# CHAPTER 6

# NON-POINT SOURCE POLLUTION CONTROL

The following sections discuss general considerations for the control of stormwater pollution from the sources identified in Chapter 5 and present specific recommendations for the City of Soap Lake.

## GENERAL CONSIDERATIONS IN URBAN STORMWATER

Each issue discussed in the previous chapter for stormwater quantity and quality problems represents a classic stormwater quantity or quality management problem. Stormwater management solutions to alleviate the stormwater problem areas must be found from an engineering viewpoint. They must also comply with the current and proposed state and federal regulations as discussed in Chapter 3.

As the consequences of uncontrolled urban runoff have become more widely recognized and better understood and as the alternatives available for control have increased, the complexity of stormwater management has grown. Several general considerations may be identified which provide a framework for consideration of issues that affect the method in which the City handles its stormwater management program. The considerations include:

- **Stormwater Quality versus Quantity Control –** In the case of quantity control, the objective is to release storm runoff at a rate that does not exceed stream channel capacity. For quality control, the objective is to provide sufficient holding time for the effective operation of physical settling or biochemical removal of pollutants. Because storage may benefit both quantity and quality, some of the same storage technologies can achieve both goals. The City is concerned primarily with quality control in order to preserve the characteristics of the lake. There are no natural stream channels within the City and the City's existing conveyance system is relatively small.

- **Construction Phase versus Long-Term Site Operation Phase –** Water quality problems that occur during site construction differ from those that occur during the operation of a developed site and these periods should be treated separately in stormwater management planning.

- **Structural versus Non-Structural Controls –** Non-structural stormwater quality controls focus on preventing pollution and include enhanced maintenance programs, regulations, public involvement, land use controls, and other measures.

- **Source Control versus Downstream Treatment –** Source controls (such as enclosing or covering a pollutant source) are methods that prevent pollutants from coming into contact with stormwater and are generally more effective and less expensive than treatment devices.

- **Control in New versus Existing Development –** New developments can be required to provide stormwater quantity and quality control infrastructure. It may be easier to implement non-structural approaches, such as modified maintenance practices or public education, in existing developments.

- **Control of Acute versus Chronic Impacts –** A stormwater management program should include strategies to reduce both acute (one-time or short-duration occurrence event or discharge) and chronic (long-term or recurring event or discharge) impacts to water quality.

- **Sensitive Area Considerations –** Typically, areas that are sensitive to impacts from urban stormwater include stream corridors, especially those with valuable fish habitat, floodplains, wetlands, steep slopes, and groundwater aquifers. Special considerations in stormwater management apply to these areas. Although the City does not contain stream corridors, wetlands, or fish habitat areas, Soap Lake is a uniquely sensitive water body that the City is concerned about preserving.

## OUT-OF-CITY STORMWATER MANAGEMENT

The majority of the stormwater flow conveyed through the City originates within the City's boundary. Though areas to the south of the City are located upslope of the City, the highly permeable soils in the region and the lack of developed land outside of the City's boundary facilitate the infiltration of runoff. It is unlikely that significant volumes of runoff produced south of the City would reach the City's stormwater conveyance system, though the City has observed that some runoff from the nearby agricultural land use areas does eventually reach the City's conveyance system during larger storms or during increased irrigation periods in the summer. The City is therefore able to reduce impacts of runoff through land management policies and regulations implemented within its boundaries.

The drainage basin for Soap Lake includes an area of approximately 27 square miles, and the City constitutes only 1.25 square miles of this area, as shown on Figure 2-3. Therefore, the water quality within the lake is likely to be impacted by runoff from areas outside of the City's control. A large portion of the drainage basin consists of non-native farmland, which may contribute freshwater irrigation runoff to the lake. Therefore, while the City can reduce the impact of urban pollutants on the water quality of the lake through stormwater management within city limits, the water quality impacts of the surrounding farmland to the northeast, south, and southeast of the lake may be outside of the City's control.

## STORMWATER QUANTITY AND QUALITY CONTROL: STRUCTURAL ALTERNATIVES

Stormwater management alternatives for control of the quantity and quality of stormwater runoff need not be mutually exclusive. The outdated method of designing stormwater conveyance systems that relied on curbs and gutters to transport stormwater directly into pipes which discharged the stormwater directly into a stream, river, or lake provided little in the way of stormwater quantity control and nothing in the way of quality control. As citizens, municipalities, and designers are becoming more aware of the damaging effects of stormwater quantity and quality, the line between stormwater management alternatives which are strictly concerned with quantity issues and those concerned strictly with quality issues is becoming blurred. The remainder of this chapter discusses stormwater management alternatives which will serve to limit the quantity of stormwater runoff and improve the quality of the runoff. The quantity of runoff can be controlled by site controls or by storage and regulated release. Storage and regulated release includes systems such as detention vaults or ponds with stormwater release orifices.

Site controls can minimize the quantity of stormwater released as well as provide water quality benefits. Site controls generally reduce runoff at or near the point where the rainfall hits the ground surface. The following are common types of site controls:

- Low impact development;
- Infiltration devices, such as trenches and basins;
- Storage and regulated release; and
- Swales and filter strips.

### LOW IMPACT DEVELOPMENT

Low impact development (LID) is a method for controlling stormwater on a site by using techniques like permeable pavement, rain gardens, and infiltration. LID is an efficient method of decreasing the amount of runoff associated with a developing site. The primary goal of LID methods is to mimic the predevelopment site hydrology by using site design techniques that store, infiltrate, evaporate, and detain runoff. Use of these techniques helps to reduce off-site runoff and ensure adequate groundwater recharge. The Washington State Department of Ecology recommends that LID include the following:

- Maintain the predeveloped, undisturbed stormwater flows and water quality;

- Retain native vegetation and soils to intercept, evaporate, and transpire stormwater on the site, rather than using ponds and conveyances;
- Maintain and improve soil quality in order to improve infiltration and reduce runoff;
- Cluster development and roads on the site and retain natural features that promote infiltration; and
- Reduce impervious surface area and use permeable surfaces instead.

Management practices used in LID design include minimizing the grading of the construction site, bioretention facilities, dry wells, filter/buffer strips, grass swales, rain gardens, soil amendment, pin pile formation, and/or infiltration trenches. As with many practices, maintenance of LID facilities is essential and should be addressed prior to implementation.

LID design guidance is available in the *Eastern Washington Low Impact Development Guidance Manual* (June 2013) by the Department of Ecology.

## INFILTRATION DEVICES

Infiltration devices capture runoff and infiltrate it into the ground. The Department of Ecology *Stormwater Management Manual for Eastern Washington* provides design and sizing guidance in Section 6.3. Infiltration systems provide groundwater recharge and pollutant removal, can be integrated into a site's landscaped and open areas, and if designed properly, can serve larger developments. Infiltration devices should be used only in situations where the captured volume of water can infiltrate into the ground before the next storm and where soils, slope, and cover will not promote sloughing and mass wasting (landslides). The soils throughout Soap Lake are generally favorable for infiltration and a portion of the City's stormwater system currently consists of dry wells to infiltrate runoff. The drywells seem to perform adequately and the City does not note ponding on City streets in the locations of these facilities. There are generally few drainage complaints from residents throughout the City.

## STORAGE AND REGULATED RELEASE

Where infiltration is not feasible, storage and regulated release of stormwater should be implemented in new developments in the City to ensure that the rate of stormwater runoff leaving the site for the design storm event during the post-development condition is no greater than the predevelopment rate for the same design storm event. This method of stormwater control minimizes downstream impact on the existing conveyance system. The Department of Ecology *Stormwater Management Manual for Eastern Washington* provides design and sizing guidance in Section 6.2.

## SWALES AND FILTER STRIPS

Swales and filter strips are among the oldest stormwater quality control measures, having been used alongside streets and highways as well as by farmers for many years. With sufficient vegetative cover, swales and filter strips can remove suspended solids, nutrients, metals, and other pollutants from runoff as it travels through the vegetation and can slow the flow of runoff downslope. More robust treatment facilities such as biofiltration use engineered soils and specific kinds of plants to more effectively remove pollutants from contaminated runoff. The Department of Ecology *Stormwater Management Manual for Eastern Washington* provides design and sizing guidance for swales and filter strips in Sections 5.4 and 5.5.

# CHAPTER 7

# OPERATION AND MAINTENANCE

The following sections summarize considerations for the control of stormwater pollution from the sources identified in Chapters 5 and 6 and present specific recommendations for the City of Soap Lake (City). A detailed water quality BMP Operation and Maintenance Manual can be found in Appendix B.

## FACILITY OPERATION AND MAINTENANCE PROGRAM

The objective of a stormwater maintenance program is to assure the continued functioning of stormwater management facilities. A complete maintenance program includes more than the physical tasks of cleaning catch basins, pipes, and open ditches; maintenance of vegetation in biological treatment structures; and proper disposal of debris from the maintenance activities. Maintenance programs also involve management items such as completing and maintaining a facilities inventory, updating a base map, scheduling inspections and maintenance activities, assessing costs for contract maintenance versus staff maintenance, and record keeping.

In order to perform inspections and maintenance at the appropriate times, a budget, staff, and priority schedule needs to be established. Certain types of maintenance are more important than others. It is important that catch basins and conveyance facilities be inspected before the wet season and after the spring snowmelt to assure that debris has not blocked a channel or taken up capacity in a manhole. Street sweeping in the fall is important because leaves block catch basin grates, which could result in overland flow across private property or flooding of roadways. Street sweeping in the spring is important to because sand used in snow control can fill catch basins and pipes, clog infiltration facilities, or be transported downstream to Soap Lake.

Reports and record keeping are important feedback mechanisms that enable management to compare actual versus planned costs, production, and efficiency. Reports provide a database for improved budgeting and resource allocation. Records and reports should include personnel hours, equipment hours, materials used, and the unit of work completed.

Maintenance control establishes accountability for specific results within a specific time frame and budget. The maintenance program needs a control hierarchy to establish a chain of command to complete the work.

The proper operation and maintenance of stormwater facilities benefits the public as a whole; therefore, the City should utilize innovative solutions to accomplish the goals of stormwater management in those cases where a private entity will not maintain its facility. The City should obtain easements for all portions of the stormwater system that lie outside of the right-of-way for which it will provide maintenance.

## MAINTENANCE STANDARDS

Appendix 5A of the 2004 Ecology Manual identifies maintenance standards for flow control, conveyance, and water quality facilities that should be established by the City.

The following is a brief description of the recommended maintenance procedures and the impact on stormwater pollution that could result from not maintaining the facility. Appendix B contains complete descriptions of maintenance activities the City may need to complete.

### STREET SWEEPING OR WASHING

Streets with concrete curb and gutter or thickened edges are part of the stormwater conveyance system. All streets accumulate vehicular emission particles, silt, and leaves and other debris and pollutants that could enter the stormwater conveyance system. Street sweeping or washing is an important maintenance item to reduce pollution in the receiving waters and to reduce the potential for blocking of the conveyance system. If street washing is used, filter fabric or hay bales should be placed temporarily over downstream catch basins or ditch inlets to prevent introduction of debris or pollutants into the drainage system.

In 2019, the City received a grant and is currently in the process of developing a Street Sweeping Plan, purchasing a street sweeper, and implementing a street sweeping program. The City plans to sweep high-use streets weekly and other streets once or twice per month. The program will involve testing the collected waste to determine the types and concentrations of pollutants.

### CATCH BASIN CLEANING

The City has approximately 187 identified storm drainage structures, including types with and without sumps. Sumps are important features that allow deposition of particulate matter carried in the stormwater. When sumps become filled to 60 percent of their volume, the efficiency of silt removal diminishes significantly. Maintenance is recommended when the sediment exceeds this 60 percent threshold. Catch basins are typically cleaned with a vactor truck that removes the sediment from the basin. This sediment must be disposed of properly at an appropriate disposal site.

A number of the catch basin sumps within the City's collection system contain sediment and Mount St. Helens ash. The City has been unable to effectively clean the ash out, as it has solidified into a cement-like substance that cannot be removed using a vactor truck. At present, catch basin cleaning will be limited to the loose sediment settled on top of the ash layers. The City will likely need to replace portions of the collection system in order to fully remove the ash from the structures.

**PIPE CLEANING**

The City has approximately 186 identified stormwater pipes. Pipes in the City vary in size from 6 to 36 inches in diameter. Pipe types include concrete, corrugated metal, and HDPE. It is recommended that storm drain pipes be cleaned on a 3- to 5-year rotating basis. The primary maintenance activity for stormwater pipes is removal of accumulated sediment once the sediment or debris exceeds 20 percent of the diameter of the pipe. Sediment can decrease conveyance capacity or can be washed out of the pipes during storm events causing downstream sediment and pollution problems. A vacuum system is recommended for cleaning. If pipe flushing is used, adequate downstream siltation control must be in place prior to flushing.

**PIPE INSPECTION**

In order to assess the condition of the City's pipe network, a television inspection program is recommended. This program would require the City to contract with a television inspection company. It is recommended that television inspections be completed following pipe cleaning to ensure that pipes are clean enough to inspect and that any defects within the pipe will be visible. Each pipe should be inspected once every 10 years to identify structural deficiencies as they arise. Television inspection can also be conducted if the City notices any particular areas that suddenly fail to drain, which could indicate a collapsed or blocked pipe.

**OPEN DITCH MOWING AND CLEANING**

Ditches and swales can provide biofiltration, if vegetation is allowed to remain within the channel and on the sides. The primary pollutant removal mechanism of a bioswale (or ditch) involves filtration by grass blades, which enhance sedimentation, as well as trapping and adhesion of pollutants to the grass and thatch. To be most effective, the vegetation within the ditch should be cut down to a height of between 2 and 6 inches. Mowing is the first method that should be used to reduce capacity loss. If the ditch must be reshaped to promote drainage or remove excess materials, the work should be performed during dry weather.

Swales can be cleaned with a backhoe, taking care not to remove more material than is necessary. Only areas where there is a flow restriction should be cleaned. Small amounts of sediment should be removed by hand.

**LOW IMPACT DEVELOPMENT METHODS**

Many low impact development methods require maintenance similar to traditional stormwater management facilities. Bioretention ponds generally require vegetation management such as weeding, mulching, trimming and removal of dead vegetation, similar to ditches and swales. Depending on the types of vegetation installed in the bioretention ponds, the level of required maintenance may be slightly higher. The City may desire to choose plants with lower maintenance requirements, in consultation with a landscaping expert.

Permeable pavement generally requires increased maintenance as compared with traditional pavement. Because the surface of the pavement is constructed to allow stormwater to filter through to the subgrade, the pavement must be washed regularly in order to prevent clogging due to sediment or moss growth. The level of maintenance required is site-specific, but pressure washing may be required once or several times per year in order to maintain the efficacy of the pavement.

## RECOMMENDED MAINTENANCE PROGRAM

The types and quantities of stormwater facilities the City must maintain are shown in Table 4-1.

The stormwater maintenance activities anticipated by City staff and the corresponding production units, estimated personnel hours, and estimated labor costs are shown in Table 7-1. This information is used to estimate the cost of the stormwater maintenance program and estimate the staff required to implement the program. It has been assumed that all maintenance activities will be completed by City staff and that the cost to the City per manhour is an average of $50.

**TABLE 7-1**

**Annual Operation and Maintenance Expenses**

| Activity | Production Unit | Number of Units | Manpower Requirement | Equipment/ Contractor Requirement | Recommended Schedule | Manhours | Estimated Annual Cost |
|---|---|---|---|---|---|---|---|
| Clean Catch Basins | 50/day | 187 | contractor/ 3-man crew | $2,000/day | 1/year | 100 | $8,000 |
| Storm Pipe Cleaning | 3,000 ft/day | 21,157 ft | contractor/ 3-man crew | $2,000/day | every 2 to 5 years, as needed | 100 | $7,000 |
| Miscellaneous Repairs | N/A | N/A | 8 hrs/month | N/A | as needed | 100 | $5,000 |
| Street Sweeping and Pickup | N/A | N/A | 2-man crew | N/A(1) | 2/month on average | 100 | $5,000 |
| Pipe Television Inspection | 2,000 ft/day | 21,157 ft | contractor/ 2-man crew | $4,000/day | every 10 years, as needed | 50 | $7,000 |
| **Total** | | | | | | **450** | **$32,000** |

(1) The City received a grant in 2019 to purchase a street sweeper and develop a street sweeping program.

## STAFF REQUIREMENTS

The total City staff hours required annually for the maintenance activities identified in Table 7-1 is 400 hours, or approximately 1/5 FTE.

## INSPECTIONS

The City should inspect all municipally owned stormwater facilities annually, unless there are maintenance records to support a different frequency. Reducing the inspection frequency should be based on records of double the length of time proposed for inspection frequency. Repair or maintenance actions should be performed in accordance with established maintenance standards.

All catch basins and inlets should be inspected at least once every 5 years. They should be cleaned to comply with established maintenance standards if inspections indicate a need. The decant water generated from catch basin cleaning must be disposed of properly.

## STAFF TRAINING

As discussed previously in this chapter, the City should develop and implement an ongoing training program for City employees with responsibility for permit review and issuance, and monitoring construction and whose operation and maintenance (O&M) job functions may impact stormwater quality. This program should address the importance of protecting water quality, stormwater regulatory standards for surface water and foundation drains, O&M standards, inspection procedures, BMP and LID technique selection, ways to perform job activities to prevent impacts to water quality, and procedures for reporting water quality concerns.

Administrative staff should receive training on permit requirements, plan review requirements, and permit implementation to ensure adequate erosion and sediment control and stormwater control elements are included in development plans.

The City should also ensure that staff is well trained on how to inspect and maintain best management stormwater practices. At a minimum, staff should be educated on how to maintain catch basins and dry wells, bioswales and ditches, and any other best management practices implemented within the City. Staff shall also be knowledgeable in identifying pollutant sources and in understanding pollutant control measures, spill response procedures, and environmentally acceptable material handling practices. Ecology's *Stormwater Pollution Prevention Planning for Industrial Facilities* (WQ-R-93-015, September 1993) may be used as a training reference. Renewal training for all employees on a biannual basis is recommended.

Personnel should also be well trained on sediment and erosion control issues so they can properly investigate and advise contractors regarding problem areas during construction.

A staff member should be certified through the "Construction Site Erosion and Sediment Control Certification Course" offered by the Associated General Contractors of Washington Education Foundation or an approved equivalent. Equivalent certificates include:

- WSDOT certification in Construction Site Erosion and Sediment Control; and
- Certified Professional in Erosion and Sediment Control (CPESC) offered by the International Erosion Control Association (IECA).

Erosion and sediment control certification for staff members should be renewed every 3 years.

### ENFORCEMENT

Staffing levels should be sufficient to monitor construction activity, respond to stormwater complaints, and provide periodic inspection of stormwater facilities. City staff should document the hours spent performing site inspections, together with the frequency of inspection of construction sites and stormwater facilities. From these records and the records of time spent responding to complaints, an understanding of the adequacy of the current staffing level can be gained.

## PUBLIC EDUCATION AND OUTREACH

An important element of stormwater management planning is public education and outreach. The involvement of the public is necessary to ensure the overall success of the stormwater management plan. For the public to be motivated to participate in stormwater management, it must first be aware of existing stormwater and surface water problems, the public's role in creating these problems, and actions to avoid and correct them.

The public must also be aware of how their normal activities affect stormwater quality and quantity. Most citizens believe that stormwater management is someone else's problem. In order to educate the public, issues with local relevance must be identified and programs must be designed to address them. The following is the outline of a public education and outreach program.

### BEST MANAGEMENT PRACTICES

In most communities, a major source of stormwater contamination comes from sources that are lumped together and called non-point pollution. Non-point pollution sources can generally be defined as "pollution that does not have a single point of discharge." Non-point pollution discharges can be divided into commercial and residential categories.

The treatment of stormwater runoff prior to discharge to surface water or prevention of non-point pollution in stormwater should be accomplished by using best management practices (BMPs). BMPs are defined as physical, structural, and/or managerial practices, which when used singly or in combination, prevent or reduce pollution of water.

The Ecology Manual contains BMPs for urban land uses. BMPs can be placed into two general groups: source control BMPs and runoff treatment BMPs. The former group includes those BMPs that keep pollutants from coming in contact with stormwater; the latter group consists of methods for treating stormwater. Source control BMPs are preferred as they are generally less expensive and frequently are more effective.

BMPs and general strategies for their use in commercial and industrial applications are listed below in order of preference:

1. **Alter the Activity:** The preferred option is to alter any practice that may contaminate surface water or groundwater by either not producing the pollutant to begin with or by controlling it in such a way as to keep it out of the environment. An example would be recycling used oil rather than dumping it down a storm drain.

2. **Enclose the Activity:** If the practice cannot be altered, it should be enclosed in a building. Enclosure accomplishes two things. It keeps rain from coming into contact with the activity and since drains inside a building must discharge to sanitary or process wastewater sewers or a dead-end sump, any contamination of runoff is avoided.

3. **Cover the Activity:** Placing the activity inside a building may be infeasible or prohibitively expensive. A less expensive structure with only a roof may be effective, although it may not keep out all precipitation. Internal drains must be connected to the sanitary sewer to collect water used to wash down the area as well as any rain that may enter along the perimeter.

4. **Segregate the Activity:** Segregating an activity that generates more pollutants than other activities may lower the cost of enclosure or covering to a reasonable level.

5. **Discharge Stormwater to the Process Wastewater Treatment System:** Many industries have their own process wastewater treatment system with final disposal directly to the receiving water.

6. **Discharge Small, High-Frequency Storms to Public Sanitary Sewer:** This BMP would be limited to those few outside activities that contribute unusually high concentrations of pollutants and/or pollutants of unusual

concern. Limited entry of these few special cases may not overtax the public sanitary sewer.

The entry of stormwater to the sanitary or combined sewer can be limited to the small high-frequency storms that carry off the majority of pollutants over time. Storm flows in excess of the hydraulic capacity of the sanitary or combined sewer would be discharged to the storm drain.

7. **Discharge Small, High-Frequency Storms to a Dead-End Sump:** This BMP would be limited to those few activities that contribute unusually high concentrations of pollutants and/or pollutants of unusual concern. This option would be used when discharge into a sanitary sewer or process wastewater treatment is not available or feasible. This option requires the capacity to pump out the sump regularly and to dispose of the pumpage in an appropriate manner.

8. **Treat the Stormwater with a Stormwater Treatment BMP:** The treatment of stormwater is the least-preferred option for several reasons. Source control BMPs keep the pollutants completely away from stormwater. In contrast, stormwater treatment devices are not 100 percent effective. In fact, a highly effective BMP is considered successful if 80 percent of the pollutants are removed. Even after treatment, freshwater criteria may not be met for commercial areas.

Given the above strategies for use of BMPs, Ecology has developed mandatory BMPs for many types of pollutant sources. Appendix 8A of the 2004 Ecology Manual lists each group of business in the following way:

- Title of business group;
- Standard Industrial Code (SIC);
- Description of business activities; and
- Potential pollution-generating sources.

Chapter 8 of the 2004 Ecology Manual lists applicable operational and structural source control and treatment BMPs for each type of pollutant source. Any stormwater treatment BMPs required can be found in Chapter 5. Ecology recommends implementing oil control measures for "high use areas." These areas include:

- An area of a commercial or industrial site subject to an expected average daily traffic count equal to or greater than 100 vehicles per 1,000 square feet of gross building area.

- An area of a commercial or industrial site subject to parking, storage, or maintenance of 25 or more diesel vehicles that are over 10 tons gross weight.

Providing treatment under the oil control menu is provided in Chapter 5 of the 2004 Ecology Manual. It is not anticipated that the commercial or industrial areas within the City exceed these thresholds at this time. Regardless, the City should keep these guidelines in mind when future development occurs.

# CHAPTER 8

# CAPITAL IMPROVEMENT PLAN

## INTRODUCTION

The City of Soap Lake's Capital Improvement Plan (CIP) is developed in this section. The recommended projects include structural elements to control both the quantity and quality of stormwater runoff as well as recommendations to integrate stormwater management into redevelopment within the City.

The CIP was developed based on the hydraulic model results and input from City public works staff in order to improve the quality of stormwater runoff within the city limits and mitigate the impact of runoff on Soap Lake.

## CAPITAL IMPROVEMENT PROJECTS

The hydraulic model results identified runoff flow rates for each basin within the City and determined the volume of runoff necessary to treat or infiltrate in order to mitigate the effects of polluted runoff. End-of-pipe stormwater management is not proposed for Basin C, as this basin has the most fragmented conveyance system of the City's main basins. Therefore, it may be difficult to capture runoff from much of this basin in order to convey it to a single disposal location. Instead, recommendations are provided at the end of this chapter for the City to incorporate localized stormwater management within Basin C and the City as a whole. These include roadside stormwater facilities to treat and infiltrate runoff without the need for a larger conveyance system.

The City's conveyance system was not analyzed for capacity at this time. A goal of the City is to locate all drainage facilities in rights-of-way or on City-owned property. The projects identified in the CIP support this goal.

The projects described below are developed based on the hydraulic model results and input from City staff. Survey should be conducted as part of the design of any recommended capital improvement project to ensure the most accurate and effective design for the project. All recommended projects assume that the existing slope will be utilized in the future.

Figure 8-1 shows the locations of the recommended projects discussed below and Table 8-1 shows the cost for each project. Projects are listed in order of priority. Detailed cost estimates are provided in Appendix C.

**TABLE 8-1**

**Planned Capital Improvements**

| Capital Improvement Projects | Total Project Cost, Alternative A (2019 dollars)(1) | Total Project Cost, Alternative B (2019 dollars) |
|---|---|---|
| CIP 1A – Eastern Outfall Bioswale and Infiltration Facility | $609,000 | N/A |
| CIP 1B – 6th Avenue SE to 1st Avenue NE Bioretention Ditches and East Basin Infiltration Facility | N/A | $747,000 |
| CIP 2 – Central Outfall Bioswale and Infiltration Facility | $360,000 | $360,000 |
| **TOTAL** | **$969,000** | **$1,107,000** |

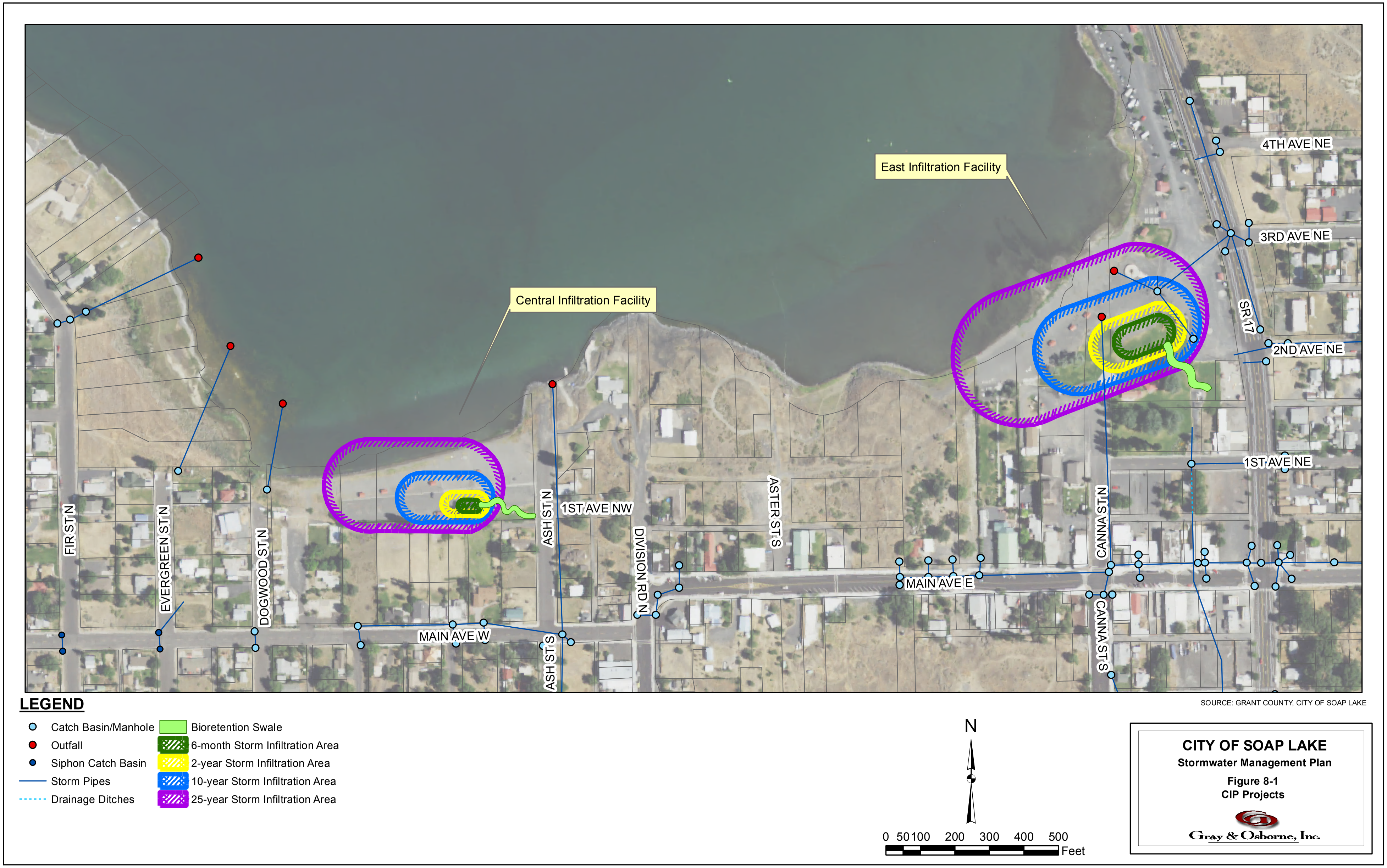
(1) January 2019 National ENR Value: 11206.

## CIP 1A – EASTERN OUTFALL BIOSWALE AND INFILTRATION FACILITY

Runoff from the City's largest basin, Basin A, outfalls to the southeast corner of Soap Lake. This basin includes the largest amount of impervious coverage within the City and the largest area of pollution-generating surfaces. These areas include a number of large parking lots, private driveways, City streets, and State Route 17. The best method of limiting the impact of pollutants generated within the basin is to employ source control methods, as discussed in Chapters 5 and 6. However, as the area is already largely developed, the implementation of source control features would be difficult. An end-of-pipe solution located near the outfall to Soap Lake is a more feasible way of protecting the lake's water quality. A bioswale located at the shore of the lake to treat runoff followed by an infiltration pond to detain and infiltrate runoff before it reaches the lake would prevent most pollutant volumes, including oils, TSS, and metals, from contaminating the lake.

Because the existing infrastructure collects runoff indiscriminately from pollution-generating areas as well as non-pollution-generating areas, the facility must be sized to treat and infiltrate runoff from the entire basin.

The biofiltration swales are designed to treat runoff from the 6-month storm (plus snowmelt), as the majority of pollutants are collected during the first flush of runoff from pollution-generating surfaces. Ecology has determined that designing facilities for the 6-month storm event is most efficient, and facilities sized in excess do not generally provide significantly increased pollutant removal capacity. The eastern bioretention swale would be approximately 212-feet long and 22-feet wide at the top, occupying an area of approximately 4,670 square feet. The swale would be approximately 1.9-feet deep and it is assumed that the swale would slope toward the infiltration basin and the




Document Path: M:\Soap Lake\17037 - Stormwater Plan\GIS\Fig 8-1 CIPs.mxd lake at approximately 1 percent. Plantings within the bioswale would consist of native grasses, which could be selected to complement and enhance the lakeshore.

The infiltration facility would consist of a large, shallow pond to detain runoff. The infiltration pond was modeled in XPStorm to determine the necessary facility size. The pond was determined to include approximately 34,754 cubic feet of storage, with dimensions at the top of the overflow elevation of 122 feet by 123 feet. The depth of the pond was assumed to be 4 feet in total, including 1 foot of freeboard above the riser elevation. The facility is sized to infiltrate the entire runoff volume from the 6-month, 24-hour storm, including snowmelt. The modeling assumes a conservative long-term infiltration rate of 0.6 inches per hour, based on the USDA Soil Survey data. It is possible that site soils have higher infiltration rates and that the facility size may be reduced, and a full geotechnical analysis including infiltration testing will be conducted at the time of design. Figure 8-1 demonstrates the approximate footprint of the infiltration pond if it were sized to infiltrate the 6-month, 2-year, 10-year, or 25-year storm. The cost estimate assumes the 6-month storm is used for sizing the facility.

**Estimated Project Cost: $609,000**

## CIP 1B – EAST BASIN BIORETENTION SWALES

As an alternative to CIP 1A, runoff from the eastern portion of the City, Basin A, could be managed through the use of several biofiltration ditches. A series of existing ditches and pipes currently conveys runoff from south to north within Basin A between SR 17 and Canna Street South. The ditches could be retrofitted and redesigned as bioretention swales, which would allow for treatment and infiltration along the conveyance route to Soap Lake, upstream of the lake shore.

The bioretention swales would be constructed using an engineered soil mix specified by Ecology that provides treatment as runoff filters through the soil and infiltrates to the subgrade. Plants and grasses in the swales provide additional retention and treatment as runoff that exceeds the infiltration capacity flows through the swales to the downstream conveyance system. The conveyance system along the project flowpath currently includes 8-inch to 24-inch diameter pipes that convey flow between the ditches. It is assumed that these pipes are adequate for the tributary flow, as the City does not report flooding or ponding in this area.

At the downstream end of the series of swales, a smaller infiltration pond would be constructed to infiltrate the remaining runoff from the basin that is not tributary to the swales, or exceeds the capacity of the swales.

The bioretention swales were modeled in XPStorm under the 6-month, 24-hour storm. Each ditch is assumed to be 1.5-feet deep, with 1 foot of ponding depth and 0.5 foot of freeboard. Table 8-2 includes the ditch locations and sizes, and the ditches are shown on Figure 8-2.

**TABLE 8-2**

**CIP 1B Bioretention Swales**

| Ditch | Location | Bottom Length | Bottom Width | Top Area (sq ft) |
|---|---|---|---|---|
| 1 | 6th Avenue SE to 5th Avenue SE | 300 | 4 | 4,020 |
| 2 | 5th Avenue SE to 4th Avenue SE | 200 | 6 | 3,140 |
| 3 | 4th Avenue SE to 3rd Avenue SE | 200 | 4 | 2,720 |
| 4 | 3rd Avenue SE to 2nd Avenue SE | 100 | 8 | 1,850 |
| 5 | Main Avenue East to 1st Avenue NE | 100 | 2 | 1,200 |

The infiltration pond is somewhat smaller than the size required in CIP 1A, due to the upstream bioretention swales. The pond was determined to include approximately 28,310 cubic feet of storage, with dimensions at the top of the overflow elevation of 112 feet by 112 feet. The depth of the pond was assumed to be 4 feet in total, including 1 foot of freeboard above the riser elevation. The facility is sized to infiltrate the entire runoff volume from the 6-month, 24-hour storm, including snowmelt. The modeling assumes a conservative long-term infiltration rate of 0.6 inches per hour, based on USDA Soil Survey data. A full geotechnical analysis including infiltration testing will be conducted at the time of design.

The City does not currently own the properties where the ditches are located, and an additional cost for land acquisition has been included for this project.

**Estimated Project Cost: $747,000**

## CIP 2 – CENTRAL OUTFALL BIOSWALE AND INFILTRATION FACILITY

Basin B outfalls to Soap Lake via a pipe along Ash Street North. The conveyance in this basin is well-established and extends from the lake shore along Division Street S nearly to the City's southern boundary. This basin includes mostly single-family residences and associated impervious surfaces, including City streets, driveways, and parking areas. As in Basin A, source control methods should be used if possible to limit contribution of pollutants into runoff. However, source control implementation may be difficult in already developed areas. An end-of-pipe solution located near the outfall s proposed to protect the lake's water quality. As in the other basins, a bioswale and an infiltration pond are proposed.

The central bioretention swale would be approximately 211-feet long and 14-feet wide at the top, occupying an area of 2,960 square feet. The swale would be approximately 1.9-feet deep, and it is assumed that the swale would slope toward the lake at approximately 2 percent. Plantings within the bioswale would consist of native grasses, which could be selected to complement and enhance the lakeshore.


SOURCE: GRANT COUNTY, CITY OF SOAP LAKE

## LEGEND

- Catch Basin/Manhole
- Outfall
- Storm Pipes
- Proposed Bioretention Ditches

N

0 50 100 200 300 400 500 Feet

**CITY OF SOAP LAKE**
**Stormwater Management Plan**
**Figure 8-2**
**East Basin Bioretention CIP**
Gray & Osborne, Inc.

Document Path: M:\Soap Lake\17037 - Stormwater Plan\GIS\Fig 8-2 basinACIPs.mxd

The infiltration facility would consist of a large, shallow pond to detain runoff. The infiltration pond was modeled in XPStorm to determine the necessary facility size. The pond was determined to include approximately 3,039 cubic feet of storage, with dimensions at the top of the overflow elevation of 44 feet by 49 feet. The depth of the pond was assumed to be 4 feet in total, including 1 foot of freeboard above the riser elevation. The facility is sized to infiltrate the entire runoff volume from the 6-month, 24-hour storm, including snowmelt. The modeling assumes a conservative long-term infiltration rate of 0.6 inches per hour, based on USDA Soil Survey data. It is possible that site soils have higher infiltration rates and that the facility size may be reduced, and a full geotechnical analysis including infiltration testing will be conducted at the time of design. Figure 8-1 demonstrates the approximate footprint of the infiltration pond if it were sized to infiltrate the 6-month, 2-year, 10-year, or 25-year storm. The cost estimate assumes the 6-month storm is used for sizing the facility.

A possible constraint for this project is the rocky outcropping located near the end of the pipe that discharges along Division Street South. Depending on the subsurface conditions, it may be difficult to identify a suitable location for excavation and infiltration in this area. It may be possible to combine runoff from both the central and western basins so that an infiltration pond for both basins could be located near Dogwood Street. This option would require additional piping, but it should be considered during a future design effort when additional information is available.

**Estimated Project Cost: $360,000**

## ADDITIONAL CONSIDERATIONS

The proposed infiltration facilities were sized to infiltrate the total 6-month, 24-hour storm plus snowmelt. This is the standard that the 2004 Ecology Manual prescribes for detention and infiltration facilities. The larger 2-year, 10-year, and 25-year storm events were also considered to provide a point of comparison.

Due to the large basin area, pervious land coverage, and long flow paths from the greater lake drainage basins to the lake, runoff during the 6-month and 2-year storm events is predominantly generated within the city limits. The basins within the City have much higher impervious coverage than the greater basins outside of the City, generating larger volumes of stormwater and decreasing travel time of the surface runoff. Runoff within the larger basins outside of the City has a much greater chance of infiltrating or being detained by vegetation before it is able to reach the City's collection system or the lake. During more intense storms, the ground may become saturated, decreasing the attenuation and infiltration capacity of the pervious land, causing a greater proportion of runoff from the larger basins to reach the lake by surface flow.

The infiltration facilities become very large when considering runoff from the greater drainage basins during more intense storm events. In order to infiltrate all runoff from the 10-year storm event, the proposed infiltration facilities would need to be approximately 8 times larger than the 6-month facilities. In order to infiltrate all runoff from the 25-year storm event, the proposed infiltration facilities would need to be more than 20 times larger than the 6-month facilities. Table 8-3 provides a comparison of the surface area and volume required to infiltrate all runoff from several storm events.

**TABLE 8-3**

**Infiltration Facility Size Comparison**

| Storm Event | East Facility Surface Area (square feet) | East Facility Volume (cubic feet) | Central Facility Surface Area (square feet) | Central Facility Volume (cubic feet) |
|---|---|---|---|---|
| 6-month | 10,010 | 34,750 | 2,160 | 3,040 |
| 2-year | 37,250 | 95,140 | 8,370 | 17,620 |
| 10-year | 109,580 | 299,530 | 36,420 | 92,830 |
| 25-year | 266,700 | 753,560 | 124,420 | 342,190 |

The different facility sizes may be seen on Figure 8-1. The sizes of the 25-year infiltration facilities are prohibitively large and even the 10-year facilities would need to occupy a large portion of the existing park areas.

Given the available space at the shoreline within the City's parks, the 6-month storm infiltration size may be most appropriate and this size should be sufficient to infiltrate most of the total runoff that the City experiences each year. During 2016 and 2017, there was only 1 day (October 13, 2016; 0.55 inch) that exceeded the 6-month, 24-hour runoff total of 0.53 inch. Additionally, the facilities have been sized to accommodate potential runoff from snowmelt if storms should occur during the spring, resulting in a design runoff depth of 0.87 inch. The facilities would therefore be capable of treating and infiltrating the first 0.87 inches of rainfall from storms larger than the 6-month event, and only rainfall in excess of this amount would overflow from the facilities to the existing outfall locations.

Ecology has estimated that a facility sized to accommodate the 6-month storm is able to address approximately 91 percent of all runoff tributary to it. Most pollutants are picked up by runoff during the beginning of a storm. If the "first flush" of runoff from polluted surfaces can be adequately captured and treated, the majority of pollution concerns can be addressed. Even though larger storm events may result in overflows from the facility, these events are very infrequent in comparison with the smaller storms that the facility is designed to manage. The substantial increase in cost to construct a larger facility is generally not justifiable given the marginal benefit that it could provide.

Ecology's determination of an appropriate level of treatment is based on stormwater research to remove pollutants and sediments to a level appropriate for freshwater or saltwater habitat and human recreational use. While the Lake is not generally subject to these requirements, runoff in the City should be treated prior to infiltration to remove sediments that could clog the infiltration facility and to preserve the groundwater quality. Additionally, many people have direct contact with the Lake's water and mud, so treating runoff to a standard that is considered safe for recreational contact is warranted here.

Though the City's conveyance system was not analyzed for capacity at this time, it is likely that the pipes were sized for a 25-year storm event, which tends to be a standard level of service. With this in mind, the City's conveyance system may not even be capable of conveying runoff from a larger storm event to the downstream outfalls. Larger storms would likely result in increased surface sheet flows discharging directly to the lake. The proposed facilities are not intended to serve as flood-control facilities, as the City generally does not have flooding concerns.

If the City desires and if space and funds are available, the facilities may be made larger in order to capture additional runoff from events larger than the 6-month storm. These facilities are considered retrofits and are not subject to any of the new development or redevelopment requirements. Any stormwater management facility will result in water quality benefits as compared with the current-day situation where no stormwater management is provided.

## IRRIGATION DISCHARGES

As mentioned previously in Chapters 4 and 5, there is evidence of excess irrigation runoff reaching the City's drainage system from outside of the City limits. Because of the larger regional impact of the irrigation project, the irrigation concerns are outside of the scope of the City's stormwater management plan. Farms are responsible for proper handling of their own irrigation water and for preventing discharges offsite, so this issue must be discussed with the specific owners of farms that are noted to be causing the offsite discharges. The Bureau of Reclamation should also be consulted to discuss an approach to protect the Lake from adverse impacts due to excess freshwater from irrigation discharges, and the impact of the Bureau's groundwater pumping operation should be studied.

## LOCALIZED IMPROVEMENTS

### Collection and Conveyance System

Much of the City's collection and conveyance system is at least partially filled with Mount St. Helens ash. The ash has solidified into a clay-like or cement-like substance, reducing capacity in the conveyance system and likely impeding the infiltrative ability of dry wells. Though the City does not generally note ponding or flooding issues as a result of the ash, the portions of the system that are impacted by the ash should be replaced to restore capacity. Because of the lack of drainage complaints, it seems that the storm system is generally adequate and does not require immediate replacement. However, the

City should plan to replace the storm system in conjunction with its road improvement projects.

A general planning-level cost estimate for the construction of 12-inch storm conveyance is $400 per linear foot. This includes pipe, structures, bedding, and backfill, but does not include other general project costs such as excavation or traffic control. This cost estimate assumes that the storm conveyance system will be installed during road projects. For this reason, costs for system replacement have not been included in the financial modeling in Chapter 9, aside from an annual $10,000 allowance for miscellaneous small projects or emergency repairs and replacements.

**Low Impact Development**

As development continues in the City, localized measures to ensure proper management of stormwater may be an effective way of mitigating potential impacts on the lake. One such method is the incorporation of low impact development (LID) techniques within new developments or as retrofits in redeveloping areas.

LID methods include more than just stormwater facilities. Planning plays an important role in LID, as reducing impervious surfaces and minimizing disturbance to existing vegetation are effective ways of reducing the impact of site development. Policies that limit the amount of impervious area per lot and preserve open space or sensitive area buffers are examples of LID techniques.

A main tenet of LID is the reduction of impervious coverage. This includes reducing the width of streets and driveways, and incorporating additional vegetation coverage adjacent to impervious surfaces. Many roads within the City are excessively wide for the amount of traffic that they carry, and the City should consider revisiting its design standards to reduce the minimum road widths and allow for or encourage alternative driveway configurations, such as ribbon driveways.

Funding for road rehabilitation through the Transportation Improvement Board or other agencies may be harder to obtain for designs using older road standards that do not restrict pavement width. As the City is actively working to rehabilitate its streets, incorporating LID elements into the City’s design standards may be beneficial in securing funding for these projects.

LID techniques are applied throughout a development site, whereas traditional detention/retention facilities are generally large facilities located at the downstream corner of a site or even farther away, such as a regional facility collecting runoff from multiple sites.

New developments offer greater opportunities to apply stormwater management techniques than do existing developments, due to new regulations requiring stormwater controls and the ability to install effective stormwater control and treatment facilities into the design of the development. Retrofitting structural techniques in existing developments can be difficult and expensive.

**Infiltration**

The City's soils are generally well suited for infiltration, and as such, the City should consider either recommending or requiring infiltration on private developments if soil conditions are feasible. Infiltration is the preferred LID method of managing stormwater runoff rates. Within the City, some steep slope and erosion hazard areas exist, and infiltration should not be used in these locations.

**Road Project Retrofits**

Road rehabilitation projects are another opportunity for the City to incorporate additional stormwater controls. The City's roadways have been the source of significant revitalization efforts. The City has been fortunate to receive substantial grant funds to reconstruct portions of its arterial network and plans to continue to pursue funding to reconstruct a number of streets and sidewalks throughout the City. As pollutants in runoff are primarily generated on roads due to vehicle use, incorporating road side stormwater treatment or infiltration facilities is an effective, localized method of stormwater management.

More localized stormwater management integrated into the road design can reduce the size of downstream stormwater management facilities.

As road projects are planned, the City should incorporate LID elements such as roadside bioretention swales, permeable shoulders, and infiltration trenches or dry wells to manage runoff. A typical unit cost of these facilities is presented in Table 8-4. Note that this is just the additional cost for those elements, not the installed cost, which is assumed to be incidental and already included in the site work required for the road rehabilitation.

**TABLE 8-4**

**Roadside Stormwater Management Typical Costs**

| Stormwater Management Method | Cost |
|---|---|
| Bioretention Swale | $15/sqft |
| Permeable Pavement | $10/sqft |
| Infiltration Trench | $10/sqft |

These LID elements will require additional maintenance. The City has preferred to avoid permeable pavements in the past due to the additional maintenance required to clean the surface of the pavement to maintain the permeability. Bioretention generally requires a similar level of maintenance effort to other roadside vegetation, including mowing and weeding. The City currently operates several dry wells, and infiltration facilities tend to have similar maintenance requirements. Any such facilities should be preceded by sedimentation or filtration facilities such as vegetated filter strips to limit clogging the permeable course with sand or sediment.

These types of localized improvements are recommended for the West Basin instead of a larger, end-of-pipe facility. The City's conveyance infrastructure in the West Basin is less extensive than in the Central or East Basins, and therefore it may be difficult to identify a suitable location where runoff from the majority of the basin could be collected. It is likely that the outfall located near the intersection of Fir Street N and Lakeshore Drive NE collects the majority of runoff from the basin, but there is currently no publicly owned land in this area that would be conducive to the installation of a regional stormwater facility.

The West Basin's lack of existing conveyance presents a good opportunity for localized infiltration facilities, which can be installed as road rehabilitation projects are completed without the need for a downstream conveyance system. Roadside infiltration facilities can reduce flow rates, and the City may not need to install higher-capacity pipes to convey flow to an outfall. Stormwater treatment should be included in these improvements to remove pollutants and sediment. Biofiltration planters or swales are a suitable method of providing both infiltration and treatment in the same facility, and they can be incorporated as roadside planting features to provide aesthetic benefits.

# CHAPTER 9

# FINANCIAL REVIEW

Historically, general revenues from property taxes have financed stormwater management programs. Revenue from these types of taxes tends to be inadequate to fund necessary stormwater management services. As discussed in Chapter 7, the estimated annual expenditures, not including capital projects, for the stormwater system is $25,000. As outlined in Chapter 8, capital project expenses total $969,000 to 1,107,000 (2019 dollars), depending on the alternative selected. Additionally, $10,000 is assumed annually for miscellaneous projects or repairs. The City's general revenues are not adequate to support the planned stormwater expenses.

The financial resources potentially available to the City to fund the operation and maintenance and capital improvements, other than general revenue from property taxes, include service charges, connection charge (GFCs), or grants and loans.

This chapter provides a summary of potential funding sources. The City may consider forming a stormwater utility to fund ongoing operation and maintenance as well as capital improvements. A 10-year budget forecast and rate recommendation required to fund the planned stormwater program are provided.

## GRANT AND LOAN PROGRAMS

Grants and loans can be used to fund capital improvement projects but cannot be used to fund operation and maintenance. Within the State of Washington, there are several grant and loan funds available for capital improvements. Among these are the Public Works Trust Fund (PWTF), Centennial Clean Water Fund (CCWF), the State Revolving Fund (SRF), Federal FEMA Mitigation funds, and Flexline. The various grant and loan programs are briefly described below.

### PUBLIC WORKS TRUST FUND

This program is a revolving fund loan designed to help local governments finance needed public works projects through low-interest loans and technical assistance. It was established by the Washington State Legislature in 1985 and is administered by the Public Works Board. In addition to construction funding, the Public Works Trust Fund program also provides low-interest loans to fund preconstruction activities that prepare a specific project for construction. Funding is subject to state legislature appropriation and is not guaranteed to be available every year.

An applicant must have a long-term plan for financing their public works needs. If the applicant is a county or city, it must adopt the 1/4 percent real estate excise tax that is dedicated to public works construction projects. Eligible public works projects include streets and roads, bridges, storm sewers, sanitary sewer collection and treatment systems, and domestic water.

**DEPARTMENT OF ECOLOGY WATER QUALITY COMBINED FUNDING PROGRAM**

The Department of Ecology administers several loan and grant programs that can be used to fund the following:

- Stormwater capital improvements including stormwater system retrofits;
- Low impact development projects;
- Inventories of stormwater sources;
- Public education and communication;
- Review and preparation of stormwater regulations;
- Mapping;
- Source control activities; and
- Establishing and refining stormwater utilities.

The funding programs include the Centennial Clean Water Grant and Loan program (state funds), the Clean Water Act Section 319 Nonpoint Source Fund (federal funds), the Stormwater Financial Assistance Program (SFAP) (state funds), and the Washington State Water Pollution Control Revolving Fund (federal and state funds). A common application is available for funding from the Ecology-administered programs. The programs are competitive and the majority of the funding available is in the form of low-interest loans.

## DEBT FINANCING

Two forms of debt financing are available for capital improvements including general obligation (G.O.) bonds and revenue bonds. G.O. bonds are backed by the “full faith and credit of the City” and are paid for through property tax levies. These bonds require voter approval before they can be implemented. A less common means of financing capital improvements associated with stormwater projects is through the use of revenue bonds. The City, like other municipalities, is capable of issuing tax-exempt bonds. The principal and interest of such bonds are repaid from revenue generated from a utility, such as a water, sewer, or stormwater utility. This type of funding may be offered without voter approval. However, in order to qualify to sell revenue bonds, the City must establish that its net operating income is equal to or greater than its debt coverage factor, typically 1.4, multiplied by the annual principal and interest due for all outstanding bonded indebtedness. Utility rates have to be set high enough to ensure revenue bond repayment.

## STORMWATER UTILITIES

RCW Chapter 35.67 allows the City to form a stormwater management utility, similar to those in place for the City's water and sewer systems, to provide for the planning, development, management, operation, maintenance, use, and improvement of the storm drainage system. A utility is an enterprise that is operated or regulated by a government entity. Enterprise funds are predominantly self-sustaining and account for the acquisition, operation, and maintenance of governmental facilities. Sample ordinances to form and establish rates for a stormwater utility are included in Appendix D.

It is recommended that a monthly utility rate be levied by the City upon all developed property within the City's boundary. These charges may provide revenue for the stormwater operation and maintenance expenditures, depreciation of existing facilities, and existing customer's share of capital improvements. If the City does establish a stormwater utility, it may also consider discussing stormwater maintenance costs along SR 17. Runoff along the portion of the state highway within City limits is currently managed by the City, though WSDOT owns the roadway itself. The City may be able to use its stormwater utility to recuperate maintenance and improvement costs for stormwater elements associated with SR 17 from WSDOT.

Most stormwater management utility fees are based on the impervious cover on a parcel of land because the amount of impervious cover is directly proportional to the volume of stormwater runoff from a given area. The methodology used to develop the recommended stormwater utility rate assumes that all single-family residential units are one ERU. An ERU is a measure of impervious surface; land covered by building, pavement, or another non-permeable surface. For the City of Soap Lake, a representative sample of impervious area for 40 randomly chosen residences shows an impervious surface coverage of 3,200 square feet. The number of residential ERUs is based on the number of sewer connections (802 as of 2016). The number of ERUs for properties other than single-family residences should be determined by dividing the amount of impervious surface, measured from the aerial maps, by 3,200 square feet of impervious area per ERU.

## CAPITAL IMPROVEMENT PLAN

The recommended capital improvements for the stormwater utility are detailed in Chapter 8. The list of projects, recommended schedule for implementation, their costs in 2019 dollars, and their costs adjusted for a 3 percent annual inflation factor for the year they are scheduled to be constructed are shown in Table 8-1.

## OPERATION AND MAINTENANCE AND EQUIPMENT PURCHASE

The annual stormwater operation and maintenance cost was developed in Chapter 7. The annual operation and maintenance cost was determined to be $25,000. Additionally, it is assumed that miscellaneous projects and repairs will cost $10,000 annually.

## SERVICE CHARGE DETERMINATION

The monthly service charge per ERU was determined by dividing the operation and maintenance costs and capital improvement expenses by the existing number of ERUs. The City's goal is to maintain a cash balance equal to 6 months of operating expenses in the utility fund.

Capital improvement projects from Table 8-1 are funded from monthly service rates and/or a low-interest loan from the Department of Ecology Water Quality Combined Funding Program where necessary. Use of these low-interest loans may be financially favorable to self-financing as long as the interest costs of the loans are less than the interest that can be earned from reserve funds. An annual inflation rate of 3 percent is assumed for both rates and project costs. A growth rate of 0.5 percent is assumed.

## PRELIMINARY RATE ANALYSIS

The following scenarios of financing capital improvement projects (CIPs) were analyzed to determine the required monthly stormwater utility rate. The analysis assumed that CIP 1B is constructed instead of CIP 1A, as it is slightly more expensive and presents a more conservative analysis. CIP 2 is also included, as described in Chapter 8.

The scenarios varied based on source of financing and length of time for completion of the capital improvement plan. The detailed schedules for each scenario are included in Appendix C.

- **Scenario A –** All CIPs are paid in full by utility and all projects are complete by 2029. 2019 Monthly Service Charge – **$15.25/ERU**

- **Scenario B –** All CIPs are paid in full by utility and all projects are complete by 2039. 2019 Monthly Service Charge – **$10.75/ERU**

- **Scenario C –** All CIPs are paid in full by utility and all projects are complete by 2048. 2019 Monthly Service Charge – **$8.50/ERU**

- **Scenario D –** All CIPs are funded through the Department of Ecology Water Quality Combined Funding Program loan for 10-year terms and all projects are complete by 2029. 2019 Monthly Service Charge – **$11.50/ERU**

- **Scenario E –** All CIPs are funded through the Department of Ecology Water Quality Combined Funding Program loan for 20-year terms and all projects are complete by 2029. 2019 Monthly Service Charge – **$8.50/ERU**

- **Scenario F –** All CIPs are funded through the Department of Ecology Water Quality Combined Funding Program loan for 30-year terms and all projects are complete by 2029. 2019 Monthly Service Charge – **$7.25/ERU**

All scenarios assumed a system development charge for new connections of $500 (2019 dollars).

Low-interest loan financing of these projects is not guaranteed. Revenue bond financing will have higher debt service and debt coverage requirements and a resulting higher rate impact. In this analysis, a portion of the City's revenue is obtained from growth-related revenue sources and increased service rate revenue. If the expected growth does not occur or if low-interest loan financing is not obtained, the City must find alternate sources of revenue or delay the completion of the capital improvement program.

## RECOMMENDATION

The City could implement a stormwater utility to fund the CIP plan presented in Chapter 8. Sample ordinances for the formation of a stormwater utility and the implementation of a monthly service charge are included in Appendix D.

In order to construct the proposed CIPs within 20 years, the City should collect a service charge of $8.50 per ERU per month, or $102 per ERU annually. The service charge will provide revenue for administration, operation and maintenance, and repair through capital improvement projects. If the City is able to secure loans for some or all of the projects, the construction schedule can be expedited, and it may be possible to construct the CIPs within 10 or 15 years. Additionally, grant funding may be available that would reduce the City's direct costs to implement the projects. It is assumed that the monthly service charge will be increased by 3 percent each year to keep up with inflation.

Along with the monthly charge, it is recommended that a system development charge be established for the stormwater utility. This charge should be placed in a capital reserve account and be used to finance stormwater improvements. Property owners will be responsible for the cost of physically connecting their property to the existing stormwater system including plan review and inspection fees. An initial system development charge at $500 per ERU is recommended.

The City should review the service charge and system development charge annually to compare actual expenses and growth rate with the assumptions outlined in this study.

Table 9-1 includes a schedule for implementation of the CIPs assuming an initial monthly service charge of $8.50 per ERU and a system development charge of $500, assuming both self-funding and loan funding. Appendix C includes the detailed financial analysis sheets for each scenario.

**TABLE 9-1**

**CIP Implementation Schedule**

| **Capital Improvement Projects** | **Year of Construction** | |
|---|---|---|
| | **Self-Funded Only (Scenario C)** | **20-Year Term Loan Funding (Scenario E)** |
| CIP 1B[1] – East Basin Bioretention Swales | 2041 | 2022 |
| CIP 2 – Central Outfall Bioswale and Infiltration Facility | 2048 | 2027 |

(1) CIP 1A is an alternative to this project and is not included in the financial analysis.