improvements:

- Improvements to the north ROW shoulder of Chennault Beach Drive between 60th Avenue W and McArthur Lane consisting of paving and re-grading of the shoulder and installing asphalt curbing to channel water to the existing stormwater inlets.
- A 12-inch-diameter drainage system located in the alignment of the existing ditch-and-culvert system located on the south side of Chennault Beach Drive between west of 60th Place W and west of 62nd Place W.
- An 18-inch-diameter drainage system located in the alignment of the existing ditch-and-culvert system located on the south side of Chennault Beach Drive between west of 62nd Place W and 64th Place W. A proposed drainage system from 62nd Place W will tie into this new system on Chennault Beach Drive (see 62nd Place W/Canyon Drive Storm Drainage Improvements project, CIP Rank 7). The new 18-inch-diameter drainage system discharges to the existing outfall to Upper Chennault Creek east of 64th Place W. A maintenance easement will be obtained along the extent of the existing outfall pipe.

- A 12-inch-diameter drainage system located in the alignment of the existing ditch-and-culvert system on the north side of Chennault Beach Drive between 64th Place W and W Marine View Drive. This new drainage system will tie into the existing drainage system on Marine View Drive.
- An 18-inch-diameter drainage pipe located in the west ROW shoulder of 62nd Place W (from where the existing pipes from the east ROW cross over 62nd Place W north) and in the north ROW shoulder of Chennault Beach Drive crossing over Chennault Beach Drive and tying into the proposed piped system on the south side of Chennault Beach Drive

Project Rationale

Drainage from the Chennault Beach Drive roadway is conveyed in an under-developed ditch-and-culvert system as well as intermittent piping between 60th Avenue W and Marine View Drive. The piped portions of the system are located where the system outfalls to Upper Chennault Beach Creek at four locations: 60th Avenue W, McArthur Lane, 64th Place W, and west of Marine View Drive.

During high flows, roadway flooding occurs because of a lack of ditch capacity, debris blocking driveway culverts and inlets, and misplaced inlets. High flows scour landscaping material (typically small rocks) located in the right-of-way (ROW), providing a debris and sediment source. Soil and vegetation on steep slopes adjacent to ditches slough into the ditches, reducing ditch capacity and providing another sediment/debris source. Some inlets are located outside of the drainage pathway. Flows bypass the inlets and contribute to the roadway flooding by concentrating flow in under-capacity ditches. In addition, the City does not have an easement to perform maintenance on their outfall near 64th Place W.

Anticipated Elements

Key elements of this project include the coordination and relocation of existing utilities that are in conflict including gas, sewer, and water. Public engagement will be critical to the success of this project due to the driveway access and construction impact during the pipe installation. A condition assessment should be conducted to ensure existing pipes are in good condition, as well as a geotechnical investigation to determine if any special requirements or replacement of retaining walls is necessary. Cost estimate assumes no special measures or replacements are necessary.