



CITY OF
BAINBRIDGE ISLAND

2023

**CITY OF BAINBRIDGE ISLAND
STORMWATER MANAGEMENT
ACTION PLAN**

**Prepared for
City of Bainbridge Island**

**Prepared by
Herrera Environmental Consultants, Inc.**

Note:

Some pages in this document have been purposely skipped or blank pages inserted so that this document will print correctly when duplexed.

CITY OF BAINBRIDGE ISLAND STORMWATER MANAGEMENT ACTION PLAN

**Prepared for
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March 20, 2023

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TABLE OF CONTENTS

Introduction	1
Watershed Assessment and Prioritization Process Summary	3
Stormwater Management Actions.....	6
Criteria for Developing Stormwater Management Actions	6
Strategic Stormwater Retrofit Project Opportunities.....	7
Land Management Strategies	9
Stormwater Management Program Enhancements.....	10
Monitoring and Assessment	10
Illicit Discharge Field Screening and TMDL	10
Source Control Program for Existing Development.....	10
Operations and Maintenance	10
Public Education and Outreach	10
Public Involvement and Participation	11
Changes to Long-Range Plans	11
Budget and Schedule	12
SMAP Future Assessment and Feedback.....	16
SMAP Implementation.....	17
References	18
Cost Assumptions.....	19

Appendices

Appendix A Cost Assumptions

Tables

Table 1.	Manzanita East Catchment Strategic Stormwater Retrofit Project Opportunities.	7
Table 2.	Manzanita East Catchment Land Management Strategies.	9
Table 3.	Manzanita East Catchment Stormwater Management Program Enhancements.	11
Table 4.	Manzanita East Catchment Stormwater Management Actions Schedule and Cost Summary.....	13

Figures

Figure 1.	City of Bainbridge Island Watersheds.....	4
Figure 2.	Manzanita East Catchment Overview Map.	5
Figure 3.	Manzanita East Catchment Stormwater Retrofit Project Opportunities.	8
Figure 4.	Manzanita East Catchment Identified Stormwater Management Short-Term Actions Schedule and Cost Estimate Summary.	14
Figure 5.	Manzanita East Catchment Identified Stormwater Management Long-Term Actions Schedule and Cost Estimate Summary.	15

INTRODUCTION

The City of Bainbridge Island (COBI) Stormwater Management Action Plan (SMAP) is prepared pursuant to requirements of S5.C.1.d.iii of the 2019–2024 Western Washington Phase II National Pollutant Discharge Elimination System Municipal Stormwater Permit (NPDES Phase II Permit) issued by the Washington Department of Ecology (Ecology 2019).

COBI completed the *City of Bainbridge Island Watershed Inventory and Assessment* on March 21, 2022 (Herrera 2022a) and the *City of Bainbridge Island Watershed Prioritization* on June 22, 2022 (Herrera 2022b). Additionally, COBI is in the process of developing their Stormwater System Plan, anticipated in 2023. Much of the watershed data and analysis conducted for meeting the NPDES Phase II Permit requirements will serve future planning to better understand stormwater pressures upon water resources on a watershed basis. This SMAP will be incorporated into COBI’s Stormwater System Plan.

COBI’s Stormwater Interdisciplinary Team and relevant community stakeholder groups have been instrumental in the development of the receiving water assessment and the watershed prioritization. The Stormwater Interdisciplinary Team reviewed and commented on identified stormwater management actions for this SMAP.

This SMAP first describes how this plan is informed by COBI’s watershed inventory and prioritization results and then the criteria used to identify stormwater management actions. The remaining content of the SMAP is presented in order of the NPDES Phase II Permit requirements of S5.C.1.d.iii:

- iii. Stormwater Management Action Plan (SMAP). No later than March 31, 2023, Permittees shall develop a SMAP for at least one high-priority catchment area from (ii), above, that identifies all of the following:
 - (a) A description of the stormwater facility retrofits needed for the area, including the BMP types and preferred locations.
 - (b) Land management/development strategies and/or actions identified for water quality management.
 - (c) Targeted, enhanced, or customized implementation of stormwater management actions related to permit sections within S5, including:
 - IDDE field screening,
 - Prioritization of source control inspections,
 - O&M inspections or enhanced maintenance, or
 - Public education and outreach behavior change programs.

Identified actions shall support other specifically identified stormwater management strategies and actions for the basin overall, or for the catchment area in particular.

- (d) If applicable, identification of changes needed to local long-range plans, to address SMAP priorities.
- (e) A proposed implementation schedule and budget sources for:
- Short-term actions (i.e., actions to be accomplished within 6 years), and
 - Long-term actions (i.e., actions to be accomplished within 7 to 20 years).
- (f) A process and schedule to provide future assessment and feedback to improve the planning process and implementation of procedures or projects.

WATERSHED ASSESSMENT AND PRIORITIZATION PROCESS SUMMARY

Step 1 of the watershed assessment and prioritization process was to develop a list of watersheds for Bainbridge Island. The twelve watersheds are depicted in Figure 1.

Step 2 included developing a list of qualitative metrics to use from existing data to evaluate and compare watersheds. Upon evaluation, nine candidate watersheds were selected for the prioritization and scoring process. Three watersheds were set aside from the prioritization and scoring process due to low or no COBI stormwater influence. Through the scoring process, four watershed candidates emerged as higher priority, specifically for restoration, and were carried forward into Step 3.

Step 3 involved applying a second group of metrics, including social equity, promotes plans and projects and stakeholder feedback on the process and metrics.

Step 4 included combining the results of Step 3 with additional stakeholder feedback and selecting the Manzanita watershed as the highest priority watershed for restoration based on the following characteristics:

- High rating for community and aquatic life water importance:
 - High diversity of salmon species present including coho, resident trout and fall chum
 - High level of shoreline (90 percent) classified as “open” for shellfish harvest
 - Rated “highest” for water flow importance (Ecology 2021a)
 - Several species of nearshore forage fish use including sand lance, surf smelt and herring
- Moderate rating for level of existing and future development for the following landscape metrics:
 - Watershed impervious cover
 - Watershed stormwater infrastructure constructed prior to higher flow control requirements
 - Percentage of vacant lands to potentially undergo development
- High level of potential groundwater withdrawal due to anticipated future growth (Ecology 2021a)
- Moderate-high rating for water flow degradation due to development and increase of private wells (Ecology 2021b)
- High level of support with studies, plans and projects targeting stormwater retrofits for stream flow preservation, protection of water flow importance and reducing impacts of future groundwater wells
- Majority of stakeholder feedback agreed with selection of this watershed

Step 5 (the final step of the prioritization process) involved identifying a priority catchment within the selected priority watershed. Water processes for sub areas of concentrated flow paths and maximum infiltration in the Manzanita watershed area draining to the creek were evaluated. It was determined that the eastern portion of the watershed was critical for aquifer recharge and discharge to the stream and susceptible to future groundwater withdrawal due to private wells (Herrera 2022b). Thus, Manzanita East was selected as the priority catchment for the SMAP. Figure 2 depicts the 827-acre Manzanita East Catchment.

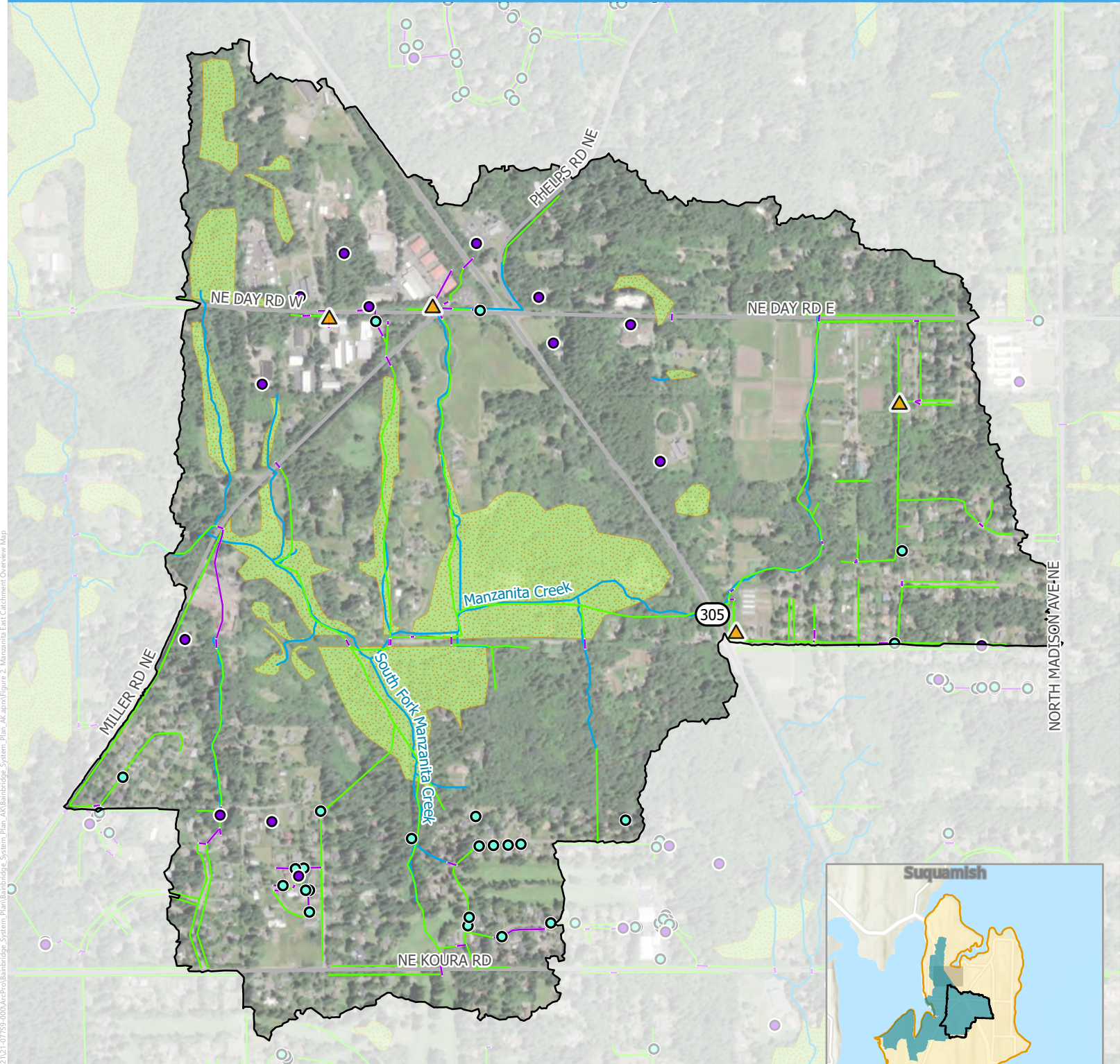
Figure 1.
City of Bainbridge Island Watersheds.



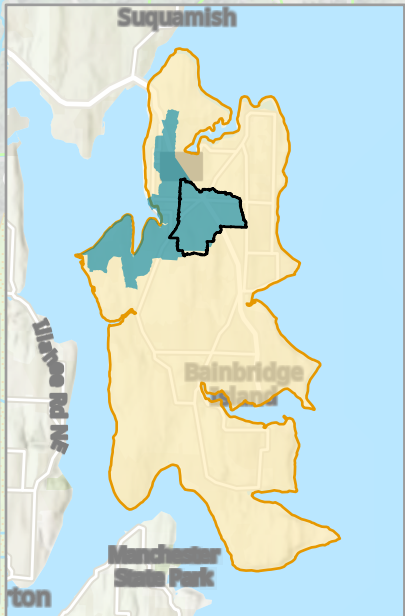
PUGGET SOUND

- Roads
- Streams
- Wetlands and Lakes
- Watersheds

Date: 3/6/2023
 Author: akamadagull
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- Outfalls
- Stormwater Facilities
- Connections and Structures
- Channels and Ditches
- Pipes
- Streams
- Roads
- Wetlands
- Bainbridge City Limits
- Manzanita East Catchment (827 acres)
- Manzanita Watershed (2285 acres)



STORMWATER MANAGEMENT ACTIONS

Stormwater management actions considered by the project team included projects, programs, or policies to address water quality and water processes in the Manzanita East Catchment. The focus of the actions identified supplement aquifer recharge, provide water quality treatment, reduce pollutants from existing development, and engage the community through public education. Identified stormwater management actions are presented in three categories:

- **Strategic stormwater retrofit project opportunities (RP):** Project opportunities designed and constructed, usually a new facility or expansion/upgrade of an existing facility, to address existing stormwater. Project opportunities encourage infiltration so that stormwater is directed to groundwater in locations previously identified as important for groundwater/surface water interactions (Ecology 2021a) to supplement summer stream flow. Project opportunities may include a water quality treatment component.
- **Land management strategies (LM):** Programs, policies or studies targeting methods to improve or protect lands that are of high value or lands that can be converted to improve water quality or supplement groundwater.
- **Stormwater management program enhancements (SE):** Actions integrated with existing NPDES Phase II Permit programs that supplement permit requirements to address the primary water resource protection or improvement in the Manzanita East Catchment.

Criteria for Developing Stormwater Management Actions

The process to identify stormwater management actions for the Manzanita East Catchment included an evaluation of landscape characteristics, including:

- The existing stormwater system,
- zoning,
- vacant lands,
- stream buffers,
- wetlands,
- geohazard areas, and
- roadways.

In general, actions with potential to effectively protect or restore the Manzanita Creek receiving water were identified.

Identified actions and their anticipated general costs were presented to COBI's interdisciplinary team. The team's input was considered and incorporated into this SMAP.

Strategic Stormwater Retrofit Project Opportunities

Four strategic stormwater retrofit project opportunities (RP) were identified in the Manzanita East Catchment:

- RP-1. Design and construct Fieldstone Lane NE Regional Facility
- RP-2. Design and construct Bayhill Pond Naturalization Retrofit
- RP-3. Construct Bainbridge Island Food Forest Regional Facility
- RP-4. Design and construct Miller Road NE/NE Day Rd W Linear Facility Retrofits

The locations of the project opportunities are depicted in Figure 3. The projects, best management practice (BMP) types, and anticipated costs are summarized in Table 1.

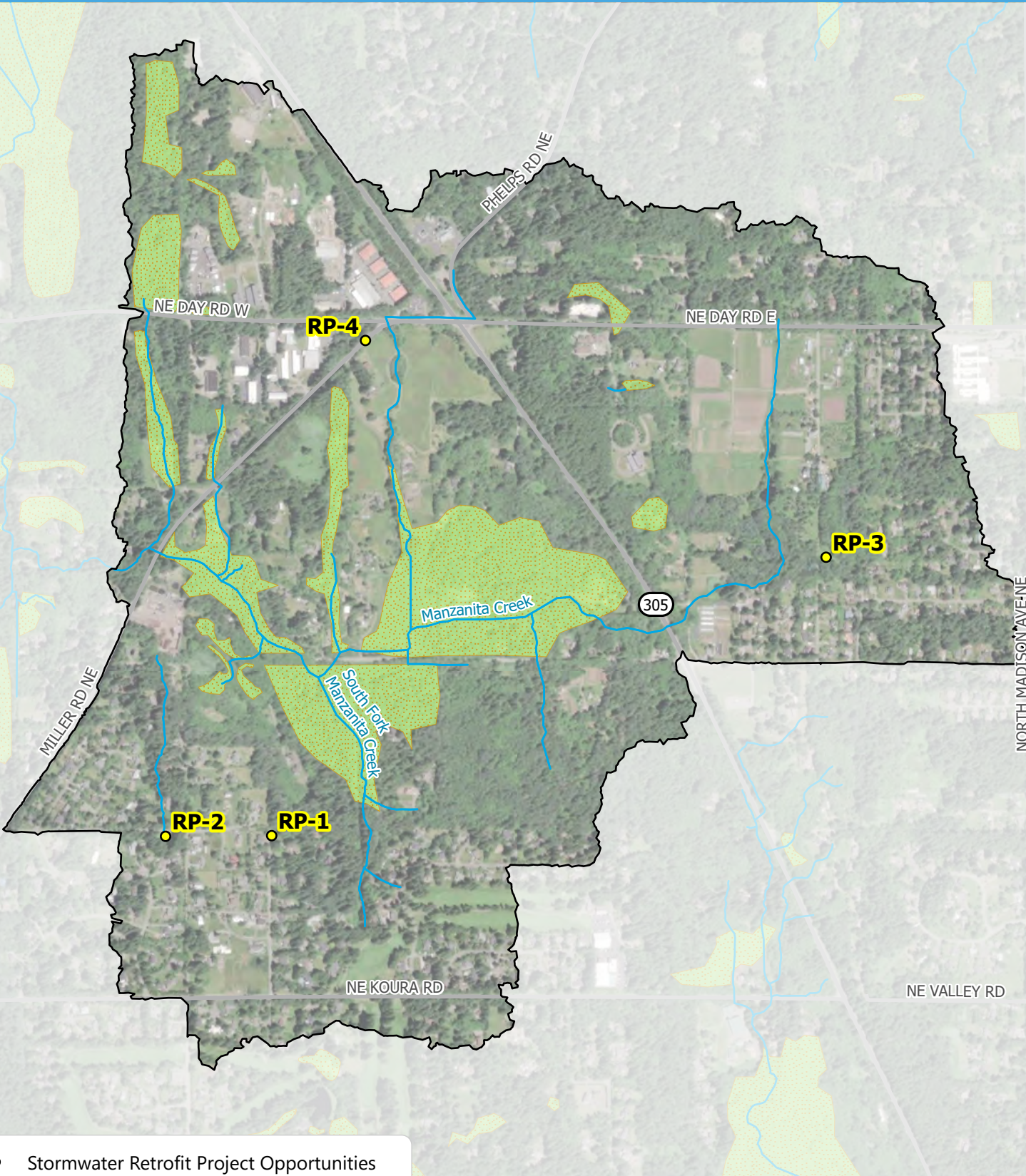
Table 1. Manzanita East Catchment Strategic Stormwater Retrofit Project Opportunities.

Action	Description	BMPs Considered ^a	Cost or Cost Range
RP-1. Design and construct Fieldstone Lane NE Regional Facility	Construct a biofiltration facility to provide water quality treatment for runoff from 9 acres of residential development draining to Manzanita Creek. Include educational signage and improve an existing trail connection. Protect and relocate existing underground utilities.	Biofiltration	Design ^b and Construction: \$200,000
RP-2. Design and construct Bayhill Pond Naturalization Retrofit	The existing pond in this residential neighborhood may not meet current stormwater standards. This project will examine options for improving water quality treatment and flow control by creating additional volume or expanding treatment processes, including potentially expanding the footprint across the road.	Naturalization	Design and Construction: \$30,000–75,000
RP-3. Construct Bainbridge Island Food Forest Regional Facility	Create a stormwater park to provide water quality treatment and flow control for stormwater runoff from 18 acres of residential land. The project would be a partnership between COBI's SSWM Utility and Friends of the Farms.	Detention Pond	Construction: \$700,000
RP-4. Design and construct Miller Road NE/NE Day Rd W Linear Facility Retrofits	Unmanaged stormwater from a high use area of Miller Road NE and the southern portion of the intersection of Miller Road NE and NE Day Road flows to Manzanita Creek. This project would construct linear facilities to improve water quality and flow control.	Bioretention	Design: \$200,000–300,000 Construction: \$500,000–600,000

^a These projects are in early design phase and the specific best management practice (BMP) that will be implemented may change.

^b 30 percent design is complete. Design costs include advancing the project from 30 percent design to 100 percent design.

RP = retrofit project



- Stormwater Retrofit Project Opportunities
- Roads
- Streams
- Wetlands
- East Manzanita Catchment

Site ID	Project Name
RP-1	Fieldstone Lane NE Regional Facility
RP-2	Bayhill Pond Naturalization Retrofit
RP-3	Bainbridge Island Food Forest Regional Facility
RP-4	Miller Road NE/NE Day Rd W Linear Facility Retrofits



Land Management Strategies

Seven land management (LM) strategies related to restoration, conservation, or protection were identified in the Manzanita East Catchment. The action, description, and anticipated costs are shown in Table 2.

Table 2. Manzanita East Catchment Land Management Strategies.

Action	Description	Cost (Time Period)
LM-1. Develop forest and wildland preservation process and policy	Review existing process and policies related to land preservation. Identify opportunities to support or streamline the process.	\$8,000 (one-time)
LM-2. Conduct soil restoration/regeneration education	Develop and implement education of those who inspect, enforce, and implement post-construction soil quality and depth (Ecology BMP T5.13).	\$8,000 (one-time)
LM-3. Conduct impervious surface conversion pilot project	Encourage removal of existing impervious surfaces and conversion to pervious surfaces (similar to the Depave Puget Sound initiative).	\$40,000 (one-time)
LM-4. Conduct Manzanita Creek Floodplain Restoration Feasibility Study	Unmanaged stormwater from older portions of Day Road Industrial Park and surrounding areas flows to Manzanita Creek. This feasibility study would evaluate modifying the area surrounding the stream to expand the floodplain of Manzanita Creek, increase flood storage (flow control) and groundwater recharge. Additional benefits that would be investigated include providing habitat and water quality improvements.	\$200,000 (one-time)
LM-5. Prioritize culvert replacements	Identify and prioritize culvert replacements, develop scheme where fish passage improvements are rated higher.	\$3,200 (one-time)
LM-6. Identify annual drainage program projects – water quality/flow control improvement project identification	Identify projects in catchment that improve water flow or quality.	\$8,000 (over 5 years)
LM-7. Conduct Lovgreen Road Flow Control Feasibility Study	This feasibility study would investigate using a linear facility to provide water quality treatment and flow control to reduce downstream erosion and flooding at the highway intersection. It will also evaluate coupling the linear facility with other road improvements (such as sidewalks) and expanding the linear facility onto adjacent COBI property (with potential impacts to the current use of the property).	\$100,000 (one-time)

LM = land management

Stormwater Management Program Enhancements

COBI conducts activities for compliance with the current NPDES Phase II Permit, including activities associated with monitoring and assessment, illicit discharge field screening and Total Maximum Daily Load (TMDL), source control, operations and maintenance, public education and outreach, and public involvement and participation. This section describes identified stormwater management program enhancements (SE) that exceed current NPDES Phase II Permit requirements.

Monitoring and Assessment

To better understand water quality status and trends, and effectiveness of management actions, COBI identified conducting enhanced stream and outfall water quality monitoring in the Manzanita East Catchment as a potential SE.

Illicit Discharge Field Screening and TMDL

COBI is required to field screen 12 percent of their municipal separate storm sewer system (MS4) annually for illicit discharges. COBI identified focusing field screening activities in the Manzanita East Catchment as a potential SE, especially adjacent to properties with agriculture or septic systems since these are potential sources of bacteria.

Source Control Program for Existing Development

COBI is required to implement a source control program no later than January 1, 2023. Twenty percent of the businesses/sites in COBI's source control inventory are required to be inspected annually with provisions for responding to complaints and re-inspecting sites. COBI identified prioritizing source control activities in the Manzanita East Catchment as a potential SE.

Operations and Maintenance

COBI is required to inspect MS4 catch basins every 2 years and clean and repair as needed based on inspection. COBI identified developing an enhanced storm system maintenance plan for the Manzanita East Catchment as a potential SE.

COBI conducts street sweeping and power brooming throughout COBI to reduce road debris. COBI identified enhanced street sweeping in the Manzanita East Catchment as a potential SE.

Public Education and Outreach

COBI is required to implement public education and outreach programs to build awareness, foster behavior change, and provide stewardship opportunities to address and reduce the impacts from stormwater runoff. COBI identified expanding education and outreach activities in the Manzanita East Catchment as a potential SWM program enhancement. Specific activities may include:

- Developing a residential rain garden cost-share pilot program
- Developing tree, wetland, stream buffer, and noxious weeds homeowner education
- Developing a residential natural yard care pilot program

Public Involvement and Participation

COBI is required to create opportunities for the public to participate in decision-making processes. COBI meets the requirement through public notices. COBI identified enhancing communication with and encouraging public involvement and participation from the community in and around the Manzanita East Catchment with this SMAP.

The NPDES Phase II Permit section reference, potential action, and action costs are summarized in Table 3.

Table 3. Manzanita East Catchment Stormwater Management Program Enhancements.		
NPDES Phase II Permit Section	Potential Action	Cost (time period)
Monitoring and Assessment (S8)	SE-1. Perform enhanced stream and outfall monitoring and assessment	\$35,000 (over 5 years)
Illicit Discharge Detection and Elimination (S5.C.5) and Total Maximum Daily Load (S7)	SE-2. Perform field screening for bacteria adjacent to agricultural properties	\$20,000 (over 2 years)
	SE-3. Perform field screening for bacteria adjacent to properties with septic systems	\$12,500 (over 2 years)
Source Control Program for Existing Development (S5.C.8)	SE-4. Prioritize source control inspections	\$0
Operations and Maintenance (S5.C.7)	SE-5. Develop enhanced storm system maintenance plan	\$8,000 (one-time)
	SE-6. Perform enhanced street sweeping	\$72,000 (over 6 years)
Public Education and Outreach (S5.C.2)	SE-7. Develop residential rain garden cost-share program	\$20,000 (over 3 years)
	SE-8. Develop tree, wetland, stream buffer, and noxious weeds homeowner education pilot program	\$20,000 (one-time)
	SE-9. Develop residential natural yard care pilot program	\$20,000 (one-time)
Public Involvement and Participation (S5.C.3)	SE-10. Communicate with and encourage public involvement and participation from the people and property owners in and around Manzanita East Catchment	\$0

SE = stormwater management program enhancement

Changes to Long-Range Plans

The SMAP will be incorporated into the 2023 Stormwater System Plan (SWSP), and COBI City Council may incorporate the SWSP into the 2024 COBI Comprehensive Plan periodic update.

BUDGET AND SCHEDULE

Cost estimates and time schedule for identified SMAP actions were determined for short-term (2024–2030) or long-term (2031–2044) implementation (Table 4). Some identified actions may be implemented annually while others are possibly a one-time project or program. The proposed schedule (see Figures 4 and 5) does not assume continuation of the Short-term projects or programs beyond the year 2030, and Long-term projects or programs beyond the year 2044.

Costs may be mitigated by grant funding programs or alternative funding programs (i.e., fees in lieu of onsite stormwater management or regional facility connection) (Lotus Water 2023). For this document, no assumptions have been included about grant or alternative funding programs. Detailed cost assumptions can be found in Appendix A. The total estimated cost for short-term actions is \$1,099,000. The total estimated cost for long-term actions ranges from \$1,105,700 to 1,350,700 depending on project complexity.

A summary of the identified short-term and long-term action costs is included in Table 4 and Figures 4 and 5.

Table 4. Manzanita East Catchment Stormwater Management Actions Schedule and Cost Summary.

Action	Schedule		Total Cost ^b
	Short- or Long-Term ^a	Duration	
RP-1. Design and construct Fieldstone Lane NE Regional Facility ^c	Short	One-time	\$200,000
RP-3. Construct Bainbridge Island Food Forest Regional Facility	Short	One-time	\$700,000
LM-1. Develop forest and wildland preservation process and policy	Short	One-time	\$8,000
LM-2. Conduct soil restoration/regeneration education	Short	One-time	\$8,000
LM-6. Identify annual drainage program projects – water quality/flow control improvement project identification	Short	5 years	\$8,000
SE-1. Perform enhanced stream and outfall monitoring and assessment	Short	5 years	\$35,000
SE-2. Perform field screening for bacteria adjacent to agricultural properties ^d	Short	2 years	\$20,000
SE-4. Prioritize source control inspections	Short	One-time	\$0
SE-5. Develop enhanced storm system maintenance plan	Short	One-time	\$8,000
SE-6. Perform enhanced street sweeping	Short	6 years	\$72,000
SE-8. Develop tree, wetland, stream buffer, and noxious weeds homeowner education pilot program	Short	One-time	\$20,000
SE-9. Develop residential natural yard care pilot program	Short	One-time	\$20,000
SE-10. Communicate with and encourage public involvement and participation from the people and property owners in and around Manzanita East Catchment	Short	Annual	\$0
RP-2. Design and construct Bayhill Pond Naturalization Retrofit	Long	One-time	\$30,000–\$75,000
RP-4. Design Miller Road NE/NE Day Rd W Linear Facility Retrofits	Long	One-time	\$200,000–\$300,000
RP-4. Construct Miller Road NE/NE Day Rd W Linear Facility Retrofits	Long	One-time	\$500,000–\$600,000
LM-3. Conduct impervious surface conversion pilot project	Long	One-time	\$40,000
LM-4. Conduct Manzanita Creek Floodplain Restoration Feasibility Study	Long	One-time	\$200,000
LM-5. Prioritize culvert replacements	Long	One-time	\$3,200
LM-7. Conduct Lovgreen Road Flow Control Feasibility Study	Long	One-time	\$100,000
SE-3. Perform field screening for bacteria adjacent to properties with septic systems	Long	2 years	\$12,500
SE-7. Develop residential rain garden cost-share pilot program	Long	3 years	\$20,000
Total Short-Term (2024–2030) Cost		\$1,099,000	
Total Long-Term (2031–2044) Cost		\$1,105,700–1,350,700	

^a Short-term = implementation between 2024 to 2030

Long-term = implementation between 2031 and 2044

^b Cost estimates are in 2022 dollars. Inflation and escalation of costs were not incorporated into cost estimates.

^c 30 percent design is complete. Design costs include taking the project from 30 percent design to 100 percent design.

^d Includes agricultural property survey and an update to risk level.

LM = land management strategy, RP = strategic stormwater retrofit project opportunity, SE = stormwater management program enhancement
LID = low impact development, O&M = operations and maintenance, WQ = water quality

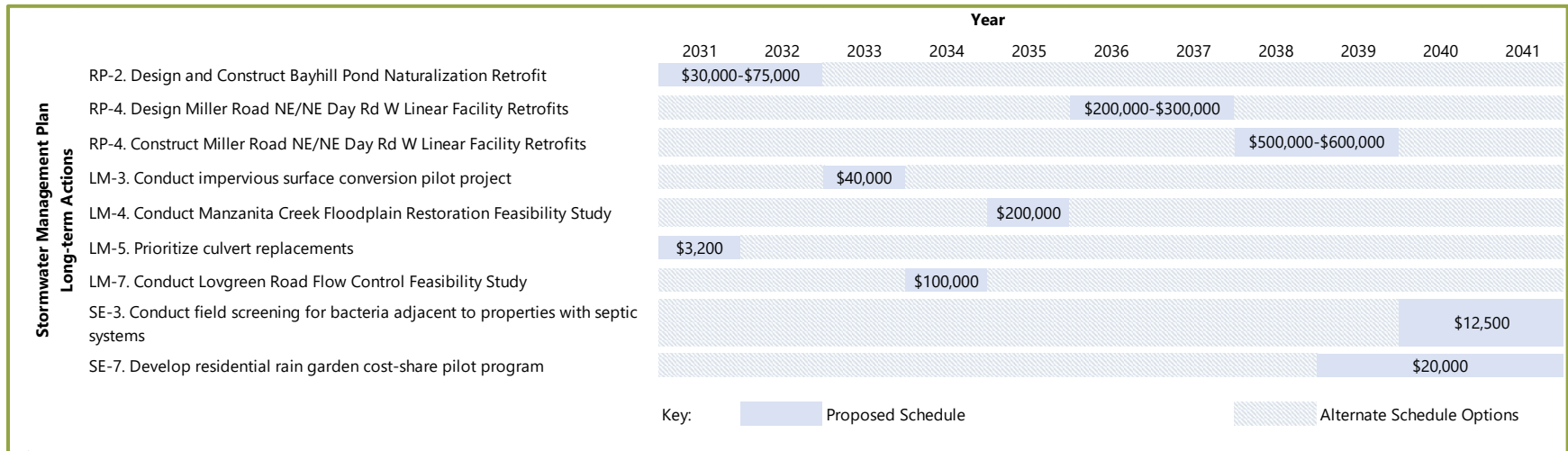
Figure 4. Manzanita East Catchment Identified Stormwater Management Short-Term Actions Schedule and Cost Estimate Summary.

	Year						
	2024	2025	2026	2027	2028	2029	2030
RP-1. Design and Construct Fieldstone Lane NE Regional Facility							\$200,000
RP-3. Construct Bainbridge Island Food Forest Regional Facility		\$700,000					
LM-1. Develop forest and wildland preservation process and policy			\$8,000				
LM-2. Conduct soil restoration/regeneration education					\$8,000		
LM-6. Identify annual drainage program projects	\$1,600	\$1,600	\$1,600	\$1,600	\$1,600		
SE-1. Perform enhanced stream and outfall monitoring and assessment			\$7,000	\$7,000	\$7,000	\$7,000	\$7,000
SE-2. Perform field screening for bacteria adjacent to agricultural properties		\$10,000	\$10,000				
SE-4. Prioritize source control inspections		\$0					
SE-5. Develop enhanced storm system maintenance plan				\$8,000			
SE-6. Perform enhanced street sweeping	\$12,000	\$12,000	\$12,000	\$12,000	\$12,000	\$12,000	
SE-8. Develop tree, wetland, stream buffer, noxious weeds homeowner education pilot program						\$20,000	
SE-9. Develop residential natural yard care pilot program							\$20,000
SE-10. Communicate with and encourage public involvement and participation from the people and property owners in and around Manzanita East Catchment	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Key: Proposed Schedule Alternate Schedule Options

LM = land management strategy
 RP = strategic stormwater retrofit project opportunity
 SE = stormwater management program enhancement

Figure 5. Manzanita East Catchment Identified Stormwater Management Long-Term Actions Schedule and Cost Estimate Summary.



LM = land management strategy

RP = strategic stormwater retrofit project opportunity

SE = stormwater management program enhancement

SMAP FUTURE ASSESSMENT AND FEEDBACK

COBI proposes to assess implementation of this SMAP by tracking project implementation and program effectiveness. COBI will use the results of this assessment to adjust SMAP implementation over time.

Actions identified in this plan, and then determined to be implemented, based upon future permit requirements, will be tracked for status of implementation. Tracking and review of actions will be performed periodically with the Stormwater Interdisciplinary Team. Challenges, modifications, or implementation timelines may be adjusted during the review period. The status and modifications will be documented.

COBI staff may continue to review water quality data collected by Ecology, neighboring jurisdictions, and partners to determine long-term if SMAP implementation is adequate to meet receiving water improvement goals.

SMAP IMPLEMENTATION

This SMAP identifies and describes retrofit projects, land management strategies, and enhanced stormwater management program activities intended to protect and hopefully restore the receiving waters in the selected priority Manzanita East Catchment.

Implementation of the SMAP is contingent on future unknown NPDES Phase II Permit requirements and authority of approval and resources by COBI City Council.

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APPENDIX A

Cost Assumptions

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Table A-1. Stormwater Management Action Plan—Short-Term Action Cost Assumptions.

Action	Type	Description	One-Time Funding	Ongoing Funding	Cost Assumptions
RP-1. Design and construct Fieldstone Lane NE Regional Facility	Strategic Stormwater Retrofit Project Opportunity (RP)	Construct a biofiltration facility to provide water quality treatment for runoff from 9 acres of residential development draining to Manzanita Creek. Include educational signage and improve an existing trail connection. Protect and relocate existing underground utilities.	\$200,000	\$0	Assumes approximate cost based on 30% design opinion of probable cost. Cost includes advancing the project from 30% design to 100% design.
RP-3. Construct Bainbridge Island Food Forest Regional Facility	Strategic Stormwater Retrofit Project Opportunity (RP)	Create a stormwater park to provide water quality treatment and flow control for stormwater runoff from 18 acres of residential land. The project would be a partnership between COBI's SSWM Utility and Friends of the Farms.	\$700,000	\$0	Assumes approximate cost based on 30% design opinion of probable cost. Design is expected to be complete in 2023.
LM-1. Develop forest and wildland preservation process and policy	Land Management Strategy (LM)	Review existing process and policies related to land preservation. Identify opportunities to support or streamline the process.	\$8,000	\$0	Assumes consultant costs for policy review, similar to feasibility study.
LM-2. Conduct soil restoration/regeneration education	Land Management Strategy (LM)	Develop and implement education of those who inspect, enforce, and implement post-construction soil quality and depth (Ecology BMP T5.13).	\$8,000	\$0	Assumes cost to research similar programs, develop program, and implement.
LM-6. Identify annual drainage program projects – water quality/flow control improvement project identification	Land Management Strategy (LM)	Identify projects in catchment that improve water flow or quality.	\$0	\$8,000	Assumes the cost of 20 hours of planner staff time at a cost of \$1,600 per year for a total of 5 years.
SE-1. Perform enhanced stream and outfall monitoring program	Stormwater Management Program Enhancement (SE)	Increase sampling points in COBI's stream and outfall monitoring program.	\$0	\$35,000	Assumes 9 bacteria sites with lab costs at \$35/site and annual lab costs of \$1,000 for a 2-year duration. Includes 3 sampling days over summer, 5 temperature/dissolved oxygen deployments, data collection, validation, and technical memorandum. Estimate includes 1 day to deploy, data download every 2 weeks, data validation, and summary report to occur during June to September. The cost also includes 96 hours of a field technician staff time.
SE-2. Perform field screening for bacteria adjacent to agricultural properties	Stormwater Management Program Enhancement (SE)	Conduct field screening for bacterial contamination in drainages adjacent to properties with agricultural activities. Partner with Kitsap Conservation District to update "risk" of contamination from agricultural properties (proximity to stream, number and type of animals, buffer condition). Identify and work with high-risk properties.	\$0	\$20,000	Assumes the field screening would be done by COBI staff or in a partnership with Kitsap Conservation District for a 2-year duration. This project could be a potential grant project if combined with updating the agricultural inventory. Current interlocal agreements with Kitsap Conservation District for the Manzanita watershed is for technical assistance for agricultural and non-agricultural properties.
SE-4. Prioritize source control inspections	Stormwater Management Program Enhancement (SE)	Catchment receives additional points for inspection prioritization. Can consider additional requirements or more frequent inspections.	\$0	\$0	Assumes no additional cost for the Manzanita East Catchment being prioritized for business source control inspections.
SE-5. Develop enhanced storm system maintenance plan	Stormwater Management Program Enhancement (SE)	Inventory and prioritize system for pipe cleaning (sediment removal).	\$8,000	\$0	Assumes the cost of 40 hours of planner staff time or consultant support.
SE-6. Perform enhanced street sweeping	Stormwater Management Program Enhancement (SE)	Enhance street sweeping frequency in the catchment.	\$0	\$72,000	Assumes enhance street sweeping frequency in the Manzanita East Catchment at \$12,000 per year for a total of 6 years. Analogous cost estimates from two jurisdictions, and size of catchment. Estimate of area of catchment swept as a portion of the entire sweeping program.
SE-8. Develop tree, wetland, stream buffer, and noxious weeds homeowner education pilot program	Stormwater Management Program Enhancement (SE)	Develop and implement education resources, conduct outreach and implement "boots on the ground" projects related to retaining trees, retaining wetlands, preventing stream buffer encroachment, and controlling noxious weeds.	\$20,000	\$0	Assumes cost to create materials, distribute materials, measure response, graphics (assumes 20 hours for standard graphics and additional 10 hours for complex graphics), distribution (mail or electronic), and review from either West Sound Stormwater Outreach Group interlocal agreement or consultant support.
SE-9. Develop residential natural yard care pilot program	Stormwater Management Program Enhancement (SE)	Develop and implement residential natural yard care program. Can consider combining with tree, wetland, stream buffer, noxious weeds homeowner education program.	\$20,000	\$0	Assumes cost to create materials, distribute materials, measure response, graphics (assumes 20 hours for standard graphics and additional 10 hours for complex graphics), distribution (mail or electronic), and review from either West Sound Stormwater Outreach Group interlocal agreement or consultant support.

Table A-1 (continued). Stormwater Management Action Plan—Short-Term Action Cost Assumptions.

Action	Type	Description	One-Time Funding	Ongoing Funding	Cost Assumptions
SE-10. Communicate with and encourage public involvement and participation from the people and property owners in and around Manzanita East Catchment	Stormwater Management Program Enhancement (SE)	Work with people and property owners in and around Manzanita East Catchment to become more involved with the stormwater management program.	\$0	\$0	Assumes no additional cost for the public involvement in the Manzanita East Catchment.
			\$964,000	\$135,000	
			Total Short-Term Cost		\$1,099,000

LM = land management strategy
 RP = strategic stormwater retrofit project opportunity
 SE = stormwater management program enhancement

Table A-2. Stormwater Management Action Plan—Long-Term Action Cost Assumptions.

Action	Type	Description	One-Time Funding	Ongoing Funding	Cost Assumptions
RP-2. Design and construct Bayhill Pond Naturalization	Strategic Stormwater Retrofit Project Opportunity (RP)	The existing pond in this residential neighborhood may not meet current stormwater standards. This project will examine options for improving water quality treatment and flow control by creating additional volume or expanding treatment processes, including potentially expanding the footprint across the road.	\$30,000 to \$75,000	\$0	Assumes analogous cost based on similar pond naturalization project, which includes design, plants, planting, maintenance, and inspection.
RP-4. Design Miller Road NE/NE Day Rd W Linear Facility Retrofits	Strategic Stormwater Retrofit Project Opportunity (RP)	Unmanaged stormwater from a high use area of Miller Road NE and the southern portion of the intersection of Miller Road NE and NE Day Road flows to Manzanita Creek. This project would construct linear facilities to improve water quality and flow control.	\$200,000 to \$300,000	\$0	Assumes approximate analogous design cost based on a similar project.
RP-4. Construct Miller Road NE/NE Day Rd W Linear Facility Retrofits	Strategic Stormwater Retrofit Project Opportunity (RP)		\$500,000 to \$600,000	\$0	Assumes approximate analogous construction cost based on a similar project.
LM-3. Conduct impervious surface conversion project	Land Management Strategy (LM)	Encourage removal of existing impervious surfaces and conversion to pervious surfaces (similar to the Depave Puget Sound initiative).	\$40,000	\$0	Assumes cost to research similar programs, develop program, and implement.
LM-4. Conduct Manzanita Creek Floodplain Restoration Feasibility Study	Land Management Strategy (LM)	Unmanaged stormwater from older portions of Day Road Industrial Park and surrounding areas flows to Manzanita Creek. This feasibility study would evaluate modifying the area surrounding the stream to expand the floodplain of Manzanita Creek, increase flood storage (flow control) and groundwater recharge. Additional benefits that would be investigated include providing habitat and water quality improvements.	\$200,000	\$0	Assumes analogous cost based on similar feasibility study, which includes initial planning and site assessment, geotechnical analysis, hydrologic and hydraulic analysis and modeling, professional site survey, conceptual design drawings, preferred alternatives feasibility assessment report, and project management.
LM-5. Prioritize culvert replacements	Land Management Strategy (LM)	Identify and prioritize culvert replacements, develop scheme where fish passage improvements are rated higher.	\$3,200	\$0	Assumes the cost of 40 hours of planner staff time or consultant support.
LM-7. Conduct Lovgreen Road Flow Control Feasibility Study	Land Management Strategy (LM)	This feasibility study would investigate using a linear facility to provide water quality treatment and flow control to reduce downstream erosion and flooding at the highway intersection. It will also evaluate coupling the linear facility with other road improvements (such as sidewalks) and expanding the linear facility onto adjacent COBI property (with potential impacts to the current use of the property).	\$100,000	\$0	Assumes analogous feasibility study cost based on a similar project.
SE-3. Perform field screening for bacteria adjacent to properties with septic systems	Stormwater Management Program Enhancement (SE)	Conduct field screening for bacterial contamination in drainages adjacent to properties with septic systems. Partner with Kitsap Public Health to develop actions to identify failing systems, conduct maintenance education, or proactive/early response to inadequate systems.	\$0	\$12,500	Assumes \$250 per property inspection for a total of 50 property inspections over a 2-year duration.
SE-7. Conduct a residential rain garden cost-share program	Stormwater Management Program Enhancement (SE)	Develop and implement a cost-share pilot program to install/ encourage residential rain gardens or other infiltrating projects on developed sites.	\$0	\$20,000	Assumes cost will be similar to that of a 3-year duration interlocal agreement for the same program between Bremerton and Kitsap Conservation District.
			\$1,073,200 to \$1,318,200	\$32,500	
			Total Long-Term Cost		\$1,105,700 to 1,350,700

LM = land management strategy

RP = strategic stormwater retrofit project opportunity

SE = stormwater management program enhancement