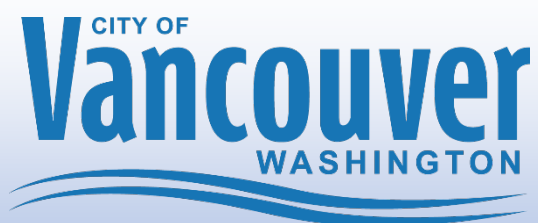


Stormwater Management Action Plan

March 2023



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Table of Contents

1.0 Background	6
1.1 Stormwater Management Action Plan	6
1.2 Receiving Water Assessment	6
1.3 Community Survey	6
1.4 Receiving Water Prioritization Process	7
2.0 Middle Burnt Bridge Creek	7
2.1 Retro-fit needs	7
2.1.1 Background	7
2.1.2 Anticipated Retrofit Considerations	7
2.1.3 Community Survey Results	11
2.1.4 Applicable BMPs	11
2.2 Land Management and Development Strategies	11
2.2.1 Land Use Overview	11
2.2.2 Special Wellhead Protection	12
2.2.3 Land Use and Development	14
3.0 NPDES Permit Needs	16
3.1 IDDE	16
3.2 Source Control Inspections	16
3.3 Operations and Maintenance	16
3.4 Public Education and Outreach Programs	19
4.0 Schedule and Budget Sources	19
4.1 Operating Funds	19
4.2 Capital Funds	20
4.3 Grant Funding	20
4.4 WSDOT Funding	20
5.0 Implementation Plan	21
5.1 Surface Water Capital Improvements/Structural Retrofits	21
5.2 Enhanced Operations and Maintenance	21
5.3 Source Control Inspection Goals and Progress Points	22

TABLE OF CONTENTS

5.4 Citywide Interdepartmental Coordination 22

 5.4.1 Water Resource Education Center 22

 5.4.2 Urban Forestry 22

5.5 Implementation 23

Abbreviations and Acronyms

This list contains abbreviations and acronyms used frequently in this document. Other abbreviations and acronyms are used infrequently and defined only in the text.

Term	Definition
BMP	Best management practices
City	The City of Vancouver
CIP	Capital Improvement Program
CARA	Critical Aquifer Recharge Area
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
GIS	Geographic information system
GMA	Growth Management Act
IDDE	Illicit Discharge Detection and Elimination
Impervious	Surfaces that do not allow water to infiltrate.
LID	Low impact development
MS4	Municipal storm sewer system
NPDES	National Pollutant Discharge Elimination System
Permit	Western Washington Phase II Stormwater Permit
Pervious	Surfaces that do allow water to infiltrate.
RWA	Receiving Water Assessment
RWP	Receiving Water Prioritization
SMAP	Stormwater Management Action Planning
SWPA	Special Wellhead Protection Area
WRPO	Water Resources Protection Ordinance
WREC	Water Resources Education Center
WSDOT	Washington State Department of Transportation

Secondary Permittee	Public entities that own or operate a stormwater sewer system located in Phase I or Phase II City or County.
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List of Figures

Figure 1.2: Burnt Bridge Creek Basin Map.....	6
Figure 2.1.2a: High Traffic Corridors Map.....	9
Figure 2.1.2b: City Treatment Facility Heatmap.....	10
Figure 2.2.2a: Special Wellhead Protection Area Map	13
Figure 2.2.2b: Land Use and Environmental Impact Map	15
Figure 3.3: City Owned Catch Basin Map.....	18

List of Tables

Table 2.1.2: Existing Infrastructure with Potential BMP Parameters	8
Table 2.2.1: Land Use and Habitat with Potential BMP Parameters	12

1.0 Background

1.1 Stormwater Management Action Plan

The City of Vancouver (City) is classified as a stormwater National Pollutant Discharge Elimination System (NPDES) Phase II permittee. As a condition of the Permit, the City is required to complete a citywide evaluation of the watersheds within this jurisdiction. This evaluation process will help in developing a Stormwater Management Action Plan (SMAP) for one high-priority catchment area by March 31, 2023, following Ecology Guidance (2019), section S5.C.1.d. The SMAP process is a planning approach that emphasizes the protection of designated uses and improvements to receiving water quality. The SMAP process will identify a catchment area that would benefit the most through strategic retrofits, land management strategies, and stormwater management planning (SWMP) enhancements.

1.2 Receiving Water Assessment

The first phase of the SMAP process, the Receiving Water Assessment (RWA), was completed in August 2022. The RWA delineated the City's watersheds, identified receiving waters, gathered data to assess receiving water conditions, and evaluated the stormwater management influence. The City concluded through the RWA process that of the five watersheds evaluated, stormwater runoff into the Burnt Bridge Creek (BBC) watershed has a significant influence on receiving waters.

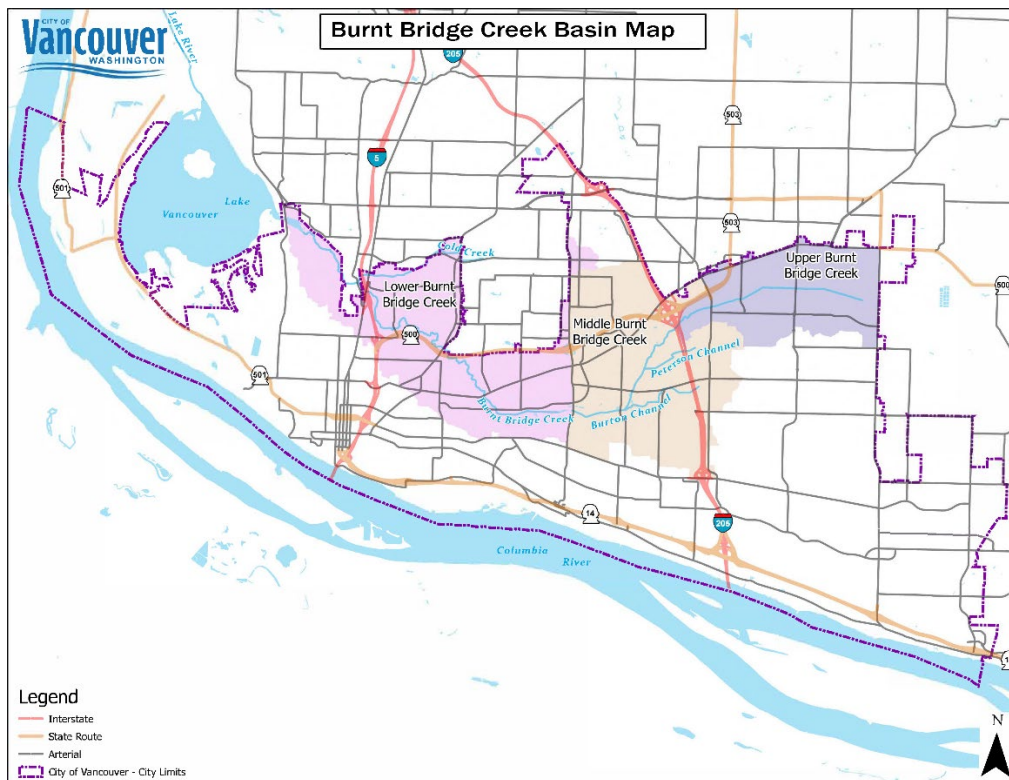


Figure 1.2 : Delineated basin map of Burnt Bridge Creek.

1.3 Community Outreach Survey

The City conducted an online outreach survey to gather information from the public from December 2022 through January 2023. The outreach survey was comprised of three questions: what their general use of BBC includes, factors that they think impact BBC's water quality, and what strategies they believe

could improve the creek's water quality. The results of the survey were compiled and utilized for the final SMAP assessment.

1.4 Receiving Water Prioritization

The second phase of the SMAP process, the Receiving Water Prioritization (RWP), was completed in December 2022. The RWP process evaluated each respective basin within the BBC Watershed to prioritize one target basin to be the central focus of the final SMAP. Ranking criteria such as land use, habitat, and basin infrastructure was used to develop an aggregate scoring for each basin. The basin with the highest aggregate score indicated which basin would likely provide the most benefit to receiving water quality from the SMAP process. The City concluded through the RWP evaluation, that of the four basins within Burnt Bridge Creek Watershed, that the Middle basin would be selected for the final phase of the SMAP process.

2.0 Middle Burnt Bridge Creek

2.1 Retrofit Needs

2.1.1 Background

The Middle Burnt Bridge Creek basin is located between NE Andresen Road on the west and Interstate 205 (I-205) on the east. After leaving the Upper basin, the stream flows through a culvert under I-205, flows through the Royal Oaks Country Club golf course and continues west where it picks up flow from two small tributaries. Peterson Channel carries surface water runoff, shallow groundwater, and is supplemented by the discharge of non-contact cooling water from an industrial facility. It enters the mainstem of Burnt Bridge Creek directly south of the Royal Oaks Country Club golf course. Burton Channel also originates near commercial and multi-family properties and carries shallow groundwater and precipitation runoff through a primarily residential area before entering Burnt Bridge Creek at Meadowbrook Marsh south of Burton Road. Both tributaries originate east of I-205 and cross under the freeway before their confluence with the creek.

The stream continues west through mixed residential and open spaces, including the central portion of the expansive Burnt Bridge Creek Greenway Restoration Project, which has been improved with native vegetation, reconnected floodplains, stormwater ponds, and a regional trail system. The project basin boundary between Middle and Lower basins effectively divides the Greenway open spaces between the two basins.

2.1.2 Anticipated Retrofit Considerations

The criteria for evaluating BMP retrofit opportunities was based on the data that was already derived during the RWP. Table 2.1.2 and Table 2.2.1 indicates the highest scoring values for the selected basin during the RWP assessment. The total area within City jurisdiction, land use within the basin (Figure 2.2.2b), and the total number of public treatment facilities (Figure 2.1.2b) provide a scope of potential areas of focus during the Capital Improvement Project (CIP) process. This process includes both opportunistic (6-year CIP) and strategic (20-year CIP) retrofits.

The City's MS4 permit covers a majority of the selected basin and the entire corridor that surrounds this section of the receiving water. A northern portion of the basin is covered by the Clark County MS4 permit, and the major state roadways in this section of the basin are managed under the

Washington Department of Transportation (WSDOT) Stormwater Permit. Roadway corridors, especially those with high traffic volume, contain impervious surfaces that are associated with increased levels of pollutants, such as suspended solids and heavy metals (Schmidt and Michaud, 2020). Middle Burnt Bridge Creek contains the highest concentration of high traffic corridors in the assessment and therefore would benefit the most from roadway retrofit projects (figure 2.1.2a). Retrofit projects directed towards traffic corridors could utilize mechanical treatment and bioretention facilities designed to filter suspended solids and heavy metals.

In 2022, City of Vancouver contracted with Parametrix to conduct an outfall impact assessment study for the Burnt Bridge Creek Watershed. The assessment study developed a scoring system that prioritized outfalls and catchment areas for water quality improvement projects. Outfall and catchment areas that scored the lowest for current water quality were then evaluated for five future development and redevelopment scenarios. The considerations for each potential scenario include:

1. Build out of parcels- All vacant and underutilized land will be developed in the future.
2. Build out of underutilized- All underutilized land will be developed for the future, while vacant lands will not.
3. Build out of vacant lands- All vacant land will be developed in the future, while underutilized land will not.
4. Road retrofits- All roads will be updated to meet current flow control and water quality standards.
5. Forest preservation- Forested lands will be preserved for conservation and will not be built out.

Existing infrastructure identified through this study in the Middle Burnt Bridge Creek basin include:

Existing Infrastructure with Potential BMP Parameters				
Basin	High Traffic Corridor	Outfalls	Private Treatment Facilities	Public Treatment Facilities
	Miles	Total Number	Total Number	Total Number
Middle BBC	41.7	51	318	90

Table 2.1.2 : Existing infrastructure of Middle Bridge Creek with potential BMP parameters.



High Traffic Corridors

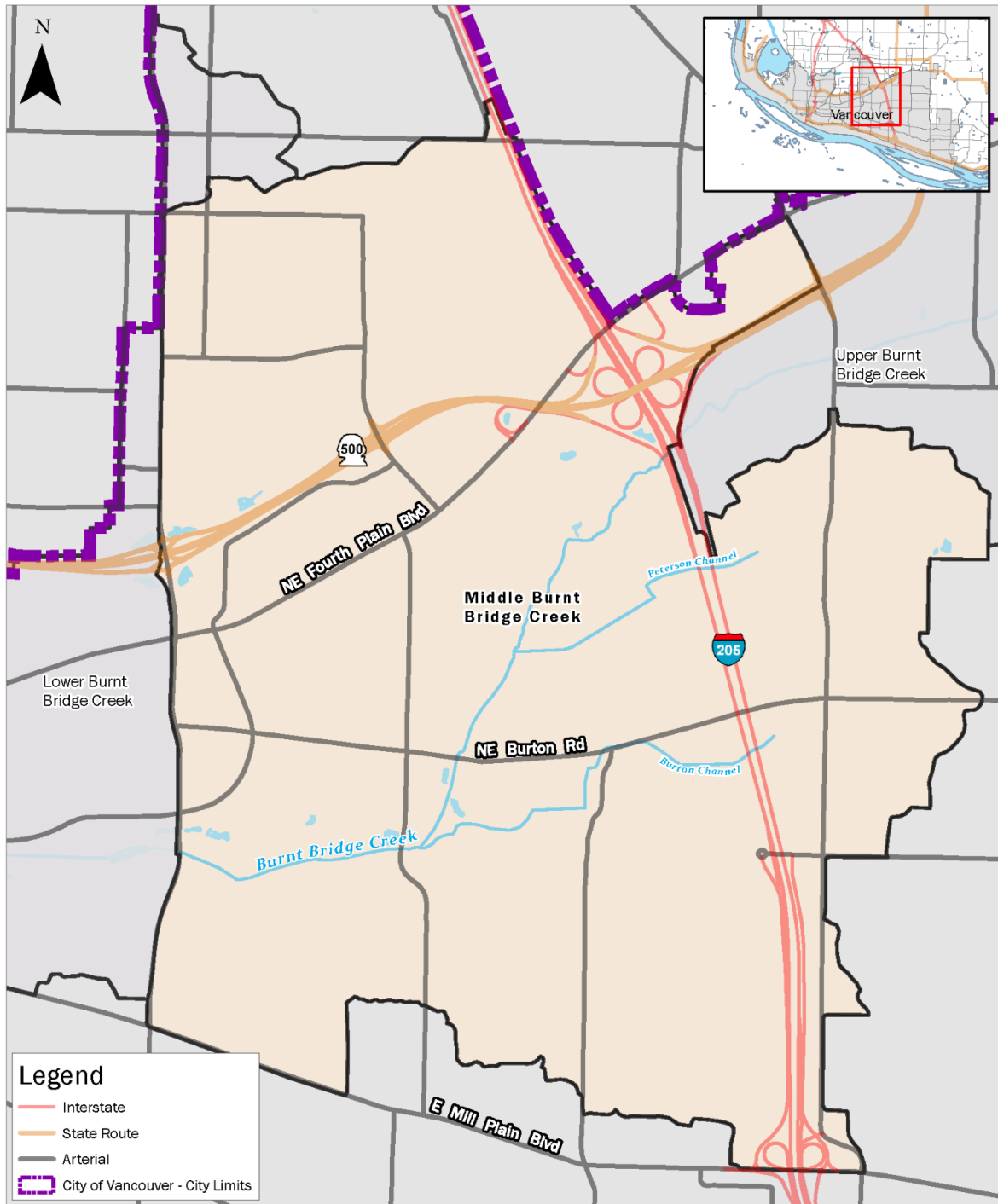


Figure 2.1.2a : High traffic corridors within Middle Burnt Bridge Creek



City Treatment Facility Heatmap and Outfall Location

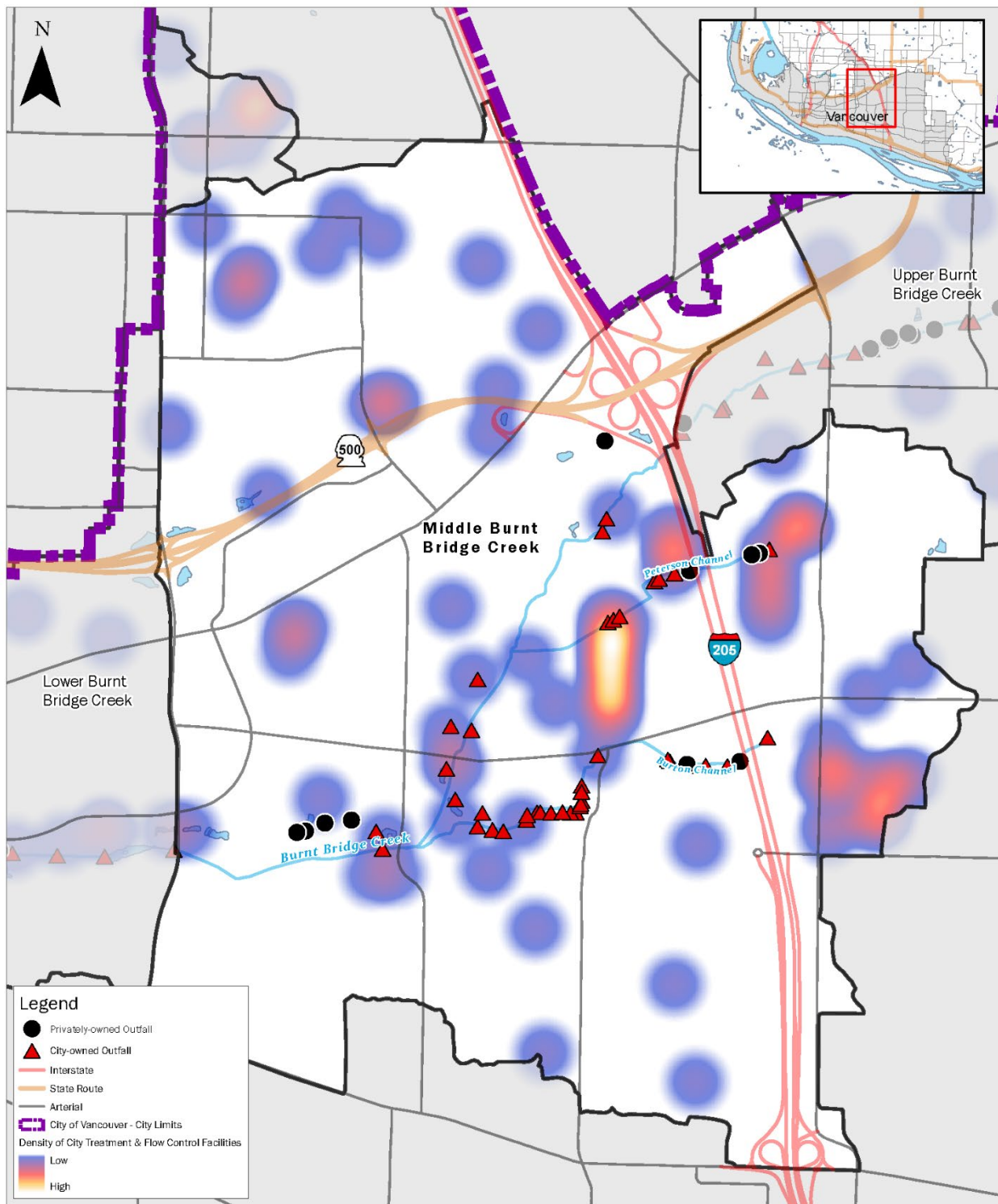


Figure 2.1.2b : City-owned treatment facility heatmap for Middle Burnt Bridge Creek.

2.1.3 Community Survey Results

In December of 2022, the City conducted an online public outreach survey. This survey was directed to gain public input of overall water quality in the Burnt Bridge Creek Watershed and the strategies or improvements that could be implemented. The results of this survey revealed that responders identified urban runoff and pesticides/fertilizers as the leading contributors to the impairment of the creek's water quality. Public responses also indicated a preference for implementing preservation strategies such as increasing tree canopy and constructing BMP retrofits to improve the stormwater quality along existing streets. Public feedback from this survey will be utilized for both strategic and opportunistic project planning during the SMAP process.

2.1.4 Applicable BMPs

Based on all currently available data, the following BMPs are considered the most feasible for implementation within the selected basin as part of the SMAP process:

1. Replacement of existing catch basins with treatment catch basins to provide basic treatment.
2. Retrofit of existing treatment facilities to provide enhanced treatment where possible.
3. Priority tree planting through City of Vancouver Urban Forestry.
4. Increased street sweeping in high traffic corridors and areas of high sediment loading.
5. Focused community outreach and education events.

It is likely that this list will evolve as the SMAP is actively updated and specific project locations are identified through additional studies and design work. Projects will be selected to maximize return on investment and provide treatment to the greatest area possible. Redevelopment of private property will include water quality treatment to meet current standards and provide additional treatment for stormwater runoff within this basin.

2.2 Land Management and Development Strategies

2.2.1 Land Use Overview

The Vancouver Comprehensive Plan provides the overall long-term vision and policy direction for managing the built and natural environment in Vancouver. The plan relates to growth and development, environmentally sensitive areas, historic places, and public services. The Plan is implemented through standards established in the Vancouver Municipal Code (VMC).

Chapter 20 of the VMC contains the Vancouver Zoning Code, which includes specific direction for implementing development standards. The Plan and code also contain maps designating the types of uses allowed on individual properties citywide. The Comprehensive Plan is updated as frequently as once per year under state law and provides an opportunity for property owners to request zoning designation changes.

Specific types of land use currently planned and permitted within selected basin have been identified through this assessment. It is anticipated that priority basins will be further evaluated to

determine the benefit of updating permitted land uses as an active management strategy for the SMAP.

Table 2.2.1 below provides specific information on existing land uses within this basin.

Land Use and Habitat with Potential BMP Parameters				
Basin	Basin Area within COV Jurisdiction	Priority Habitat and Wetlands	Special Wellhead Protection Area	Zoning and High-Priority Land Use
	Total Percent	Percent of Basin	Percent of Basin	Percent of Basin
Middle BBC	95	14	14.21	47.66

Table 2.2.1 : Land Use and Habit of Middle Bridge Creek with potential BMP parameters.

2.2.2 Special Wellhead Protection

The City of Vancouver’s drinking water source is the Troutdale Aquifer which is a sole-source aquifer that underlies a majority of Clark County. In order to protect the drinking water supply, the entirety of the City is designated as a Critical Aquifer Recharge Area (CARA). Requirements of the CARA are actively implemented through the City’s General Requirements, Operational BMP’s, Structural BMP’s, and VMC 14.26- the Water Resources Protection Ordinance (WRPO). In addition, Special Wellhead Protection Areas (SWPA) within the CARA, (Figure 2.2.2a) are designated at a 1900’ radius from the center of all drinking water wellfields for greater standards of pollution prevention.

Of the basins evaluated for the SMAP, the selected basin has the highest percent of basin area zoned for wellhead protection. Targeted BMP retrofits will provide additional benefit by reducing risk to groundwater and surface water from pollutant sources.



Special Wellhead Protection Zones

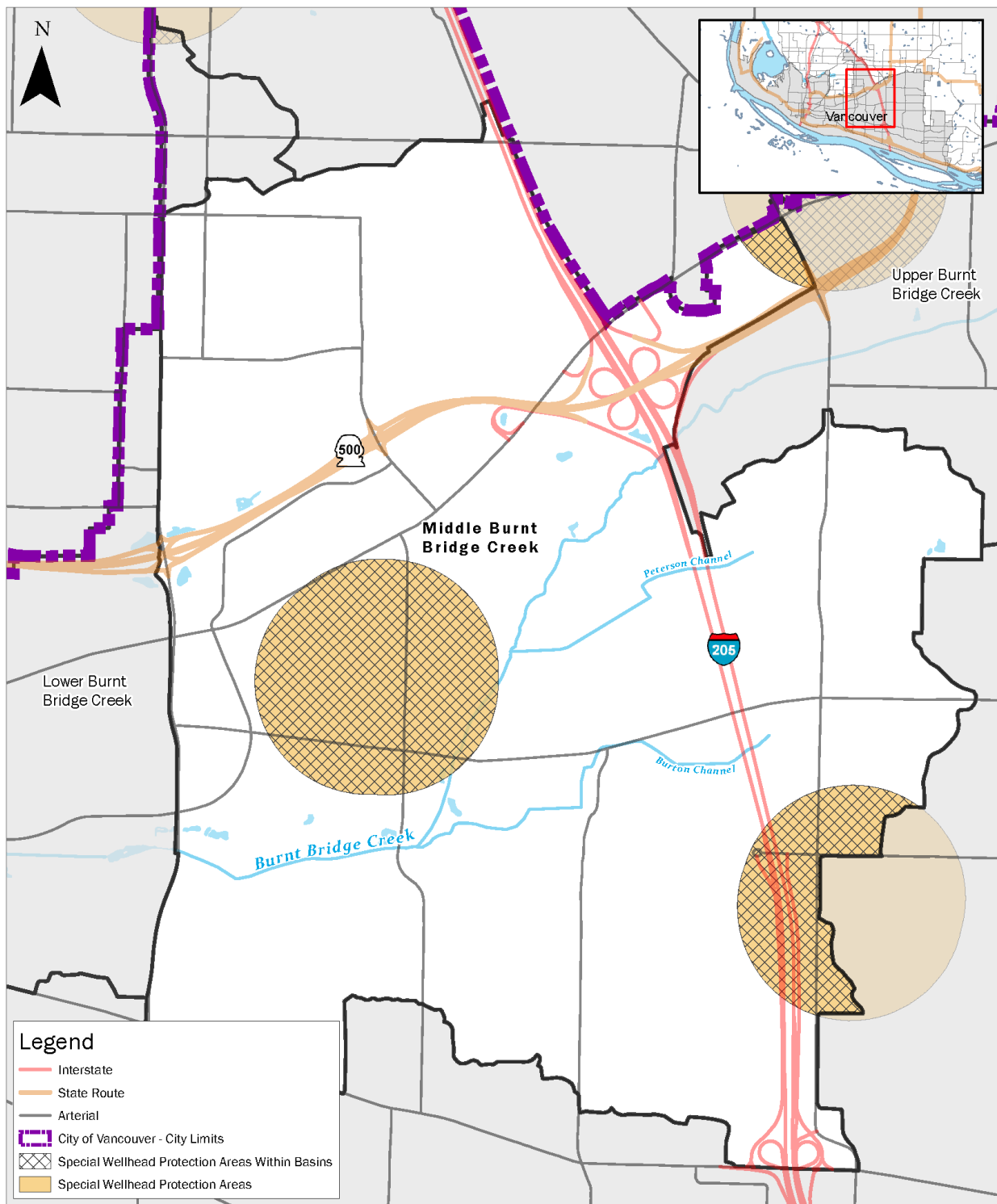


Figure 2.2.2a : Special wellhead protection zones for Middle Burnt Bridge Creek

2.2.3 Land Use and Development

As described above, land uses and development are guided by the City of Vancouver Comprehensive Plan. Additional protections are directed through the Shoreline Master Program and the Critical Areas Ordinance which regulate development within sensitive habitat resources, wetlands, floodplains, aquifer recharge areas and geologic hazard areas to protect shoreline and habitat functions.

Development within $\frac{1}{4}$ mile of Burnt Bridge Creek (including adjacent basins) is restricted but property owners may petition for a zoning change which, if approved, may be revised through the annual update to the City's Comprehensive Plan. Changes to the Comprehensive Plan include review of allowed land uses and potential impacts to catchment areas that have direct discharge or outfalls.

High-priority land uses that can impact water quality consist of Commercial, Industrial, and High-Density Residential. The percent of special protection and high priority land use in the basin has been calculated for Middle Burnt Bridge Creek (Table 2.2.1). Utilizing GIS mapping, the location of known wetlands, high-priority land uses and priority habitats has been delineated and is shown on Figure 2.2.2b below.



Land Use and Environmental Impact

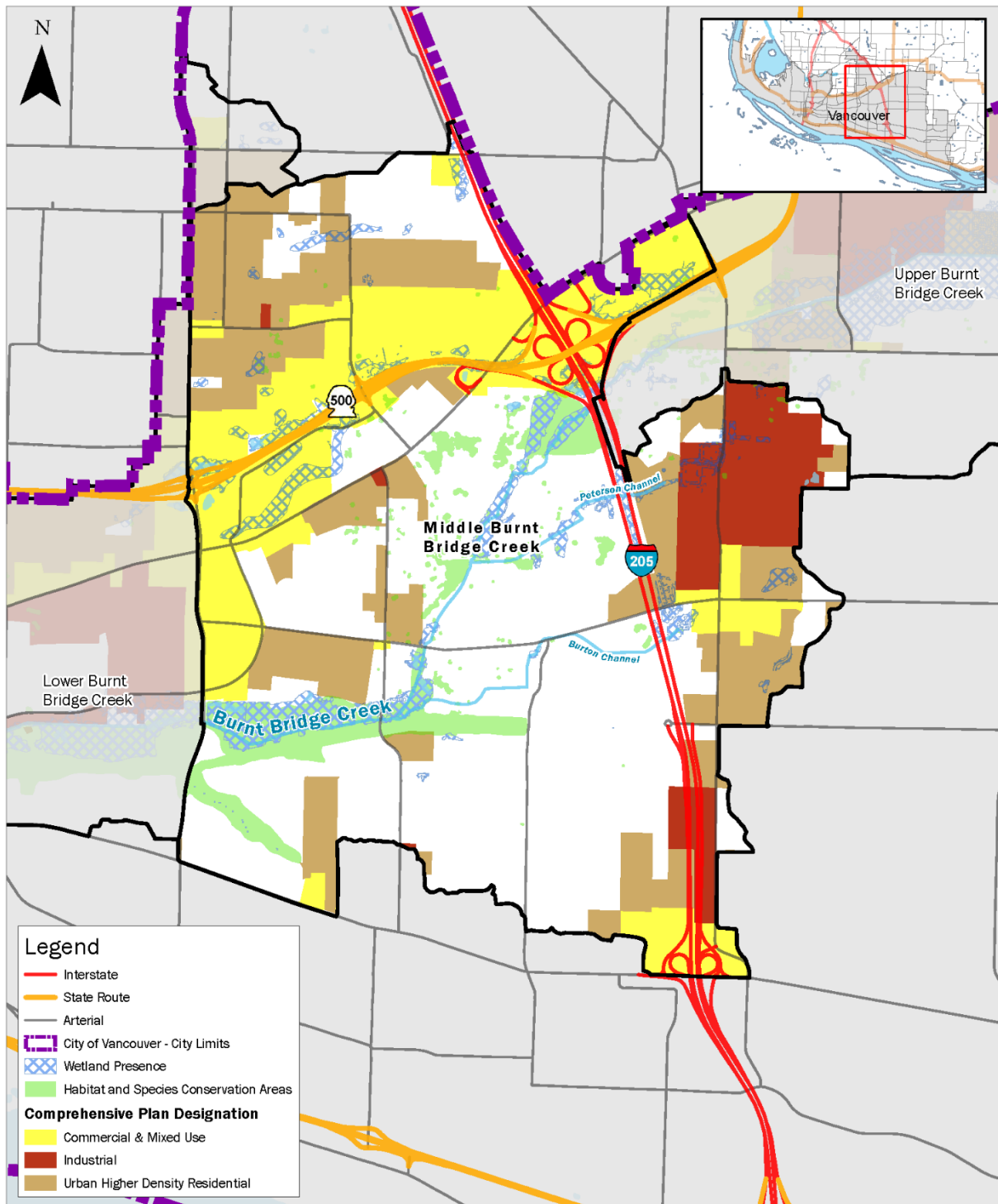


Figure 2.2.2b : Land use and habitat species conservation areas for Middle Burnt Bridge Creek.

3.0 NPDES Permit Needs

The current Western Washington Phase II Stormwater Permit (Permit) is effective August 1, 2019, through July 31, 2024. This Permit, issued by the Washington State Department of Ecology (Ecology) allows the City to discharge stormwater runoff into waters of the state. It requires that local governments manage and control runoff into their municipal separate stormwater system (MS4) so that it does not pollute downstream waters. The City of Vancouver is classified as a stormwater National Pollutant Discharge Elimination System (NPDES) Phase II permittee. As a condition of the Permit, the City is required to complete a citywide evaluation of the watersheds within this jurisdiction. This evaluation process has guided the development of a Stormwater Management Action Plan (SMAP) for one high-priority catchment area.

Key program elements that support SMAP implementation to protect and improve water quality include Illicit discharge detection and elimination (IDDE), source control business inspections, operations and maintenance procedures, and public education.

3.1 Illicit Discharge Detection and Elimination (IDDE)

The City's IDDE program was developed to identify and eliminate sources of illegal or unauthorized (not permitted) discharges of pollutants into the MS4 system. Illicit discharges along the Middle Burnt Bridge Creek corridor come from a variety of land use types including industrial and commercial facilities, agricultural activity, parks and public trails, and residential areas. The program promotes public awareness by providing education about the negative impact of illicit discharges, how to identify them, and properly report suspected violations. Encouraging community participation in protecting water quality promotes a culture of environmental responsibility, both internally and externally. Per permit requirements, City Operations staff also conducts field inspections to visually inspect for illicit discharges at all known MS4 outfalls and discharge points.

3.2 Source Control Inspections

Another component that goes hand in hand with the City's IDDE program is the inspection of businesses to identify materials or activities that could possibly discharge sediments, chemicals, and/or debris into the MS4 system. Between 2020 and 2021, the City conducted windshield surveys and identified approximately 4,000 businesses city-wide that could benefit from education and awareness about implementing BMPs, spill preparedness and prevention, and control measures that would help them prevent pollution at the source. These prioritized inspections inform business owners that regulatory agencies are taking proactive measures to prevent or minimize stormwater pollution from reaching receiving bodies of water.

3.3 Operations and Maintenance (O&M)

Proper operations and maintenance procedures are essential in the effective management of stormwater as they ensure the systems are functioning as intended. These routine assessments of facilities such as detention ponds, swales, infiltration systems, conveyance systems, culverts, pipes, and catch basins confirm that they are properly capturing and treating stormwater runoff. Another goal of regular maintenance is to prevent the deterioration of storm infrastructure which can extend the lifespan of the system and reduce the need for rehabilitation or repairs.

Both private, and publicly owned facilities are designed to control and treat stormwater runoff, but they differ in ownership and management responsibilities. In both cases, mechanical treatment and LID facilities are utilized. Mechanical treatment is designed to capture the storm runoff and remove sediment and debris by using settling chambers or screens. This is encouraged in high-traffic pollutant-loading corridors with many impervious surfaces. LID facilities are designed to mimic the natural hydrology of the site and encourage infiltration. These facilities range from rain gardens to permeable pavement. Both strategies are expected to be used to manage stormwater in the selected basin of the receiving water.



City Owned Catch Basin Map

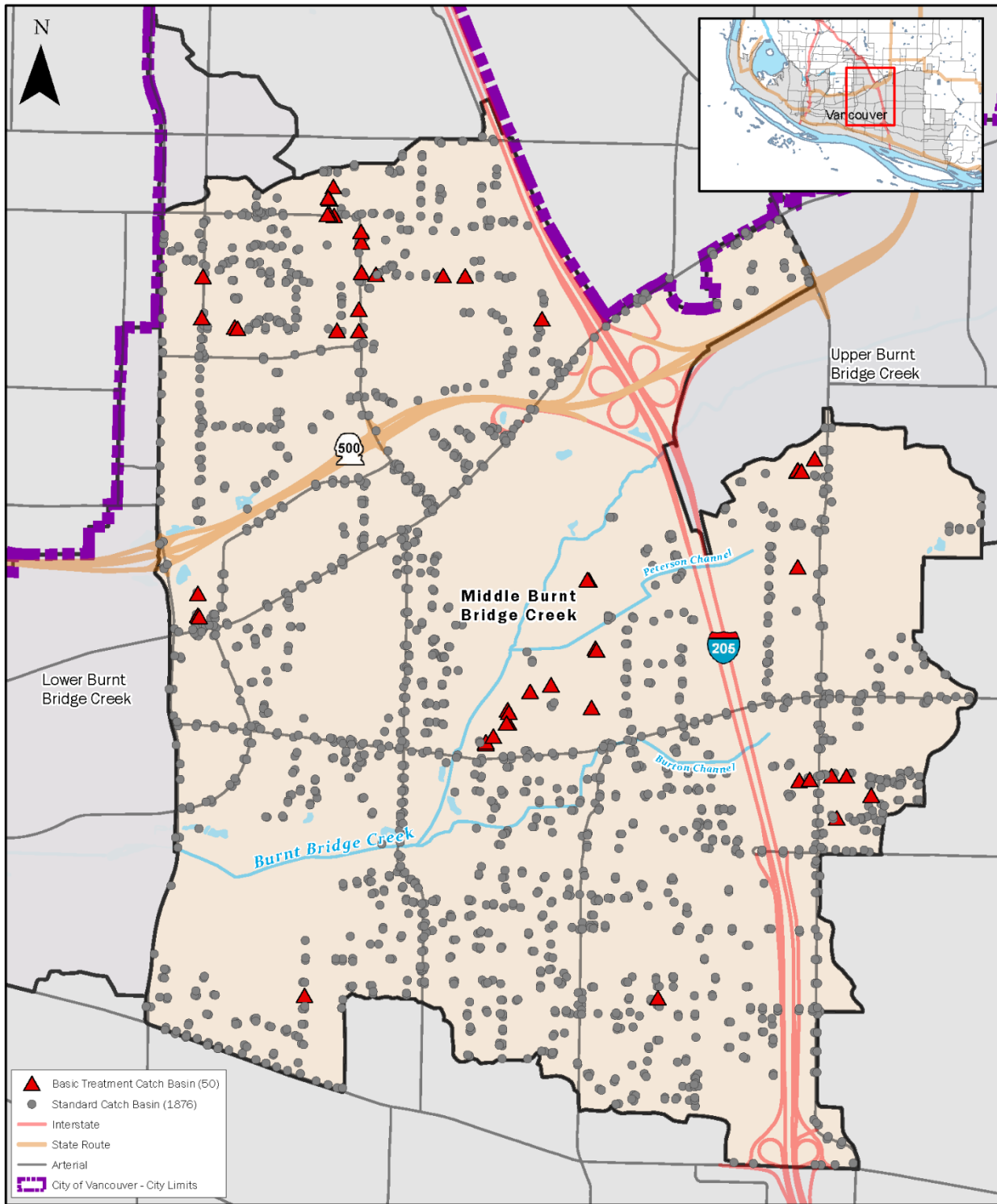


Figure 3.3 : City owned catch basins within Middle Burnt Bridge Creek

3.4 Public Education and Outreach Programs

The City has several ongoing outreach programs implemented through the Water Resources Education Center (WREC) and Urban Forestry. These programs are designed to educate individuals and communities about protecting water resources and promote behaviors that can reduce stormwater runoff and pollution. By providing this information to homeowners, landscapers, and property managers, they can learn simple steps that can be taken to protect water quality.

Urban Forestry is actively engaged in managing and expanding tree canopy within the city. Trees are vital, long-term, low-cost components of Vancouver's green stormwater infrastructure. Trees absorb rain and prevent erosion to protect watershed health. Every tree planted in Vancouver is a step toward cleaner healthier watersheds. Planting and preserving trees, and investing in our green infrastructure, is the cheapest and easiest way to assist in managing stormwater and promoting community stewardship.

Vancouver manages stormwater with a comprehensive watershed approach. Increasing tree canopy cover in both riparian and upland areas throughout the city is key to reaching water quality goals. The Greenway Sensitive Lands Team's focus is on revegetation and restoration in the riparian areas, and Urban Forestry targets upland and developed areas. Stormwater runoff retained in the upland areas helps to reduce peak flows in the riparian corridors.

Tree canopy data shows that most neighborhoods in the selected basin have limited canopy cover. Urban Forestry is focusing efforts on these neighborhoods to ensure an equitable distribution of trees that will in turn reduce stormwater impacts in the watershed. These prioritized efforts will increase the ecosystem services and health benefits of trees to these communities. Overall, through these public and private partnerships, the City increases its connection with the community which is essential for providing long-term education and awareness about public works infrastructure.

4.0 Schedule and Funding Sources

The City of Vancouver Surface Water Management department is funded through the Stormwater Utility fees. Funding for potential actions as part of the SMAP will be broken into the following categories:

1. Operating Budget/Utility Funds
2. 6-year Capital Improvement Program
3. 20-year Capital Improvement Program

4.1 Operating Funds

The City Stormwater Utility is funded through a charge on all parcels within the City limits. The Stormwater budget is approved during the City's Biennial Budget process. This fund is responsible for providing continuous revenue to ensure compliance with the MS4 permit and operational needs. It is expected that the following items related to SMAP implementation will be funded through Operating Funds:

1. Increased Operations and Maintenance
2. Urban Forestry and Community Outreach
3. Small-scale studies and BMP Retrofits

4. Targeted Source Control Inspections
5. Code updates

4.2 Capital Funds

The Surface Water Management Capital Improvement Program (CIP) is reviewed on a bi-annual basis for both short and long-term capital needs.

Allocations to approved CIP projects are projected out based on the anticipated funding year and may include both Stormwater Utility funds (charged on all parcels), Grants, and General Fund allocations when available. It is anticipated that the following items related to SMAP implementation will be funded through the CIP:

1. Short-Term/Opportunistic BMP Retrofits
2. Long-Term/Master Planned BMP Retrofits
3. Coordinated Planning updates
4. Large Scale Studies and Retrofits or Corridor Improvements

Surface Water Management staff will prioritize both long and short-term retrofits that are determined feasible within the selected basin of the SMAP. The next CIP review is scheduled for early 2024, and the SMAP will be actively updated with a project list and schedule based on the availability of funding, staffing, and materials to complete the work.

4.3 Grant Funding

The City has a successful record of applying for and utilizing grant funding to conduct water quality monitoring, construct water quality BMPs, and conduct studies for future project areas. When possible, City staff will focus on the selected basin when applying for future grant funding opportunities to improve water quality. Agencies providing grant funding may include the WA Department of Ecology, EPA, and other local/state/federal opportunities.

4.4 WSDOT Funding

As approved in RCW 90.03.525, the City collects impact fees from the Washington State Department of Transportation (WSDOT). These fees are calculated annually based on the contributing area of WSDOT ROW and utility user fee rates from VMC 14.09.060. These fees, as approved by WSDOT, may be utilized to conduct water quality studies, and retrofit projects along WSDOT traffic corridors.

As shown in Figure 2.1.2a, WSDOT ROW within the selected basin includes both State Route 500 and Interstate 205. City staff intend to complete a delineation of all WSDOT runoff contributions to City stormwater systems and will prioritize potential projects within the selected basin that may benefit from these impact fees.

5.0 Implementation Plan

5.1 Surface Water Capital Improvements/Structural Retrofits

As stated above, additional structural retrofits to provide water quality treatment is an expected outcome of the SMAP. The Surface Water CIP has an ongoing process that evaluates City surface water infrastructure needs to provide a sustainable utility designed to protect public health and safety.

To date, CIP projects encompass locations citywide and are not limited to a specific area within the City. To ensure prioritization of projects within the basin selected for SMAP, Surface Water Management will need to conduct additional studies focused on Middle Burnt Bridge Creek.

The outcome of these studies will be a prioritized project list and include high-level cost estimates. This information will be utilized to request project funding through the CIP and apply for grant funding, as appropriate, for design and construction of water quality BMPs.

5.2 Enhanced Operations and Maintenance

Surface Water Management staff will continue to coordinate closely with Stormwater Operations staff to develop targeted O&M plans within the selected basin. Staff will review maintenance data from treatment and flow control facilities located within the selected basin. Targeted operations and maintenance items related to the SMAP include, but are not limited to:

1. Increased inspection of treatment and flow control facilities
2. Increased street sweeping
3. Retrofit of existing facilities

Targeted facility inspections will identify areas of concern, assess conditions with a holistic approach, evaluate the design capacity of the area, and help with prioritizing future retrofit needs. Increasing street sweeping helps with reducing pollutant runoff while achieving Ecology permit requirements.

Collaboration efforts between engineering departments and the City's operations and maintenance staff will increase efficiency and improve project design for cost-effective maintenance.

Where feasible, existing facilities may be retrofitted by City Stormwater Operations staff under the guidance of Surface Water Management engineering staff. Specific projects will include the retrofit of existing catch basins to provide treatment or the retrofit of existing treatment facilities to meet current standards. These internal retrofit projects, while opportunistic in nature, will also provide additional technical expertise to City staff regarding maintenance cycles and reconstruction. This knowledge will be a key driver in future code/standards changes to ensure BMP's constructed within the City are maintained at the highest level possible.

5.3 Source Control Inspection Goals and Progress Points

Prioritized source control inspections will play an important role in meeting pollution prevention and water quality goals. This program will help City staff identify potential sources of pollution before it reaches the MS4 system while providing positive education to home and business owners. The City's GIS team will make advances in technical support during the program as well by creating interactive dashboards to track the progress of ongoing inspections.

5.4 Citywide Interdepartmental Coordination

Continued interdepartmental coordination will help with achieving both long and short-term jurisdictional goals. Sharing technical expertise will optimize project planning by identifying the optimal allocation of resources to meet these goals. Where possible, Surface Water Management will focus efforts on the selected basin and encourage participation across city departments in SMAP implementation.

5.4.1 Water Resources Education Center

During the summer months, local scout groups and community members plan to walk along residential corridors within the Middle basin to install stormwater medallions. These metal medallions will be installed on sidewalks above catch basins and reinforce the message "Only Rain Down the Drain". The Center also has plans for two or three community nature walks along the BBC trail, where they will be providing education about stormwater impacts affecting the creek.

Surface Water Management will coordinate with WREC staff for future educational programs, such as exhibits within the Center focused on the Burnt Bridge Creek Watershed. A community wide approach, providing education through activities throughout the watershed, will allow WREC staff to reach a greater number of people living and working within Vancouver.

5.4.2 Urban Forestry

Urban Forestry coordinates educational workshops targeting property owners, homeowners, and landscapers to highlight how water quality and watershed health can be directly impacted by how they manage their landscapes. Participants learn how to select best management practices for their property to improve water quality, such as removing high-maintenance lawns, planting native trees and shrubs, using organic mulch and fertilizers, preserving existing trees, reducing pesticide use, and picking up pet waste. Urban Forestry also partners with local educational programs such as Friends of Trees and Fourth Plain Forward to canvass and send direct mailings to residential property owners. This combined effort provides technical assistance and promotes the importance of tree plantings for managing stormwater.

Parks, Recreation & Cultural Services is leading a coordinated effort with Urban Forestry to kick off a pilot program called "Naturespaces". This program is geared towards bringing the community together to participate in restoration and enhancement projects at selected sites in the park system throughout the City.

These outreach programs educate home and business owners alike on the positive effect of planting native vegetation to manage stormwater runoff and improve water quality. Technology that incorporates aerial imagery is also being utilized to evaluate impervious surfaces and vegetation gaps throughout the watershed. These tools provide a comprehensive view of the landscape and help with identifying areas of opportunity for planning restoration projects.

5.5 Implementation

Upon submittal of the SMAP to Ecology, Surface Water Management will begin the focused efforts stated in Section 5 above. The SMAP will be actively managed and to meet Permit requirements.