8 Capital Improvement Plan

The 2021–2027 CIP will provide the City with funding to support a series of projects and programs that will help achieve the goals and objectives of the SSWU. The exercise to develop a funding level for a CIP is based on development of preferred projects; however, the actual list of projects implemented with CIP funding should be fluid to respond to other City initiatives and priorities that can influence the priority of the stormwater program. The projects listed should be considered for planning purposes only, and should not be construed as a final approved list for design and construction.

The following projects and programs will improve water quality, remove barriers to fish migration, and rehabilitate or replace aged infrastructure. They are the result of the stormwater system analysis described in Chapter 7 and were factored into the SSWU rate study described in Chapter 10. Figure 8-1 is a citywide map showing the locations of the proposed CIP projects.

The CIP comprises projects and programs. CIP projects are discrete, one-time capital improvements that, once completed, are removed from the CIP. By contrast, CIP programs receive annual funding to support projects that are similar in nature and are bundled into a continuous CIP program. The 2021–2027 CIP includes a program for addressing deficiencies, be it capacity or condition, in the stormwater conveyance pipelines. It is anticipated that CIP programs will continue well into the future.

The 2021–2027 CIP is divided into water quality improvement projects (including flow control projects), fish passage improvement projects, and infrastructure renewal projects. CIP project exhibits are included in Appendix D. The exhibits include project descriptions, cost, location maps, and an overall summary of each CIP project.

The following sections describe the CIP projects and programs and the methods used to prioritize them.

8.1 Water Quality Improvement Projects

The following water quality facilities are proposed:

- Two filtration vaults along Squalicum Way in Lower Squalicum Creek
- One bioretention facility along Bill McDonald Parkway in Lower Padden Creek
- A regional water quality treatment facility in the Lower Baker Creek Tributary that detains and treats stormwater runoff from a drainage basin with industrial facilities
- A series of bioretention facilities proposed in the Birchwood neighborhood in Little Squalicum Creek

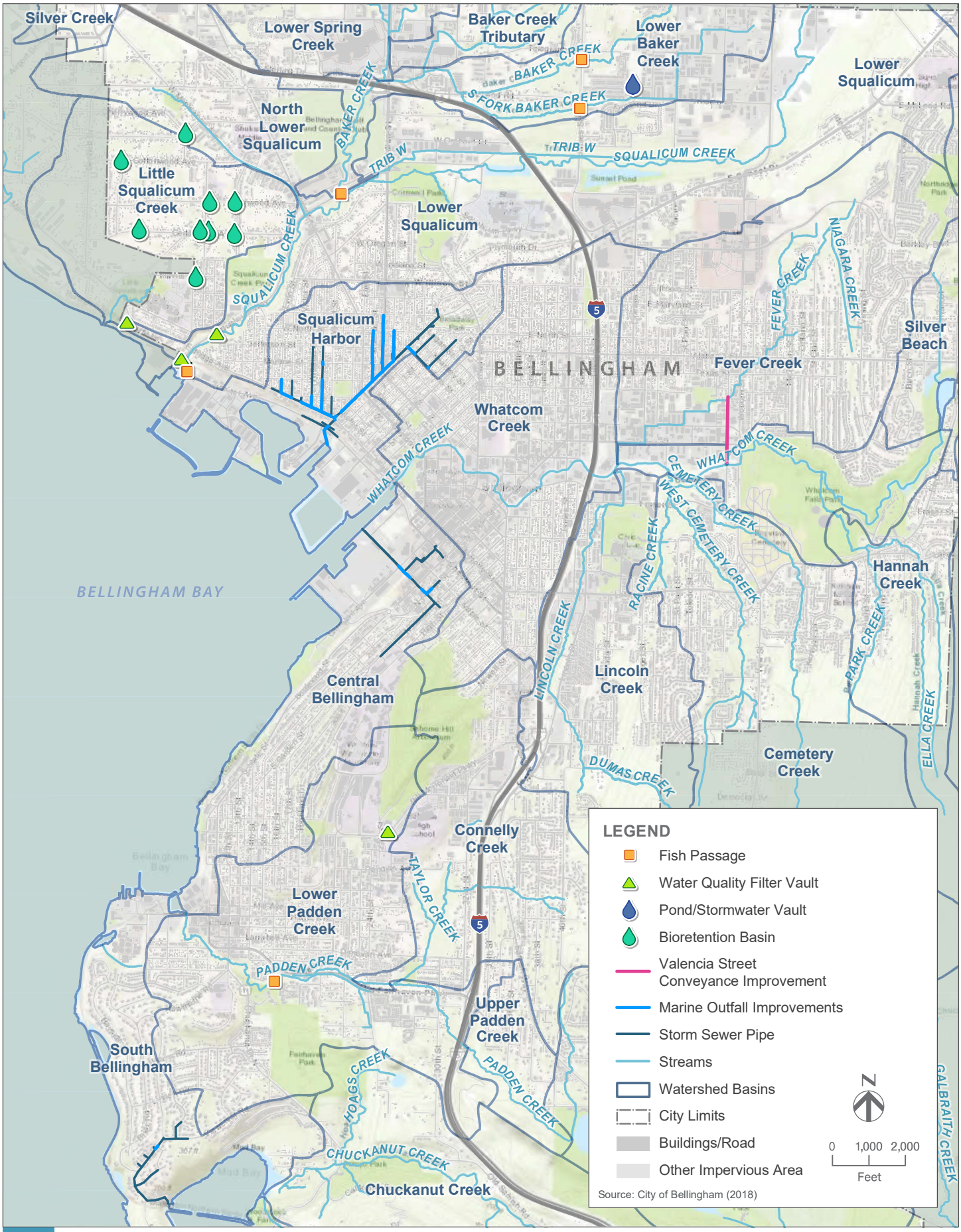
The City is also implementing water quality improvements in the Lake Whatcom drainage area, funded through the 30 percent of the Lake Whatcom Reservoir Property Acquisition Program revenue that is allowed to be used for stormwater projects within the Lake Whatcom

watershed. This report does not include those projects, but they are considered a vital part of the City's overall strategy for stormwater management.

This SSWCP does not contain a Lake Whatcom water quality section because Lake Whatcom has its own set of regulations (TMDLs) that are tied to the City's and Whatcom County's Phase II Permits. The Phase II Permit is renewed every 5 years on a cycle that does not align with the 6-year capital improvement program presented in the Lake Whatcom plan. Additionally, Lake Whatcom represents its own body of work and study and is documented in other materials. Lake Whatcom is managed through the Lake Whatcom Cooperative Management Program, which was established by an Interlocal Agreement in 1998 between the City of Bellingham, Whatcom County, and the Lake Whatcom Water and Sewer District (formerly Water District 10). The goal of the program is to jointly manage and implement programs affecting the Lake Whatcom watershed and to coordinate programs and projects that restore, protect, and preserve Lake Whatcom and its surrounding watershed. An important outcome from the work of the Lake Whatcom Cooperative Management Program is the Lake Whatcom Work Plan. The Lake Whatcom Work Plan, which outlines planned work in the 5-year horizon including stormwater projects, was developed jointly by Whatcom County, the Lake Whatcom Water and Sewer District, and the City of Bellingham. The Lake Whatcom 2020–2024 Work Plan has been approved by each of the three respective jurisdictions. The Lake Whatcom Water and Sewer District approved the plan at its June 10, 2020, Board of Commissioners meeting. The Whatcom County Council approved the plan at its July 7, 2020, council meeting. The Bellingham City Council approved the plan at its July 20, 2020, council meeting.

The adoption and use of the SSWCP is not intended to replace or supersede the comprehensive planning, timeline, and management decisions of the Lake Whatcom Cooperative Management Program, the Lake Whatcom Work Plan, or the approvals of the respective jurisdictions.

A summary of the proposed water quality facilities is shown in Table 8-1. Project costs reported are assumed to include design, permitting, and construction allowances.



BELLINGHAM CIP LOCATIONS

FIGURE 8-1

City of Bellingham
Surface and Stormwater Comprehensive Plan

UPDATED 8/20/2020

Table 8-1. Proposed water quality CIP projects

Project ID	Facility type	Description	Cost (2020 dollars)
D-01	Media-filtration treatment vault	Proprietary facility installed in Squalicum Way connected to asset V0076-CB09. Discharges treated runoff via creek outfall. Treats 1,000 lf of roadway.	$288,000
D-02	Media-filtration treatment vault	Proprietary facility installed in Squalicum Way near intersection of Roeder Ave. Flow splitter catch basin installed in existing drainage line, routes water quality design flow to proprietary facility. Treated water is returned to existing drainage system (asset V0076-CB13). Treats 800 lf of roadway.	$249,000
D-03	Bioretention facility	A bioretention facility located in planter strip receives runoff from Bill McDonald Pkwy., treats and infiltrates runoff. An overflow structure designed to capture excess runoff not able to infiltrate, is connected to the existing drainage line (asset 7306NW-59).	$97,000
D-04	Regional treatment facility	End-of-pipe, regional facility in Baker Creek tributary sub-basin will include detention pond, oil/water separator, and bioretention filtration to treat stormwater runoff. Requires property acquisition.	$3,700,000
D-05	Bioretention	ROW facility installed near intersection of W Illinois St. and Nome St.	$290,000
D-06	Bioretention	ROW facility installed near intersection of Cedarwood Ave. and Pinewood Ave.	$144,000
D-07	Bioretention	Vertical walls required because of limited space. Located at Cedarwood Ave. and Firwood Ave.	$48,000
D-08	Bioretention	Birchwood Ave. and Firwood Ave.	$108,000
D-09	Bioretention	Cherrywood, north of Cottonwood Ave.	$111,000
D-10	Bioretention	3200 block of Laurelwood Ave.	$340,000
D-11	Bioretention	3100 block of Cedarwood Ave.	$288,000

The following sections describe the water quality treatment facilities in more detail.

8.1.1 Filtration Vaults

Two filtration vaults are proposed along Squalicum Way. The filtration vaults are multistage media filtration systems (e.g., Modular Wetlands or Filterra units) to be installed in existing below-grade drainage systems. With a relatively small footprint, filtration vaults work well in existing roadway drainage systems collecting and treating roadway runoff prior to discharge into receiving waters.

Project D-01 treats about 1,000 lf of Squalicum Way collecting stormwater runoff from the driveway entrance to Squalicum Creek Park southwest to the storm drainage outfall to Squalicum Creek (the nearest drainage asset is V0076-CB09). The proposed design intercepts the water quality design flow from the existing conveyance line, routes it through the filter media for treatment, and then discharges the treated flow via a new connection from the filtration vault to the existing outfall pipe to the creek. Only the water quality design flows would be discharged at this outfall. Flows in excess of the water quality design flow would bypass the filtration vault and flow in the existing conveyance line to the next downstream outfall located near Roeder Avenue (see Exhibit D-01).

CIP D-02 treats stormwater runoff originating on Squalicum Way from a point immediately downstream of the D-01 treatment vault to the proposed vault location at the intersection of Squalicum Way and Roeder Avenue. Similar to CIP D-01, the treatment vault splits the water quality design flow off the main line, and routes it through the treatment facility where runoff is filtered and then discharged to the creek (see Exhibit D-02).

8.1.2 Baker Creek Regional Facility

The Baker Creek regional facility is an end-of-pipe water quality treatment and flow control facility collecting and treating stormwater from a 160-acre sub-basin. Stormwater runoff is treated by a series of water quality BMPs that reduce the load of pollutants of concern typical of an industrial drainage basin. The treatment-train design is premised on purchasing undeveloped land adjacent to and north of City-owned property where a detention pond would be sited. The proposed detention pond also serves as a pre-settling facility to remove large sediment particles and lower TSS prior to runoff being routed to and treated by the water quality BMPs. The water quality facility comprises two components: an oil/water separator that removes hydrocarbons and oil residue from the runoff followed by an open-air filtration unit that uses a bioretention soil mix and plants to remove metals from the runoff. From there, the treated stormwater is discharged to Baker Creek.

This regional facility provides water quality treatment and flow control to an area where no stormwater treatment facilities exist, and where a group of properties did not meet the threshold for flow control. The facility will capture runoff from an industrial sub-basin and provide downstream benefits by reducing flood risk, improving water quality in Baker Creek and thereby improved aquatic habitat (see Exhibit D-04).

8.1.3 Bioretention Facilities

Several bioretention facilities are proposed for the Birchwood neighborhood in north Bellingham. This residential neighborhood is situated on moderately well-draining loamy soils (172: Urban land-Whatcom-Labounty complex and 82: Kickerville-Urban land complex, see Appendix E (E.1 Birchwood NRCS soils map) and was built prior to stormwater regulations requiring water quality treatment. It is part of the Little Squalicum Creek sub-watershed.

City staff identified the area as a potential for siting bioretention facilities and provided HDR with 10 proposed locations. Each location was screened for viability using desktop techniques that identified conflicts, such as mature trees, driveways, and parking, that render some sites less effective. Seven facilities are proposed in the CIP (D-05 through D-11). Three sites were not

included. See Exhibit D-05 for a typical detail for the bioretention facilities in the Birchwood area.

Unit-price cost estimates per square footage for walled and side-sloped bioretention facilities were developed based on seven potential sites identified throughout the city. The determination of site receiving a walled or side-sloped facility was a function of available width given the nearby constraints. The seven sites were representative of types of sites where bioretention facilities could be built. The cost estimates assume connections to existing storm drainage infrastructure and avoid relocating conflicting utilities. Further, the estimates presume that property acquisition is not required. This metric was then applied to facilities shown in Figure 8-2.

CIP D-03 is a proposed bioretention facility located in the Padden Creek sub-watershed. It treats about 1,000 lf of Bill McDonald Parkway east of 25th Street with a bioretention facility. The proposed online bioretention facility replaces about 125 lf of existing storm drain pipe that will capture and infiltrate runoff. The native soils are mapped by the Natural Resources Conservation Service (NRCS) as Squalicum-Urban land complex described as moderately well-draining gravelly-loamy soils, see Appendix E (E.2 Bill McDonald site NRCS soils map). The online facility infiltrates stormwater runoff to the maximum extent allowed by the native soils. When native soils reach saturation and the facility reaches maximum depth, an overflow structure provides a hydraulic connection to the existing downstream drainage network to provide drainage relief for when the facility is at capacity.

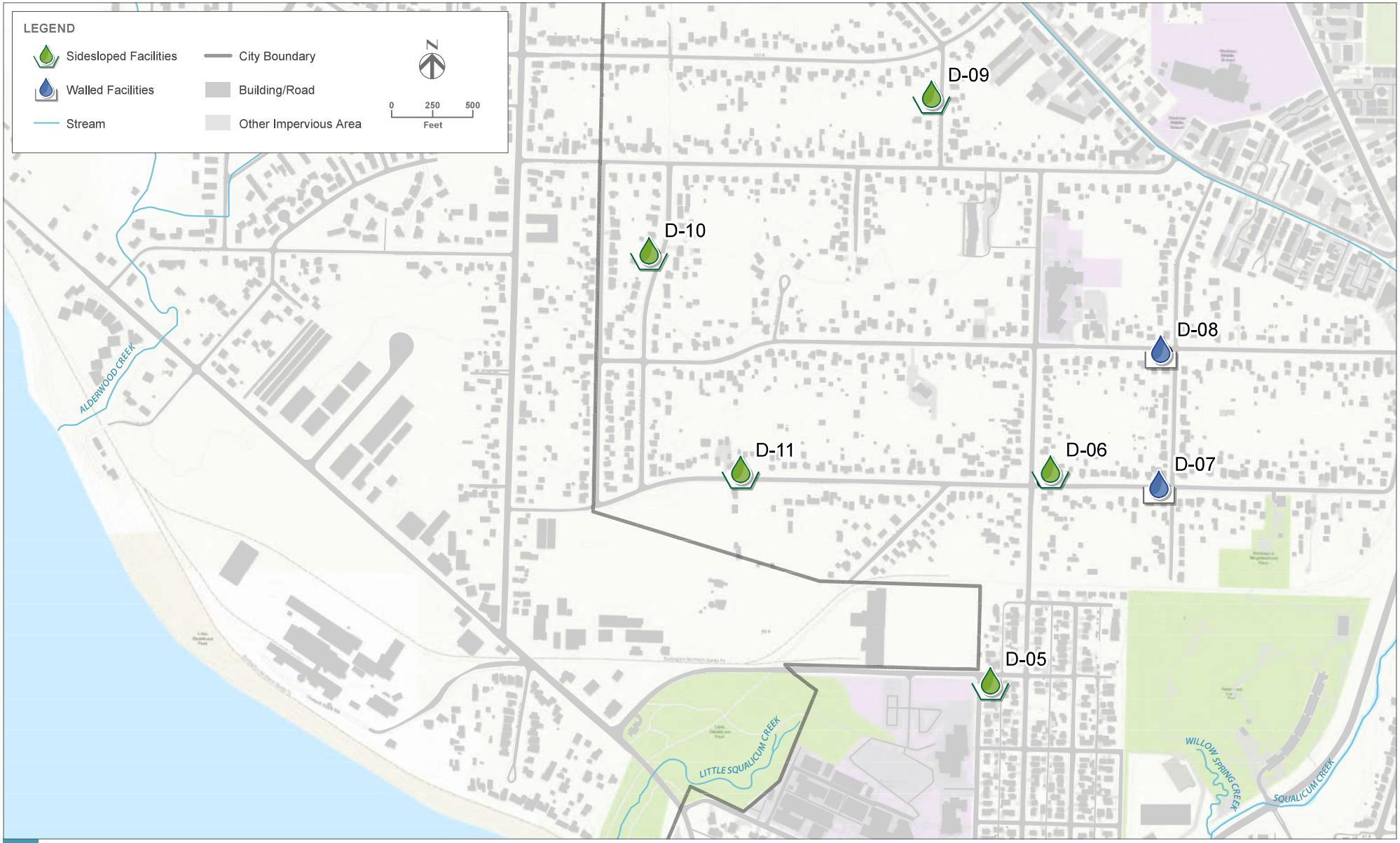
This project provides overall runoff volume reduction to the sub-watershed (see Exhibit D-03).

8.2 Infrastructure Renewal and Replacement

As documented in Chapter 2, the City has more than 280 miles of storm drain pipe to maintain. The City's infrastructure renewal and replacement program targets conveyance pipes in need of replacement because they are either undersized or in poor condition. In the 2020 SSWCP update, the following three sources were used to identify pipe segments to be included in the CIP:

- The 2007 Stormwater Comprehensive Plan update where several capacity-constrained pipe segments were identified by the modeling effort from that plan
- The City's PURC list of pipes identified as conveyance pipes in "poor" condition (the PURC-identified pipes are the product of the City's ongoing, video-based condition assessment program)
- The 2020 marine mainline conveyance hydraulic analysis

Capacity-deficient pipe segments identified in the marine line hydraulic analysis for the Broadway and C Street basins are also coincidentally listed on the PURC list.



UPDATED 8/20/2020

BIRCHWOOD NEIGHBORHOOD RETENTION SITES

FIGURE 8-2

City of Bellingham

Surface and Stormwater Comprehensive Plan

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The following sections list proposed CIP projects that will replace storm drainage conveyance pipe segments identified in the 2007 Stormwater Comprehensive Plan, the PURC program, and the marine conveyance modeling.

8.2.1 2007 Conveyance Upgrade Pipes

The 2007 Stormwater Comprehensive Plan analyzed conveyance system pipes in the Whatcom, Fever, Cemetery, Hannah, and Lincoln creek basins to identify pipe segments that were capacity constrained. The 2020 CIP proposes an ongoing CIP program (D-27) that will have funds necessary to address the recommendations of the 2007 Stormwater Comprehensive Plan to make improvements to the identified pipes. Table 8-2 shows the pipe segments recommended for renewal and/or replacement, their 2007 cost estimates, and 2020 escalated cost estimates. Details of the cost escalation calculations are included in Appendix F.

Table 8-2. CIP D-27: Program to improve capacity in pipes identified in the 2007 Stormwater Comprehensive Plan

Sub-basin	Improvement project group	Pipe upgrade quantity (lf)	2007 cost opinion [a] (× 1,000)	Construction index [b] %	2019/2020 cost of opinion (× 1,000)
Whatcom	Ellis St. #1	2,250	$1,858	150	$2,787
	Ellis St. #2	2,050	$1,176	150	$1,764
	King/Virginia/Lincoln	3,400	$2,032	150	$3,048
	Meador Ave.	200	$129	150	$194
	State St.	900	$398	150	$597
	Miscellaneous Whatcom outfalls	250	$176	150	$264
Fever	Kentucky St.	1,050	$1,373	150	$2,060
	Orleans/Nevada	1,600	$925	150	$1,388
	Valencia/North/ Verona	3,500	$3,330	150	$4,995
	Miscellaneous improvements	700	$480	150	$720
Cemetery	Insufficient data in 2007 for the analysis				
Hannah		800	$486	150	$729
		200	$185	150	$278
Lincoln		1,050	$813	150	$1,220

a. Cost from 2007 Stormwater Comprehensive Plan (City 2007), p. 92. https://www.cob.org/documents/pw/storm/2007-stormwater-comp-plan.pdf

b. Mortenson construction inflation index, average annual rate of change: 3.14%.

8.2.2 PURC Program

The PURC list of conveyance pipe upgrades is described below. These proposed CIP projects list pipe segments identified as being in poor condition. The PURC infrastructure improvement projects are listed in Table 8-3.

Table 8-3. PURC list of conveyance projects

Project ID	Description	2019/2020 cost estimate
D-24 North Garden Way E. Pine St. to E Oak St.	Replace 500 lf of 12" pipe with 12" pipe	$300,000
D-25 Billy Frank Jr. E. Holly St. to Ellis St.	Replace and enlarge 400 lf of 10" concrete pipe with 12" concrete pipe	$200,000
D 26 Valencia St. Outfall to Whatcom Creek to Fever Creek crossing	Cure in-place 1,600 lf of CMP pipe	$1,028,000

lf = linear feet.
CMP = corrugated metal pipe.

North Garden Street

The North Garden Street conveyance improvement project (D-24) replaces approximately 400 lf of 10-inch-diameter concrete pipe with 12-inch-diameter concrete pipe. The proposed CIP project assumes that existing manhole structures on either end will remain intact. Traffic control, underground utility coordination, and business outreach will be required. See Exhibit D-24 in Appendix D for project details.

Billy Frank Jr. Street

The Billy Frank Jr. Street conveyance improvement project (D-25) replaces approximate 400 lf of 10-inch-diameter concrete pipe with 12-inch-diameter concrete pipe. The proposed CIP project assumes that existing manhole structures on either end will remain intact. Traffic control and utility coordination will be required. Public outreach to nearby business is also advised. See Exhibit D-25 in Appendix D for project details.

Valencia Street

The Valencia Street conveyance improvement project (D-26) replaces approximately 1,600 lf of 42- to 54-inch-diameter CMP between the Whatcom Creek outfall north to where Fever Creek intersects with Valencia Street. The condition assessment program identified sections that have rusted out and there is concern of pipe failure.

The conveyance line doubles as a high-flow bypass pipe conveying high flows from Fever Creek directly to Whatcom Creek. In a 2013 Joint Aquatic Resources Permit Application (JARPA), project implementation plans call for fish exclusion and water quality testing prior to and during construction see Appendix E (E.3 Valencia Street JARPA). In negotiations with WDFW, the City has agreed to provide wetland mitigation in the upper Fever Creek sub-watershed.

The proposed CIP looked at the following two options for replacing five pipe segments and five manholes:

1. **Lining:** Improvements include installation of cured-in-place pipe lining, testing, and preservation of existing manholes.
2. **Replacement:** Improvements include replacement of five segments of pipes and five associated manholes.

Option 1 is proposed for the CIP project because it is more cost-effective and less disruptive to surrounding businesses. See Exhibit D-26 in Appendix D for project details. The City is currently proceeding into preliminary design on this project.

8.2.3 Marine Conveyance

The marine outfall capacity analysis resulted in the identification of capacity-constrained pipe segments in seven of the nine basins analyzed. Consideration was given to the age of the infrastructure as well as pipe material in understanding system performance risk. The Bennett Street and Cedar Street outfall lines were determined to have sufficient capacity; consequently, no CIP projects were identified in those two basins. For the remaining basins, each has capacity-constrained pipes when analyzed for future-conditions flows. Proposed pipe materials and size vary by circumstance. If flooding can be resolved by using a pipe with the same diameter, but with material that has a lower friction factor (e.g., smooth-bore PVC pipe as opposed to concrete pipe), then that arrangement was given priority. If the proposed improvement was for pipe diameters greater than 18 inches, the proposed improvement uses a pipe with a smooth roughness for sizing such as reinforced concrete pipe (RCP). If the proposed improvement has shallow cover, then DIP is proposed. CIP projects for the respective basins are proposed and are summarized in Table 8-4. As these projects advance into preliminary design, the scope of the improvements should be refined to take into account constraints with the proposed system routes (both horizontally and vertically), as surface and subsurface features (e.g., other utilities) may alter the stated improvement. Consideration at that time should consider the merits of sliplining or pipe-bursting over traditional cut-and-cover projects. For the purposes of budgeting, the more conservative approach was shown.

Table 8-4. Marine outfall conveyance projects

CIP ID	Outfall name	Project location	Project description (to eliminate flooding)	Pipe upgrade quantity (lf)	2019/2020 cost [a]
D-17	Arbutus	Fieldston Rd.	Replace 12" CMP with 12" PVC	114	$66,000
D-18	Willow	Bayside Rd.	Replace 18" CMP with 18" PVC	1,024	$565,000
D-20	Laurel	Laurel St. (State St. to Cornwall Ave.)	Increase 30" RCP to 36" RCP	290	$720,000
		Laurel St. (Forest St. to State St.)	Increase 12" RCP to 18" RCP	139	

CIP ID	Outfall name	Project location	Project description (to eliminate flooding)	Pipe upgrade quantity (lf)	2019/2020 cost [a]
		Forest St. (Maple St. to Laurel St.)	Increase 12" PVC to 15" PVC	218	
		East Maple St. to Laurel trunkline	Replace 15" CMP with 15" RCP	515	
D-21	C St.	Astor St. (C St. to D St.)	Increase 15" RCP to 18" RCP and DIP	239	$700,000
		Astor St. (D St. to E St.)	Increase 15" RCP to 18" DIP	253	
		Astor St. (E St. to F St.)	Increase 12" RCP to 15" RCP	261	
		Astor St. (F St. to G St.)	Increase 12" RCP to 15" RCP	222	
		Roeder Avenue N (C St. to D St.)	Increase 18" RCP to 24" RCP	199	
		Roeder Avenue (N) (F St. to G St.)	Increase 12" and 15" RCP to 18" RCP or DIP	247	
D-22	Ellsworth	Girard St. (C St. to D St.)	Increase 15" RCP to 24" RCP	194	$790,000
		Girard St. (F St. to G St.)	Increase 15" RCP to 18" RCP	258	
		Ellsworth St. (D St. to F St.)	Increase 15" RCP to 18" RCP	479	
		Ellsworth St. (F St. to G St.)	Increase pipe size from 12" and 18" RCP to 15" and 24" RCP	578	
D-23	Broadway (Main branch)	Kulshan St. (Broadway to W North Ave.)	Increase 12" and 15" RCP to 24" RCP	1,400	$4.7M
		Peabody St. (Broadway to W North Ave.)	Increase 12" and 15" RCP to 24" RCP	648	
		Meridian St. (Broadway to W Connecticut St.)	Arterial street; increase 12" RCP to 24" and 30" RCP and DIP	1,300	
		Broadway St. (Roeder Ave. to Peabody St.)	Arterial street; increase 30" and 36" RCP to 48" RCP and DIP	2,000	
		Bellwether Way	Increase 36" RCP to 48" RCP	500	

CIP ID	Outfall name	Project location	Project description (to eliminate flooding)	Pipe upgrade quantity (lf)	2019/2020 cost [a]
D-19	Broadway (Eldridge branch)	Williams St. (Jefferson St. to Madison St.)	Increase 12" VIT to 18" RCP	300	$1.9M
		Utter St. (Jefferson St. to Eldridge Ave.)	Increase 8" and 12" RCP to 18" RCP	960	
		Eldridge Ave. (Walnut St. to Victor St.)	Increase 24" RCP to 36" RCP	900	
		Eldridge Ave. (Victor St. to Jaeger St.)	Increase 12" and 18" RCP to 24" RCP	860	
		Eldridge Ave. (Walnut St. to Broadway)	Increase 36" RCP to 42" RCP	60	

a. Detailed cost estimates provided in Appendix F.1.
RCP = reinforced concrete pipe.
CMP = corrugated metal pipe.
PVC = polyvinyl chloride.
DIP = ductile iron pipe.
VIT = vitrified clay pipe.

As is evident in Table 8-4, several alignments in the downtown basins (Broadway-Main, Broadway-Eldridge, C Street, Ellsworth, and Laurel) could on their own be separated into individual CIP projects. For example, in the Broadway-Main basin, the magnitude of the proposed project to replace the main conveyance line from the outfall to Peabody Street (a distance of more than 2,000 lf) is a major undertaking considering the disruptions to traffic, businesses, the size of the proposed pipe, utility conflicts, and other inherent constraints of a capacity improvement project in an urban corridor. If the City chooses to break out the respective alignment improvements into smaller CIP projects for design and bid purposes, the cost estimates prepared for the respective marine outfall alignment, see Appendix F (F.2) improvements can be easily proportioned into the respective sub-projects. Alternatively, cost estimates for the smaller sub-projects could be assessed on a dollars per linear foot ($/lf) unit cost. For purposes of providing CIP costs for the rate study, the aggregate costs were used.

8.3 Fish Passage Projects

The City provided HDR a ranked list of culverts to be included in the 2020 CIP (see Appendix F.3). The list is the product of the 2019 City of Bellingham Fish Barrier Prioritization Update (City 2019). Details for how each culvert was assessed are included in this update. HDR did not reevaluate the culvert rankings for the purposes of preparing the 2020 CIP.

From the list, the top five prioritized culverts are included in the 2020 CIP with associated cost estimates based on City 2019 estimated values. These estimates are for planning purposes only

and are not based on an engineer's cost estimate. The locations of the top five culverts are shown in Figure 8-1 above. Project exhibits are included in Appendix D. Table 8-5 lists the top five culverts, their locations, and cost.

Table 8-5. Fish passage culvert projects

CIP ID	Project Title	WDFW Site ID	2019 Cost Estimate
D-12	Squalicum Creek/Baker Creek Confluence	602273	$200,000
D-13	SF Baker Creek/James St.	993881	$1,000,000
D-14	Baker Creek/ James St.	993006	$1.000.000
D-15	Padden Creek/Old Fairhaven Pkwy.16th Street ROW	01.0622 0.80	$1,000,000
D-16	Squalicum Creek/ Roeder Ave.	991104	$4,000,000

8.3.1 Baker Creek at Squalicum Creek Confluence (D-12)

The fish passage barrier at this location is not the actual culvert; it is the bed-control weir downstream of the culvert that creates the blockage. In the Prioritization Report, the culvert on Baker Creek (culvert B1) is not identified as a barrier (City 2010). The existing site consists of a concrete 29-by-2-foot bed control weir with an embedded timber flashboard riser. To increase fish passage the weir will likely need to be removed and replaced with a roughened channel (WDFW 2020) by placement of large rock and woody debris. This will help to overcome the jump height barrier and maintain hydraulic backwater conditions downstream of the proposed culvert. The proposed improvement will must meet compliance with WDFW standards for slope ratio, floodplain utilization, and bankfull width.

8.3.2 South Fork Baker Creek at James Street (D-13)

The existing site features an 8-inch-diameter concrete culvert. WDFW has indicated that the culvert is undersized. The culvert is identified as South Fork Baker 2 in the Prioritization Report (City 2010). The barrier is identified as a velocity barrier. The proposed improvement will must meet compliance with WDFW standards for slope ratio, floodplain utilization, and bankfull width. Combining this project with D-14 could produce economy-of-scale savings because the projects are both located on James Street. The culverts are about 1,200 feet apart.

8.3.3 Baker Creek at James Street (D-14)

The existing site features an unconfirmed 18-inch-diameter (or possibly a 24-inch-diameter) concrete culvert and is identified as Baker 7 in the Prioritization Report (City 2010). WDFW has indicated a large scour pool at the downstream end of the culvert and note that the culvert may proposes a velocity barrier for fish passage. Proposed improvements will must meet compliance with WDFW standards for slope ratio, floodplain utilization, and bankfull width.

8.3.4 Padden Creek at Old Fairhaven Parkway (D-15)

The existing site features a four-step concrete pool and fishway chute with rock control steps, creating a steep gradient between the mouth of the culvert and the stream channel. The unconfirmed pipe sizes are an 18-inch-diameter concrete culvert with two high flow, 9-inch-diamater concrete culverts on either side of the main culvert. The culvert is identified as Padden 7 in the Prioritization Report (City 2010) and the above-crossing is the former Old Fairhaven Parkway road converted to a gravel path. WDFW has indicated that the culvert proposes a velocity barrier for fish passage. The proposed improvement will meet compliance with WDFW standards for slope ratio, floodplain utilization, and bankfull width.

8.3.5 Squalicum Creek at Roeder Avenue (D-16)

The Squalicum Creek crossing at Roeder Avenue is not identified as a fish passage barrier in the Prioritization Report (City 2010); however, it is included in the City's top-five list because of coordination opportunities with a larger habitat/estuary restoration project at that location.

8.4 CIP Prioritization

The 2020 CIP is arranged into six planning-level prioritization categories in collaboration with City staff, reflecting the City's policies, standards, and service level goals. Each CIP project and/or program was arranged by the prioritization criteria shown in Table 8-6. In summary, most of the proposed CIP projects meet at least three of the prioritization criteria. Exceptions are noted for the PURC conveyance improvement projects and the CIP program (D-27) that will address conveyance issues identified in the 2007 Stormwater Comprehensive Plan. Conveyance improvements projects and/or programs are credited for improving drainage and neighborhoods aesthetics plus asset renewal. Weighting of the six categories was deemed not necessary for the purpose of this planning-level prioritization.

The water quality treatment projects meet objectives to treat stormwater runoff and thereby improve aquatic resources in receiving waters. Additionally, given that the bioretention facilities are located in neighborhoods, they have potential to enhance neighborhood aesthetics, but would not necessarily stimulate economic development.

The fish passage improvement projects meet regulatory requirements to remove barriers to fish passage while also improving access to habitat. Many of the culvert replacement projects also qualify for renewing assets to manage risk.

Many of the infrastructure renewal projects address three or more prioritization criteria. The marine conveyance line improvements meet the standard for improving compliance because the projects bring the City's conveyance lines up to the City's engineering design standard. When these lines are enlarged, it is likely to stimulate redevelopment in the business areas because the enlarged conveyance lines will meet Ecology's standards to exempt property owners from providing flow control because the conveyance lines directly discharge to the flow control exempt water body of Bellingham Bay. This exemption would reduce the cost for redeveloping properties. Redevelopment sites would not need to provide flow control because of downstream pipe capacity limitations, but they would have to treat runoff, which over time provides an improvement to water quality in Bellingham Bay.

Table 8-6. CIP prioritization criteria

CIP	Maintain or improve compliance	Stimulate economic development	Improve water quality	Neighborhood investment	Protect or improve aquatic resources	Renew assets to manage risk
Water quality projects (filtration vaults, bioretention, Baker Creek regional)						
D-01 Squalicum Way Filtration Vault			✓		✓	✓
D-02 Roeder Ave. Filtration Vault			✓		✓	✓
D-03 Bill McDonald Pkwy. Bioretention			✓	✓	✓	
D-04 Baker Creek WQ Facility			✓	✓	✓	
D-05 Birchwood 1			✓	✓	✓	
D-06 Birchwood 2			✓	✓	✓	
D-07 Birchwood 3			✓	✓	✓	
D-08 Birchwood 5			✓	✓	✓	
D-09 Birchwood 8			✓	✓	✓	
D-10 Birchwood 9			✓	✓	✓	
D-11 Birchwood 10			✓	✓	✓	
Fish passage improvement projects						
D-12 Squalicum Creek Baker Creek	✓				✓	✓
D-13 SF Baker Creek at James St.	✓				✓	✓
D-14 Baker Creek at James St.	✓				✓	✓

CIP	Maintain or improve compliance	Stimulate economic development	Improve water quality	Neighborhood investment	Protect or improve aquatic resources	Renew assets to manage risk
D-15 Padden Creek at 16th St.	✓				✓	✓
D-16 Squalicum Creek at Roeder Ave.		✓				
Marine outfall conveyance projects						
D-17 Arbutus Alt. 2	✓	✓	✓			✓
D-18 Willow Alt. 2	✓	✓	✓			✓
D-19 Olive	✓	✓	✓			✓
D-20 Laurel Alt. 1	✓	✓	✓			✓
D-21 C St.	✓	✓	✓			✓
D-22 Ellsworth	✓	✓	✓			✓
D-23 Broadway	✓	✓	✓	✓		✓
PURC projects						
D-24 N Graham Way				✓		✓
D-25 Billy Frank Jr.				✓		✓
D-26 Valencia St.				✓		✓
2007 conveyance improvement program						
D-27 Various Locations				✓		✓

8.4.1 Marine Outfall Conveyance Prioritization

In Chapter 7, Stormwater System Analysis, the analysis of nine separate shoreline outfall pipes, draining directly to Bellingham Bay, is described (please note that the Broadway outfall pipe has two separate conveyance lines analyzed as separate basins). Except for two outfall conveyance lines, hydraulic modeling identified pipe segments in the other outfall conveyances that need upgrades to meet the City's future land use conditions, 25-year flow rate conveyance standard. The Cedar Street and Bennett Street outfalls do not show flooding and were dropped from consideration in the 2020 CIP. Of the remaining outfall conveyance lines analyzed, where

flooding was predicted, a prioritization analysis also described in Chapter 7 resulted in the following basin priorities listed from highest priority to lowest:

1. Laurel outfall basin
2. Broadway outfall, the main pipeline branch in Broadway
3. Broadway outfall, the Eldridge Avenue pipeline branch
4. C Street outfall basin
5. Arbutus outfall
6. Ellis Street outfall basin
7. Olive Street outfall basin
8. Willow Street outfall basin

The priorities factor into the four CIP cost scenarios described in Section 8.5.

8.5 CIP Funding Scenarios

The 2020 CIP projects list was divided into four cost scenarios for use in the utility rate study analysis. The rate study evaluation (Chapter 10) analyzes rates using CIP cost categories of high cost, medium cost, and low cost to determine the respective rate increases needed to implement the three CIP scenarios within the 6-year planning horizon. A fourth category, No Rate Increase, determined how much of the proposed CIP could be implemented without increasing utility rates. The strategy in creating the different funding scenarios was built on maintaining a diverse set of project types and treatment strategies recognizing that focusing on one treatment or improvement method would lower the overall program benefit in achieving system-wide and community-wide water quality/quantity and habitat enhancement. The strategy also looks to address those projects in most need/highest benefit, regardless of location. Finally, this strategy preserves the momentum achieved in all of the City's areas of focus from renewal, to replacement, to flow control, to water quality, to habitat enhancement/protection.

The high cost scenario CIP funds all listed projects. The medium and low cost scenarios fund projects from each CIP category (Water Quality Improvement, Fish Passage, and Infrastructure Renewal) to varying degrees. Because the City Council is committed to giving fish passage improvement projects preference, the medium- and low-cost scenarios each have a majority of those projects included. The following sections list the various CIP projects and programs by cost scenario.

All scenarios include $1 million in funding from the City's property acquisition fund to go toward improvements in the Lake Whatcom area.

8.5.1 Large-CIP Funding Scenario

The Large-CIP funding scenario funds all listed projects and assumes the Engineering Group responsible for implementing the CIP with additional FTE positions (see Chapter 9, Recommended Stormwater Management Program and Implementation for details) needed to

implement 27 CIP projects/programs. The sum total of all the CIP projects is $45.3 million (2019 dollars).

8.5.2 Medium-CIP Funding Scenario

The Medium-CIP funding scenario is based on projects that meet at least three prioritization category standards and represent the highest-performing projects in certain categories. Therefore, the funding level is equivalent to all filtration vaults, the Baker Creek water quality facility, the top four prioritized bioretention facilities (representing 50 percent of the total bioretention basins), the top three (out of five) fish passage improvement projects, the top three (out of eight) marine conveyance basins, an annual fund of $1 million (or $6 million total) for making upgrades to conveyance pipes identified in the 2007 Stormwater Comprehensive Plan, and all of the PURC projects. This scenario also assumes new FTEs (see Chapter 9, Recommended Stormwater Management Program and Implementation, for details). The sum total of the medium-CIP scenario projects is $23.5 million (2019 dollars).

8.5.3 Small-CIP Funding Scenario

The Small-CIP funding scenario includes all of the filtration vaults, the top four prioritized bioretention facilities, the top two fish passage projects, the top two marine outfall basin priorities (Laurel and Broadway Main), an annual fund of $1 million (or $6 million total) for making upgrades to conveyance pipes identified in the 2007 Stormwater Comprehensive Plan, and all of the PURC projects. No new FTEs are assumed. The sum total of the Small-CIP scenario projects is $13.5 million (2019 dollars).

8.5.4 Baseline Scenario

If utility rates are held steady at 2019 levels, annual increases are based on the Seattle-Tacoma consumer price index, and system development charges (SDCs) are adjusted (increased) as part of this analysis, then about $6 million will be available to implement the CIP provided. In this cost scenario, funding would be available for the equivalent of these following projects: the filtration vaults, the top three bioretention facilities, the top two fish passage projects, the highest-priority marine outfall system (Laurel Street outfall system), an annual fund of $250,000 (or $1.5 million total) for making upgrades to conveyance pipes identified in the 2007 Stormwater Comprehensive Plan, and all of the PURC projects.

Each cost scenario includes the top-tier projects from the CIP categories (Water Quality, Fish Passage, and Infrastructure Renewal).

Table 8-7 presents a summary of CIP costs for each scenario. A detailed representation of how these funding levels were developed can be found in Appendix D.

Table 8-7. CIP scenarios and associated costs

	Large CIP	Medium CIP	Small CIP	No Rate Increase CIP
Water quality improvement projects				
Filtration vaults	$537,000	$537,000	$537,000	$537,000
Baker Creek	$3,700,000	$3,700,000		
Bioretention	$1,500,000	$762,000	$762,000	$762,000
	$5,737,000	$4,999,000	$1,299,000	$1,299,000
Fish passage projects				
Top 5 projects	$7,200,000			
Top 3 projects		$2,200,000		
Top 2 projects			$1,200,000	
Top 2 projects				$2,010,000
Conveyance improvements projects				
Marine outfall lines	$9,470,500	$7,320,000	$5,450,000	$720,000
2007 lines	$20,041,500	$6,000,000	$6,000,000	$1,500,000
PURC lines	$1,528,000	$1,528,000	$1,528,000	$1,528,000
	$31,040,000	$14,848,000	$12,978,000	$2,748,000
Grand total	**$43,977,000**	**$22,047,000**	**$15,477,000**	**$6,034,500**

8.6 Opinions of CIP Cost

As described above some CIP cost estimates were derived by others and by the HDR team and are documented in their respective reports. They represent estimates for design, permitting, and construction. Specifically, the costs for improving the conveyance lines are documented in the 2007 Stormwater Comprehensive Plan and costs for the fish passage culverts are documented in the Prioritization Report (City 2019). The 2020 CIP cost estimates for the regional water quality facility, the bioretention facilities, and the PURC and marine outfall conveyance pipe improvements were derived by HDR as part of the 2020 SSWCP update.

The cost estimates derived by HDR are opinions of cost considered to be "Class IV" estimates. The Association for the Advancement of Cost Engineering (AACE) and the American National Standards Institute (ANSI) both define the expected accuracy of a Class IV estimate to be plus or minus 30 percent. It must be clearly understood that this is a planning-level estimate and has been prepared only for guidance in project evaluation purposes from information presented to the estimator at the time of the estimate.

The opinions of cost (estimates) shown, and any resulting conclusions on project financial or economic feasibility or funding requirements, have been prepared for guidance in project evaluation and implementation based on the information available at the time that the opinion

was prepared. The final costs of the projects and resulting feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, final project scope, implementation schedule, continuity of personnel and engineering, and other variable factors. As a result, the final project costs will vary from the opinions of cost presented herein.

The detailed cost estimates used to assist in developing funding levels for the 2020 CIP are included in Appendix D.

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